

A STUDY ON FUNCTIONING AND IMPACT OF FARMER PRODUCER ORGANISATIONS IN KARNATAKA

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M.Sc. (Ag.)

**DOCTOR OF PHILOSOPHY IN AGRICULTURE
(AGRICULTURAL EXTENSION)**



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A STUDY ON FUNCTIONING AND IMPACT OF FARMER PRODUCER ORGANISATIONS IN KARNATAKA

BY

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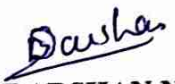
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2019

DECLARATION

I, **DARSHAN N. P.** hereby declare that the thesis entitled "**A STUDY ON FUNCTIONING AND IMPACT OF FARMER PRODUCER ORGANISATIONS IN KARNATAKA**" submitted to the **PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY** for the Degree of **Doctor of Philosophy in Agriculture** is the result of original research work done by me. I also declare that no material contained in the thesis has been published earlier in any manner.

Date: **22.05.2019**
Place: **Hyderabad**


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CERTIFICATE

Mr. **DARSHAN N. P.** has satisfactorily prosecuted the course of research and that the thesis entitled "**A STUDY ON FUNCTIONING AND IMPACT OF FARMER PRODUCER ORGANISATIONS IN KARNATAKA**" submitted, is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor part thereof has been previously submitted by him for a degree of any University.

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This is to certify that the thesis entitled "A STUDY ON FUNCTIONING AND IMPACT OF FARMER PRODUCER ORGANISATIONS IN KARNATAKA" submitted in partial fulfillment of the requirement for the degree of 'DOCTOR OF PHILOSOPHY IN AGRICULTURE' of the Professor Jayashankar Telangana State Agricultural University, Hyderabad, is a record of the *bonafide* original research work carried out by Mr. DARSHAN N. P. under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigation have been duly acknowledged by the author of the thesis

Thesis approved by the Student's Advisory Committee.

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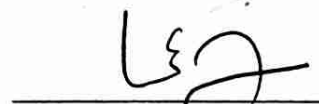
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LIST OF SYMBOLS AND ABBREVIATIONS

%	: Per cent
&	: And
₹	: Rupees
<	: Less than
>	: More than
AAO	: Assistant Agricultural Officer
ABA	: Agribusiness Accelerators
Ac	: Acre
ADA	: Assistant Director of Agriculture
AEO	: Agriculture Extension Officer
AGBM	: Annual General Body Meeting
ANGRAU	: Acharya N. G. Ranga Agricultural University
AO	: Agricultural Officer
AP	: Andhra Pradesh
APMC	: Agricultural Produce Market Committee
APPI	: Azim Premji Philanthropic Initiatives
ARS	: Agriculture Research Station
ATIC	: Agriculture Technology Information Center
BKPCL	: Balabheemasena Krushikara Producer Company Limited
BoD	: Board of Directors
BoM	: Board of Management
BSMCL	: Basaveshwara Souharda Multipurpose Cooperative Limited
CEO	: Chief Executive Officer
CIG	: Common Interest Groups
COA	: College of Agriculture
CWC	: Central Warehousing Corporation
DAS	: Days After Sowing
DCC bank	: District Cooperative Central Bank
DoA	: Department of Agriculture
e.g.	: for example, for instance
Et al.	: and other people
Etc.	: and so on
Exp (B)	: Exponential of B
F	: Frequency
FAO	: Food and Agriculture Organization

FC	: Farmers Clubs
FFS	: Farmers Field School
FIG	: Farmer Interest Groups
Fig	: Figure
FO	: Farmer Organization
FWWB	: Friends of Women's World Banking
FYM	: Farm yard manure
GDP	: Gross Domestic Product
gm	: Gram
ha	: Hectare
i. e.	: That is
ICAR	: Indian Council of Agriculture Research
ICRISAT	: International Crops Research Institute for Semi-Arid Tropics
ID	: Identification
IFAD	: International Fund for Agricultural Development
IFFCO	: Indian Farmer Fertilizers Cooperative Limited
INM	: Integrated Nutrient Management
IPM	: Integrated Pest Management
ISAP	: Indian Society of Agri-Business Professionals
ITD	: Innovation in Technology Dissemination
IQV	: Index of qualitative variation
IWM	: Integrated Weed Management
JKSMCL	: Jai Kisan Souharda Multipurpose Cooperative Limited
JLG	: Joint Liability Groups
Kg	: Kilograms
Km	: Kilometers
KVK	: Krishi Vigyan Kendra
Lit	: Liter
MFI	: Micro-Finance Institutions
MYRADA	: Mysore Resettlement and Development Agency
NABARD	: National Bank for Agricultural and Rural Development
NATP	: National Agricultural Technology Project
NBFC	: Non-Banking Finance Company
NCDEX	: National Commodity and Derivatives Exchange Limited
NCF	: National Commission on Farmers
NGO	: Non-Government Organization
NKPCL	: Nisarga Krushikara Producer Company Limited

NSKE	: Neem Seed Kernel Extract
NSSO	: National Sample Survey Organization
PACS	: Primary Agriculture Co-operative Society
PC	: Producer Companies
PJTSAU	: Prof. Jayashankar Telangana State Agricultural University
PKGB	: Pragati Krishi Grameena Bank
PO	: Producer Organisations
PRI	: Panchayat Raj Institutions
R	: Correlation coefficient
RARS	: Regional Agriculture Research Station
RKPCL	: Rohini Krushikara Producer Company Limited
ROC	: Receiver Operating Characteristic
RRBs	: Regional Rural Banks
RSK	: Raitha Samparka Kendras
SAU	: State Agricultural University
SEWA	: Self-Employed Women's Association
SFAC	: Small Farmers Agribusiness Consortium
SHGs	: Self Help Groups
Sl. No	: Serial Number
SWC	: State Warehousing Corporation
TTC	: Trainers Training Centre
TV	: Television
UHS	: University of Horticultural Sciences
Viz.	: Namely
VLRC	: Vrutti Livelihood Resource Center
Vs.	: Against
WASSAN	: Watershed Support Services and Activities Network
WMS	: Weighted mean score
$\overline{X}$	: Arithmetic mean

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ABSTRACT

The present study was conducted in Bidar and Kalaburagi districts of Karnataka state during 2017-18 to analyse the functioning and impact of farmer producer organisations (FPOs) in terms of comparison of knowledge level and extent of adoption of red gram cultivation practices among members and non-members. The study also analysed the income generation aspects of respondents, network linkages of farmer producer organisations and the constraints and suggestions as perceived by the respondents.

The findings revealed that majority of the members and non-member belonged to medium age group (57.33 % and 59.33 % respectively) with intermediate level of education (35.33 % and 34.67 % respectively), belonged to general caste (46.00 % and 46.67 % respectively) had 5-8 members per family (56.67 % and 68.67 % respectively), had medium (30.00 %) and semi-medium (60.67 %) farm size, medium farm mechanization status (56.00 % and 48.00 % respectively), medium (62.67 %) and high (49.33 %) level of income, medium (34.00 %) and high (58.00 %) level of indebtedness. They also had high (50.67 %) and medium (56.00 %) level of participation, medium level of information seeking behaviour (40.67 % and 44.67 % respectively), medium level of leadership ability (37.33 % and 54.00 % respectively), medium (40.00 %) and low (54.67 %) level of capacity building, medium (36.67 %) and low (48.67 %) risk orientation, high (42.67 %) and low (54.67 %) innovativeness, medium (44.00 %) and low (72.67 %) level of achievement motivation, medium level of self-confidence (41.33 % and 76.00 % respectively), medium (47.33 %) and low (46.67 %) level of communication behaviour and medium (42.00 %) and low (48.67 %) level of decision making power.

Findings with respect to formation revealed that except Jai Kisan Souharda Multipurpose Cooperative Limited (JKSMCL), all the FPOs were registered in 2013. FPOs under Vrutti Livelihood Resource Centre (VLRC) had five villages each whereas ten villages were clustered under FPOs of Indian Society of Agribusiness Professionals (ISAP). 61.02 per cent of board of directors faced problems in convincing farmers during formation. Majority of members enrolled into FPOs to get remunerative price for

their crop to produce, however, due to the high membership fee, the majority of non-members (6.43 %) show reluctance in joining FPOs. Members under VLRC and ISAP had a high level of training (77.78 % and 86.67 % respectively). With respect to functional aspects, FPOs under VLRC and ISAP had medium level of supportive environment (51.11 % and 51.67 % respectively), high and medium level of cohesiveness (46.67 % and 60.00 % respectively), medium level of role differentiation (50.00 % and 71.67 % respectively), high and medium level of group leadership (44.44 % and 58.33 % respectively), medium level of communication (57.78 and 45.00 % respectively), medium level of group sustainability (56.67 % and 51.67 % respectively), low critical issues (63.33 % and 50.00 % respectively) and medium level of team spirit (50.00 % and 45.00 % respectively).

With respect to the level of knowledge on red gram cultivation practices, the majority of the members and non-members had a high and medium level of knowledge (72.66 % and 61.33 % respectively). There was a significant difference in the knowledge levels of members and non-members. The variables such as age, secondary, intermediate and undergraduate levels of education, medium and high family size, low and high farm size, medium and high indebtedness, medium and high income, medium and high information seeking behavior, medium and high innovativeness of member farmers, medium and high supportive environment, medium and high group cohesiveness and medium and high group sustainability had influenced the gain/increase of knowledge of member farmers on red gram cultivation practices.

Majority of members and non-members had high (50.00 %) and medium (63.33 %) extent of adoption of red gram cultivation practices. There existed a significant difference between them. The variables such as low and medium age, low and medium family size, medium and high farm size, medium and high indebtedness, medium and high income, medium and high innovativeness, medium and high group cohesiveness, medium and high group sustainability and knowledge of the member farmers had influenced the increase of adoption of member farmers on red gram cultivation practices.

With respect to the cost of cultivation of red gram cultivation, the members had incurred 11.06 per cent lesser cost for red gram cultivation when compared to that of non-members and in case of returns they had gained 18.95 per cent returns when compared to non-numbers. There observed a significant difference between costs and returns of red gram cultivation between members and non-members. It was also noticed that if a non-member joins FPO, his/her returns will increase by 14 per cent.

Majority of members perceived that irregular procurement of produce and inadequate infrastructure facilities were the major technical constraints and non-uniform rotation of governing body followed by competition among villages for getting benefits were the major organisational constraints. In addition to that members also felt NGOs were focusing on resource-rich areas followed by they were showing profit motive were the constraints related to NGO support.

With respect to the technical constraints in red gram cultivation, both for members and non-members felt labor shortage as the major problem. But the non-members also felt a lack of technical guidance and costly inputs as the serious constraints. In case of marketing, members and non-members felt lack of assured procurement facilities and price fluctuations of produce as the major constraints respectively.

Major suggestions expressed by the members to overcome technical constraints in FPOs were the provision of regular procurement of their products every year and giving equal importance to every village for overcoming organisational constraint. They also

expressed that NGOs should give importance to all the areas irrespective of resource availability.

With respect to suggestions for overcoming technical constraints in red gram cultivation, respondents suggested for the provision of infrastructure facilities and inputs at subsidized rates. To overcome the marketing constraints of red gram cultivation, respondents suggested for the regular procurement, establishing organised supply chains in the non-FPO operated system.

Chapter I

INTRODUCTION

Agriculture is rightly said to be the backbone of the Indian economy as it contributes to 13.7 per cent of Gross Domestic Product (GDP) and provides employment to 58 per cent of population of our country. With the advent of the green revolution, there has been a significant four-fold increase in food grain production during the last five decades. The production trend has projected to a laudable state of self-sufficiency from a meager 51 million tonnes in 1950-51 to record production of 284.8 million tonnes of food grains by the end of 2018. This provides strong evidence for the fact that the Indian farmers are good producers.

However, the increase in agricultural production has not resulted in an increase in income of cultivators. In the present Indian context of rapid changes, the agricultural sector is facing severe challenges like declining per capita agricultural land availability (due to increased fragmentation of land holdings), declining natural resource base, increasing demand for land for non-agricultural purposes due to urbanisation and industrialisation, breaking of joint to nuclear families, disinterest or disenchantment of youth towards agriculture i.e. more than 40 per cent of rural youth want to quit farming, absence of a vibrant model to organise farmers and link with the market (NSSO, 2011). According to the agriculture census 2015-16, 86.21 per cent of Indian farmers come under the small and marginal category. The per capita agricultural land availability in India, at present, is 0.13 ha.

Problems faced by Indian small farmers are multi-fold. They produce fruits and vegetables in rural areas but they are highly demanded and highly priced in urban areas. For this, they need to sell the produce in cities but unfortunately, rural India lacks transportation facilities and storage facilities which would otherwise have helped farmers to store their perishable produce for a longer time period and sell it at a later time when the market prices are favourable. More than 45 per cent of fruits and vegetables and 30 per cent cereals are wasted due to lack of storage and processing facilities. Post-harvest losses of food grains in India account to 10 per cent of total production, i.e. 20 million tonnes which is equivalent to the total annual food grains production of Australia. (TACSA Report on Secondary Agriculture, 2013). Processing and value-addition can secure better prices for the farmers' produce but the farmers lack the needed amount of money and infrastructure required for processing. Access to the latest information and

technology and recent market trends and prices are also not available to the farmers. This lands the farmers in a position of ignorance and low bargaining power, which makes them vulnerable to exploitation by middlemen. As a result of all this, the farmers suffer distress sale and ultimately, sell their produce at throwaway prices. This reveals the glaring fact that Indian farmers are poor marketers. They do not get remunerative prices for their produce. The share of the producer in consumer's rupee, at present, is 10 to 23 per cent only in India against a remarkable 64 to 81 per cent in developed countries (FAO, 2013). Another emerging challenge before the small scale farmers is the present trend of globalisation and liberalisation. This has further complicated the situation by throwing small-scale producers to fight large commercial producers from all around the world. Thus, fragmented and dispersed in remote areas, small producers face a number of challenges which cannot be tackled individually.

Traditional agriculture will not be able to sustain the farmer's interest. In this context, if agriculture has to survive, we have to explore ways and means to make it more profitable (increase income obtained per unit of time & land), and more employment opportunities in agriculture need to be created. In this modern era of cut-throat competition, agriculture will be only successful if it will move from culture (a way of life) to a dynamic entity of agribusiness.

Research increasingly shows that smallholders would be able to substantially increase their incomes from agriculture and allied activities if they participate in markets. As a result, the focus of development has shifted from the enhancement of production to market connectivity. One of the potential alternatives for efficient marketing is mobilising farmers for group action, for arranging inputs and collective marketing so as to benefit from economies of scale. Keeping this in mind, mobilisation of farmers into "Farmers' Organisations (FOs)" for group activities is very much imperative.

Farmers' organisations are groups of rural producers coming together to form organisations, in order to pursue specific common interests of their members developing technical and economic activities that benefit their members and maintaining relations with partners operating in their economic and institutional environment.

Farmers' organisations are essential institutions for the empowerment, poverty alleviation and advancement of farmers and the rural poor. (FAO, 2006).

NCF, 2006 stated that “FOs should be promoted to combine the advantages of decentralised production and centralised services, post-harvest management, value addition, and marketing.”

International Fund for Agricultural Development-2004 (IFAD) opined “In rural areas, FOs are the nearest and often, only institutions providing essential goods and services to the rural poor and helping them to break out from the poverty cycle. FOs reduces the risk - individual farmers face during seasonal shocks. FOs also helps to mobilise capital and contribute to the growth of the local economy.”

A Producer Organisation (PO) is a generic name that represents different forms of community organisations such as large cooperatives, Primary Agricultural Cooperative Societies (PACS), Self-Help Groups (SHGs), Federation of SHGs, Commodity Interest Groups (CIGs), Joint Liability Groups (JLGs), Farmers Club (FCs), and Producer Companies (PCs).

Farmers Organisations can take one of the many possible forms, like Farmer Interest Groups (FIG), CIGs, Cooperatives, SHGs, Farmers’ Associations, Producer Organisations, Federations, and Unions. Whatever be the form of the organisation, there are some characteristics which hold farmer organisations together – a common interest, mandatory membership, rules, regulations and discipline, adherence to quality standards in production and shared roles and responsibilities on a rotation basis.

The basic idea is that farmers’ organisations will strengthen the farmers’ negotiation position in relation to the buyers, reducing transaction costs and production risks faced by the farmers. This will bring farmers closer to the market, enable them to benefit from comparative advantages and maybe even to connect them to the international market. The purpose of establishing FOs is to internalise extension services for its members and provide backward linkages (input, credit, and technology) and forward linkages (production facilities, market and value addition).

Farmer organisations can be grouped into two types: one is the community-based and resource-orientated organisation; the other is the commodity-based and market-orientated organisation (Chamala, 1990). Community-based, resource-orientated FOs could be present at village level consists of more diversified clients in terms of crops and commodities. They focus on dealing with inputs needed by the members, to enhance the productivity of their businesses based on land, water, or animals. These organisations are

generally small, have well-defined geographical areas, and are predominantly concerned about inputs. These organisations can generate income from the sale of inputs and outputs. The income can be used back to spend on extension, data generation, business planning, and administration. Examples of such organisations are agriculture cooperative societies, farmers clubs, SHGs, FIGs, etc.

Whereas commodity-based, market-oriented FOs focus on a single commodity and choose for value-added products which have expanded markets. They are designated as output-dominated groups. Not specific to any single community, they can obtain members from among the regional growers of that commodity who are interested in investing some share capital to acquire the most recent processing technology and professional manpower. These FOs are generally not small and have to operate in a competitive environment. Research, input supply, extension, credit, collection of produce, processing, and marketing are all integrated to maximise the returns on the investments of the members who invested in the collective enterprise. Some of such organisations are Anand milk and other dairy FOs, jackfruit growers association, grape growers association, onion growers association, etc.

At present, there have been an increasing number of attempts to organise farmers in India. Agriculture Technology Management Agency (ATMA) organises farmers into groups (FIGs and CIGs), Innovation in Technology Dissemination (ITD) and National Agricultural Technology Project (NATP) evaluated success stories and tried replicating the models, Non-Governmental Organisations (NGOs) and Panchayat Raj Institutions (PRIs) organise farmers groups, National Bank for Agricultural and Rural Development (NABARD) organises farmers into SHGs and farmers clubs, line departments form producer groups through different commodity boards, State Agricultural Universities (SAUs) also facilitate formation of farmer groups through support of Krishi Vigyan Kendras (KVKs). The role of extension in promotion of FOs (Chamala, 1990) includes (1) empowerment role (2) community-organising role (3) human resource development role and (4) problem-solving and education Role.

Small Farmers Agribusiness Consortium (SFAC), through FPOs, intends to work closely in support of the Department of Agriculture & Cooperation and the various state governments to enhance production, productivity, and profitability of small farmers in the country. Farmers will be organised in small neighbourhood informal groups which would be supported under the program to form associations/organisations relevant to their

context including confederating them into FPOs for improved input and output market access and negotiating power.

Since the FPOs have been established in the recent past there is less documentation regarding the formation, functioning and the problems faced by them and also the level of knowledge and extent of adoption of red gram cultivation practices by the farmers of pulse based FPOs in Karnataka. Hence, the present research on “**A Study on Functioning and Impact of Farmer Producer Organisations in Karnataka**” was conducted with the following objectives.

The **overall objective** of the study was to analyse the functioning of the FPOs in Karnataka and assess the impact of these groups on their constituent members.

The **specific objectives** of the study were:

1. To study the formation and functional aspects of Farmer Producer Organisations.
2. To study the profile characteristics of members and non-members of Farmer Producer Organisations.
3. To study the knowledge level of members and non-members of Farmer Producer Organisations with respect to red gram farming practices.
4. To study the adoption level of members and non-members of Farmer Producer Organisations with respect to red gram farming practices.
5. To analyse the linkages of Farmer Producer Organisations with governmental and non-governmental organisations.
6. To study the income generation aspects of members and non-members of Farmer Producer Organisations.
7. To elicit the constraints as perceived by members and to suggest suitable strategies for the effective functioning of Farmer Producer Organisations.

1.1 SCOPE OF THE STUDY

The present study focused on analysing the knowledge and adoption levels of members and non-member of FPO with respect to red gram cultivation. The main emphasis of the study was to steer around the functional aspects, networking systems,

income generation aspects and constraints of FPOs in Bidar and Kalaburagi districts of Karnataka. Detailed study of functional aspects and impact of FPOs will help to understand the effectiveness of FPOs on improving the socio-economic conditions of the farming community. A closer look into the functional aspects and impact of FPOs will help the policy makers to remove bottlenecks in the present policy framework and to develop an overall guidelines for improving the functioning and impact of FPOs.

1.2 LIMITATIONS OF THE STUDY

The major limitation was with respect to the duration of the study. Some aspects, which require longitudinal studies and observations that are time-dependent, could not be studied as it was student research constrained by funds and time. The findings of the study are based on the expressed opinion of the respondents. Hence the objectivity would be limited to the extent of the respondents' honest opinion. Even if the data were cross-checked to minimise the error, it is a fact that the results of the study may be apt only for the area where the study had been conducted and this should be considered while generalising the results to a larger area. It would not be appropriate to generalise the findings of the study for the areas which do not have similar conditions as the project under study. In spite of the above limitations, no effort was spared to make the study as objective and systematic as possible.

1.3 ORGANISATION AND PRESENTATION OF THE STUDY

The thesis report is organised into five chapters. It opens with an introductory chapter. The second chapter presents a brief overview of the past results of the studies conducted in the related aspects of the present study; however, the methodology followed for the study together with the statistical procedure is dealt in the third chapter. The fourth chapter gives the research findings and discussions of the study, and the fifth chapter deals with the summary and conclusions of the study and points suggested for future research. In the end, literature cited and interview schedule used for data collection are appended.

Chapter II

REVIEW OF LITERATURE

Keeping in view of objectives of the study, an attempt has been made to include the review of related studies and is presented under the following headings in this chapter.

2.1 Formation and functional aspects of Farmer Producer Organisations

2.2 Profile characteristics of respondents

2.3 Knowledge level of respondents

2.4 Extent of Adoption of respondents

2.5 Network linkages of Farmer Producer Organisations

2.6 Income generation aspects of respondents

2.7 Constraints as perceived by respondents

2.1 FORMATION AND FUNCTIONAL ASPECTS OF FARMER PRODUCER ORGANISATIONS

2.1.1 Formation of Farmer Producer Organisations

Social homogeneity increased credibility and trust within the group (Ratner *et al.* 2010), which in turn reduced management costs and can facilitate group cooperation (Bernard, De Janvry, and Sadoulet 2009).

Desai and Joshi (2014) defined farmers' group as informal, voluntary and self-governing association of farmers or farm women, formed at the local level (village level), for the purpose of economic cooperation aimed at improving and sustaining the resource base (economic, social, and natural).

For the successful promotion of interest of members of the Farmers' Organisation (FO) an enabling legal, regulatory, and policy environment was required. This required changing mindset of policymakers and staff in government departments, private companies, and donor agencies about the role of FOs (FAC Policy Brief 032, 2009)

The financial requirements were essential for the functioning of the organisations. The governing members usually prepared a plan of financial resources to minimise economic problems in their organisation. In most cooperatives and associations the main sources of finance were membership fees, income generating activities, and buildings (IFAP, 1992).

Lang (1981; 1986) explained three terms, i.e. aggregate, collective and group. Accordingly, the aggregate of persons was referred to persons coming together temporarily for any reason or purpose, while collective was a plurality of persons having a social structure, collective consciousness, and interaction between themselves. A group, on the other hand, had a common identity, a feeling of unity, shared goals and norms.

Mannheim (1957) defined the group as a social force trying to integrate individuals. The main characteristics of the groups identified were: a relative organisation meaning some kind of division of roles and functions among members, group norms, ideas about existence or purpose of group and its relationship with other groups; collective interest and individual interest; a system of distributing power; and repressions and conflicts and mechanisms to deal with them.

Tonnies (1955) classified groups into communities and association. According to him, the community was any circle of people who live together and share a whole set of interests. He saw groups as the tribe, the village, the city, and the nation, and association as a group organised for a specific interest or a group of interests in common rules, implementing decisions, and monitoring adherence to rules. Members can contribute in various ways to achieve the shared goal: money, labor or in-kind contributions like food, wood, etc.

The 2008 World Development Report on Agriculture for Development (World Bank 2007; Mercoiret and Minla Mfou'ou 2007) placed strong emphasis on the promotion of farmer's organisations (FOs) to help bring about what it calls a 'smallholder revolution' to facilitate farmer access to inputs, credit, output markets, and technical training and to increase engagement with policy processes to improve coordination within the agricultural sector.

Braun and Immink (1994) proposed that the creation of producer organisations is the most common solution to share the fixed costs necessary for smallholders to link to dynamic markets as the Rural Producer Organisations is a form of collective action that improves both the farmers' access to credit, information, and improved varieties of crops. And he also stated that economies of scale, be it in production or marketing, producers will have incentives for collective action, in the form of producer associations.

Bhattacharjee (2010) concluded that producer companies can be made viable in the long run through provision of adequate support by the donor agency and supportive environment and relaxing of the capital constraints and as far as commodity-based

producer companies were concerned, there were possibilities of both diversification of business, value addition possibilities and integration with both input and output markets.

Marzena and Paul (2011) concluded that for the producer company to be an influential and effective model for improving the livelihoods of small and marginal producers, it has to overcome its credit constraints either with the help of supporting policies and with an alteration of its design.

Pustovoitova (2011) proposed that the choice of company format and business model should not limit farmers' options, particularly in an economic sense. But, the working capital constraint in the initial stages locked the producer company and its member farmers into a smaller scale, preventing the company from engagement in value addition.

Ragasa and Golan (2012) concluded that membership commitment was highly and positively correlated with the performance of rural producer organisations' and in order to sustain financial contributions from members and operations of rural producer organisations', support will have to focus on the economic viability and increasing incomes for the members. Marketing training and extension approaches, including training on value chain approaches, is the important strategy for supporting rural producer organisations'.

Jessop *et al.* (2012) identified that cooperatives or smallholder groups can cooperate with public and private financial institutions in the mobilisation of smallholders to have better education about financial services as well as effective investments and risk management. Those initiatives from smallholders' cooperatives and groups would be crucial and useful for achieving financial services and expanding their investment.

Bijiman and Wollni (2008) stated that monetary incentive to organise, professionalise and innovate would support capacity building of producer organisation. But, such a shift from direct payments to farmers towards payments to producer associations also had negative aspects like subsidy dependence or making life more difficult for existing cooperatives.

Ampaire *et al.* (2013) suggested that promoting Savings and Credit Cooperatives (SACCOs) as rural financial institutions to support rural smallholder producers was a timely and necessary solution to the current lack of credit in Uganda. He also suggested policies guiding the establishment and loaning conditions should be reviewed to match rural producers' economic status.

2.1.2 Functioning of FPOs

Collion and Rondot (2001) proposed that collective action and farmers' organisations have gained renewed interest in recent years from governments, donors and NGOs alike that see them as appropriate institutions for building capacity among farmers by helping them participate in more competitive and globalised market environments.

Agarwal (2001) described that small Farmers' Organisations such as cooperatives and FPOs were expected to enhance incomes, reduce costs of input purchases along with transaction costs, create opportunities for involvement in value-addition including processing, distribution, and marketing, enhance bargaining power and provide access to formal credit. He also reported that for the successful collective action in any organisation the following enabling conditions were essential. These include clearly defined boundaries, shared norms, appropriate leadership, interdependence among group members, heterogeneity of endowments and homogeneity of identities and interests.

Bingen *et al.* (2003) explained the functional aspects of Farmers' organisations. They identified three types of contracts between farmers and business entities. According to them only those type of contracts that build human capacity would lead to long term sustainable benefit to the small scale farmers and their community. They also classified contracts into three categories like contract/business which is profit driven, projects initiated and run by NGOs and process-oriented human capacity development projects.

Brown (1997) identified the key variables of group viz., context, group dynamics, individual members and the worker and he pointed out the following aspects of working of group such as the use of social interaction among members to achieve group goals is the key, it is an empowering method as all members are helped, at the same time they are helpers as well. Thus groups are powerful instruments of change

Urban Poverty and Environment series report (2007) mentioned that to minimise the cost of inputs and ensure proper handling of output by middlemen or to command higher output prices, group negotiation through producers' organisations' was a valuable advantage. It also strengthened experience sharing and offered opportunities for inter-change programmes and training.

FAC Policy Brief 032 (2009) presented the term 'The Seven Habits of Highly Effective Farmers' Organisations'. It represented critical elements of success' in high performing farmers' organisations in Africa. The seven 'habits' identified were: (i) clarity of mission; (ii) sound governance; (iii) strong, responsive and accountable leadership;

(iv) social inclusion and raising ‘voice’; (v) demand-driven and focused service delivery; (vi) high technical and managerial capacity; and (vii) effective engagement with external actors. These habits offered a useful checklist of working principles and practices to assess the performance of farmers’ organisation in Africa and elsewhere.

Gábor and Szabó (2009) proposed that producer-owned organisations were good examples for the vertical integration based on the horizontal coordination of farmers as initiators as they proved that by co-operation there was an opportunity to significantly improve their countervailing power and to establish ownership for farmers in the upper part of the food chain if they can secure strict quality requirements, solid financing, loyalty and trust in their organisations.

Gupta (1989) in his report on guide to monitoring and evaluation of small farmers' cooperatives in Asia expressed that for the sustainable development of an organised professional and honest management with constant monitoring and periodic rounds of the evaluation was essential.

Onumah *et al.* (2007) indicated that the FPOs performed a “bridging” function to organise relationships between the group and the external world. In many developing countries, FPOs normally had elements of both traditional and formal organisations. They were rooted in local customs but organised on economic principles. Unlike traditional groupings, which tend to be inclusive, formal producer organisations were often more exclusive. Producer Organisations could be local and serve only at the village and inter-village levels or could operate at regional and national levels (as advocacy, apex organisations, and federations).

Torero (2011) in his research paper on “A Framework for Linking Small Farmers to Markets” presented that under the broad definition, [producer] institutions play 5 prospective roles in strengthening markets for commodities produced, bought, and sold by smallholders: reducing transaction costs; managing risk; building social capital; enabling collective action; and redressing missing markets.

Tita *et al.* (2013) argued that the group negotiated better prices commensurate to the extra efforts made and so that members should be satisfied with such prices. To be successful, producer groups should be able to increase their bargaining power and one of such means was to have control over members' produce. One way to do so may be to have access to microcredit in order to offer advanced payments to members to withhold produce while waiting for an agreed market day so that members are not tempted to sell out of the group.

Prasad (2013) proposed that the Farmer Producer Organisation (FPO) was the best of the structures, in terms of the express objective of eliminating the “Moral Economy”, and argued for the same using the tools of Transaction Cost Economics (TCE). He also argued that the problem of individual farmers being unable to pursue litigation against corporate would become less of an issue, because of the financial capacity of the FPO and farmers, who were previously not exposed to any form of business organisation, have become “experts” in marketing their produce to the public, a mere six months after their FPO was officially incorporated.

Berdegúe *et al.* (2008) concluded that for the producer organisations to become viable, autonomous organisations, three factors seemed to explain their success. The first was that they must act as vehicles for change. Producer organisations’ can be effective for farmers who were willing to change their practices, but not for those who wish to maintain the status quo in the context of traditional commodity production systems. The second factor was related to producer organisations’ networking capability. Effective organisations were embedded in dynamic multi-agent networks that link their members to ideas, resources, incentives, and opportunities from beyond their rural communities. Finally, a system of rules and incentives for the internal allocation of costs and benefits, both among the members, and between the farmers as a group and the organisation itself, was key to success. With effective and sustainable producer organisations’, these rules typically transmit undistorted market signals to individual members, to which the members are able to respond.

Trebbin and Hassler (2012) concluded that Kabini Organics Producer Company has helped farmers for the production of high-quality organic cotton which was dependent on a seed supply alternative to the Bt cotton mainstream. Getting organised into a producer company has helped these farmers overcome the seed supply crisis and reach organic certification. The producer company has been of great service to its members through a row of activities which helped farmers tap till then unknown or unreachable sources of credit and funding to stabilise their living situation.

Robert and Peter (2014) inferred that farmer organisation has the potential to improve services and reduce transaction costs but effective mechanisms of downward accountability were necessary so that issues such as poor management and elite capture can be addressed, and farmers are motivated to invest in actions that have collective benefits. They also suggested that for farmer organisations (and particularly for large farmer organisations) to fulfill their potential roles in development, there needed to be a

focus on developing means of legitimising smallholder farmers' rights, building their capacity to challenge exclusion and moving from rights to obligations regarding information provision.

2.2 PROFILE CHARACTERISTICS OF RESPONDENTS.

2.2.1 Age

Raghavendra *et al.* (2005) conducted a study on the knowledge level of farmers about cultivation practices and post-harvest technology in red gram found that 53.30 per cent of respondents belonged to the middle age group.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka found that 57.50 per cent of the trained and 60 per cent of untrained farmers were from the middle age group (31 to 50 years) followed by 35 per cent of trained and 26.25 per cent of untrained farmers in young age category and 7.50 per cent of trained and 13.75 per cent of untrained farmers in old age category.

Rajput *et al.* (2016) in their study on technological gap in red gram cultivation described that majority of the respondents (47.50 %) were found in the group of middle-aged i.e. 36 to 50 years.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka reported that majority (50.00 %) of the respondents belonged to young age, followed by middle (33.33 %) and old (16.67 %) age.

2.2.2 Education

Gopinath (2005) in his study on knowledge and adoption of bengal gram farmers in Kurnool district of Andhra Pradesh revealed that 28.66 per cent of the respondents were having middle school level of education followed by those who are functionally literate (23.33 %), primary school (20.67 %), high school (12.67 %), illiterates (8.67 %) and those with college level and above education (6.00 %).

Raghavendra *et al.* (2005) conducted a study on the knowledge level of farmers about cultivation practices and post-harvest technology in red gram showed that 47.33 per cent of farmers were educated up to 7th standard followed by 27.33 per cent of the respondents were illiterates and 7.34 per cent of them had undergone education up to college level.

Sidram (2008) conducted a study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka state and found that 31.67 per cent were illiterate 20.83 per cent of respondents had received primary school education. While, 15.83, 14.17, 10.83 and 6.67 per cent of them had undergone middle school, high school, PUC and degree/master degree, respectively.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka showed that 30 per cent of the trained and 36.25 per cent of untrained farmers belonged to middle school level of education followed by 22.50 per cent of trained and 21.25 per cent of untrained farmers in primary education level and 20 per cent of trained and 10 per cent of untrained farmers in high school level of education.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in re gram in dryland areas of Karnataka studied that majority (39.20 %) of the respondents had primary level of education followed by can read and write (23.30 %), illiterate (22.50 %), high school (10.80 %) and college level (4.20 %).

Rajput *et al.* (2016) in their study on technological gap in red gram cultivation reported that majority of the respondents (36.25 %) were educated up to the high school level.

2.2.3 Family type

Raghavendra *et al.* (2005) conducted a study on the knowledge level of farmers about cultivation practices and post-harvest technology in red gram showed that 56.67 per cent of farmers had small family size.

Sidram (2008) in his study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka state revealed that majority (59.17 %) of the respondents belonged to the joint family. While 40.83 per cent of the respondents belonged to the nuclear family.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK training on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka showed that 43.75 per cent of the trained and 45 per cent of untrained farmers belonged to joint family and 56.25 per cent of the trained and 55 per cent of untrained farmers belonged to nuclear family.

2.2.4 Farming experience

Sidram (2008) in his study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka revealed the experience of farmers in farming and experience in organic pigeon pea cultivation. Nearly one-third farmer (30.83 %) had high experience in farming whereas the majority (69.17 %) had low experience. In the case of organic farming experience, the majority (82.50 %) of the respondents had the low experience, while only 17.50 per cent of the respondents had high experience in organic pigeon pea cultivation

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka showed that 72.50 per cent of the trained and 70 per cent of untrained farmers belonged to medium farming experience followed by 17.50 percent of trained and 13.75 per cent of untrained farmers in high farming experience and 10 per cent of trained and 16.25 per cent of untrained farmers in low farming experience.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in re gram in dryland areas of Karnataka indicated that majority of the respondents had low farming experience (54.20 %), followed by medium (40.80 %).

Rajput *et al.* (2016) in their study on a technological gap in red gram cultivation identified that concluded that the majority i.e. (53.75 %) of the farmers were found in the category of low experience in red gram cultivation i.e. up to 18 years

2.2.5 Landholding

Raghavendra (2004) in his study on knowledge and adoption level of post-harvest technologies by red gram farmers in Kalaburagi district of Karnataka reported that majority of the respondents belonged to the medium category of land holding (48.75 %), followed by semi-medium land holding category (30.00 %).

Sidram (2008) in his study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka revealed that large land holder's category occupied the highest percentage (60.83 %), while 23.33 per cent and 15.83 per cent of the respondents were in medium and small land holder's category respectively.

Bikadakatti *et al.* (2011) conducted study on the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka revealed that 61.25 per cent of the trained and 53.75 per cent of untrained farmers were of medium farmer category (10.01 to 25 acres) followed by 22.50 per cent of trained and 35 per cent

of untrained farmers in semi-medium farmer category (5.01 to 10 acres) and 13.75 per cent of trained and 10 per cent of untrained farmers in big farmer category (> 25 acres).

Rajput *et al.* (2016) in their study on a technological gap in red gram cultivation identified that majority (33.75 %) of the respondents had a medium size of land holding i.e., 2.01 to 4 ha category and 45 per cent of them had up to 2 ha of the area under red cultivation. However, more than half i.e., (63.75 %) of the respondents had no source of irrigation.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka observed that 54.20 per cent of the respondents had small farm size followed by medium (36.60 %) and large farm size (9.20 %).

2.2.6 Annual income

Bikadakatti *et al.* (2011) conducted study on the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka revealed that 45 per cent of the trained and 41.25 per cent of untrained farmers were belong to semi-medium income category (₹ 17001-34000) followed by 32.50 per cent of trained and 33.75 per cent of untrained farmers in low income category (up to ₹ 17000) and 13.75 per cent of trained and 18.75 per cent of untrained farmers in medium income category (₹ 34001-51000).

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka identified that more than fifty per cent (60.00 %) of respondents had medium annual income, followed by low (31.71 %) and high (8.30 %) annual income.

Rajput *et al.* (2016) found that the majority (55.00 %) of the respondents had their annual income of ₹ 2 lakhs and above and 16.25 per cent had an annual income between ₹ 50,001 to ₹ 1,00,000.

2.2.7 Market facilities

Mamledesai (1983) studied the economics of marketing of red gram in Kalaburagi district of Karnataka state. He had recognised three channels namely, producer > commission agent > wholesaler > dal miller (channel - I), producer > dal miller (channel - II) and producer > village merchant > dal miller (channel - III). The share of the producer in consumer's rupee was found to be 75.96, 96.74 and 80.41 per cents in the channel - I, channel - II and channel - III respectively.

Trebbin and Hassler (2012) explained that the concept of producer companies symbolised a tool for smallholder farmers to get organised and to realise benefits - not only from joint action but also from links to evolving high-value markets in India's urban centers.

Kandeeban (2015) in his study on market competitiveness and financial patterns of farmer producer organisations (FPOs) in Telangana and Karnataka reported mentioned that FPCs have helped to enhance farmers' competitiveness and gave them a level playing field in an emerging market and prevented exploitation by middlemen by offering a more competitive price and fair procurement than the prevailing market conditions.

2.2.8 Participation in group/ community activities

Raghavendra (2004) led a study on knowledge and adoption level of post-harvest technology by red gram cultivators in Kalaburagi district, found that 24.66 per cent and 22.67 per cent of the farmers participated regularly in agricultural exhibitions and demonstrations conducted in their villages, respectively.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK training on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka revealed that 75 per cent, 71.95 per cent, 57.14 per cent, 57.14 per cent and 42.86 per cent of trained respondents regularly participated in training, krishi mela, field day, demonstration and field visit respectively.

2.2.9 Information seeking behavior

Gayathri *et al.* (2002) in her study on knowledge and adoption of improved post-harvest practices by farm women in red gram reported that mass media exposure had a significant relationship with the knowledge level of red gram farmers.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka found that 33.75 per cent of the trained and 11.25 per cent of untrained farmers were regular listener of radio, while 10 per cent of the trained and 13.75 per cent of untrained farmers belonged to occasional viewers of television and 21.25 per cent of the trained and 56.25 per cent of untrained farmers belonged to occasional readers of newspaper.

Rajput *et al.* (2016) reported that more than half of the respondents i.e. 56.25 per cent used a high level of the source of information channel while, 42.50 per cent and 1.25 per cent used a medium and low level of sources of information of communication channels, respectively.

2.2.10 Leadership ability

Chithra *et al.* (2018) conducted the study to understand the entrepreneurial behaviour of pigeon pea seed growers in Raichur district of Karnataka and found that nearly half (47.50 %) of the growers had medium leadership ability, followed by low (30.00 %) and high (22.50 %) leadership ability, respectively.

2.2.11 Innovativeness

Natkar (2001) carried out a study on attitude and use of farm journal by the subscriber's farmer and their profile in Northern Karnataka and reported that, most of the subscriber farmers belonged to medium (73.75 %) innovativeness category followed by low innovativeness (16.87 %) and high innovativeness (10.62 %) categories.

Sidram (2008) found that the majority of the respondents (45.00 %) belonged to medium innovativeness category whereas, 32.50 per cent and 22.50 per cent of the respondents belonged to low and high innovativeness category, respectively.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka reported that majority of farmers had medium innovativeness (50.00 %), followed by high (33.33 %) and low innovativeness (16.67 %).

Chithra *et al.* (2018) conducted the study to understand the entrepreneurial behaviour of pigeon pea seed growers in Raichur district of Karnataka and reported that majority (77.50 %) of the growers had high innovativeness, followed by medium (12.50 %) and low (10.00 %) innovativeness, respectively.

2.2.12 Risk orientation

Natkar (2001) in his study on attitude and use of farm journal by the subscriber farmers in Northern Karnataka and their profile indicated that the subscriber farmers belonged to high-risk preference category (67.50 %) followed by medium (16.87 %) and low-risk preference (15.36 %) categories.

Chidananda (2008) revealed that the majority (65.83 %) of dryland farmers have medium risk preference followed by high (20.00 %) and low (14.17 %) respectively.

Sidram (2008) concluded that the majority of the respondents (46.67 %) belonged to the low level of risk orientation whereas, 29.17 per cent and 24.17 per cent of the respondents belonged to medium and high-risk orientation category, respectively.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka found that fifty-five per cent of farmers had medium risk orientation followed by high (28.30 %) and low-risk orientation (16.70 %).

2.2.13 Achievement motivation

Ravichandra (2002) shown that majority (62.50 %) of the on-farm extension demonstration beneficiaries had a medium level of achievement motivation followed by high 25 per cent and low 12.50 per cent levels of achievement motivation. Whereas, in the case of non-beneficiaries, 46.44 per cent had a low level of achievement motivation followed by medium (39.28 %) and high (14.28 %) levels of achievement motivation.

Subrahmanyam (2002) identified that majority (78.34 %) of the trained farmers under agricultural market committee level had a medium level of achievement motivation followed by high (18.33 %) and low (3.33 %) levels of achievement motivation.

Prasanth (2007) stated that majority of the trained farmers of agricultural marketing committee level had medium (71.67 %) level of achievement motivation followed by low (15.00 %) and high (13.33 %) levels of achievement motivation. Whereas, 70 per cent of the un-trained farmers had a low level of achievement motivation followed by medium (26.67 %) and high (3.33 %) levels of achievement motivation.

Manoj *et al.* (2009) in their study on profile characteristics of farmers in the adopted and non-adopted villages of KVK, Amudalavalasa in Srikakulam reported that there was a significant difference between farmers of adopted and non-adopted villages regarding achievement motivation at 0.01 level of probability.

2.2.14 Decision making power

Chithra *et al.* (2018) in their study on entrepreneurial behaviour of pigeon pea seed growers in Raichur district of Karnataka showed that more than half of the growers (57.50 %) belonged to intermediate decision-making ability, followed by high (22.50 %) and low (20.00 %) decision-making ability.

2.3 KNOWLEDGE LEVEL OF RESPONDENTS

Shivaraj (1996) in his study on knowledge and adoption level of integrated pest management practices by red gram growers of Kalaburagi district noticed that only 15 per cent of the farmers had knowledge of use of green lacewing (*Chrysoperla cornea*) predator, while majority of the farmers (57.50 %) knew the use of Nuclear Polyhedrosis

Virus (NPV) as a biocontrol measure and about 85 per cent of the respondents possessed knowledge of use of NSKE in red gram.

Raghavendra *et al.* (2005) revealed that a majority of the respondents (70.66 %) had medium knowledge level about cultivation practices, followed by low (18.00 %) and high (11.34 %) categories respectively. Whereas, 71.30 per cent of respondents had medium knowledge with respect to post-harvest technologies, followed by low (20.00 %) and high (8.70 %) categories.

Sidram (2008) conducted a study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka state and found that majority of the respondents (63.33 %) belonged to the medium knowledge level category, while 23.33 and 13.33 per cent of the respondents belonged to high and low adoption categories, respectively.

Bikadakatti *et al.* (2011) conducted study to know the impact of KVK trainings on the use of bio-fertilizers and bio-pesticides in Kalaburagi district of Karnataka revealed that among 80 trained and 80 untrained farmers 38.75 per cent of trained and 17.50 per cent of untrained farmers belonged to high category of overall knowledge followed by 36.25 per cent of trained and 17.50 per cent of untrained farmers belonged to medium category and 25 per cent of trained and 47.50 per cent of untrained farmers belonged to low category.

Jadhav and Aski (2014) found out that 37.14 per cent of trained and 21.43 per cent of untrained farmers possessed high knowledge, 40 per cent of trained and 34.29 per cent of untrained farmers possessed medium knowledge and 22.86 of trained and 50 per cent of untrained farmers possessed medium knowledge about improved red gram production practices.

Akkamahadevi (2016) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka, reported that majority (66.60 %) of respondents had a medium level of knowledge followed by high (24.20 %) and low (19.20 %) knowledge levels. The practice wise knowledge on red gram farming revealed that majority of respondents (95.83 %) had knowledge regarding concept of nipping operation that would increase the number of branches, followed by 91.66 per cent of farmers who knew about deep summer ploughing destruction of crop residues help for in-situ moisture conservation and pest control, suitable season for growing crop, important pest and diseases and planting/ sowing of pest resistant and early maturity varieties help in arresting pest population.

Mohanakumara *et al.* (2016) conducted a study on the adoption of post-harvest management practices in pigeon pea crop for sustainable income in Kalaburagi district of Karnataka. They found that the majority of the respondents belonged to medium knowledge category with respect to post-harvest management practices and these practices were practiced since ages.

Rajput *et al.* (2016) in their study on technological gap in red gram cultivation reported that majority of the respondents (67.50 %) of the respondents were found in the category of medium level of knowledge.

2.4 EXTENT OF ADOPTION OF RESPONDENTS

Shivaraj (1996) in his study on knowledge and adoption level of integrated pest management practices by red gram growers of Kalaburagi district revealed that majority of the respondents had not adopted the practices of using light trap (100.00 %), use of pheromone trap (66.25 %) and use of green lace as predator (*Chrisoperla cornea*) 93.75 per cent, use of NPV (73.75 %), use of neem seed kernel extract/neem based pesticide 22.50 per cent.

Nikhade *et al.* (1997) in their study on technological gap in cultivation of red gram, green gram and bengal gram in Kalaburagi district of Karnataka reported that, a wide gap (43.00 %) was observed in the use of plant protection measures, followed by application of nitrogenous (31.00 %), phosphatic (25.00 %) fertilizer and seed rate (29.00 %) in red gram cultivation.

Raghunandan (2004) conducted a study on knowledge and adoption level of soil and water conservation practices by farmers in northern Karnataka reported that about 17.50 per cent of respondents had the complete knowledge of contour cultivation purpose. Majority of respondents possessed the knowledge of reduces soil erosion and conserves soil moisture (62.50 %), followed by the reduced cost of cultivation (50.00 %) and directly improves soil fertility (26.25 %).

Sidram (2008) conducted a study on analysis of organic farming practices in pigeon pea in Kalaburagi district of Karnataka state and indicated that 69.17 per cent of respondents belonged to medium adoption category with a mean score of 33.4 and with a mean yield of 3.86 quintals/acre. While, 20 and 10.83 per cent of respondents belonged to high and low adoption category with mean scores 37.31 and 29.05 and mean yield of 4.29 quintals/acre and 3.34 quintals/acre, respectively.

Burman *et al.* (2010) conducted a study to identify a gap in adoption of improved pulse production technologies in Hamirpur district of Uttar Pradesh revealed that farmers in general use local varieties instead of the recommended improved varieties as the quality seed of improved varieties are not easily available. Very few farmers were able to arrange an improved variety of seed. Farmers followed the broadcast method of sowing against the recommended line sowing and because of this, they applied a higher seed rate than the recommended. No sulphur fertilizer was applied as recommended. The full gap was observed in case of irrigation and plant protection in pigeon pea.

Dwivedi *et al.* (2011) in their study on adoption of improved production technology of pigeon pea concluded that the majority of the farmers adopted scientific recommendations about improved varieties, time of sowing, manual and chemical weed management were adopted, while seed treatment and plant protection measures were not adopted by majority of the farmers due to lack of knowledge, high cost involved in purchasing agro-chemicals, use of sprayers in standing long crop of control pod fly and fruit Borers.

Mohanakumara *et al.* (2016) conducted study on adoption of post-harvest management practices in pigeon pea crop for sustainable income in Kalaburagi district of Karnataka and found that majority (41.67 %) of the respondents belonged to the medium level of adoption category followed by low (30.00 %) to high (27.50 %) adoption categories.

Rajput *et al.* (2016) in their study on technological gap in red gram cultivation reported that majority of the respondents (80.00 %) of the respondents were found in the category of medium level of adoption.

Sarada and Kumar (2017) carried out a study on red gram productivity enhancement through front line demonstration in Prakasam district of Andhra Pradesh and they concluded that there was a considerable variation in the adoption of critical interventions demonstrated before and after organising Front Line Demonstrations (FLDs). Regarding the adoption of high yielding variety, almost sixty (56.67 %) per cent of the farmers were not adopting previously, but eighty-one per cent of them switched over to LRG 41 variety after organising FLDs. This is because of the confidence gain in terms of yield potential of the variety among the farmers. Seed treatment was another aspect where very meager per cent (8.89 %) of the farmers were adopting previously, but with the positive result in terms of tolerance to wilt disease more than three fourths (76.67 %) were adopting seed treatment after conducting demonstrations. As red gram was cultivated in red soils under

rain-fed situation majority (75.56 %) of the farmers were not interested in timely fertilizer management but after noticing the yield enhancement more than sixty per cent (64.44 %) of the farmers were convinced and adopting recommended fertilizer at right time. Cent per cent of the farmers was not using neem oil spray as prophylactic against *Maruka* previously but after observing its effectiveness in demonstrations more than sixty per cent (61.11 %) of the farmers were spraying neem oil at bud initiation and flowering stages. The great majority of the farmers (84.44 %) were going for indiscriminate sprayings previously but 67.78 per cent of them were convinced with need-based pest and disease management and reduced unnecessary sprays which ultimately led to the reduced cost of cultivation.

Akkamahadevi *et al.* (2018) in her study on knowledge and adoption of organic farming practices in red gram in dryland areas of Karnataka, depicted that majority (41.60 %) of the respondents had the medium extent of adoption followed by low (39.20 %) and high (19.20 %). With respect to the practice wise adoption of red gram cultivation practices 91.66 per cent of the farmers had fully adopted the practice of deep summer ploughing for pest disease control and practice of timely sowing, followed by (83.33 %) of farmers fully adopted practice of allow cattle grazing to add cow dung manure in field and for weeding and post-harvest management.

2.5 NETWORK LINKAGES OF FARMER PRODUCER ORGANISATIONS

Interacting with external organisations increased directly the probability of providing inputs and advice by 17 per cent, but there was no direct effect of external interaction on the marketing of outputs. (Bernard *et al.* 2008; Karami and Rezaei-Moghaddam (2005).

Carroll and Bebbington (2001) explained that those farmer organisations which got an extended period of support from external agencies like government, NGOs, donors and market actors had shown significant development.

FAC Policy Brief 032 (2009) concluded that the most fruitful partnerships involved intensive ‘software’ support, in which external actors accompanied and advised farmer organisations over a long period, but did not intervene directly in decision making. Such collaborations could also help existing organisations become more empowered and more capable of representing the interests of their members in key policy arenas.

Ragasa and Golan (2012) studied that external linkage and support was one of the factors influencing RPO performance. They explained that the greater the interaction with external actors, the greater was the likelihood that services and information were provided to members through the RPOs. They suggested the need for greater recognition of the importance of linking with other actors that are potential sources of services, information, technical support, and market outlets. They also identified several factors that influence RPO performance. They were governance and management, group composition, membership commitment, and community and agro-ecological factors.

2.6 INCOME GENERATION ASPECTS OF RESPONDENTS

Singh *et al.* (1981) studied the economics of marketing and processing arhar in Unnao district of Uttar Pradesh. They stated that marketing cost per quintal of arhar was ₹ 4 while the producer's share in consumer's rupee was 80.90 per cent.

Gupta and Gaikwad (1986) suggested that if the price of any commodity was fifty per cent of the cost of raw material then it could be considered for value-added processing by a farmer's organisation.

Prasad *et al.* (2001) conducted a study on costs and returns in cotton production vis-a-vis its competing crops in Guntur district and revealed that per hectare cost of cultivation on cotton was ₹ 11331.37. This was very high compared to ₹ 4217.92 in the soy bean-bengal gram cropping system, ₹ 4379.81 in soy bean- red gram and ₹ 1334 in soy bean-jowar cropping systems. The cost of production in total operational cost was highest in cotton (₹ 29884.77) compared to soy bean-bengal gram (₹ 27802.84), soy bean-red gram (₹ 29171.42) and soy bean-jowar (₹ 2954.78), whereas net returns were very low in cotton compared to other cropping systems.

Benagi *et al.* (2004) in their study on comparison of costs and returns of seed yields in red gram cultivation in IPM and non IPM fields of Sannur and Farthabad villages in Karnataka reported that in case of IPM fields in Sannur and Farthabad villages in Karnataka, seed yields were 7690 and 9700 kg/ha respectively, whereas in case of non-IPM fields seed yields were 7300 and 8050 kg/ha, respectively. The IPM practices produced an additional income of ₹ 1457 and ₹ 3305 in Sannur and Farthabad, respectively.

Estelle and Danies (2005) reported that competitiveness rests on cost reduction strategies which can be achieved through economies of scale, either in terms of input provision, technical assistance or commercial logistic through farmer's organisation. It

also relies on non-price factors such as reputation, commercial efficiency, or specific quality attributes.

Biradar (2007) in their study of economics of red gram based cropping systems in Bidar district reported that medium farmers incurred highest total cost in cropping system (red gram + black gram, red gram + soy bean, red gram + green gram) and large farmer in cropping system (red gram + jowar, red gram sole). Net return obtained by small farmers were highest in cropping system (red gram + jowar, red gram sole) highest net return obtained by large farmers in cropping system (red gram + black gram, red gram + soy bean, red gram + green gram). From the above review it is observed that, the cost of production was high for large farmers followed by medium and small farmers due to higher level of use of fertilizer and quality seeds, but net returns were high for small farmers followed by medium and large farmers due to lower cost and high gross return and efficient utilisation of family labor. Under the irrigated condition, net return from sugarcane was high and under rainfed condition net return from red gram was found to be high.

Pavankumar (2007) studied the economic assessment of IPM technology on red gram in Kalaburagi district of north Karnataka. He stated that there was a significant difference between the two categories of farmers (IPM and non-IPM) with respect to the input use. In the IPM category, the cost of organic manure accounted for the highest share (17.7 %). Whereas in the non-IPM category plant protection chemicals cost accounted for the highest share (25.30 %). Cost on chemical fertilizer accounted for the lowest share (3.80 %) in the IPM category and the cost on organic manure accounted for the lowest share (8.40 %) in the non-IPM category.

Hellin *et al.* (2009) have suggested that the benefits of farmer organisation for market access were more evident in the vegetable sector, characterised by high transaction costs. There was less incentive for farmers producing an undifferentiated commodity such as maize to organise as the transaction costs associated with market access were relatively low. Farmer organisations that sold vegetables secured a very small percentage of the final consumers' price. Low volumes of the product plus low margins meant that ongoing subsidies were probably needed to cover operational costs.

According to Agarwal (2010) more the heterogeneity of the groups more would be the management and transaction costs as well as diversification of risks which lead to weakness of the group.

Fischer and Qaim (2012) concluded that collective action spurred innovation through promoting efficient information flows and output price advantages associated with collective marketing but relatively small in magnitude.

Javier and Caverio (2012) argued that group of small producers through producer organisations were capable of making strategic investments to gain access to agro-industrial markets where their produce was more profitable by establishing more complex contractual arrangements with potential purchase, lowering transactions costs through promoting producer organisations, will not only make more likely that the less endowed small farmers enhance their opportunities to access to agro-industrial markets but also increase their net incomes once they were able to access these markets.

Trebbin and Hassler (2012) documented a case study on Vasundhara Agri-Horti Producer Company (VAPCOL) which showed that producer companies can help smallholder farmers and underprivileged rural communities to position themselves in a more demanding market environment and to establish trading relations to modern retail companies by conducting value-adding processes and generate economies of scale in output marketing. By selling larger quantities to a larger buyer, not only transaction costs were reduced, but also the marketing risk.

Robert and Peter (2014) inferred that farmer organisation has the potential to improve services and reduce transaction costs but effective mechanisms of downward accountability were necessary so that issues such as poor management and elite capture can be addressed, and farmers are motivated to invest in actions that have collective benefits.

Kandeeban (2015) pointed out that in the year 2013-14 red gram open market prices were only ₹ 3979.84 per quintal and ₹ 3975.17 per quintal in Telangana and Karnataka states respectively. But FPC made arrangements to sell the product through SFAC at MSP of ₹ 4300 per quintal in the year 2014-15 red gram was sold by FPC at a price of ₹ 5323.33 per quintal in the state of Telangana and at ₹ 5321.6 per quintal in the state of Karnataka which is more than that of open market price (₹ 5233.37 per quintal and ₹ 5287.21 per quintal in Telangana and Karnataka states respectively to traders as FPC ensures quality of produce. He also noted that the marketing cost of the farmer-producer company channel consisting of farmers – FPC - traders - miller – wholesaler – retailer – consumer was significantly reduced to ₹ 2463 per quintal as compared to ₹ 2732 per quintal of famer marketing channel including farmers – commission agent – trader – miller – wholesaler – retailer – consumer. Also, the producer's share in consumer's rupee of farmer marketing

channel (channel I) was found to be 62.19 per cent and in the case of farmer producer company channel (channel II), it was 64.56 per cent.

Sarada and Kumar (2017) carried out a study on red gram productivity enhancement through front line demonstration in Prakasam district of Andhra Pradesh and they explained the details of the extension activities organised through FLDs. They pointed out that two training programmes and two field days at critical stages of crop growth viz., one at the vegetative phase and another at flowering stages of the red gram were organised to enhance the knowledge levels of the farmers and showcase the results of the demonstration. Leaflets on red gram production technology were distributed to the farmers participated in training programmes and field days. They also presented the economics of demonstration and control plots. It is evident from the results that there was an average productivity enhancement of 26.67 per cent in demo plots over control. With respect to the cost of cultivation 30.77 per cent, a decrease was recorded over control plots. There was an average increase of 38.86 per cent in terms of net returns in FLD plots over control. The CB ratio was 1:3.7 in demo units whereas it was 1:2.5 in control plots. The major reasons for productivity enhancement were using high yielding variety and using the recommended dose of fertilizer as basal. Regarding the decreased cost of cultivation seed treatment, prophylactic neem oil spray and need-based pest and disease management were the major factors contributed.

2.7 CONSTRAINTS

Gra *et al.* (1989) had identified three significant categories of problems in the associations they studied. The problems were described as related to agricultural production, marketing, and management. In the first group, there were problems related to poor cultural practices and insufficient capital. In the second category, problems related to prices, lack of transport and storage facilities, lack of communication, and lack of a secure and guaranteed market were present. In the final group, when the associations were member-driven only few farmers understand the system of management, thereby placing a lot of responsibility in a very few people's hands.

Srivastava *et al.* (1989) conducted a study to identify the constraints in pulse production in Tal region of Bihar. The study showed lack and inadequate supply of improved seeds as the major constraints in the study area. Therefore four district components of technological improvements recognised in the study area were the adoption of improved seeds, seed treatment practices, use of plant protection measures, and intensive use of machine labor for different farm operations.

Bhatia (1991) recorded some of the important economic constraints which retard the growth of pulse production in India. They were production under rain-fed situation low yield and value productivity, higher risk associated with pulse cultivation, low level of technology adoption and susceptibility to pests and diseases. From the point of marketing, the most important problem was the large price spread. To increase the yield per hectare, appropriate measures might have to be taken up for reducing/shifting the risk of adopting new technology through the expansion of crop insurance scheme to cover pulse crops. Efforts should also be made to improve the efficiency of marketing so that producers could get their due share in the prices paid by the ultimate consumer.

Bebbington *et al.* (1994) in their work on farmer and community organisations in agricultural research and extension: functions, impacts, and questions identify that the major problems faced by FPOs were related to costs and sustainability.

As per the studies of IFAP (1995) links between farmers, extension services and research were weak, partly because the limitations of FOs translate into inadequate representation in agricultural research and limited access to the extension.

Singh and Mohiley (1995) in their study on “a comparative analysis of costs and margins for different channels in the marketing of arhar” reported the costs and margins in different channels in the marketing of arhar (1975-1995) in Allahabad. They found that the producer's share in consumer's rupee was more or less the same in both the above periods.

Lal and Prakash (1996) in their study on economic constraints in pulse marketing stated low marketable surplus and large price spread as the difficulties in marketing. Most of the farmers grow pulses for their own domestic requirement on a limited area which resulted in the low marketable surplus and the farmers sold the produce at the village level only to the village traders who offer a lower price. The data collected on the price spread at Kanpur shown that the producer's share in consumer's rupee remained as low as ₹ 60.69 and ₹ 50.78 in pigeon pea and chickpea respectively. The problems would be eradicated by appropriate transfer of technology for cultivation of pulses under dry farming or limited irrigation agriculture, expansion of crop insurance schemes to cover pulse crops and improving the marketing efficiency so that the producers could get their due share in the prices paid by the ultimate consumer.

Snehalatha and Reddy (1998) listed out the problems faced by group members as selling the produce without assured market outlets, lack of co-operation and teamwork among group members, non-availability of sufficient matching grant in time, ineffective

group leadership, lack of training in group formation, unequal work delegation, mismanagement of accounts, discontinuance of internal lending. The problems perceived by group leader were lack of time to perform home, farm and group activities, no reimbursement of money spent for group purposes, explaining accounts to illiterate members, resolving group conflicts, misunderstanding of group members that leaders benefit more and there were no economic incentives for being a group leader.

The development of farmers organisations could be weakened by attempts to encourage them to scale up too rapidly or to take on too many or over-ambitious activities. They could also be weakened by subsidies, by a failure to emphasise fundamental activities offering incentives and benefits to members, and by donor and government assistance and interference that interacts with them more as development agents than as private businesses (Penrose-Buckley 2007; Heemskerk and Wennink 2006; Stockbridge, *et al.* 2003; Bosc, *et al.* 2002; Collion and Rondot 2001; Hussein 2001).

Stockbridge *et al.* (2003) stated that collective organisations such as farmer based organisations were often confronted with two interrelated problems: the rules on which the organisation should be based and the effective monitoring and enforcement of such rules.

Wadekar *et al.* (2003) pointed out the problems faced by the sample farmers in the production of different crops in selected zones of northern Karnataka. He observed that problems like price fluctuation, lack of storage facility and incidence of pests and diseases were reported as severe problems under farming system-I (green gram, jowar, tur, black gram, paddy, sunflower, and groundnut in *kharif*; bengal gram and jowar in *rabi* and sugarcane and dairy animals) in zone-I. Lack of knowledge about source of availability of seeds and incidence of pests and diseases were the severe constraints in sunflower production under farming system-I (green gram, tur, sunflower, chilli and groundnut in *kharif*; bengal gram and jowar in *rabi* and dairy animals) in zone-II, constraints in bengal gram production, followed by the non-availability of seeds in time under both the farming systems in both zone-I and zone-II. Problems like non-availability of seeds in time lack storage facility, pest and disease incidence, and price fluctuation were severe in many crops. In milk production problem on non-availability of credit, non-availability of pasture land, lack of artificial insemination facility and improved breeds, lack of knowledge of scientific feeding, inefficient marketing facility and higher cost of feed materials were severely confronted, which need immediate attention.

Arun (2004) reported that the problems faced by the members were lack of timely support from banks/other organisation (it was the major problem), inadequate number of organisations linked up, unequal distribution of work among members, non-introduction of agriculture based income generating activities (IGA), non-availability of information about IGA, and difficulty in getting external loans.

Raghuprasad *et al.* (2004) in the study conducted at Shivamogga district reported that internal problems faced by some groups were lack of good leadership, conflicts among its members, time constraints, lack of decision making, inadequate space to conduct activities, etc.

Bharathi (2005) reported that the problems faced by members were lack of formal education, lack of training, lack of social mobility, insufficient loans as their economic problems and technical problems like non-availability of spare parts, shortage of electricity and unskilled women group members.

TISS (2005) reported that smallholders across Asia did not appear to be unifying in large numbers due to a greater proportion of better-off farmers had formal membership than smallholders.

Chandargi (2007) reported that majority of the members expressed constraints like lack of assistance from organisations, the margin of profit was not sufficient, lack of infrastructure facilities for selected activities and high market cost of raw materials. Majority of the members suggested a single outlet of marketing, marketing facilities to be improved and quick release of the loan.

Dhakal (2013) concluded that farmers' organisations were collapsed due to the lack of ownership, group management skill and inability to link with the market. The business skills, technical skills, and organisational management skills of Agricultural Resource Centers (ARC) members were not promoted parallel. Autonomy and adequacy of time given to select the enterprise for groups have long term impact on ownership development. High level of external influence lead ARCs for dependency and lack of problem-solving ability among members.

Gundlach (2013) concluded that constraints could be internal or external to the system. Internal constraints were those constraints found within the organisation which gives a set-back to the effective and efficient performance of the organisation. Internal constraints include physical constraints (it includes the scarcity of resources, machines, and buildings needed to convert resources into an end product), people constraints (lack

of skilled people limits the organisation) and policy constraints (a written or unwritten policy, organisational procedures might prevent the organisation from achieving its goal)

Bernard and David (2015) concluded that several RPOs still struggled to offer the type of commercialisation services that would lead to higher output prices for their members and it also argued that trust in leaders' motives and competence as well as trust in ordinary members were crucial for successful collective commercialisation as a form of collective action.

Mohanakumara *et al.* (2016) conducted study on adoption of post-harvest management practices in pigeon pea crop for sustainable income in Kalaburagi district of Karnataka and reported that majority of the respondents faced the problem of high fluctuation in market prices (71.66 %), followed by non-availability of processing units at village level (45.83 %), and inadequate storage facility at village level (35.83 %).

Rajput *et al.* (2016) explained that the highly perceived constraints in technological gap of cultivation of improved recommended practices of red gram faced by the farmers were shortage of water, non-availability of labour in time, inadequate source of finance, high cost of improved variety seed, fertilizer, FYM and herbicides, high labour charges, non-availability of storage facility, high charge and non-availability of storehouse, fluctuation price of red gram in market, irregular demand of red gram, non-remunerative price during time of glut in market and high transport cost.

Chapter III

MATERIAL AND METHODS

This chapter deals with the detailed description of the methods and procedures employed in conducting the research in an organised manner. The procedure followed in sampling, development of empirical measures of the variables, data collection and statistical measures used for data analysis were described under following headings.

3.1 Research design

3.2 Locale of the study

3.2 Sampling procedure

3.3 Variables and their empirical measurement

3.4 Devices and methods used for the collection of data

3.5 Statistical tools used for analysis of data.

3.6 Preparation of report

3.1 Research design

The research design adopted for the present study was the ex-post-facto technique since the phenomenon has already started and is continuing.

The ex-post facto research design is a systematic empirical inquiry in which the researchers do not have direct control on independent variables, as their manifestation has already occurred or they are inherently not manipulated. Ex-post facto studies can be devised to identify behavioral phenomenon and to explore conditions under which the phenomenon occurs (Kerlinger, 1973). Keeping in view the objective of the study, type of variables, size of respondents and phenomena to be studied, the ex-post facto research design was selected as an appropriate design to investigate the variables.

3.2 Locale of the study

For any research in social sciences, it is needed that the situations in which investigations are carried out will give a basic idea to relate the findings to similar situations.

The state of Karnataka was purposively chosen for the study as the investigator belonged to the same state. The familiarity of the place of investigation and local language

would help the investigator in developing a quick rapport with respondents and would facilitate in-depth study.

3.2.1 Selection of Farmer Producer Organisations

The study aims to assess the functioning and impacts of FPOs in terms of the level of knowledge and extent of adoption of red gram cultivation practices between members and non-members of FPOs. The list of FPOs in Karnataka provided by SFAC was reviewed and those FPOs with the major intervention of red gram cultivation and having more than three years of operation were selected based on pilot survey. Five such FPOs namely Rohini Krushikara Producer Company Limited (RKPCL), Nisarga Krushikara Producer Company Limited (NKPCL) and Balabheemasena Krushikara Producer Company Limited (BKPCL) of Kalaburagi district and Jai Kisan Souharda Multipurpose Cooperative Limited (JKSMCL) and Basaveshwara Souharda Multipurpose Cooperative Limited (BSMCL) of Bidar district were selected. All the organisations were registered during the same period (2012 to 2013) and continuing their activities.

3.2.2 Selection of district:

Bidar and Gulbarga districts were purposively selected as the above FPOs were located in these districts. These districts were the major producers of red gram in Karnataka with large area and production respectively. Hence the FPOs with red gram as major crop growers were concentrated here.

3.2.3 Selection of taluks:

In Kalaburagi district, RKPCL, NKPCL, and BKPCL were located in Kalaburagi, Aland and Sedam taluks respectively. In Bidar district, JKSMCL and BSMCL were situated in Bhalki and Basavakalyan taluks respectively. All the taluks were purposively selected.

3.2.4 Selection of villages:

Each FPO is associated with a cluster of villages. The list of villages associated with each FPO is presented in the table.

3.3 Sampling procedure

3.3.1 Sources of data

For the study purpose, both primary and secondary data were used. The primary data was collected from member and non-members of FPO, project managers, village residents, coordinators, personnel of the agricultural department and dealers. This data



Fig.1: Map of India showing Bidar and Kalaburagi districts of Karnataka state

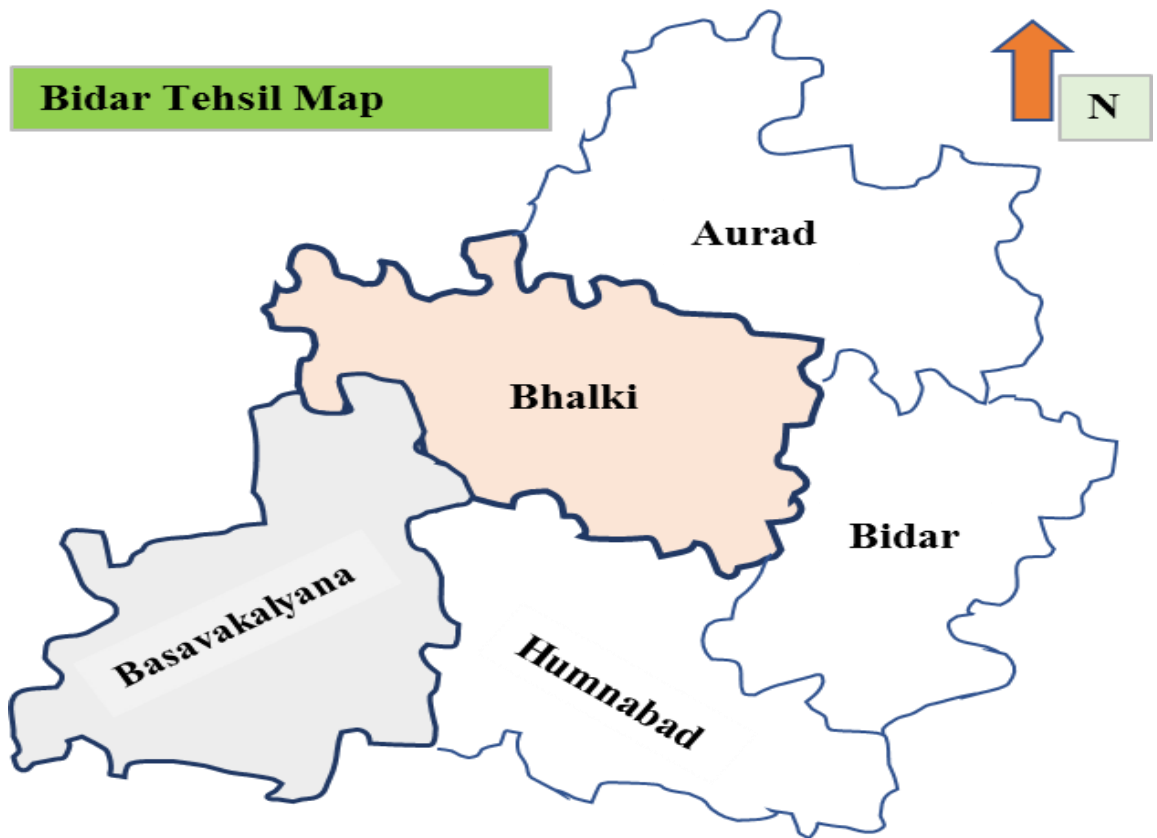


Fig.2: Map of Bidar district showing tehsils

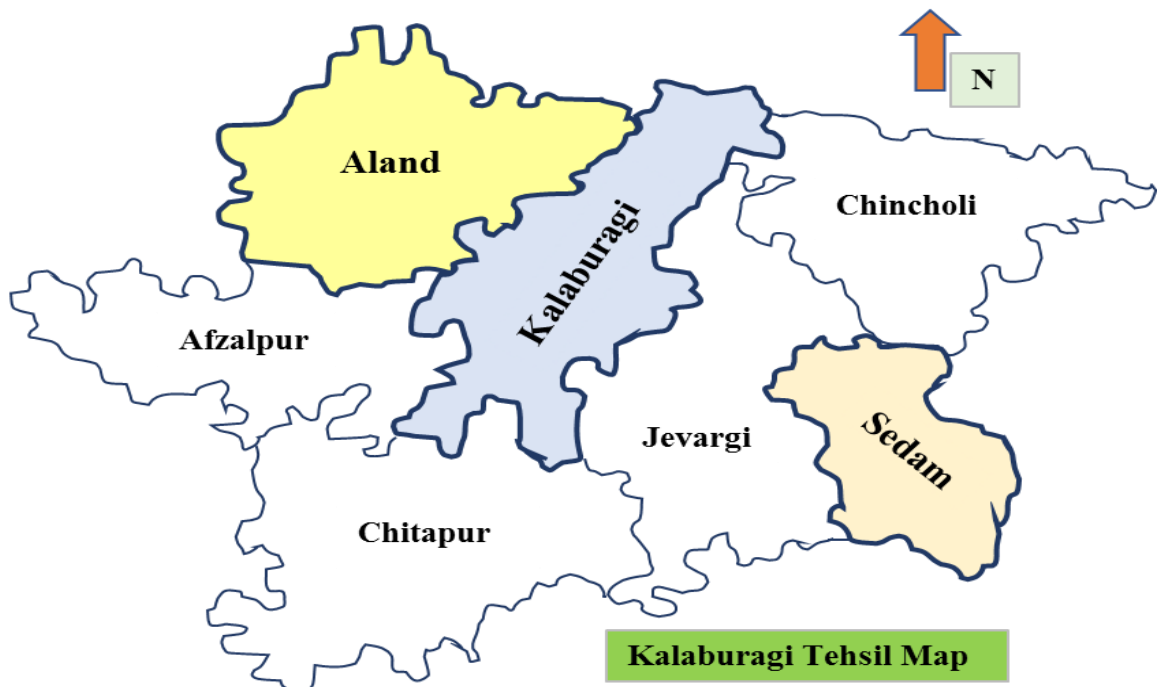


Fig.3: Map of Kalaburagi district showing tehsils

Table 3.1: List of districts, taluks, FPOs, and villages selected for the study.

Sl No.	District	Taluk	FPO	Villages	Number of members	Number of non-members
1	Kalaburgi	Kalaburgi	RKPCL	Nandur (K)	6	30
				Nandur (B)	6	
				Azadpur	6	
				Kesartgi	6	
				Dharmapur	6	
2		Aland	NKPCL	Munnalli	6	30
				Tadkal	6	
				Tambakwadi	6	
				Mamadapur	6	
				Hallisalgar	6	
3		Sedam	BKPCL	Mudhol	6	30
				Ribbanapalli	6	
				Kadcherla	6	
				Gopanapalli	6	
				Kadlapur	6	
4	Bidar	Bhalki	JKSMCL	Halbarga	3	30
				Tarnalli	3	
				Jhyanti	3	
				Kona Melkunda	3	
				Dhanur	3	
				Halli ippurga	3	
				Jainapur	3	
				Byalhalli	3	
				Tegampur	3	
				Kosam	3	
		Basavakalyana	BSMCL	Sastapur	3	30
				Hanumanth wadi	3	
				Erandgi	3	
				Chiknagaon	3	
				Halli	3	
				Sydapur	3	
				Gadigondagaon	3	
				Gokul	3	
				Mudbi	3	
				Atlapur	3	
Total	2	5	5	35	150	150

was collected through personal interviews, observation methods, farmer meetings, and field surveys. The primary data were related to behavior and response of respondents including members and non-members of FPOs. The secondary data collected from records of the FPOs records maintained by the associated NGOs, journals, thesis, and books related to the study as well as from the internet. These data used in combination as per the need of the study.

3.3.2 Selection of the respondents:

Thirty members from each FPO were selected randomly. The number of farmers from each village was proportionately selected to match the number of samples of each FPO. The number of farmers from each village was selected proportionately to the number of sample from each FPO, thus making a total of 150 members. Thirty non-members were randomly selected from the cluster of villages associated with each FPO. Thus making a total of 300 respondents for the study.

3.4 Variables and their empirical measurement

In order to study the objectives under study, relevant variables were identified in consultation with experts and based on available literature. Different variables selected for the study were given in Table 3.2.

Table 3.2: List of variables and their empirical measurement:

S. No	Variables	Measurement
Dependent variables		
1.	Knowledge level	The test was developed
2.	Extent of adoption	The schedule was developed
Independent variables		
Personal variables		
3.	Age	Chronological age of the respondents.
4.	Education	The schedule was developed
5.	Caste	The schedule was developed
6.	Family size & composition	The schedule was developed
7.	Farm size	Possession of total land by the respondent.
8.	Farming experience	Completed years of experience in farming.
9.	Farm mechanization status	The schedule was developed
Socio-psychological variables		

10.	Participation in group/ community activities	The schedule was developed
11	Information seeking behavior	The schedule was developed
12.	Leadership ability	A scale developed by Sri Manga (1999) with suitable modifications
13.	Capacity building	
14.	Achievement motivation	
15.	Communication behavior	
16	Decision-making power	
17	Risk orientation	A scale developed by Supe (1969) with suitable modifications.
18	Innovativeness	A scale developed by Feasten (1968) with suitable modifications.
19.	Self-confidence	A scale developed by Prasad (1996) with suitable modifications.
Economic variables		
20.	Family income	The schedule was developed
21.	Indebtedness	The schedule was developed
Situational variables		
22.	Market facilities	The schedule was developed
Structural characteristics of FPOs		
23	Working-age of the FPO	The schedule was developed
24	Size of the FPO	The schedule was developed
25	Literacy level of the group	The schedule was developed
26	Heterogeneous caste composition of the group	Index of qualitative variation used by Sri Manga (1999)
27	Financial assistance obtained	The schedule was developed
28	Training received by the group	The schedule was developed
29	Frequency of group meetings	The schedule was developed
30	Supportive environment	Index developed Sri Manga (1999) with suitable modifications
Functional characteristics of FPOs		
31	Group cohesiveness	Scale developed by Sri Manga (1999) with suitable modifications.
32	Group leadership	
33	Group's role differentiation	

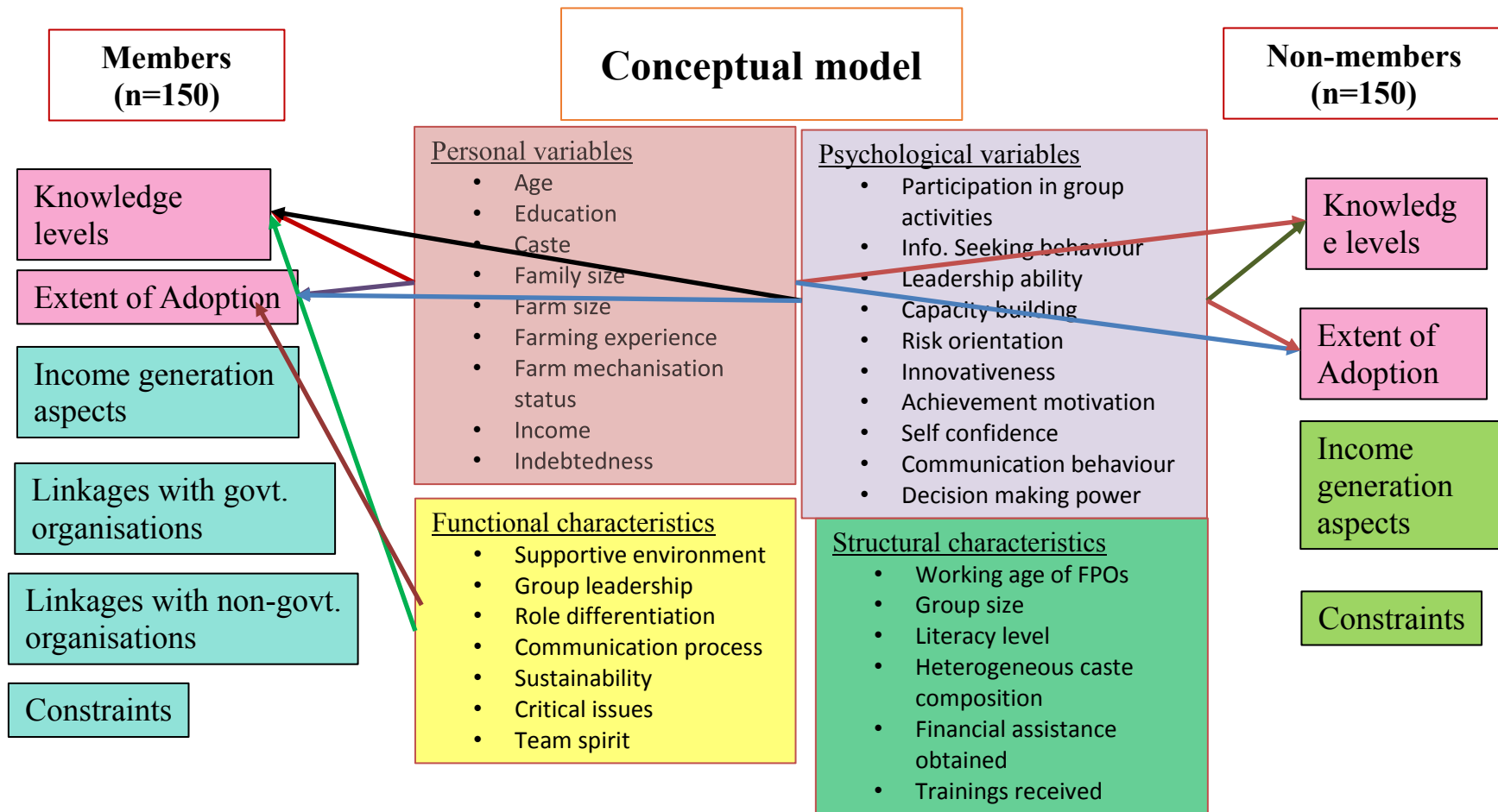


Fig.4: Conceptual model of the study

34	Communication process in the group	
35	Group sustainability	Index developed Preethi Manukonda (2011) with suitable modifications
36	Critical issues of group meetings	The schedule was developed
37	Motivation for forming into group	The schedule was developed
38	Team spirit	The schedule was developed
39	Income generating activities of FPOs	Semi-structured schedule was developed
40	Linkage with government organisations	Open ended questions
41	Linkage with non-government organisations	Open ended questions
42	Constraints	Semi-structured schedule developed

3.4.2 Operationalisation and measurement of variables

The appropriate variables for the present study were identified based on the objectives of the study, review of literature and discussion with experts. Details of the variables and their measurements were mentioned below.

3.4.2.1 Dependent variables

3.4.2.1.1 Knowledge:

Knowledge in this study was operationalised as the amount of information and understanding possessed by the respondents about red gram cultivation practices.

For measuring respondents' knowledge on red gram cultivation practices, a knowledge test was developed by implementing the following procedure.

A) Construction and standardisation of knowledge test on red gram cultivation practice.

(a) Collection of items

Initially, 100 items were collected focusing on various aspects of red gram cultivation practices. Experts in the field of agriculture viz., Agronomists, scientists of KVKs, agricultural officers and NGO officials working in field level were consulted to collect the above 100 items. After screening, fine-tuning and editing based on the opinion of the concerned scientists, 76 items were retained. These 76 items were subjected to item

analysis to screen some more items based on the opinion of the respondents in the non-sampling area.

(b) Item analysis

The item analysis was carried out in terms of item difficulty index, item discrimination index and point bi-serial correlation. The index of item discrimination provides information on how well an item discriminates in agreement that is whether an item really discriminates a well-informed respondent from a poorly informed respondent. Whereas the item difficulty index indicates the extent to which an item was difficult. The point bi-serial correlation provides information on how well item measures or discriminates in agreement with the rest of the test.

Pretesting of the items was done as suggested by Gonard (1948). The items were revised and administered to 60 respondents selected for the purpose of pretesting.

(c) Item difficulty index (P)

The 76 items consisting of fill up the blanks, yes/no, true/false, one-word answer and multiple choice items were administered to 72 respondents from the non-sampling area. The scores allotted were one for a correct response and zero for an incorrect response. After computing the total score obtained for each of the 72 respondents on 76 items, they were arranged in order from highest to lowest. Based on which the 72 respondents were then divided into six equal groups. These groups were labeled as G₁, G₂, G₃, G₄, G₅, and G₆ with 12 respondents in each group. For the purpose of item analysis, the middle two groups G₃ and G₄ were eliminated keeping only four extreme groups with high and low scores. (Bloom *et. al.*1956). The index of difficulty was worked out as the percentage of the respondents answering an item correctly. The items with 'p' values ranging from 0.2 to 0.8 were considered for the final selection of the knowledge test.

(d) Item discrimination index (E 1/3)

The item discrimination index indicated by "E 1/3" which is calculated by the formula.

$$E \frac{1}{3} = \frac{(S1 + S2) - (S5 + S6)}{N/3}$$

Where S1, S2, and S5, S6 are the frequencies of correct answers in the groups G1, G2 and G5, G6 respectively. 'N' is the total member of respondents of the sample selected for the item analysis that is 72.

The discrimination index varies from 0 to 1. The items with the discrimination index ranging from 0.20 to 0.80 were selected for the final test.

(e) Point biserial correlation (r_{pbis})

The main aim of calculating point bi-serial correlation was to work out the internal consistency of the items i.e. the relationship of the total score to a dichotomized answer to any given item. In a way, the validity power of the item was computed by the correlation of the individual item of preliminary knowledge test calculated by using the formula suggested by Garret (1966).

$$r_{pbis} = \frac{MP - MQ}{SD} \times \sqrt{pq}$$

r_{pbis} = point bi-serial correlation.

MP = Mean of the total scores of the respondents who answered the item correctly.

$$MP = \frac{\text{Sum total of } xy}{\text{Total number of correct answers}}$$

MQ = Mean of the total scores of the respondents who answered the item incorrectly.

$$MQ = \frac{\text{Sum total of } x - \text{Sum total of } xy}{\text{Total number of wrong answers}}$$

SD = Standard deviation of the entire sample.

P = Proportion of the respondents giving the correct answer to the item.

$$P = \frac{\text{Total number of correct answers}}{\text{Total number of respondents}}$$

q = Proportion of the respondents giving incorrect answer to the item (or) $q = 1 - P$

X = Total score of the respondent for all items.

Y = Response of the individual for the items i.e. (Correct = 1; Incorrect = 0)

XY = Total score of the respondent multiplied by the response of the individual to the item. i.e. (Correct = 1; Incorrect = 0)

Items having significant point bi-serial correlation either at 1 per cent (or) 5 per cent level was selected for the final test of the knowledge.

(f) Representativeness of the test

Care to see that the test items selected finally covered the entire universe of respondent's knowledge on red gram cultivation practices.

(g) Total items selected

Out of 76 items, 34 items were finally selected based on

- i. Items with difficulty level indices ranging from 30 to 80.
- ii. Items with discrimination indices ranging from 0.2 to 0.8.
- iii. Items having significant point bi-serial correlation either at 1 per cent or 5 per cent level.

Items selected have range of 0.20 and 0.80 proportion correct. The average of these proportions is equal to $(0.80 + 0.20)/2 = 0.50$.

Thus, the finally selected knowledge test items comprised of 5 types of questions viz. true/false, multiple choice, fill up the blank questions, yes/no and one-word answer totaling to 60 items to measure the knowledge on red gram cultivation practice behavior. The selected items with P, E1/3, and r_{pbis} values are given in table Annexure II.

(h) Test-Retest reliability

The test was administered to 25 respondents separately with an interval of 15 days. The two sets of knowledge scores obtained by the farmers were correlated. The correlation coefficient ($r=0.83$) was highly significant indicating a high degree of dependability of the instrument for measuring knowledge of the farmers.

(i) Validity

The validity of the test items was tested by the method of point bi-serial correlation (r_{pbis}). The items with highly significant correlation coefficients either at 1 per cent (or) at 5 per cent level indicated the validity of the items of the knowledge test designed to measure the knowledge of the farmers on red gram cultivation practices.

Content validity

The content validity of the knowledge test was derived from a long list of test items representing the whole universe of red gram cultivation practices collected from various sources as discussed earlier. It was assumed that the score obtained by administering the knowledge test of this study measures what was intended to measure.

Thus the knowledge test developed in the present study measures the knowledge of farmers on red gram cultivation practices as it showed a greater degree of reliability and validity.

(j) Scoring pattern

The selected knowledge test items were presented under different types as yes/no, multiple choice and one word answers, true/false and fill up the blanks. The correct response to each test item was given a score of 'one' and incorrect response a score of 'zero', that the knowledge score of a respondent is the summation of scores of correctly answered items out of total test items. The possible knowledge score ranged from 0 to 34.

(k) Administration of the test

The final knowledge test with 34 items was administered to farmers. Each item in the knowledge test was read out to the respondents in the translated version (Kannada) by the investigator and the responses in the form of correct or incorrect answers were recorded. The correct answer was assigned a weight of 'one' and the incorrect with 'zero'.

(l) Scoring and categorisation

Based on the knowledge scores obtained, respondents were grouped into the following 3 categories by using the class interval technique. The class intervals were calculated based on maximum and minimum obtained scores.

Total score on knowledge test for a respondent was obtained by adding the scores obtained for all items present in the knowledge test. The maximum possible and minimum possible scores for knowledge tests of red gram were 0 to 34 respectively. The maximum and minimum obtained scores were 23 to 34 for members and 12 to 29 for non-members respectively. Based on obtained scores the respondents were grouped into low, medium and high knowledge categories according to equal interval method as shown below.

S. No.	Category	Score for members	Score for non-members
1	Low	23-26	12-17
2	Medium	27-30	16-23
3.	High	31-34	24-29

The results were expressed in the form of frequencies and percentages in results and discussion chapter.

3.4.2.1.1.1 Application of logistic regression analysis to study the relationship between knowledge and independent variables of members of FPO

The logistic regression model was exploited to study the effect of independent variables on the dependent variable that is knowledge level that is to identify the factors that could influence the knowledge of members on red gram cultivation practices.

R software was used as a statistical package for the analysis.

This section was divided into 3 sections. In the first section, the variables taken for the analysis were presented. Findings (2) and conclusions (3) of the analysis were presented in the results and discussion chapter.

3.4.2.1.2.1.1 Variables used for logistic analysis

In the present study, the selection of variables is done with a careful analysis of each variable. After running stepwise regression and analysing multicollinearity the variables were considered for the model fitting. For analysis purpose, the knowledge of members on red gram cultivation practices is defined as a dichotomous variable by assigning 1 for known and 0 for unknown.

In the present study 27 covariates such as age, education, caste, family size, farm size, income, indebtedness, farming experience, farm mechanisation status, participation, information seeking behaviour, leadership ability, capacity building, risk orientation, innovativeness, achievement motivation, self-confidence, communication behaviour, decision making ability, supportive environment, group cohesiveness, group leadership, group role differentiation, communication process in the group, group sustainability, critical issues and team spirit were considered and after checking significance and multicollinearity, eleven variables were selected for fitting the logistic model to predict their influence on the knowledge of members. All the variables were quantitative in nature except education and caste. For better prediction, some of the continuous variables were categorised using mean $\pm$ SD. Thus the variables included in the logit model were as follows.

(I) Dependent variable:

- (1) Knowledge of members: 1 if known, 0 unknown

(II) Independent (prediction) variables:

- (1) Age: low, medium and high (**medium** as reference category)
- (2) Education: Functional literate, primary, secondary, intermediate, undergraduate

(**illiterate** as reference category)

(3) Family size: low, medium and high (**low** as reference category)

(4) Farm size: low, medium and high (**medium** as reference category)

(5) Indebtedness: low, medium and high (**low** as reference category)

(6) Income: low, medium and high (**low** as reference category)

(7) Information seeking behavior: low, medium and high (**low** as reference category)

(8) Innovativeness: low, medium and high (**low** as reference category)

(9) Supportive environment: low, medium and high (**low** as reference category)

(10) Group cohesiveness: low, medium and high (**low** as reference category)

(11) Group sustainability: low, medium and high (**low** as reference category)

The model to predict the probability of increase in knowledge of members is

$$\text{Log} \left(\frac{\text{MKnow}}{1-\text{MKnow}} \right) = \beta_1 (\text{AgeLow}) + \beta_1 (\text{AgeHigh}) - \beta_2 (\text{Functional}) - \beta_2 (\text{Primary}) + \beta_2 (\text{Secondary}) + \beta_2 (\text{Intermediate}) + \beta_2 (\text{Undergraduate}) + \beta_3 (\text{FamilysizeMedium}) + \beta_2 (\text{FamilysizeHigh}) + \beta_4 (\text{FarmsizeLow}) + \beta_4 (\text{FarmsizeHigh}) + \beta_5 (\text{IndebtednessMedium}) + \beta_5 (\text{IndebtednessHigh}) + \beta_6 (\text{IncomeMedium}) + \beta_6 (\text{IncomeHigh}) + \beta_7 (\text{ISBMedium}) + \beta_7 (\text{ISBHigh}) + \beta_8 (\text{InnovativenessMedium}) + \beta_8 (\text{InnovativenessHigh}) + \beta_9 (\text{SupenvironmentMedium}) + \beta_9 (\text{SupenvironmentHigh}) + \beta_{10} (\text{GroupcohesivenessMedium}) + \beta_{10} (\text{GroupcohesivenessHigh}) + \beta_{11} (\text{GroupsustainabilityMedium}) + \beta_{11} (\text{GroupsustainabilityHigh})$$

Where,

MKnow is knowledge of members

ISB is information seeking behaviour.

Here the odds ratio Exp (B) represents the multiplicative effect of one unit change in independent variable on the odds of the dependent variable that is knowledge of members.

3.4.2.1.2 The extent of adoption:

Adoption is the acceptance and application respondent of some or all the practices recommended for selected crops, by respondents.

The extent of adoption was operationally defined as the number of practices adopted by respondent out of the total number of recommended practices in red gram cultivation expressed in terms of percentage. An adoption schedule is prepared to measure the extent of adoption.

Scoring and categorisation:

Each practice adopted by a respondent was given a score of 3 for full adoption, 2 for partial adoption and 1 for no adoption.

Based on the scores obtained, the respondents were grouped into low, medium and high adoption categories based on equal class interval method. The maximum and minimum possible score was 1 to 93 respectively. For the maximum and minimum obtained scores were 49 to 78 respectively for members and 30 to 59 for non-members.

The results were expressed in the form of frequencies and percentages while the presentation of results.

S. No.	Category	Score for members	Score for non-members
1	Low	49-58	30-39
2	Medium	59-68	40-49
3.	High	69-78	50-59

3.4.2.1.2.1 Application of logistic regression analysis to study the relationship between adoption and independent variables of members of FPO

In this section, the logistic regression model is exploited to study the effect of independent variables on the dependent variable that is the adoption of red gram cultivation practices. That is to identify the factors that could determine the extent of adoption of red gram cultivation practices by members.

R software was used as a statistical package for the analysis.

This section was divided into 3 parts. In the first section, the variables taken for the analysis were presented. Findings (2) and conclusions (3) of the analysis were presented in the results and discussion chapter.

3.4.2.1.2.1.1 Variables used for logistic analysis

The selection of variables was done with a careful analysis of each variable. After running stepwise regression and analysing multicollinearity the variables with significance as well as variables showing non-multicollinearity were considered for the

model fitting. For analysis purpose, the adoption of red gram cultivation practices by members was defined as a dichotomous variable by assigning 1 for adopted and 0 for non-adopted.

In the present study 28 covariates such as age, education, caste, family size, farm size, income, indebtedness, farming experience, farm mechanisation status, participation, information seeking behaviour, leadership ability, capacity building, risk orientation, innovativeness, achievement motivation, self-confidence, communication behaviour, decision making ability, supportive environment, group cohesiveness, group leadership, group role differentiation, communication process in the group, group sustainability, critical issues in groups, team spirit, and knowledge of members were considered and after checking significance and multicollinearity, ten variables were selected for fitting the logistic model to predict their effect on the adoption of members. All the variables were quantitative in nature except education, caste, and knowledge. For better prediction, some of the continuous variables were categorised using mean $\pm$ SD. Thus the variables included in the logit model were as follows:

(I) Dependent variable:

- (1) Adoption of red gram cultivation practices by members: 1 if adopted, 0 otherwise

(II) Independent (prediction) variables:

- (1) Age: low, medium and high (**high** as reference category)
- (2) Family size: low, medium and high (**high** as reference category)
- (3) Farm size: low, medium and high (**low** as reference category)
- (4) Indebtedness: low, medium and high (**low** as reference category)
- (5) Income: low, medium and high (**low** as reference category)
- (6) Innovativeness: low, medium and high (**low** as reference category)
- (7) Group cohesiveness: low, medium and high (**low** as reference category)
- (8) Group sustainability: low, medium and high (**low** as reference category)
- (9) Supportive environment: number
- (10) Knowledge level of members: (**low** as reference category)

The model to predict the probability of an increase in adoption by members was

$$\log\left(\frac{M_{\text{Adopt}}}{1-M_{\text{Adopt}}}\right) = \beta_1 (\text{AgeLow}) + \beta_1 (\text{AgeMedium}) + \beta_2 (\text{FamilysizeLow}) + \beta_2 (\text{FamilysizeMedium}) + \beta_3 (\text{FarmsizeMedium}) + \beta_3 (\text{FarmsizeHigh}) + \beta_4 (\text{IndebtednessMedium}) + \beta_4 (\text{IndebtednessHigh}) + \beta_5 (\text{IncomeMedium}) + \beta_5 (\text{IncomeHigh}) + \beta_6 (\text{InnovativenessMedium}) + \beta_6 (\text{InnovativenessHigh}) + \beta_7 (\text{GroupcohesivenessMedium}) + \beta_7 (\text{GroupcohesivenessHigh}) + \beta_8 (\text{GroupsustainabilityMedium}) + \beta_8 (\text{GroupsustainabilityHigh}) + \beta_9 (\text{Supenvironment}) + \beta_{10} (\text{KMMedium}) + \beta_{10} (\text{KMHigh})$$

Where,

MAdopt is adoption by members.

Here the odds ratio Exp (B) represents the multiplicative effect of one unit change in independent variable on the odds of the dependent variable that is adoption by members.

3.4.2.2 Independent variables

3.4.2.2.1 Age:

It was operationalised as a total number of years completed from date of birth by the respondent (members and non-members) at the time of the investigation.

Scoring and categorisation:

A weight of one was given for each completed year of the respondent. The respondents were grouped into three categories based on the equal interval method. The results were expressed in the form of frequencies and percentages at the time of presentation of results.

Sl. No.	Category	Score
1.	Young age	Below 35 years
2.	Middle age	36-55 years
3.	Old age	>56 years

3.4.2.2.2 Education:

It was operationally defined as the number of years of formal schooling attained by the respondent at the time investigation.

Scoring and categorisation:

The scores were assigned to calculate the literacy level of respondents as given below and the respondents were also grouped into the following categories. The educational status of red gram cultivation practicing farmers was noted against the category composed of the following.

Sl. No.	Category	Score
1.	No schooling / Illiterate	0
2.	Functional literate	1
3.	Primary school	2
4.	High school	3
5.	Intermediate	4
6.	Undergraduate	5

3.4.2.2.3 Caste

It was operationalised the social category to which the respondent belonged. The categorisation of scheduled caste and most backward and forward castes was done as per the listing was done by village panchayat. The dominant class categorisation was done as per the existing caste domination in the village.

Scoring and categorisation:

The scores were assigned to calculate the caste status of respondents as given below. The caste status of red gram cultivation practicing farmers was noted against the category composed of the following.

Sl. No.	Category	Score
1.	Others	0
2.	Minority	1
3.	ST	2
4.	SC	3
5.	OBC	4
6.	General	5

3.4.2.2.4 Family size

Family size was operationalised as the total number of individuals present in a family. It was measured in terms of a total number of members in a family, the

composition of male and female and the family type. Beneficiary families are classified into three kinds of categories based on the total number, family type as well as sex composition.

Sl. No.	Category	Score
1.	Small family	<5 members
2.	Medium family	5-8 members
3.	Large family	>8 members
a)	Nuclear	Family including married couples and unmarried children
b)	Joint	Family consisting of married couples and married children
i)	Male	Frequency
ii)	Female	Frequency
iii)	Total	Frequency

3.4.2.2.5 Farm size:

The farm size was operationalised as the number of standard acres possessed by the respondents at the time of conducting the study. The details of land possessed by the respondents under different categories were converted into standard acres based on the Karnataka State Agricultural Land Reforms Act (1973) as one acre of wetland equal to 2.5 acres of dry land and 2.5 acres equivalent to 1ha.

Scoring and categorisation:

The scores were assigned to calculate farm size of respondents as given below and the respondents were also grouped into the following categories. The farm size of red gram cultivation practicing farmers was noted against the category composed of the following.

Sl. No.	Category	Score
1.	Marginal	<1 ha
2.	Small	1-2 ha
3.	Semi medium	2-4 ha
4.	Medium	4-10 ha
5.	Large	>10 ha

3.4.2.2.6 Farming experience:

It was operationalised as the number of years, completed by a respondent in farming.

Scoring and categorisation:

A score of one was assigned for each completed year of experience in farming. The respondents were grouped into low, medium and high farming experience categories based on equal class interval method. The results were expressed in the form of frequencies and percentages at the presentation of results.

Sl. No.	Category	Score for members
1	Low	Less than 15 years
2	Medium	16-30 years
3	High	More than 31 years

3.4.2.2.7 Farm mechanization status:

This variable was operationalised as the extent of possession of farm implements by the respondents.

Scoring and categorisation:

Three response categories namely 'owned, taken on rent and non-available' were provided with weights of 3, 2 and 1 respectively. All the score on sub items were summed up to get the total score. Based on the total scores obtained by the respondents they were grouped into three categories viz., low, medium and high.

S. No.	Category	Score
1	Low	12-16
2	Medium	17-21
3.	High	22-26

3.4.2.2.8 Total annual income:

Total annual income was operationally defined as the total amount of money earned in rupees per year, derived from all sources.

Scoring and categorisation:

The total annual income for each respondent was calculated and based on the total scores obtained the respondents were grouped into five categories viz; very low, low, medium, high and very high as presented below.

S. No.	Category	Score
1	Very low	Less than ₹ 904823.9
2	Low	₹ 904824 - 1809647.8
3.	Medium	₹ 1809647.9 - 2714471.7
4.	High	₹ 2714471.8 - 3619295.6
5.	Very high	More than ₹ 3619295.7

3.4.2.2.9 Indebtedness:

Indebtedness was operationally defined as the total amount of credit taken by the respondents in rupees from the financial institutions such as banks, landlords etc.

Scoring and categorisation:

The total indebtedness for each respondent was calculated and based on the total scores the respondents were grouped into five categories viz; very low, low, medium, high and very high as presented below.

S. No.	Category	Score
1	Very low	Less than ₹ 50000
2	Low	₹ 50001-100000
3.	Medium	₹ 100001-150000
4.	High	₹ 150001-200000
5.	Very high	More than ₹ 200001

3.4.2.2.10 Participation in group / community activities

It was operationally defined as the extent of involvement of respondents including members and non-members in the group as well as community-related activities.

Scoring and categorisation:

Three response categories namely 'frequently, occasional and never' were provided with weights of 3, 2 and 1 respectively. All the score on sub items were summed up to

get the total score. The obtained range of score on the scale for respondents were 14 to 24. The respondents were classified into three categories as given below by using the class interval technique.

S. No.	Category	Score
1	Low	14-17
2	Medium	18-21
3.	High	22-24

3.4.2.2.11 Information seeking behavior:

This variable was operationalised as the extent of exposure of respondent to sources such as informal sources, formal sources and others about red gram cultivation practice.

Scoring and categorisation:

Three response categories namely 'frequently, occasional and never' were provided with weights of 3, 2 and 1 respectively. All the score on sub items were summed up to get the total score. The obtained range of score on the scale was 11 to 25. The respondents were classified into three categories as given below by using the class interval technique.

S. No.	Category	Score
1	Low	11-15
2	Medium	16-20
3.	High	21-25

3.4.2.2.12 Leadership ability

It is operationalised as the ability of an individual to influence his or her followers to establish and accomplish a goal or goals.

S. No.	Category	Score
1	Low	17-20
2	Medium	21-24
3.	High	25-28

This variable was measured with the help of the scale developed by Sri Manga with suitable modifications. It consisted of 10 items arranged on a three point continuum of agree, undecided and disagree with a scoring of 3, 2 and 1 for positive statements. The

obtained range of score on the scale was 17 to 28. Based on these scores the respondents were categorised into three groups by adopting exclusive class interval range.

3.4.2.2.13 Capacity building

This variable was operationalised as the ability of the respondents to develop skills and capabilities to deal with farming activities.

This variable was measured with the help of the scale consisted of 5 items arranged on a three point continuum of agree, undecided and disagree with a scoring of 3, 2 and 1 for positive statements. The obtained range of score on the scale was 8 to 15. Based on these scores the respondents were categorised into three groups as presented below by adopting exclusive class interval range.

S. No.	Category	Score
1	Low	8-10
2	Medium	11-13
3.	High	14-16

3.4.2.2.14 Risk orientation:

This variable was operationalised as the degree to which the farmer was oriented towards risk and uncertainty and has the courage to face the problems in the adoption of red gram cultivation practices in crop production.

Scoring and categorisation:

The scale developed by Supe (1969) with suitable modifications was used for quantifying the variable. The scale consisted of seven statements. The response categories were ‘agree’, ‘undecided’ and ‘disagree’ with the scores of 3, 2, and 1 for positive. The score obtained by a respondent for all the statements is computed to an obtained a total score of that respondent on risk orientation.

S. No.	Category	Score
1	Low	12-15
2	Medium	16-19
3.	High	20-23

The obtained range of score on the scale was 12 to 23. Based on the scores obtained respondents were grouped into low, medium and high-risk orientation categories based on equal class interval method.

3.4.2.2.15 Innovativeness:

This was operationalised as the degree to which the individual adopts red gram cultivation practices relatively earlier than others in his/her social system.

Scoring and categorisation:

This variable was measured with Feaston (1968) scale with suitable modifications. This scale consists of 8 items, among them 5 were positive score and 3 were negative items. In this scale, each item was rated on the three-point continuum agree, undecided, and disagree. A score of 3, 2 and 1 was given for positive items and 1, 2 and 3 was given for negative statements.

The maximum and minimum obtainable score for innovativeness was 12 and 20 respectively. The farmers were categorised into 3 groups based on class interval technique.

S. No.	Category	Score
1	Low	12-14
2	Medium	15-17
3.	High	18-20

3.4.2.2.16 Achievement Motivation

This variable was operationalised as the need for excellence to attend a sense of personal accomplishment.

S. No.	Category	Score
1	Low	10-12
2	Medium	13-15
3.	High	16-18

This variable was measured with the help of the scale developed by Rani (1985). The scale consisted of six items arranged on a 3 point continuum of agree, undecided and disagree with a scoring of 3, 2 and 1 for positive statements. The maximum and minimum obtainable score for achievement motivation was 10 and 18 respectively. Based on these

scores the respondents were categorised into three groups by adopting exclusive class interval range.

3.4.2.2.17 Self confidence

It was operationalised as the ability of the respondents to cope up with changing conditions and ability to conduct oneself during difficult situations

This variable was measured with the help of the scale consisted of 8 items arranged on a 3 point continuum of agree, undecided and disagree with a scoring of 3, 2 and 1 for positive statements. The maximum and minimum obtainable score for innovativeness was 11 and 22 respectively. Based on these scores the respondents were categorised into three groups by adopting exclusive class interval range.

S. No.	Category	Score
1	Low	11-14
2	Medium	15-18
3.	High	19-22

3.4.2.2.18 Communication behaviour

It was operationalised as the ability of the respondents to comprehend, interpret and analyse verbal as well as non-verbal messages.

This variable was measured with the help of the scale consisted of seven items arranged on a 3 point continuum of agree, undecided and disagree with a scoring of 3, 2 and 1 for positive statements. The maximum and minimum obtainable score for innovativeness was 11 and 21 respectively. Based on these scores the respondents were categorised into three groups by adopting exclusive class interval range.

S. No.	Category	Score
1	Low	11-14
2	Medium	15-18
3.	High	19-22

3.4.2.2.19 Decision making power

It was operationalised as the ability to take decisions / choices from among the alternatives which affect their lives. This variable was measured with the help of the scale consisted of six items arranged on a 3 point continuum of agree, undecided and disagree

with a scoring of 3, 2 and 1 for positive statements. The maximum and minimum obtainable score for innovativeness was 10 and 18 respectively. Based on these scores the respondents were categorised into three groups by adopting exclusive class interval range.

S. No.	Category	Score
1	Low	10-12
2	Medium	13-15
3.	High	16-18

3.4.2.3 Situational variables

3.4.2.3.1 Market facilities

Market facilities are operationalised as the sum total of all the facilities including market information, procurement, transportation, storage, processing and financial facilities obtained by the respondents for getting forward as well as backward linkages. In addition to that, the actors in the marketing channel were also studied.

3.4.2.4 Formation of FPOs

The formation of each FPO was documented in terms of process of initiation, problems faced by the initiating agencies during the formation. The process was presented in the descriptive manner whereas the problems faced were analysed and ranked using Garret ranking method.

3.4.2.5 Structural characteristics of FPOs

Structural characteristics were assessed in terms of organisational composition, working age of the organisation, membership, group size, literacy level, heterogeneous caste composition, financial assistance, training received, frequency of group meetings and supportive environment of the FPO for the effective functioning.

3.4.2.5.1 The organisational structure of FPO

It was operationalised as the chronological arrangement of all the stakeholders involved in the functioning of each FPO.

3.4.2.5.2 Working-age of the group

It was operationally defined as the duration or period of working of an FPO. Each year of the working of an organisation was given a score of 1 for calculating the working age of score of each FPO. Based on the period of working, the FPO were classified.

3.4.2.5.3 Group size

The size of the group was operationally defined as the total number of members in each FPO at the time of investigation.

3.4.2.5.4 The literacy level of the group

It was operationally defined as the average educational status of all the members of each FPO. It was calculated by counting the number of members who can read and write

3.4.2.5.5 Heterogeneous caste composition

It was operationalised as the varied caste composition of each FPO in terms of their extent of heterogeneity. The procedure followed by Sri Manga was adopted for measuring it. The variable was measured with the help of an 'index of qualitative variation' (IQV) developed by Simon Thai (1984). The general procedure followed for the study was presented below.

For an FPO with 20 members and four caste categories, the frequency of maximum possible variation in each category will be five members. The IQV can be calculated as follows:

Caste composition of FPO	Frequency	The frequency for a maximum possible score
SC	7	5
ST	4	5
OBC	6	5
Gen	3	5

$$IQV = \frac{\text{Total observed pairs}}{\text{Maximum possible pairs}} \times 100$$

$$\text{Total observed pairs} = (7 \times 4) + (7 \times 6) + (7 \times 3) + (4 \times 6) + (4 \times 3) + (6 \times 3) = 145$$

$$\text{Maximum possible pairs} = (5 \times 5) + (5 \times 5) + (5 \times 5) + (5 \times 5) + (5 \times 5) + (5 \times 5) = 150$$

$$IQV = \frac{145}{150} \times 100 = 96 \text{ per cent}$$

The FPOs were classified into five categories based on the extent of heterogeneity as follows:

S. No.	Category	Score
1	Very less heterogeneous	Up to 20
2	Less heterogeneous	20-40
3	Average heterogeneous	40-60
4	Highly heterogeneous	60-80
5	Very high heterogeneous	Above 80

3.4.2.5.6 Financial assistance obtained

It was operationally defined as the sources of finance on which the FPOs were dependent on to conduct their day to day operations.

3.4.2.5.7 Training received:

It was operationalised as a number of trainings received by the respondent of each FPO. The purpose for which training was received were also indicated.

Scoring and categorisation:

Based on the data, the respondents were categorised into three groups viz., low training, medium and high training. The results were expressed in the form of frequencies and percentages during the presentation of results.

S. No.	Category	Score
1	Low	< 2 Trainings
2	Medium	3-4 Trainings
3	High	> 4 Trainings

3.4.2.5.8 The frequency of group meetings

It was operationally defined as the regularity of conduct of meetings by FPOs in terms of weekly, fortnightly, monthly, bimonthly or above for performing or discussing various activities and issues. The details about the type of stakeholders involved and the nature of activities conducted during the meetings were described in this variable.

3.4.2.5.9 Supportive environment

It was operationally defined as the adequacy of supportive facilities and opportunities available to members under each FPO. To measure this variable, an index developed by Sri Manga (1999) with suitable modifications was used.

Set of 8 statements were framed with a three-point continuum of highly adequate, somewhat adequate and not adequate with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score in a supportive environment. The obtained maximum and minimum scores were 15 and 20 respectively.

Based on the scores obtained, FPOs were grouped into low, medium and high supportive environment categories based on equal class interval method.

S. No.	Category	Score
1	Low	15-16
2	Medium	17-18
3.	High	19-20

3.4.2.6 Functional characteristics

3.4.2.6.1 Governance and management

It was operationalised as the activities involved in effective administration and management of all the activities of FPOs. It mainly focussed on planning, controlling, coordination, monitoring, and evaluation of activities of the FPOs and actors involved in performing them.

3.4.2.6.2 Group cohesiveness

It was operationalised as the amount of unity in the group in terms of interpersonal attractions, the ability of the member to get along with psychological or social interactions, feelings of loyalty, pride, cooperation and identification with the group. The scale employed by Sri Manga (1999) with suitable modifications was used for variable measurement.

A set of seven statements was framed with a three-point continuum of highly adequate, somewhat adequate and not adequate with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on group cohesiveness. The obtained maximum and minimum scores were 13 and 21 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	13-15
2	Medium	17-18
3.	High	19-21

3.4.2.6.3 Group leadership

It was operationalised as the nature and quality of leadership prevalent in the group for effective functioning. The scale employed by Sri Manga (1999) with suitable modifications was used for variable measurement.

This variable was measured through ten statements on a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on group leadership. The obtained maximum and minimum scores were 15 and 32 respectively. These scores were classified into three categories based on equal class interval

S. No.	Category	Score
1	Low	15-20
2	Medium	21-26
3.	High	27-32

3.4.2.6.4 Group role differentiation

It was operationally as the extent of division and distribution of group tasks and responsibilities among group members. The scale employed by Sri Manga (1999) with suitable modifications was used for variable measurement.

This variable was measured through ten statements on a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on group role differentiation. The obtained maximum and minimum scores were 12 and 23 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	12-15
2	Medium	16-19
3.	High	20-23

3.4.2.6.5 Group communication

It was operationalised as the nature and extent of information flow across the group members regarding the interpersonal communication occurring within the group. The

scale employed by Sri Manga (1999) with suitable modifications was used for variable measurement.

This variable was measured through ten statements on a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on group communication. The obtained maximum and minimum scores were 24 and 32 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	24-26
2	Medium	27-29
3.	High	30-32

3.4.2.6.6 Group sustainability

This variable was operationally defined as the various strategies employed by the group to sustain its existence. The index developed by Preeti Manukonda (2011) with suitable modifications was employed measurement of this variable.

A set of seven statements were framed with a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on group sustainability. The obtained maximum and minimum scores were 13 and 21 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	13-15
2	Medium	17-18
3.	High	19-21

3.4.2.6.7 Critical issues of group meetings

It was operationally defined as the problems aroused during the meetings of FPOs.

A set of seven statements were framed with a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on critical issues. The obtained maximum and

minimum scores were 7 and 18 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	7-10
2	Medium	11-14
3.	High	15-18

3.4.2.6.8 The motivation for forming into groups

It was operationalised as the reasons which motivated the members of each FPO to join or form into a group. The members were asked to specify the reasons which motivated them to join the group and the results were presented in a descriptive manner.

3.4.2.6.9 Team spirit

It was operationally defined as the extent of group belongingness and collective actions of each FPO member versus other group members in taking group decisions and solving group problems.

A set of six statements were framed with a three-point continuum of agree, undecided and disagree with a scoring pattern of 3, 2 and 1. The total score of statements is added to get each respondent's score on team spirit. The obtained maximum and minimum scores were 12 and 20 respectively. These scores were classified into three categories based on equal class interval.

S. No.	Category	Score
1	Low	12-14
2	Medium	15-17
3.	High	18-20

3.4.2.7 Network linkages

3.4.2.7.1 Government organisations

It was operationally defined as the linkages established by the FPOs with various government organisations. The stakeholders of each FPO were asked to specify the organisations with which the FPOs were associated with, the frequency of visits and the purpose of the association. The network of linkages was presented in a descriptive form as well as through a venn diagram.

3.4.2.7.2 Non-governmental and/or private organisations

It was operationally defined as the linkages established by the FPOs with various non-government and private organisations. The stakeholders of each FPO were asked to specify the organisations with which the FPOs were associated with as well as the purpose of the association. The network of linkages was depicted in the venn diagram.

3.4.2.8 Income generation aspects of respondents of FPO

In the present study, Income generation aspects provide comprehensive understanding of FPOs ability of changing livelihood of its members in financial terms. The difference in impact of FPOs intervention of income generation of members and non-members is studied in this objective. This was measured in three sections namely

- a) The difference in cost and returns of red gram cultivation for members and non-members: Z test was used to find the significance of costs and returns of red gram cultivation between members and non-members. Cobb-Douglas production function was used to find the influence of membership on returns of red gram cultivation.

3.4.2.8.1 Cobb-Douglas production function

Cobb Douglas production function was employed to find out the influence of variable costs on the yield of red gram. Variables like costs of FYM, seed, seed treatment, urea, DAP, pesticides, labour, and machine labour and other costs were taken into study. A dummy variable was introduced to find out the effect of membership of respondents on the yield of red gram cultivation. R software was utilized to find out log-log production function. The usual form of the function is as follows.

$$Y = a x_1^{b_1} x_2^{b_2} x_3^{b_3} \dots x_n^{b_n}$$

Where,

Y = output

$x_1, x_2, x_3, \dots, x_n$ = Input factors

$b_1, b_2, b_3, \dots, b_n$ = Regression coefficients or production elasticities.

a = Intercept

The log form of function would be

$$\text{Log } Y = \log a + b_1 \log x_1 + b_2 \log x_2 \dots b_n \log x_n$$

The function is fitted by means of Least Square Estimates (LSE) and significance of the regression is tested by analysis of variance and partial regression co-efficient are

tested through estimation of standard errors by deriving 't' values for comparison at 10 per cent, 5 per cent and one per cent levels of probability.

- b) Input services received by the members and their comparison with market costs: Here the difference in amount of costs was calculated.
- c) Income raising interventions or business plans of FPOs: The interventions of each FPO was documented in descriptive manner.

3.4.2.9 Constraints and suggestions perceived by the respondents

3.4.2.9.1 Constraints perceived by the respondents:

Constraints perceived by the respondents were operationally defined as problems faced by respondents in the adoption or implementation of different red gram cultivation practices as well as the functioning of FPOs.

The statements were analysed based on a three-point continuum of most serious, serious and not serious with a scoring pattern of 3, 2, and 1. The weighted mean score was calculated and ranked in the order of magnitude. The problem perceived by most of the respondents would become the first problem and rest follow in the order of magnitude.

3.4.2.9.2 Suggestions of the respondents:

Suggestions given by the respondents were operationally defined as solutions given by the respondents for overcoming the problems expressed by them. Frequencies and percentages were calculated and ranking was given in the order of magnitude.

3.4.2.10 Some of the terminologies used in the study

3.4.2.10.1 Lead farmers

These are the farmers who helped the resource institutes to identify and mobilise the red gram cultivators during the formation of FIGs and FPOs.

3.4.2.10.2 Members

The farmers who have enrolled as the shareholders of FPOs by paying the membership fee.

3.4.2.10.3 Non-members

The farmers who have not enrolled as the shareholders of FPOs by paying the membership fee.

3.4.2.10.4 Non-shareholders

The farmers who are getting the benefits of FPOs without being shareholders.

3.5 Method of Data Collection

3.5.1 Personal interview

Each selected respondent was personally contacted and interviewed with the help of the interview schedule. It was made sure that the questions were correctly understood by the respondent by repeating the questions wherever necessary. Observation of the respondent's background, behavior, emotions, feelings, ideas, aspirations, and surroundings were also made use of during the interview. Telephone and mobile phones were also used for collecting data verbally from respondents who were out of a location on the day of data collection and having these facilities plus the researcher having their contact numbers. Use of interviewers encourages sample persons to respond, leading to higher response rates.

3.5.2 Research methods

For the collection of primary data for this research work, survey and observation methods have been used. These two methods are explained below:

3.5.2.1 Survey method

The survey is used to collect quantitative information about items in a population. Surveys are used in different areas for collecting the data even in the public and private sectors. This survey is conducted within the field of study. The respondents were contacted personally or telephonically. The data collected through this method are standardised and relatively free from several types of errors.

3.5.2.2 Observation method

Observation is a complex research method because it often requires the researcher to play a number of roles and to use a number of techniques; including her/his five senses, to collect data. The observer puts himself in the actual situation and watches carefully.

Out of available methods for collecting primary data, survey and observation methods have been found suitable for the topic study. These have fulfilled the requirements for data collection properly.

3.5.3 Statistical Tools Used for Analysis of the Data

3.5.3.1 Frequency and percentage

The data were subjected to frequencies and used to know the distribution of the respondents according to the selected variable.

Frequency is the number of items a variable is repeated.

The percentage is the number, amount, rate etc. expressed as if it is part of a total which is 100.

3.5.3.2 Class interval

$$CI = \frac{\text{Maximum score} - \text{minimum score}}{\text{Number of classes}}$$

Under exclusive type of class intervals, the items whose values are equal to the upper limit are grouped in the next higher class.

3.5.3.3 Arithmetic mean ($\bar{X}$)

The mean is the quotient that results when addition of all the items in the series is divided by the number of items.

$$\bar{X} = \frac{\sum x}{n}$$

Where,

$$\bar{X} = \text{Mean}$$

$$\sum x = \text{Sum of all the items}$$

$$n = \text{Number of items}$$

3.5.3.4 Standard deviation

Standard deviation is the square root of the mean of the squares of the deviation from the means of the distribution, which is calculated with the formula given below:

$$\sigma = \frac{1}{n} \left[\sum x^2 - \frac{(\sum x)^2}{n} \right]$$

Where σ = Standard deviation

$$\sum x = \text{Sum of the deviation of the scores from the mean}$$

$$\sum = \text{Summation}$$

$$n = \text{Number of items}$$

$$\sum x^2 = \text{Sum of squares of all items}$$

$$(\sum x)^2 = \text{Square of summation of all the items}$$

3.5.3.5 Henry Garrett ranking technique

Henry Garrett ranking technique was used to assess the reasons for members enroll in FPOs and the reasons for non-members to reject enrolment. In this technique, the respondents were asked to rank the given attribute according to the magnitude of the problem. The orders of merit given by the participants were converted into ranks by using the following formula.

$$\text{Per cent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for the i^{th} item j^{th} individual

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

The percentage position of each rank obtained was converted into scores by referring to the table given by Henry Garrett. Then for each factor, the scores of individual respondents were added together and divided by the total number of respondents for whom the scores were added. The mean scores for all the factors were arranged in the order of their ranks and inferences were drawn.

3.5.3.6 Weighted mean score

A weighted mean is the average of values which are scaled by importance. The weighted average of values is the sum of weights times values divided by the sum of the weights. The formula used was

$$\bar{X}_w = \frac{\sum w_i X_i}{\sum w_i}$$

Where,

$\bar{X}_w$ = weighted mean score,

w_i = weight of i^{th} item and

X_i = value of the i^{th} item X.

3.5.3.7 Z test

Two sample z test was used to find the significant difference between means of two samples that is members and non-members.

The formula used was

$$Z = \frac{\bar{x}_1 - \bar{x}_2 - \Delta}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Where,

$\bar{x}_1$ and $\bar{x}_2$ are the means of the two samples.

Δ is the hypothesised difference between the population means (0 if testing for equal means),

σ_1 and σ_2 are the standard deviations of the two populations, and

n_1 and n_2 are the sizes of the two samples.

3.6 Preparation of Report

The data thus collected through interview schedule were coded, tabulated, analysed and presented in tables to make findings easily understandable. The findings emerged out of data were suitably interpreted, necessary conclusions and inferences were drawn.

Chapter IV

RESULTS AND DISCUSSION

In this chapter, the empirical data obtained through research have been analysed in the context of objectives by subjecting them to appropriate statistical and analytical tests and the findings thus arrived are presented under the following subheads.

4.1 To Study the Formation and Functional Aspects of Farmer Producer Organisations.

4.1.1 Process of formation, structural and functional aspects of FPOs.

This section explains the process involved in the formation, structural and functional aspects of FPOs in the study area.

4.1.1.1 Process of formation.

The initiation of FPOs was started by the resource institutions (NGOs) with the identification of certain drawbacks in the areas such as

- The farmers were unaware of most of the recommended cultivation practices
- Over-exploitation by the middlemen and,
- Low price realization by the red gram growers.

These FPOs were formed under a 2-year programme wherein only the resources institutions got financial assistance.

The process of formation of RKPCL, NKPCL, and BKPCL was similar as they were guided by the same NGO i. e. VLRC. As the area has a high potential for higher productivity, the resource institute had identified a cluster of villages in each of the talukas of Kalaburagi, Aland, and Sedam. One of the important considerations during the formation was establishing Farmer Interest Groups (FIG) and aggregating them into FPO. Under the guidance of SFAC, VLRC had aggregated pulse growing farmers into FIG. A dedicated staff of VLRC with the help of local panchayat members and key informants sensitized FIGs on the concept of producer companies. By establishing the confidence of FIGs on SFAC and concept of producer companies, VLRC had started aggregating FIGs to raise minimum working capital and guiding the FPOs. VLRC also helped in the registration of FPOs under Producer Company's act 1956. However, the process of registration took more than a year.

Whereas the process of formation of JKSMCL and BSMCL was assisted by Indian Society of Agribusiness Professionals (ISAP). ISAP also followed the same approach as that of VLRC to aggregate FIG into FPOs but their registration was done under Karnataka State Souharda Sahakari (Amendment) Act, 2012.

4.1.1.2 The general objectives of all the five FPOs were as follows:

- i) To increase the production and productivity of major pulse crops especially red gram in the area and increase the income levels, thus living standards of primary producers.
- ii) To strengthen the backward and forward linkages to encourage market-driven agriculture by the primary producers.

4.1.1.3 Basic objectives

- i) To make available all the quality inputs at a lower cost as compared to the local market at the doorsteps of farmers.
- ii) To create confidence among farmers about Good Agricultural Practices (GAPs) by conducting a demonstration in their fields.
- iii) To improve processing and value addition to crop produce.
- iv) To develop capacities and to provide financial assistance to the farmers to start agri-enterprises.
- v) To create awareness and improve knowledge about the latest technologies of farming.
- vi) To help the farmers in realizing better prices for their produce by exploring the state and national markets.
- vii) To conduct community development activities in the areas of FPO operation.

4.1.1.4 Details of the process of formation, location, registration date and number of individual FPOs.

4.1.1.4.1 Rohini Krushikara Producer Company Limited (RKPCL).

The VLRC with the assistance of SFAC selected 5 villages namely Dharmapur, Nandur (K), Nandur (B), Azadpur and Kesartgi and selected progressive and interested farmers as lead farmers by thorough discussions with gram panchayat members and other key informants in the villages. These lead farmers had aggregated farmers into farmer interest groups. After sensitizing the FIGs they were merged into an organisation called

rohini farmer producer organisation. Some of the lead farmers were selected as the board of directors and a president and a vice president were selected from among them. Dharmapur village was selected as the center of operation but due to its remoteness and lack of transportation and networking facilities, it was shifted to Nandur (K) village. After 2 years of operation, the organisation was registered under producer company act 1956 as RKPCL in the year 2013 with a corporate ID U01403KA2013PTC071774.

Table 4.1 Details of information about the formation of FPOs.

S N	Particulars	RKPCL	NKPCL	BKPCL	JKSMCL	BSMCL
1	Resource institute (NGO)	VLRC	VLRC	VLRC	ISAP	ISAP
2	Year of establishment	2011	2011	2011	2010	2010
3	Year of registration	18-11-2013	30-10-2013	5-10-2013	15-09-2012	14-05-2013
4	Registration ID number	U01403KA2013PTC071774	U01403KA2013PTC071625	U01403KA2013PTC071691	954/2012-13	3206/2013-14
5	Number of villages	5	5	6	10	10
6	Centre of operation	Nandur (K)	Munnalli	Mudhol	Halbarga	Sastapur

4.1.1.4.2 Nisarga Krushikara Producer Company Limited (NKPCL).

For the initiation of NKPCL, the VLRC had adopted the same approach as that of RKPCL. It was primarily a pulse based FPO, located in Munnalli village of Kalaburagi district. It was registered under the producer company act in 2013 with the corporate Id U014003KA2013PTC071625. VLRC was instrumental in the setting up of NKPCL and is continuing to play a crucial role in its functioning.

NKPCL was located across five villages namely Munnalli, Tadkal, Tambakwadi, Mamadapur, and Hallisalgar. Munnalli was located at a distance of 10 km from the city of Aland which was taluq of Kalaburagi district. Tadkal, Tambakwadi, Mamadapur, and Hallisalgar were located at a distance of 4 km, 7 km, 6 km, and 4 km respectively.

4.1.1.4.3 Balabheemasena Krushikara Producer Company Limited (BKPCL).

VLRC was instrumental in the setting up of BKPCL. It followed the same procedures as that of RKPCL and NKPCL to initiate BKPCL, a pulse based FPO was located in Munnalli village of Kalburagi district. It was registered under the producer company act in 2013 with the corporate Id U01403KA2013PTC071691 and VLRC is still associated with its operations.

The company had shareholders in five villages namely Mudhol, Ribbanapalli, Kadcherla, Bidarchad, Gundepalli, Kadlapur, and Gopanapalli. Mudhol was located at a distance of 10 km from the city of Sedam which was taluq of Kalaburagi district. Ribbanapalli, Kadcherla, Bidarchad, Gundepalli, Kadlapur, and Gopanapalli are located at a distance of 5 km, 5 km, 5 km, and 5 km respectively.

4.1.1.4.4 Jai Kisan Souharda Multipurpose Cooperative Limited (JKSMCL).

In 2010, 15 lead farmers were identified from 10 villages and provided 50 kg DAP, 3 kg red gram seeds, 5 kg zinc and the pesticides to grow in their farm as demonstration plots and conducted field days in their respective plots to attract the farmers. In 2011-12, two farmer interest groups of 15-25 members each was formed in each village. In 2012-13, ISAP aggregated these FIGs into a mahasangha called Jai Kisan FPO and registered it as Jai Kisan Souharda Multipurpose Cooperative Limited (JKSMCL) under Karnataka Souhardha Sahakari act, 1997 in the year 2012. The FPO located in Halbarga village located at a distance of 25 km from the Bhalki Taluq of Bidar district.

The JKSMCL was distributed across ten villages namely Tarnalli, Jhyanti, Kona Melkunda, Dhanur, Halli ippurga, Jainapur, Byalhalli, Tegampur and Kosam which are situated at a distance of 3 km, 8 km, 5 km, 4 km, 5 km, 8 km, 6 km, 5 km and 5 km from Halbarga respectively.

4.1.1.4.5 Basaveshwara Souharda Multipurpose Cooperative Limited (BSMCL).

The process of genesis of BSMCL was similar to that of JKMCL. BSMCL was an FPO located in Sastapur Bangla village located at a distance of 8 km from the Basavakalyan Taluq of Bidar district. It was registered under Karnataka State Souharda Sahakari act, 2012 in the year 2013. Indian Society of Agri-Business Professionals (ISAP), a social enterprise was instrumental in the establishment of BSMCL and was helping in the functioning of it.

The BSMCL was distributed across ten villages namely Hanumanth wadi, Erandgi, Chiknagaon, Halli, Sydapur, Gadigondagaon, Gokul, Mudbi and Atlapur which are located at a distance of 8 km, 5 km, 15 km, 2 km, 5 km, 15 km, 6 km, 12 km and 5 km from Sastapur respectively.

4.1.1.4.6 The whole process of formation of FPOs can be summarised in the following steps.

(a) Preparatory phase for identification and formation

- i) Identification of resource institute
- ii) Training of functionaries and personnel of resource institute

(b) Formation of groups

- i) Identification of clusters and conduct of baseline study
- ii) Identification of local leaders and selection of farmers
- iii) Organizing farmers into farmers interest groups through the process of conscientiousness
- iv) Aggregation of farmer interest groups into FPOs and creation of an organisational structure for FPOs
- v) Building trust, cooperation and continuous interaction with farmers by initiating socio-economic activities
- vi) Mobilizing farmers for participation in organisational activities and involving them in the creation of activity plans
- vii) Initiation of business activities and provision of forward and backward linkages by building an alliance with other supporting organisations.

The findings of the study are in line with the results of Bhattacharjee (2010).

4.1.1.4.7 Problems faced by the board of management of FPOs during initiation.

It was observed from the table 4.2 that about sixty per cent of the board of directors felt that they found difficulty in convincing the farmers at the beginning (61.02 %), followed by lack of coordination among members (52.54 %), delay in the registration (49.15 %) and so on. It could be because there was the reluctance from the farmer to join the organisation as they were supposed to pay a membership fee. Since farmers were aggregated from various villages there existed a difference of opinion. The NGOs had

established a good rapport with lead farmers as well as members hence there was a positive opinion about the guidance of NGOs.

Table 4.2 Problems faced by the board of management of FPOs during initiation. **N=59**

Sl. No.	Problems	F (%)	Rank
1	Difficulty in convincing the farmers	36 (61.02)	I
2	Lack of coordination among members	31 (52.54)	II
3	Delay in the registration of FPO	29 (49.15)	III
4	Non-cooperation from the family members	23 (38.98)	IV
5	Lack of adequate finance	12 (20.34)	V
6	Difficulty in maintaining the accounts and records	10 (16.95)	VI
7	Inappropriate guidance from NGO	8 (13.56)	VII

Values in parenthesis () indicate the percentage

4.1.1.4.8 The motivation for joining the group.

This included the reasons for joining the FPOs by the members. The factors of motivation for joining into the FPOs were analysed using Garret ranking method and presented in table 4.3.

It was noticed from the table 4.3 that majority of the respondents were enrolled as the members in the FPOs to get remunerative price for the produce (74.14) followed by getting quality inputs at lower cost (65.79), to get immediate payment (59.78), to get technical assistance for better cultivation (58.34) and for getting rid of difficulties in marketing their produce (50.40).

Results from the table clearly revealed that getting remunerative price was a major motivation and challenge for the members as they were exploited by middlemen and haphazard government policies of procuring the produce. The joining of FPOs mainly gave them a hope of getting MSP for their entire product.

The members were also facing problems such as lack of knowledge about purchasing relevant inputs and in addition to that majority of the landlords and other private agencies delayed the payment for procurement so the immediacy of payment through direct benefit transfer system had prompted members to join the FPOs.

Table 4.3 The rank order of factors influencing the enrolment of respondents into FPOs. N=150

Sl. No.	Factors influencing enrolment	Garret score	Rank
1	To get remunerative price	74.17	I
2	Immediate payment	59.79	III
3	To buy quality inputs at lower cost	65.79	II
4	To get technical assistance for better cultivation	58.34	IV
5	To get rid of difficulties in marketing the produce	50.40	V
6	To make use of assets and infrastructure facilities	47.71	VI
7	To get access to PHM facilities	40.37	VIII
8	To find out new employment/ income generating opportunities	42.37	VII
9	No political interference	36.08	IX
10	To improve household assets	23.97	X

4.1.1.4.9 Reasons for non-enrolment into the FPOs.

The factors affecting non-enrolment into the FPOs were analysed using Garret ranking method and presented in table 4.4.

Result in the table 4.4 revealed that majority of the non-members were not willing to join the FPOs because of high membership fees (68.43) followed by lack of credit facilities (61.17), lack of willingness from the peer groups (56.04), non-awareness about FPOs (54.96) and unable to cut association of transactions with landlords, traders, commission agents, etc. (50.93).

4.1.2 Structural aspects of FPOs.

Structural characteristics were assessed in terms of organisational composition, working age of the organisation, membership, group size, literacy level, heterogeneous caste composition, financial assistance, training received, frequency of group meetings, and supportive environment of the FPO for the effective functioning.

Table 4.4 The rank order of factors which influenced the non-enrolment of respondents into FPOs. N=150

Sl. No.	Factor influencing non-enrolment	Garret score	Rank
1	High membership fees	68.43	I
2	Lack of credit facilities	61.17	II
3	Fellow members are not willing to join	56.04	III
4	Not aware of FPOs	54.96	IV
5	Cannot break the relations with traders/commission agents build over the years	50.93	V
6	Political interference	47.05	VI
7	Centralized governance	42.49	VII
8	No personal assistance	37.87	VIII
9	Prices offered by FPOs are low/ not competitive	32.04	IX

4.1.2.2 The organisational composition of FPOs.

The organisational structure of the VLRC assisted FPOs such as RKPCL, NKPCL and BKPCL are shown in figure 4. It consisted of a president, vice-president and representatives from each village combined together to the Board of Management (BoM) which acted as the governing body. This governing body was assisted by the project director of VLRC as well as Chief Executing Officer (CEO).

The executive body consists of coordinators, Agri-Business Accelerators (ABAs). And the final stakeholders were farmer interest groups consisting of shareholders and non-shareholders.

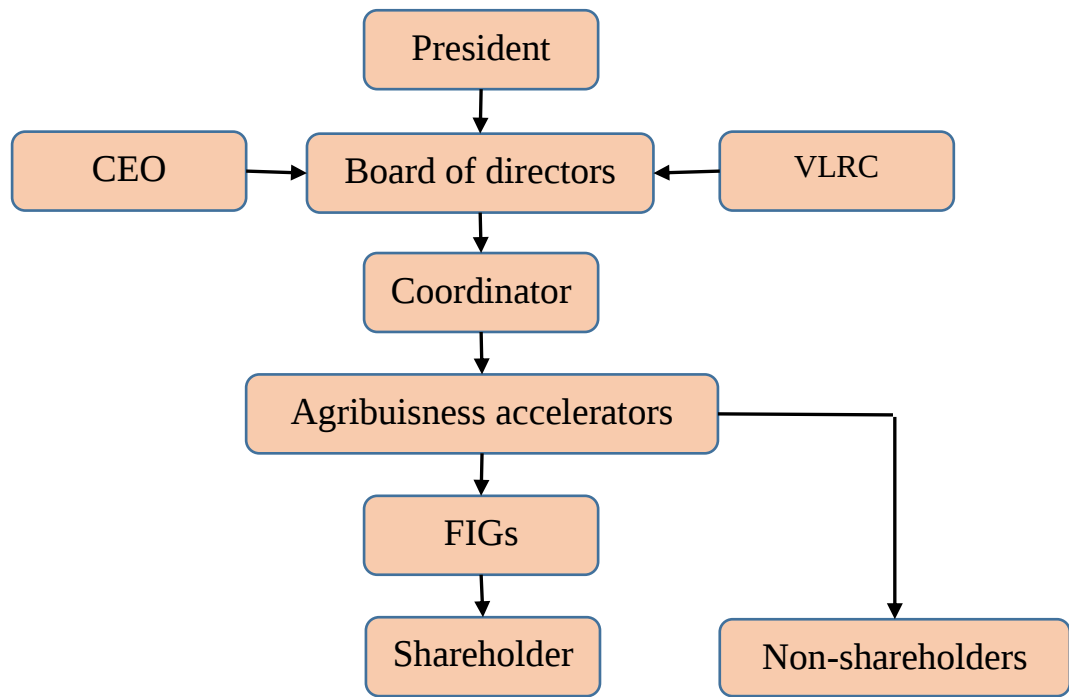


Fig.5: The organizational structure of FPOs under VLRC

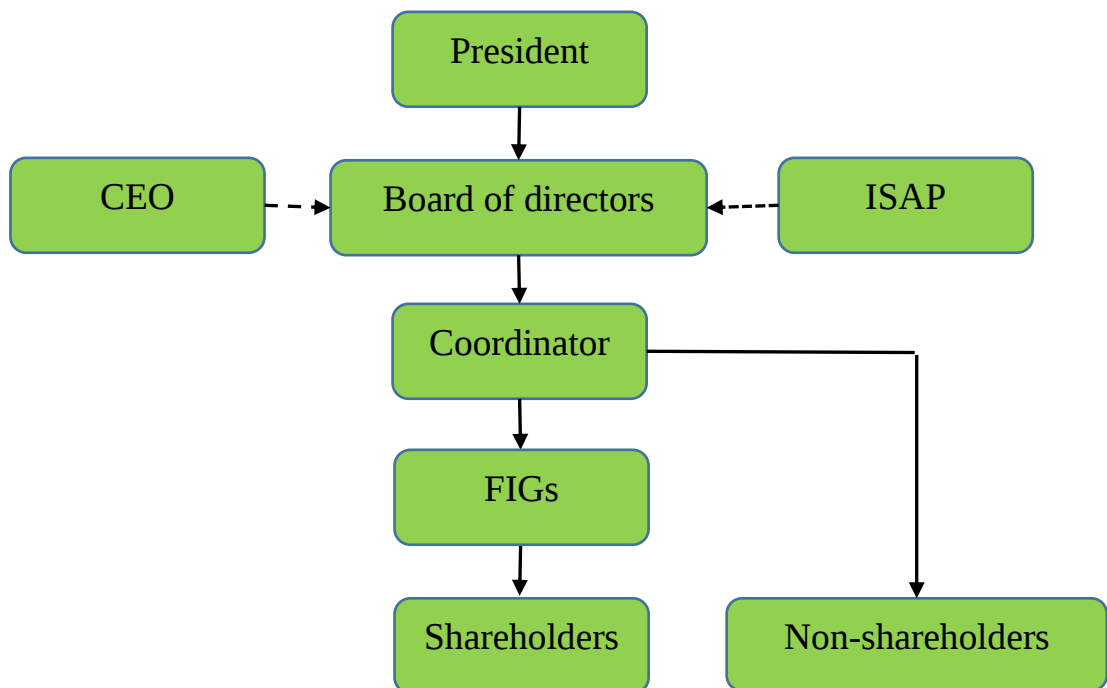


Fig.6: The organizational structure of FPOs under ISAP

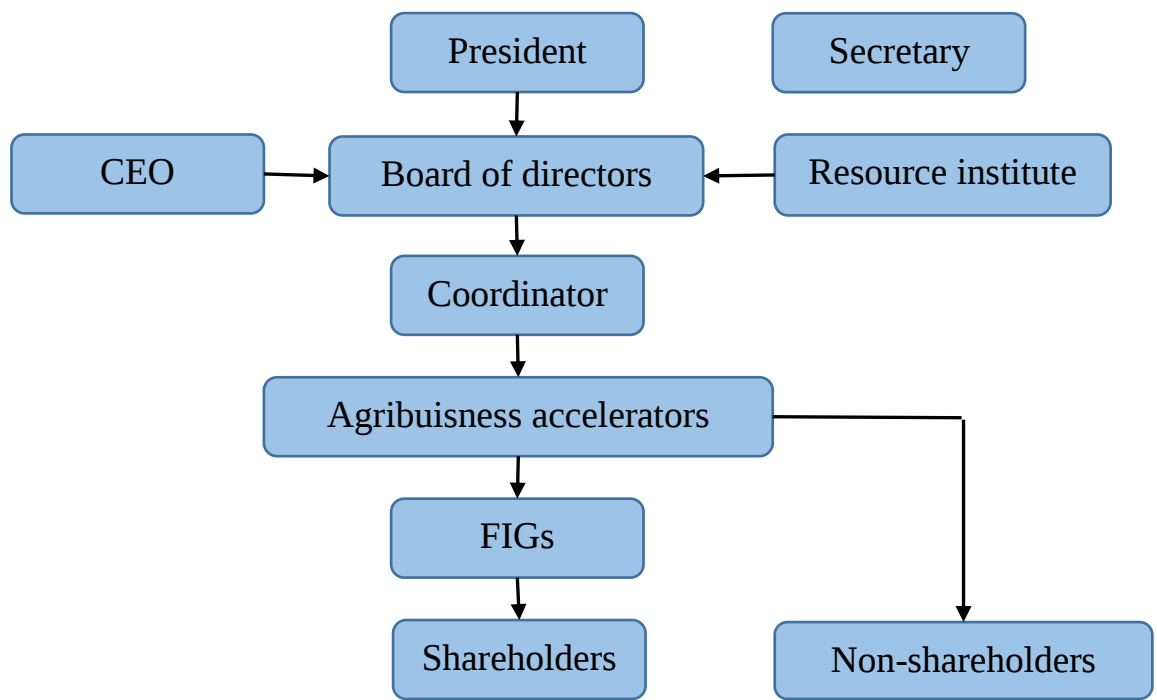


Fig.7: The model organizational structure for FPOs

From table 4.5, it was inferred that the institutional set-up of RKPCL consisted of ten Board of Directors (BoD) (10 male) with a president and a vice-president. There were a project manager and one coordinator. The coordinator himself had been acting as CEO as well as ABA. There were 495 shareholders and 300 non-shareholders.

The organisational structure of NKPCL comprised of fifteen board of directors (12 male & 3 female) with a president and a vice-president. The BoD was assisted by a project manager, a CEO, a coordinator and ABAs. NKPCL has got 3 ABAs working each in Munnalli, Hal Tadkal, and Tambakwadi villages. There were a total of 1700 shareholders and 200 non-shareholders.

Whereas BKPCL had twelve board of directors. A president and a vice-president were selected from among them. The BoD was aided by a project manager (for Kalaburagi and Yadagiri district), a CEO, a coordinator and ABAs. BKPCL has got 3 ABAs working each in Munnalli, Hal Tadkal, and Tambakwadi villages.

Whereas the institutional framework of ISAP assisted FPOs such as JKSMCL and BSMCL consisted of a president, vice-president, secretary and farmers' representatives from each village comprised the board of directors. This body acted as the governing body. The organisational structure of the ISAP assisted FPOs was shown in figure 5.

The executive body consisted of a coordinator. There were farmer interest groups consisting of shareholders and non-shareholders.

The JKSMCL and BSMCL had terminated their agreement of association with ISAP in the year 2016. However, they still get technical guidance from the officials of ISAP.

The board of management of both JKSMCL and BSMCL had thirteen board of directors (BoD) including a president, a vice-president and a secretary. It had been assisted by a project manager appointed by ISAP. The executive body had one coordinator. The JKSMCL and BSMCL comprised of 300 shareholders, 750 non-shareholders and 300 shareholders, 700 non-shareholders respectively.

4.1.1.1.1 Observations made from the above results

The following observations were made in the study regarding the organisational structure of FPOs.

- (c) In general, the organisational structure of all the FPOs consisted of actors like the president, BoDs, FIGs and shareholders in common.

- (d) The FPOs under VLRC featured ABAs where as secretary was found in FPOs under ISAP.

Based on the analysis of organisational structure, a model FPOs was framed which consisted of an ABA at each village. Instead of involving secretaries to become a part of the joint account holder in bank accounts, their role could be restricted to management of technical operations like maintaining records, updating financial documents, etc. A permanent supporting agency may be linked to FPOs by central or state governments so that their sustainability can be ensured. The FPOs can establish retail outlets at every village of its association so that the members can get necessary inputs in a timely manner.

Table 4.5 Details about organisational composition of FPOs

Sl. No.	Particulars	RKPCL	NKPCL	BKPCL	JKSMCL	BSMCL
1	Number of governing members	10	15	12	11	11
a.	Male	10	12	12	10	11
b.	Female	0	3	0	1	0
3	Number of CEOs	0	1	1	0	0
4	Number of co-ordinators	1	1	1	1	1
5	Secretary	0	0	0	1	1
5	Number of ABAs	0	3	5	0	0
6	Shareholders	495	1700	1200	300	300
7	Non-shareholders	300	200	300	750	700

The model FPOs based on the results of the study was presented in figure 5.

4.1.2.3 Working-age of the organisation

It was defined as the duration of working of each FPO. It was evident from the table 4.1 that the working age of RKPCL, NKPCL, and BKPCL was eight years as they were started since 2011. Whereas JKSMCL and BSMCL had working age of nine years.

4.1.2.4 Membership

The selection of the members for the NKPCL, BKPCL, and RKPCL was similar to one another. The BoM was the decision making body for setting up procedure and conditions of admitting members into the organisation. The members of the company were primary producers and tenant farmers which include both men and women. The membership fee was ₹ 500 which was later increased to ₹ 1000. The processing fee in both cases was ₹ 100. The shareholders were given a receipt of shareholding.

Under JKSMCL and BSMCL, there was an open and voluntary membership for those who involve in agriculture and allied activities with the membership fee of ₹ 1150 which included ₹ 100 of the registration fee and ₹ 50 of office charges, in turn, the shareholders were given a shared bond of thousand rupees.

Table 4.6 Details about shareholders of the FPOs

Sl. No.	Particulars	RKPCL	NKPCL	BKPCL	JKSMCL	BSMCL
1	Total number of members	495	1700	1200	300	300
a.	Men	443 (89.49)	1350 (79.41)	1000 (83.33)	250 (83.33)	280 (93.33)
b.	Women	52 (10.51)	350 (20.58)	200 (16.67)	50 (16.77)	20 (6.67)
2.	Heterogeneous caste composition	69.48	84.48	78.45	73.26	68.62
3.	Literacy levels [who can read and write]	400 (80.80)	1360 (80.00)	900 (75.00)	250 (83.33)	220 (75.00)

Values in parenthesis () indicate the percentage

4.1.2.4.2 Conditions to be fulfilled by the farmers to get membership are as follows

- He/she should be a primary producer taking up agriculture and allied activities.
- He/she shall be the resident of the operational area of FPO.
- He/she should not hold any membership in any of the organisations of a similar kind.

By virtue of being shareholders, the members enjoy all the privileges of FPOs such as the right to voting, getting benefits.

4.1.2.5 Group size

It was noticed from the table 4.6 that NKPCL had the highest number of membership (1700 shareholders) followed by BKPCL with 1200 shareholders. The shareholders in remaining FPOs ranged from 300 to 495. The number of women shareholders was more in the case of NKPCL (350) followed by BKPCL (200). However, the remaining FPOs had only 20 to 52 women shareholders. The patriarchal lineage was still persisted in the study area hence the female membership rate was low. Whereas the number of non-shareholders was ranging between 200 and 700 in case of FPOs.

Non-shareholders are those members who were unwilling to pay equity amount for the membership. However, to increase business operations, FPOs were supporting them. But they were not given a right of voting and were considered only after fulfilling the needs of shareholders.

4.1.2.6 Literacy levels of members of the FPOs

Literacy levels of the FPOs were defined as the proportion of members who can read and write. Table 4.6 number revealed that shareholders of RKPCL, NKPCL, BKPCL, JKSMCL, and BSMCL were having 80.80 per cent, 80 per cent, 75 per cent, and 83.33 per cent and 75 per cent level of literacy respectively. It was appreciable that the literacy rates of all the FPOs were above the country's value of 74.04 per cent.

4.1.2.7 Heterogeneous caste composition of the organisation

It was defined as varied caste composition of each FPO in terms of their extension of heterogeneity. It was apparent from the table 4.6 that NKPCL had very high heterogeneous caste composition of 84.48 per cent whereas BKPCL, KJSMCL, RKPCL, and BSMCL had highly heterogeneous caste composition of 78.45 per cent, 73.26 per cent, 69.48 per cent and 68.62 per cent respectively.

The NKPCL ensured open and voluntary membership irrespective of caste and religion. Nevertheless, the remaining FPOs also had allowed the membership across all caste and religion.

4.1.2.8 Financial assistance obtained by the FPOs

It was defined as the sources on which the FPOs were dependent on to conduct their day to operations.

4.1.2.8.1 Member's contribution

Farmers own equity was the main source of investment for the establishment of FPO. The membership fee of RKPCL, NKPCL, and BKPCL was ₹ 500 which was later increased to ₹ 1000. The processing fee in both cases was ₹ 100. The remaining amount of ₹ 500 was received from the farmers who had joined by paying ₹ 500. The members have issued a receipt for the payment. Whereas for the JKSMCL and BSMCL, the membership fee was ₹ 1000. The processing fee was ₹ 100. The members have issued a bond of thousand rupees.

4.1.2.8.2 Supporting agency contribution

The NKPCL and BKPCL also obtained financial support from Azim Premji Philanthropic Initiatives (APPI) which had established a memorandum of understanding with VLRC. They were providing financial support to small and marginal member farmers to take up small scale agribusiness activities like poultry rearing, sheep/goat rearing, and mini dal mill. The foundation had provided 10000 ₹ to needy and interested members at an interest rate of six per cent per annum. Two farmers were selected by BoD from each of NKPCL and BKPCL and provided financial assistance for doing poultry farming and sheep rearing. The foundation had also provided a subsidy of 50000 ₹ and 16000 ₹ to set up mini dal mill and Shavige machine to Sri Bhavani Mahila Swasahaya Sangha and Adishakti Mahila Swasahaya Sangha respectively. These sanghas were under the assistance of BKPCL.

The female family members of the shareholders of RKPCL, NKPCL, and BKPCL were allowed to form self-help groups and provided with financial assistance from the micro-finance institution called Sanghamitra. This was indirectly helping shareholders.

The JKSMCL and BSMCL were financially assisted by a Morocco-based organisation which was in a tie-up with ISAP. They had helped in the establishment of a custom hiring center by providing a tractor, leveler, and disc harrow.

The FPOs with a minimum of 1000 farmers were assured of financial assistance of 10 lakhs from SFAC. However, no FPO has received it yet.

The FPOs operated with a current bank account as well as a savings bank account. Both the accounts of first three FPOs' accounts were of joint holding, including the president and the project director. Signatures of both were required for the transaction. Whereas the bank accounts of JKSMCL and BSMCL were operated by the joint holding of the president and the secretary.

Table 4.7 Details about financial assistance obtained by the FPOs

Sl. No.	Particulars	RKPCL	NKPCL	BKPCL	JKSMCL	BSMCL
a)	Members' Equity (per member)	₹ 1100	₹ 1100	₹ 1100	₹ 1100	₹ 1100
b)	Office charges (per member)	0	0	0	₹ 50	₹ 50
c)	Supporting agency	No	Yes	Yes	Yes	Yes

4.1.2.9 Training received by the members of the organisation**Details of the number of training undergone by the members of FPOs**

The results shown in table 4.8 revealed that more than seventy-five per cent of members under the FPOs of VLRC (77.78 %) and FPOs of ISAP (86.67 %) had a high level of training.

The officials of VLRC, including coordinator, ABAs maintained regular contacts with member farmers and provide regular hands-on training related to improved cultivation practices such as seed treatment, chemical application through spraying, IPM, INM, and IWM, etc. They also conducted field demonstrations during cropping seasons.

Table 4.8 Distribution of respondents according to a number of training undergone.

Sl. No.	Training undergone	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [N=150]
1	Low (<2)	10 (11.11)	0 (0.00)	10 (6.67)
2	Medium (2-4)	10 (11.11)	8 (13.33)	18 (12.00)
3	High (>4)	70 (77.78)	52 (86.67)	122 (81.33)

Values in parenthesis () indicate the percentage

The project director and CEO organised regular meetings with experts of UAS-COA, Kalaburagi, Agricultural officers, and Private agencies. The BoDs were updated about advanced aspects of cultivation, who in turn shared the same with fellow farmers of their respective FIGs. FPOs also organised study tours to other FPOs within and outside the state of Karnataka such as FPO in Mulkanoor, Kalpataru FPO of Tumkur, etc.

The VLRC also conducted refresher training for the BoD, coordinators, and ABAs once in a year to update their roles and responsibilities regarding the operation of FPOs.

Table 4.9 Training and capacity building programmes of FPOs

Sl. No.	Training undergone	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [N=150]
1	Awareness about new cultivation practices	69 (76.67)	60 (100.00)	129 (86.00)
2	Demonstration on advanced crop cultivation practices	60 (66.67)	60 (100.00)	120 (80.00)
3	Study tours/exposure visits	42 (46.67)	52 (86.67)	94 (62.67)
4	Trainings for FIGs on micro-finance aspects	58 (64.44)	20 (33.33)	78 (52.00)

Values in parenthesis () indicate the percentage

In the case of JKSMCL and BSMCL, on-farm demonstrations were conducted by the selected farmers in every village throughout the cropping season. They also organised study tours to other FPOs like one in Mulkanoor, Karimnagar district of Telangana state. Frequent visits had been conducted to ICRISAT, KVK, Bidar, etc. Few members were taken to South Africa also to provide exposure to two young progressive farmers who had been actively participating in the activities of FPOs under ISAP.

4.1.2.10 The frequency of group meetings

It was evident from table 4.10 that cent percent of the board of directors felt that the board of management meet once in a month. However, 40.54 per cent of BoD under VLRC and hundred per cent of the BoDs under ISAP were of the opinion that BoM meets as and when needed also.

91.81 per cent of BoD under VLRC and 90.90 per cent of the BoD under ISAP mentioned that the average number of attendance per meeting was above 90 per cent.

Cent percent of the BoD under both FPO felt that the average period of conducting meeting would be for 1.5 to 3 hours.

Table 4.10 General information about the conduct of the board of management meetings as well as details about the activities conducted during the meetings

Sl. N	Particulars	FPOs under VLRC [n=37]	FPOs under ISAP [n=22]	Total [N=59]
1	The BoM meets			
a)	Once in a month	37 (100.00)	22 (100.00)	59 (100.00)
b)	As and when needed	15 (40.54)	22 (100.00)	37 (62.71)
2	Place of meeting (At office)	37 (100.00)	22 (100.00)	59 (100.00)
3	Average member attendance per meeting			
a)	Above 90 per cent	34 (91.89)	20 (90.90)	54 (91.53)
b)	80-90 per cent	3 (08.11)	2 (09.10)	5 (8.47)
4	Average period of conducting meetings (1.5-3 hours)	37 (100.00)	22 (100.00)	59 (100.00)
5.	Activities conducted during the board of management meetings			
a)	Follow up on decisions of previous meetings	37 (100.00)	22 (100.00)	59 (100.00)
b)	Verification of accounts/ document	37 (100.00)	22 (100.00)	59 (100.00)
c)	Addressing the problem of members related to farming	37 (100.00)	22 (100.00)	59 (100.00)
d)	Taking up new activities	31 (83.78)	18 (81.82)	49 (83.05)
e)	Selection of beneficiaries for project interventions (subsidy/ other provisions)	27 (72.97)	22 (100.00)	49 (83.05)
f)	Deciding upon the business plan of FPO	31 (83.78)	18 (81.82)	49 (83.05)

Values in parenthesis () indicate the percentage

The decisions were taken on a voting basis where 60 per cent of the agreement was taken as the majority. Every BoD would share the details of the meeting with their respective FIG.

As these were the guidelines laid down by the SFAC, all the FPOs strictly follow diligently.

4.1.2.10.2 Activities conducted during the BoM meetings

With respect to the activities conducted during BoM meetings, cent per cent of the respondents under both the NGOs expressed that the following specific activities were conducted during the meeting.

- (1) Follow up on decisions of previous meetings.
- (2) Verification of accounts/ document.
- (3) Addressing the problem of members related to farming.
- (4) Taking up new activities.
- (5) Selection of beneficiaries for project interventions (subsidy/ other provisions).
- (6) Deciding upon the business plan of FPO.

4.1.2.10.3 Annual general body meeting (AGBM)

As the name indicates the AGBM was conducted once in a year at the center of operation of respective if PO. It was one such meeting in which all the shareholders and BoM needs to share and discuss the happenings of FPO during the year of operation.

Table 4.11 Details about the activities conducted during the AGBM.

Sl. No.	Particulars	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [N=150]
a)	Presentation of annual budget report of the year	90 (100.00)	60 (100.00)	150 (100.00)
b)	Presentation of Details about the activities and achievements during the year.	90 (100.00)	60 (100.00)	150 (100.00)
c)	Discussion about the problems faced during the year.	90 (100.00)	60 (100.00)	150 (100.00)
d)	Getting feedback from the shareholders for better working	90 (100.00)	60 (100.00)	150 (100.00)
e)	Distribution of profits a company performs well financially.	90 (100.00)	60 (100.00)	150 (100.00)
f)	Election of the board of directors once in 3 years.	90 (100.00)	60 (100.00)	150 (100.00)

Values in parenthesis () indicate the percentage

As table 4.11 indicated cent per cent of respondents of FPOs under both the NGOs were expressed that the specific activities have been conducted during AGBM. They were

- (1) Presentation of the annual budget report of the year
- (2) Presentation of details about the activities and achievements during the year.
- (3) Discussion about the problems faced during the year.
- (4) Distribution of profits if the company performs well financially.
- (5) Getting feedback from the shareholders for better working
- (6) Election of the board of directors once in 3 years.

4.1.2.11 Types of licenses owned by FPOs

The licenses are such certificates issued by the government to perform business activities. The types of licenses owned by FPOs are presented in table 4.12. It can be seen from the table that all the FPOs had been possessing fertilizer storage and sale license, pesticides storage and sales license, seed storage and sale license, APMC mandi license and trader license.

Table 4.12 Details of licenses possessed by the FPOs.

Sl.N	Licence	FPOs under VLRC [n=3]	FPOs under ISAP [n=2]	Total [N=5]
1	Fertilizer storage and sale license	✓	✓	✓
2	Pesticides storage and sale license	✓	✓	✓
3	Seed storage and sale license	✓	✓	✓
4	APMC mandi license	✓	✓	✓
5	Trader license	✓	✓	✓

4.1.2.12 Supportive environment

A supportive environment was defined as the adequacy of supportive facilities and opportunities available to each FPO. The FPOs under VLRC and ISAP were classified into three categories based on the class interval and this was presented in table 4.13.

Table 4.13 indicated that about fifty per cent of the FPOs under VLRC was with medium (51.11 %) supportive environment followed by high (28.89 %) and low (20.00%) categories (20.00 %). In a similar way majority of the FPOs under ISAP had medium

(51.67 %) supportive environment followed by high (33.33 %) and low (15.00 %) categories.

The results of the study indicated that the FPOs under VLRC had been providing services such as recommended inputs at lower prices, drudgery reduction tools like sprayers, training, and guidance related to farming and household essentials like solar rechargeable battery at the highest level but failed to provide healthcare facilities, vocational training, etc. whereas, in case of FPOs under ISAP, they were able to provide inputs through subsidies as well as lower cost, guidance related to farming and vocational training. But they failed to concentrate on giving drudgery reduction tools, household essentials, etc. hence the overall score comes at the medium level.

Table 4.13 Details of the supportive environment of FPOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [N=150]
1.	Low	18 (20.00)	9 (15.00)	27 (18.00)
2.	Medium	46 (51.11)	31 (51.67)	77 (51.33)
3.	High	26 (28.89)	20 (33.33)	46 (30.67)

Values in parenthesis () indicate the percentage

4.1.3 Functional aspects of the organisations

Functional aspects were expressed in terms of group processes which include governance and management, group cohesiveness, role differentiation, leadership, the process of communication, group sustainability, and critical issues of group meetings and team spirit of the FPO for the effective functioning.

4.1.3.1 Governance and management

The resource institutes had followed the guidelines of SFAC and NABARD while setting up of operational standards however they had made a considerable amount of change in the functioning of FPOs according to the context which was depicted in the organisational structure of each FPO. The similarities and differences in governance and management of the FPOs were described below.

4.1.3.1.1 Governance and management under VLRC assisted FPOs

The Project manager looked after the overall operation of the FPOs which included monthly evaluation, the election of BoD members, monitoring the work of CEO, coordinator, and ABAs and solving the problems of farmers which the CEO/coordinator/ABAs can't handle. CEO supervises and supports the work of coordinator and ABAs. He acted as a connecting link between FPO and external agencies. The coordinator harmonizes the day to day operations of FPO by maintaining the financial, stock, membership records, provides technical assistance and supervises the activities of ABAs. He was also assisting in the formation of FIGs at the village level. ABAs are the ground level workers who provide technical assistance to the farmers by conducting demonstrations and required inputs. They are helping farmers in informed decision making.

4.1.3.1.2 Governance and management under ISAP assisted FPOs

The works of a project manager, CEO and coordinator were similar to the works of RKPCCL. While the secretary looks after the financial matters along with president of BoDs. However, the withdrawal of support had put the FPOs under difficult conditions. The president of FPO felt that they were unable to handle and coordinate all the activities of FPOs alone. Sometimes there existed a difference of opinion in the initiation of business activities like purchase of inputs, sale of produce, etc.

4.1.3.2 Group cohesiveness

It was observed from the table 4.14 that majority of the members of FPOs under VLRC perceived that their group had high cohesiveness (46.67 %) followed by medium (35.56 %) and low (17.78 %). But in case of FPOs under ISAP members felt that there was a medium level of cohesiveness followed by high and low.

Table 4.14 Details of group cohesiveness of FPOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	16 (17.78)	5 (8.33)	21 (14.00)
2.	Medium	32 (35.56)	36 (60.00)	68 (45.33)
3.	High	42 (46.67)	19 (31.67)	61 (40.67)

Values in parenthesis () indicate the percentage

The results of the study revealed that the majority of the groups were found with medium to the high category of group cohesiveness. During the formation, the farmers were motivated towards a group approach in such a manner that they are working beyond material benefits. The farmers had realized that there was no other choice but to unite together was the only best way to avoid distress in farming.

4.1.3.3 Group role differentiation

It was noticed from the table 4.15 that among members of FPOs under VLRC, there was a majority of medium (50.00 %) level of role differentiation followed by low (32.22 %) and high (17.78 %) whereas majority of members perceived medium (71.67 %) level of role differentiation in case of FPOs under ISAP followed by high (18.33 %) and low (10.00 %).

It was noticed in the study that the majority of the groups were with medium to the low category of role differentiation which reflects the passive role of respondents of the group. The leaders took the majority of the responsibilities and roles of numbers were mostly restricted to attending the meetings. It was also due to an increase in the number of members, the groups felt quite difficult to assign roles for each member.

Table 4.15 Details of group role differentiation of FPOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	29 (32.22)	6 (10.00)	35 (23.33)
2.	Medium	45 (50.00)	43 (71.67)	88 (58.67)
3.	High	16 (17.78)	11 (18.33)	27 (18.00)

Values in parenthesis () indicate the percentage

4.1.3.4 Group leadership

The FPOs under VLRC were having high (44.44 %) group leadership followed by medium (41.11 %) and low (14.11 %). This was due to greater involvement of leaders in the overall development of the members. They have not been receiving any form of travelling or daily allowance for attending the BoM meetings. They made sure that regular exchange of all the ideas and information that were discussed in the BoM meeting to all its members. They have also been oriented and trained about functioning and improvement of responsibilities by the VLRC once in a year.

Table 4.16 Details of group leadership of FPOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	13 (14.44)	2 (3.33)	15 (10.00)
2.	Medium	37 (41.11)	35 (58.33)	72 (48.00)
3.	High	40 (44.44)	23 (38.33)	63 (42.00)

Values in parenthesis () indicate the percentage

In case of ISAP, even though there was a large number of associated villages and greater distance from the operating village the board of directors put in a lot of efforts to provide necessary service to their members.

4.1.3.5 Process of communication

Table 4.17 Details of the communication process of FPOs under 2 NGOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	15 (16.67)	15 (25.00)	30 (27.33)
2.	Medium	52 (57.78)	27 (45.00)	79 (52.67)
3.	High	23 (25.56)	18 (30.00)	41 (27.33)

Values in parenthesis () indicate the percentage

It was noticed from the table 4.17 that among members of FPOs under VLRC, there was a majority of medium (57.78 %) level of communication followed by high (25.56 %) and low (16.67 %) whereas majority of members perceived medium (45.00 %) level of communication in case of FPOs under ISAP followed by high (30.00 %) and low (25.00 %).

The overall results of the study depicted that there existed a medium to a high level of communication within the groups indicating that there was a good exchange of information and ideas within the group which encourages members to involve in the activities.

4.1.3.6 Group sustainability

It was noticed from the table 4.18 that there was a medium level of sustainability was observed in both cases of FPOs that was FPOs under VLRC (56.67 %) and ISAP (51.67 %).

It was noticed in the study that the majority of the groups were following open and voluntary membership, regular training and capacity building activities, establishment of common properties, and establishment of sound networking with other organisations. However, there was considerably less gender representation in membership as well as in BoD and centralised decision making in case of business model preparation and other administrative decisions.

Table 4.18 Details of group sustainability of FPOs under 2 NGOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	18 (20.00)	11 (18.33)	29 (19.33)
2.	Medium	51 (56.67)	31 (51.67)	82 (54.67)
3.	High	21 (23.33)	18 (30.00)	39 (26.00)

Values in parenthesis () indicate the percentage

4.1.3.7 Critical issues of group meetings

Regarding critical issues of group meetings, table 4.19 indicated that majority of the FPOs under the association of both VLRC (63.33 %) and ISAP (50.00 %) had low critical issues

Table 4.19 Details of critical issues of group meetings of FPOs under 2 NGOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	57 (63.33)	30 (50.00)	87 (58.00)
2.	Medium	33 (36.67)	28 (46.67)	61 (40.67)
3.	High	0 (0.00)	2 (3.33)	2 (1.33)

Values in parenthesis () indicate the percentage

The results of the table indicated since the meeting have been guided by the research institute for more than 8 years the FPOs under VLRC have learned to solve most of the common issues arise during the meetings. But in case of FPOs under ISAP due to the withdrawal of control from ISAP, the meeting was conducted by the members themselves so the critical issues have been slightly rising in terms of lack of creativity, irregular management of meetings, etc.

4.1.3.8 Team spirit

It was observed from the table 4.20 that medium level of team spirit was observed in case of FPOs under both VLRC (50.00 %) and ISAP (45.00 %).

Table 4.20 Details of team spirit of FPOs under 2 NGOs

Sl. No.	Category	FPOs under VLRC [n=90]	FPOs under ISAP [n=60]	Total [n=150]
1.	Low	16 (17.78)	11 (18.33)	27 (18.00)
2.	Medium	45 (50.00)	27 (45.00)	72 (48.00)
3.	High	29 (32.22)	22 (36.67)	51 (34.00)

Values in parenthesis () indicate the percentage

The finding of the study showed that there was a medium to high team spirit. The FPOs have been trying to inculcate the qualities of unity among members. They are helping the members to realize the importance of group work in achieving bargaining power, getting benefits of government and better standards of living. They are helping to keep the morale of the members high.

The results of functional aspects are in agreement with the results of Brown (1997), FAC Policy Brief 032 (2009), Gupta (1989), and Berdegúe et al. (2008).

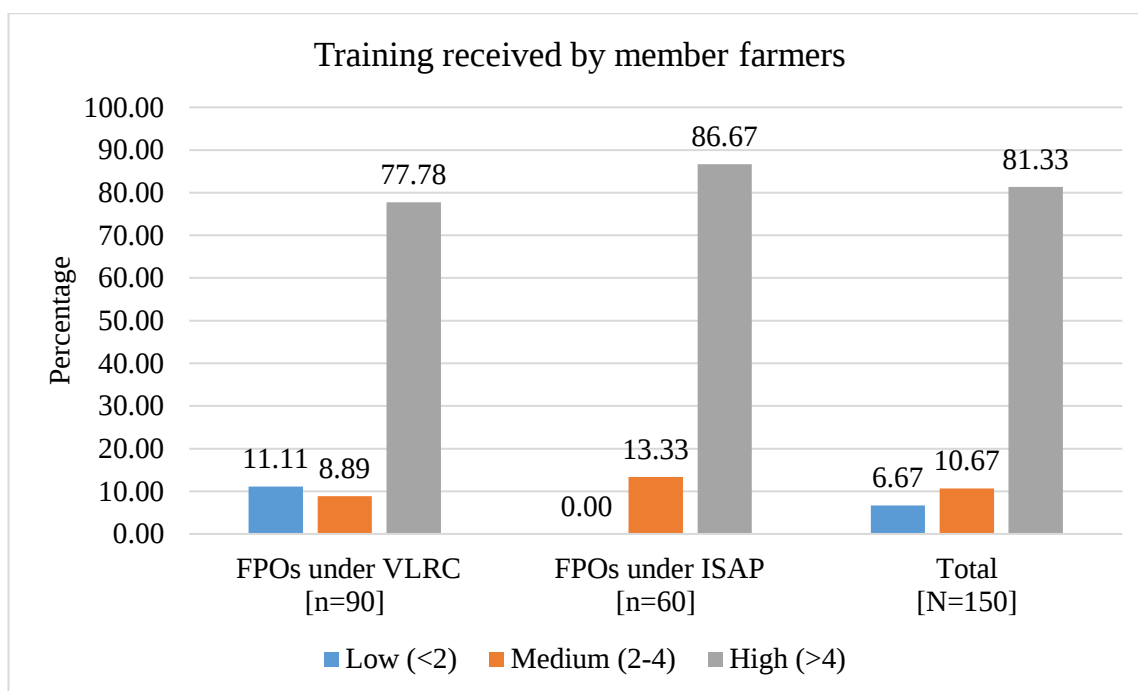


Fig.8: Distribution of the member farmers according to training received

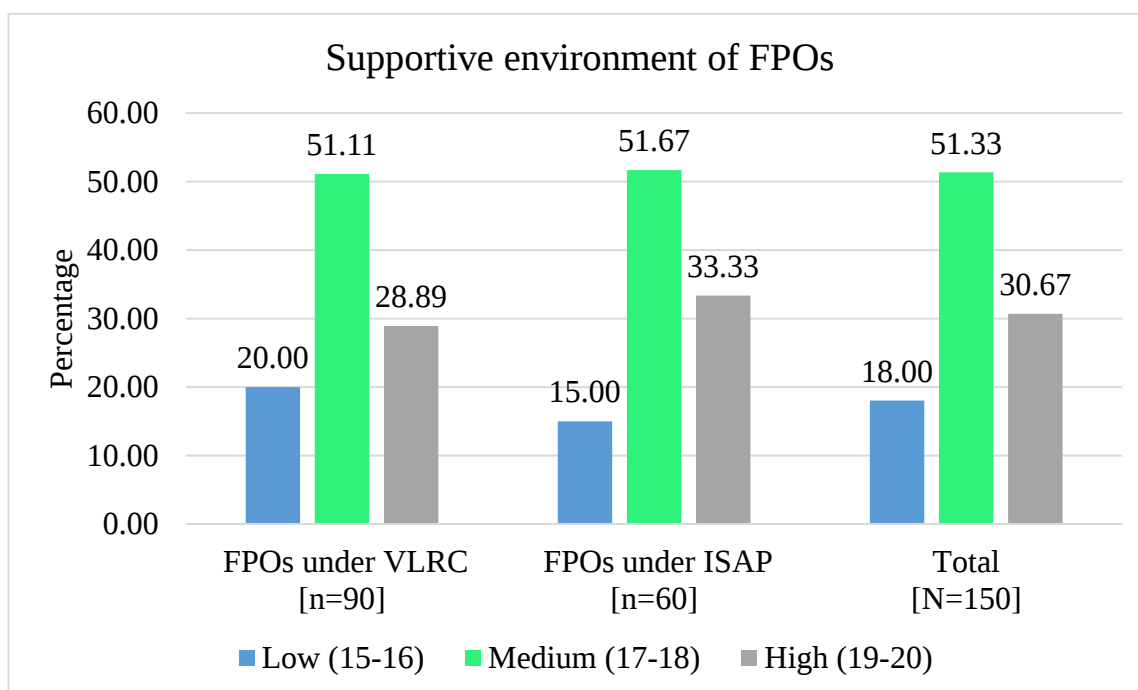


Fig.9: Details of the supportive environment of the FPOs

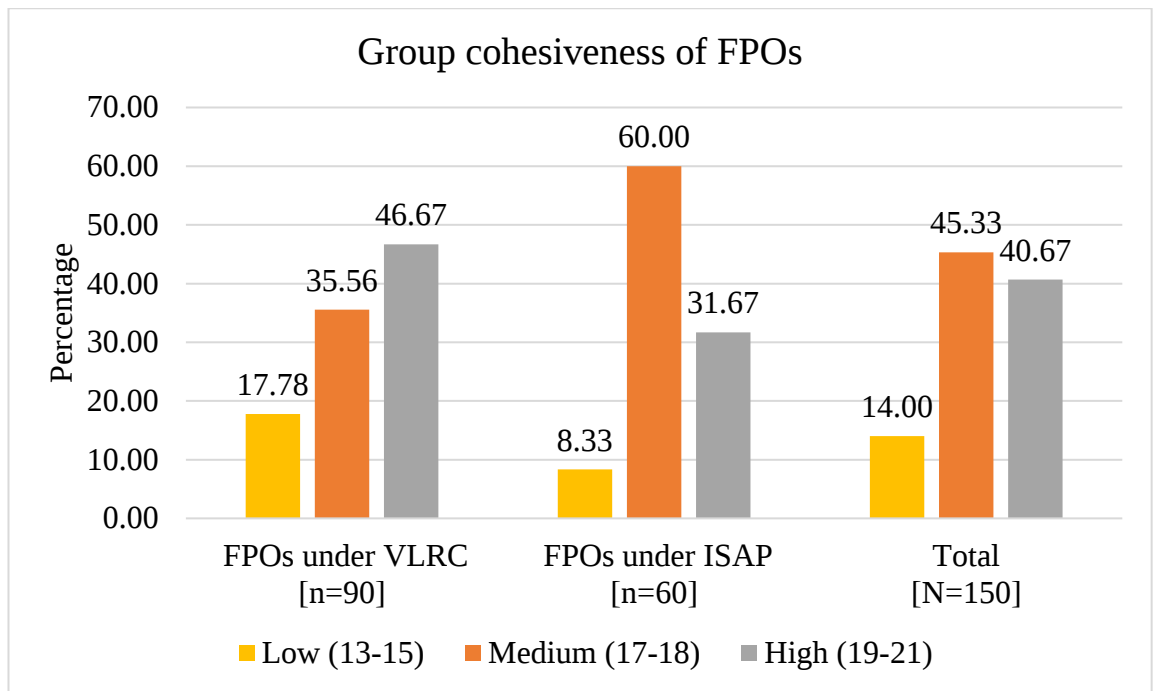


Fig.10: Details of the group cohesiveness of the FPOs

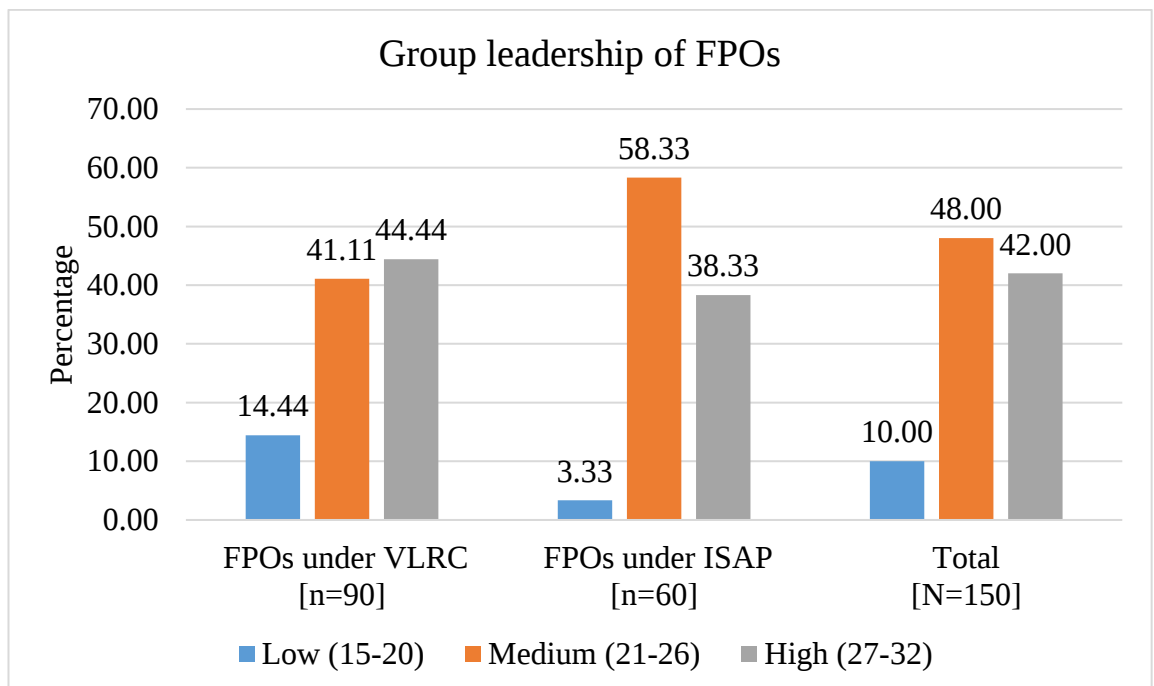


Fig.11: Details of the group leadership of the FPOs

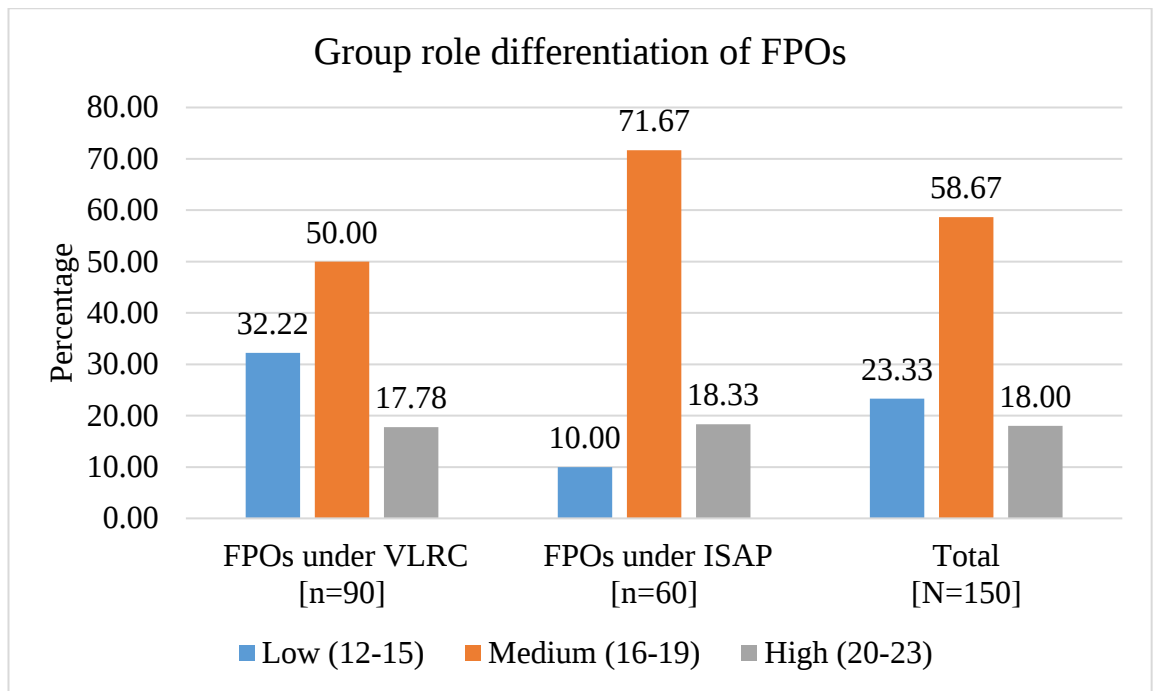


Fig.12: Details of the group role differentiation of the FPOs

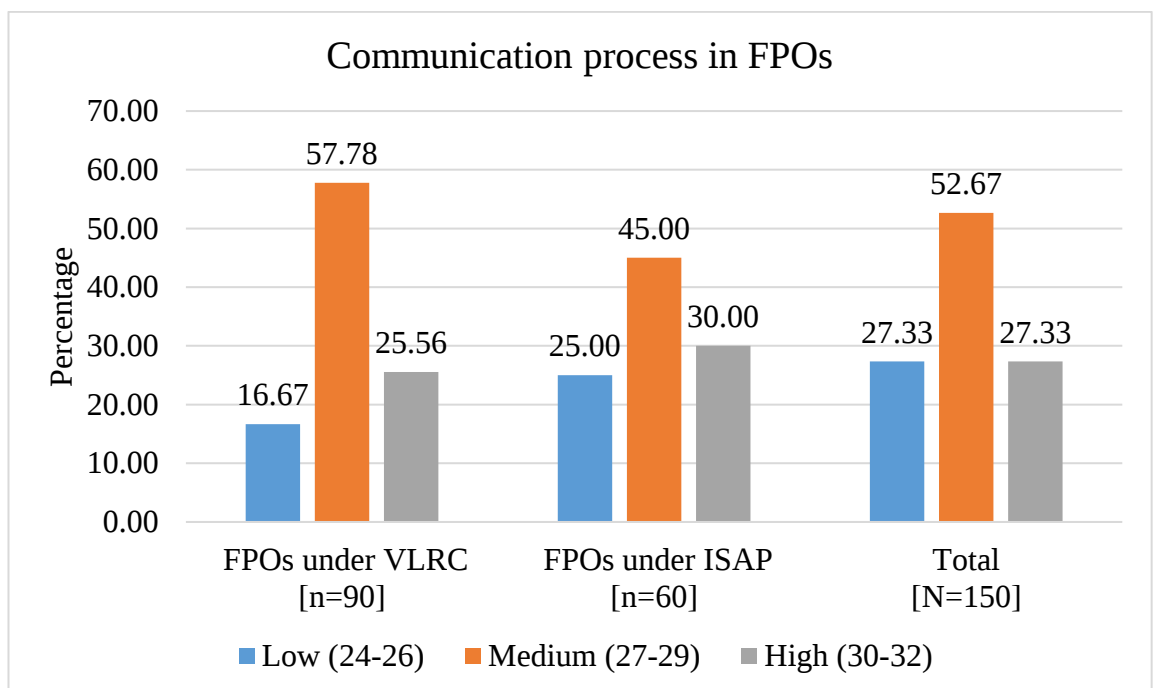


Fig.13: Details of the communication process in the FPOs

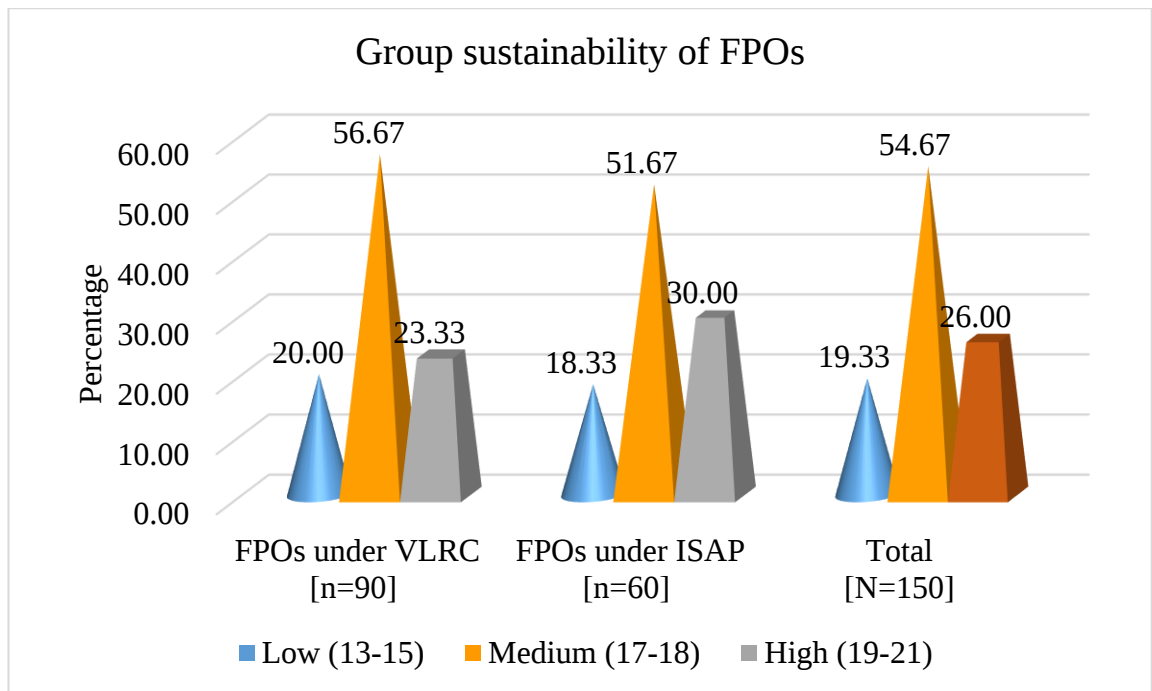


Fig.14: Details of the group sustainability of the FPOs

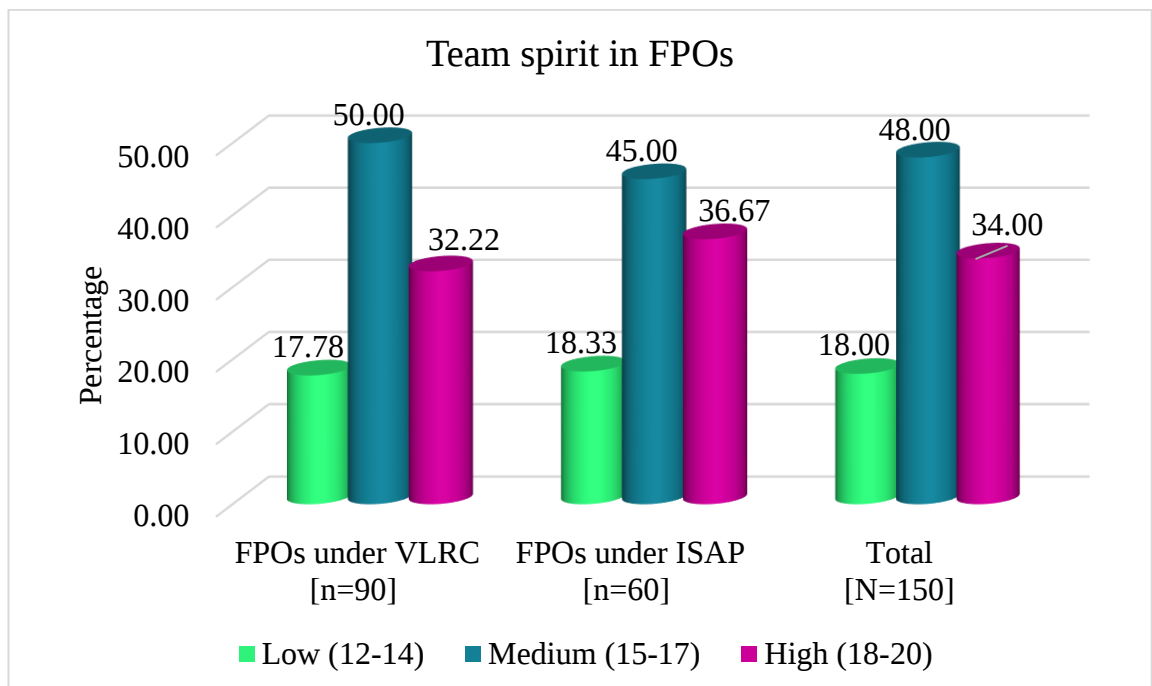


Fig.15: Details of the team spirit in the FPOs

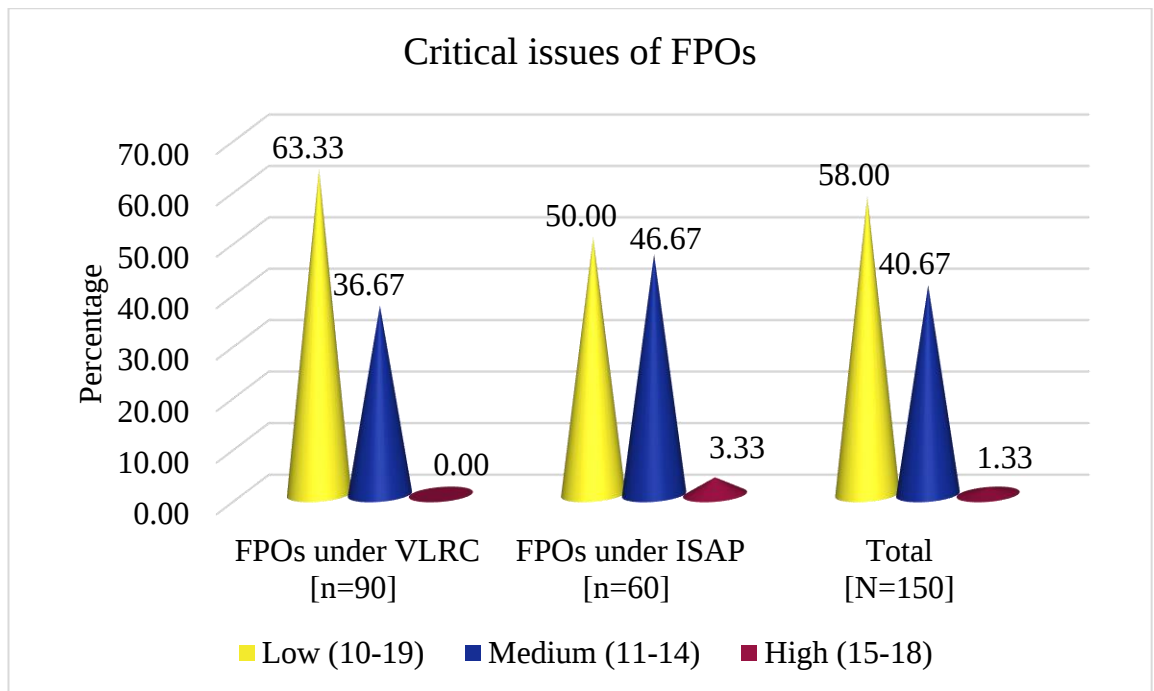


Fig.16: Details of the critical issues of the FPOs

4.2 To Study the Profile Characteristics of Members and Non-Members of Farmer Producer Organisations.

The results with respect to personal, economic, situational and socio-psychological characteristics of members and non-members were presented in the following paragraphs with corresponding tables.

4.2.1 Personal characteristics

4.2.1.1 Age

It was evident from table 4.21 that, majority of the member farmers belonged to middle (57.33 %) age group followed by old (26.00 %) and young (16.67 %) age, whereas majority of the non-member farmers were middle (59.33 %) aged followed by young (27.33 %) and old (13.33 %) age.

The cluster of villages from which FPOs were formed contains the majority of farmers with the age group of 35 to 55 years. Hence the medium level of age group was observed in the case of sample respondents. In addition to that, the sense of responsibility of improving farm and family for middle-aged farmers had naturally oriented them to join the FPOs.

Table 4.21 Distribution of respondents according to their age.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Young age (up to 35)	25	16.67	41	27.33
2.	Middle age (36-55)	86	57.33	89	59.33
3.	Old age (> 55years)	39	26.00	20	13.33
	Total	150	100.00	150	100.00

The findings were in agreement with the results of studies conducted by Raghavendra *et al.* (2005), Bikadakatti *et al.* (2011), Akkamahadevi (2016), and Rajput *et al.* (2016).

4.2.1.2 Education

It could be observed from table 4.22 that, the majority of the member farmers were educated up to intermediate (35.33 %) followed by an undergraduate (22.00 %) and 6.67 per cent of members were illiterates. Whereas the majority of non-member farmers were educated up to intermediate (34.67 %) followed by high school (26.67 %) and about 7.33 per cent of them were illiterates.

The farmers with a good level of education have a natural tendency towards embracing changes in the social system. With the formation of FPOs, more of the literate farmers had joined with a hope of changing their socio-economic and psychological characteristics. Among literate farmers, the majority were having an intermediate level of education. However, in the case of non-members the efforts of the government towards universalization of education through total literacy campaign, national literacy mission, etc., could help them to attain a good education.

Similar results were observed in the study of Raghavendra *et al.* (2005), Gopinath (2005), Bikadakatti *et al.* (2011), Akkamahadevi (2016) and Rajput *et al.* (2016).

Table 4.22 Distribution of respondents according to their education

Sl. No.	Level of Education	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Illiterate (0)	10	6.67	11	7.33
2.	Functional literate (1)	7	4.67	32	21.33
3.	Primary School (2)	15	10.00	40	26.67
4	High school (3)	53	35.33	52	34.67
5	Intermediate (4)	33	22.00	15	10.00
6	Undergraduate (5)	32	21.33	0	0.00
	Total	150	100.00	150	100.00

4.2.1.3 Caste.

It could be observed from table 4.23 that, majority of member farmer belong to general category (46.00 %) followed by OBC (34.00 %), SC (15.33 %) , ST (2.00 %), minority (2.00 %) and other (0.67 %), whereas majority of non-member farmers belongs to general category (46.67%) followed by OBC (39.33 %), SC (10.00 %), ST (2.00 %), minority (1.33 %) and others (0.67 %).

In the case of member farmers, the upper castes had dominated the membership in FPOs. This might be due to its large distribution in the region of operation. A similar trend was observed in the non-member category also.

Table 4.23 Distribution of respondents according to their caste.

Sl. No.	Caste	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	General	69	46.00	70	46.67
2.	OBC	51	34.00	59	39.33
3.	SC	23	15.33	15	10.00
4	ST	3	2.00	3	2.00
5	Minority	3	2.00	2	1.33
6	others	1	0.67	1	0.67
	Total	150	100.00	150	100.00

4.2.1.4 Family size and composition

It could be observed from table 4.24 that majority of the member as well as non-members families belong to medium category (56.67 % and 68.67 %) followed by small (27.33 % and 22.67 %) and high (16.00 % and 8.67) category.

The table also indicates the family composition where the majority of the family members in both member and non-member families were male (53.43 % and 52.33 %) followed by a female (47.10 % and 48.14 %) respectively. In addition, the table also analysed family type where the majority belonged to the joint family (59.33 % and 55.33 %) followed by nuclear family (40.67 % and 44.67 %) respectively.

The region of operation of FPOs consisted of most of the joint families with a married couple living with husband's parents in most cases due to patriarchal societal structure.

Table 4.24 Distribution of respondents according to their family size and composition.

Sl. No.	Particulars	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Small (<5 members)	41	27.33	34	22.67
2.	Medium (5-8 members)	85	56.67	103	68.67
3.	Large (>8 members)	24	16.00	13	8.67
4	Nuclear	61	40.67	67	44.67
5	Joint	89	59.33	83	55.33
6	Male	506	53.43	449	52.33
7	Female	446	47.10	413	48.14
	Total	947	100.00	858	100.00

It was also interesting to see that there was about 40 per cent of the members' families were the nuclear type. The reason might be due to the thought of the generation gap had to an influence on the family of farmers which led to a preference for smaller households.

The results of the study were in agreement with that of studies of Sidram (2008) and Bikadakatti *et al.* (2011).

4.2.1.5 Farm size

The results in table 4.25 indicated that, most of the member farmers were medium farmers (30.00 %) followed by semi medium (28.67 %), small (26.00 %) and large (10.67 %), marginal (4.67 %) farmers whereas most of the non-member farmers were semi medium (60.67 %) followed by medium (26.67 %) and small (8.00 %) and marginal (4.67 %) farmers.

The FPOs have been encouraging multiple memberships per families and developing a sense of belongingness among the family members. Even though there exists a trend of fragmentation of landholdings, about 40 per cent of members still had medium to the large land holdings. But in case of non-members, the effect of generation gap had slowly been taking over the concept of large holdings and due to the fragmentation of land holdings from generation to generation which led to the conversion of large farmers into small, semi-medium and medium farmers.

Table 4.25 Distribution of respondents according to their farm size.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Marginal (<1 ha)	7	4.67	7	4.67
2.	Small (1-2 ha)	39	26.00	12	8.00
3.	Semi medium (2-4 ha)	43	28.67	91	60.67
4	Medium (4-10 ha)	45	30.00	40	26.67
5	Large (>10 ha)	16	10.67	0	0.00
	Total	150	100.00	150	100.00

Similar results were observed in the studies of Raghavendra (2004), Bikadakatti *et al.* (2011), Akkamahadevi (2016) and Rajput *et al.* (2016).

4.2.1.6 Farming experience

It could be observed from table 4.26 that, the majority of the member farmers had medium farming experience (48.67 %) followed by high (28.00 %) and low (23.33 %) farming experience. As the majority of farmers were more than middle-aged, they might have had a medium level of farming experience. Whereas in the case of non-members majority of them were having medium (44.00 %) farming experience followed by high (32.66 %) and low (23.33 %) farming experience. The study of Bikadakatti *et al.* (2011) also expressed similar results as that of the present study.

Table 4.26 Distribution of respondents according to their farming experience.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low (<15 years)	35	23.33	35	23.33
2.	Medium (15-30 years)	73	48.67	66	44.00
3.	High (>30 years)	42	28.00	49	32.66
	Total	150	100.00	150	100.00

4.2.1.7 Farm mechanization status

It could be seen from table 4.27 that, the majority (48.00 %) of the member farmers had medium farm mechanization status like that of non-members (56.00 %).

The shortage of labor and increased labor cost might be one of the biggest constraints in the study area. Hence most of the non-member farmers were shifting to mechanized farming. The easy availability of loans from nationalized banks had been promoting them to purchase farm machinery.

Table 4.27 Distribution of respondents according to their farm mechanization status.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	42	28.00	16	10.67
2.	Medium	72	48.00	84	56.00
3.	High	36	24.00	50	33.33
	Total	150	100.00	150	100.00

But for member farmers, the availability of farm implements like tractors, cultivators, levelers, etc. through custom hiring centers of FPOs especially under ISAP had helped them to follow mechanized farming. The members of FPOs under VLRC were

establishing contracts with the local farm machinery holders to provide service at nominal rates.

4.2.2 Economic variables

4.2.2.1 Family income

It could be seen from table 4.28 that 30 per cent of member farmers fall under low and medium income category followed by very high (26.67 %) income category, whereas majority of non-members had low-income level (57.33 %) followed by very low (13.33 %) and medium (12.00 %) level of income.

The results from the table indicated that the majority of the member farmers were fell in the range of medium to very high-income levels. The participation in FPOs had been helping the member farmers to get assured income from the farming activities. The procurement process, bargaining power exercise to reduce the cost of inputs and other costs like costs of transportation, marketing, etc. and developing business plans for its members like the establishment of agri-enterprises were showing great impact. The farmers also started practicing diversified cropping systems. This had been increasing the income levels of member farmers in a considerable manner.

Table 4.28 Distribution of respondents according to their family income.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Very low	5	3.33	20	13.33
2.	Low	45	30.00	86	57.33
3.	Medium	45	30.00	18	12.00
4.	High	15	10.00	13	8.67
5.	Very high	40	26.67	13	8.67
	Total	150	100.00	150	100.00

In the case of non-members, the majority were having low and very low-income levels as they were deprived of getting low-cost inputs and they were also not receiving regular procurement facilities.

Similar results were observed in the studies of Bikadakatti *et al.* (2011), Akkamahadevi (2016) and Rajput *et al.* (2016).

4.2.2.2 Indebtedness

It could be seen from table 4.29 that majority of member farmers had very low (57.33 %) indebtedness followed by low (28.67 %) indebtedness, whereas the majority of non-member farmers belong to very low indebtedness (79.33 %) followed by low (20.00 %) indebtedness.

The provision of loans through cooperative banks and nationalized banks had helped the members to get credit facilities. But the extent of wilful defaulters had been decreasing in case of members when compared to members due to improvement in economic gains in farming with the help of FPOs. The FPOs have been inculcating a sense of responsibility in members to maintain the high standards for farming.

Table 4.29 Distribution of respondents according to their indebtedness.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Very low	99	66.00	106	70.67
2.	Low	30	20.00	43	28.67
3.	Medium	12	8.00	1	0.67
4.	High	8	5.33	0	0.00
5.	Very high	1	0.67	0	0.00
	Total	150	100.00	150	100.00

4.2.3 Situational variables

4.2.3.1 Market facilities

It was evident from table 4.30 that most of the members were getting marketing information related to availability and price of inputs (100.00 %), price of the produce (100.00 %) and suitability of crops or agribusiness enterprises before their initiation (56.67 %) from the FPOs but in case of non-members only about 45.33 per cent were

getting information related to availability and price of the inputs, 28 per cent about price of outputs and 14.67 per cent about suitability of crops for the upcoming season.

With respect to procurement facilities cent per cent used facilities of FPOs. Whereas about 76 per cent of non-members were getting procurement facilities of societies. The SFAC had been promoting price support scheme and market intervention schemes through FPOs which are procuring the produce of its shareholders. As the members expressed, the FPOs were procuring up to 20 quintals of produce from farmers which were against the mere 4 quintals of societies.

Table 4.30 Distribution of respondents according to market facilities.

Sl. No.	Facilities	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Information facilities				
a.	Availability and price of inputs	150	100.00	68	45.33
b.	Price of outputs	150	100.00	42	28.00
c.	Suitability of crop or enterprise before take up	85	56.67	22	14.67
2	Procurement facilities	150	100.00	114	76.00
3	Storage facilities				
a.	At home	118	78.67	146	97.33
b.	At warehouse	32	21.33	4	2.67
4	Processing facilities	24	16.00	4	2.67
5	Transportation facilities	104	69.33	81	54.00
6	Insurance facilities (PMPBY)	115	76.67	22	14.67

In case of storage facilities, 78.67 and 21.33 per cent of member farmers were storing their produce at their home and warehouses respectively. Whereas 97.33 per cent of non-members were storing their produce at their houses. A negligible proportion (2.67 %) had used warehouses for the storage. Those farmers who used warehouses for storage also got the warehouse receipts. The APMC mandi act had provided a new prospect of utilizing the facilities of APMC markets by the farmers of FPOs. Only 16 per cent of members had processing facilities and in the case of non-members, it was 2.67 per cent. The mini dal mills provided by FPOs BKPCL, JKMSCL and BMSCL had been helping the farmers to get their red gram products, however, the scale of processing was limited to one quintal per hour which hinder the large scale processing.

More than fifty per cent of the member (69.33 %) and non-member (54.00 %) farmers expressed that they had good transport facilities. Members felt that due to facilities provided by the FPOs like input supply at village doorsteps, procurement facilities at nearer villages had helped them to reduce their transportation hurdles.

More than 3/4th of the member farmers (76.67 %) had insured under Pradhan Mantri Phasal Bhima Yojana (PMPBY). But in the case of non-members only about fifteen per cent enrolled for insurance services (14.67 %).

The FPOs have been mobilizing their members to actively participate in training as well as development activities which ensured the adequate reach of market services for them. The FPOs are also making use of bargaining power to get input services at reasonable rate especially in case of plant protection chemicals.

The findings were in the agreement with the results of Vadivelu and Kiran (2013), Trebbin and Hassler (2012), and Panda and Singh (2016).

4.2.3.2 Actors in the market channel of member and non-member farmers

Figure indicated a common model of red gram supply chain for all the five FPOs under the study. The actors in the red gram supply chain indicated that the FPOs had eliminated various middle-level actors like wholesalers, retailers, commission agents, landlords, transporters from the value chain which were found to be misleading the non-members.

Major actors found in the supply chain of red gram under FPO led value chain, as well as that of non-members, was depicted in figure 16 and 17 respectively.

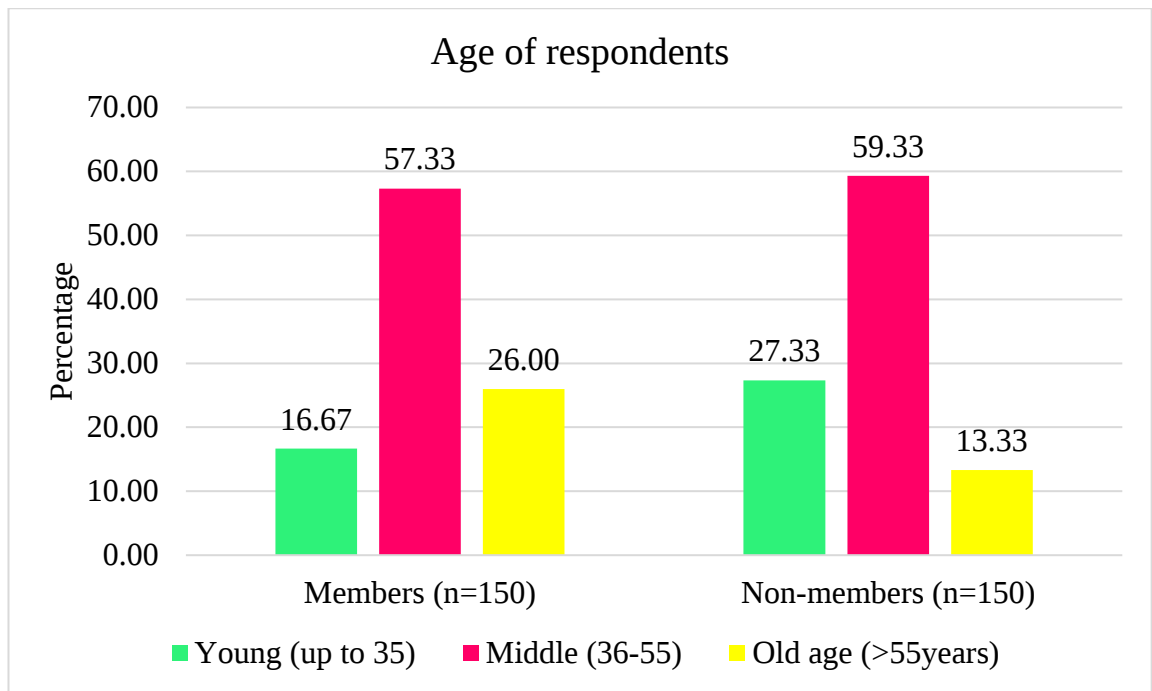


Fig.17: Distribution of the respondents according to their age

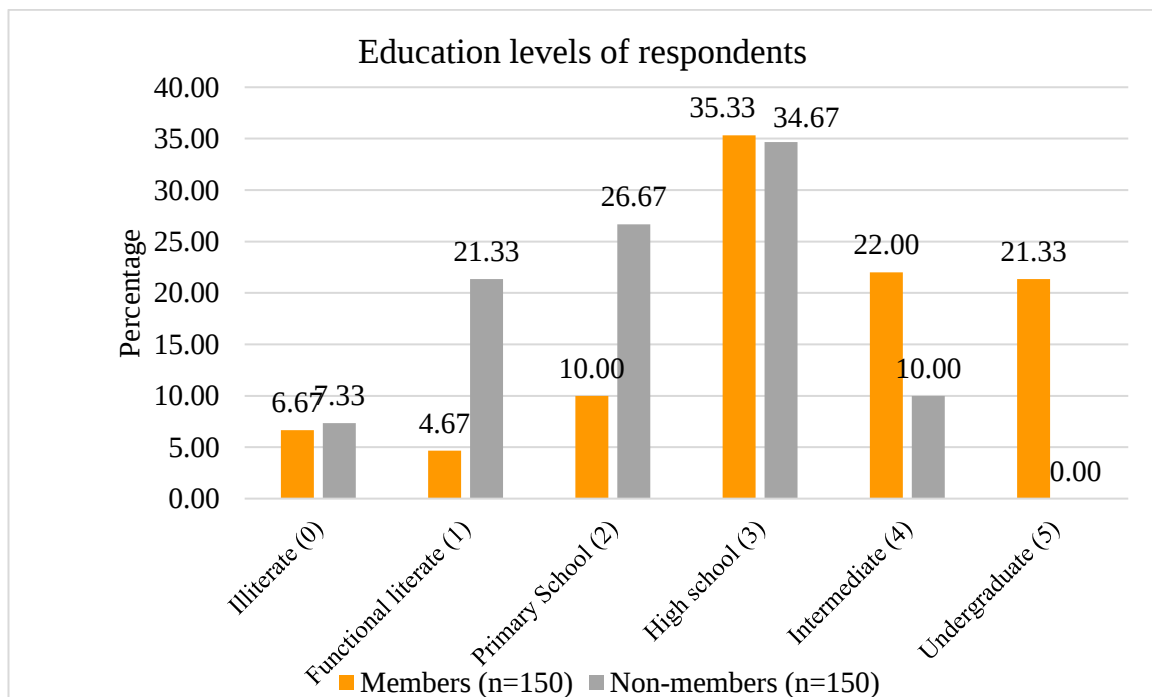


Fig.18: Distribution of the respondents according to their education

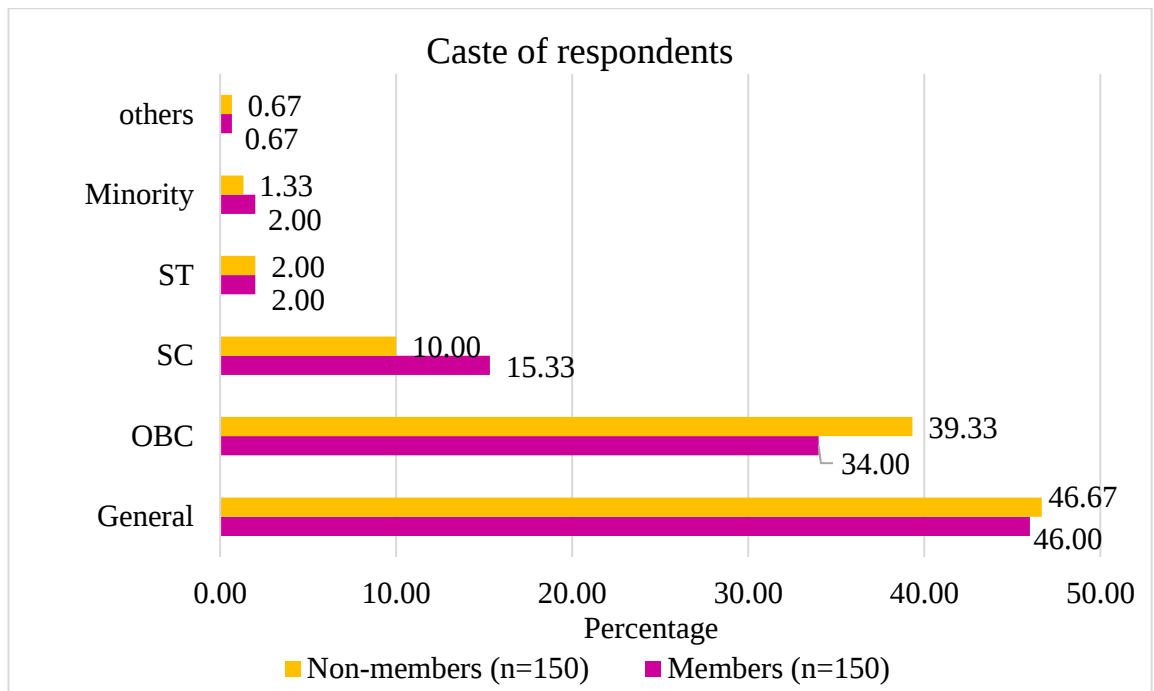


Fig.19: Distribution of the respondents according to their caste

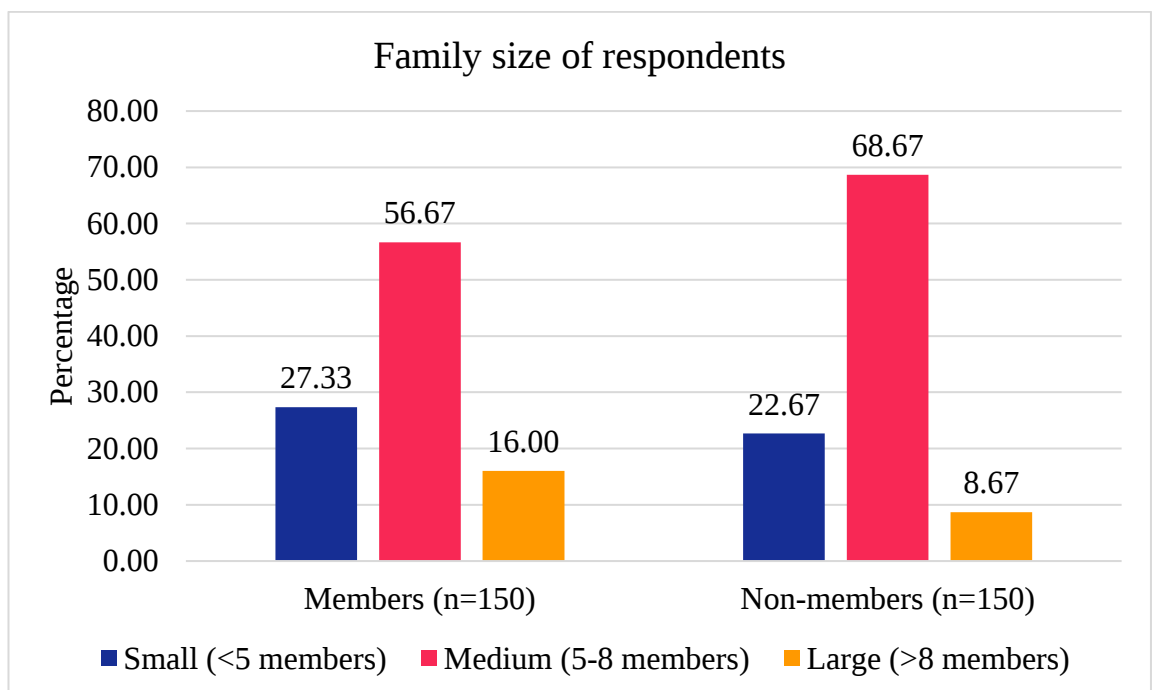


Fig.20: Distribution of the respondents according to their family size

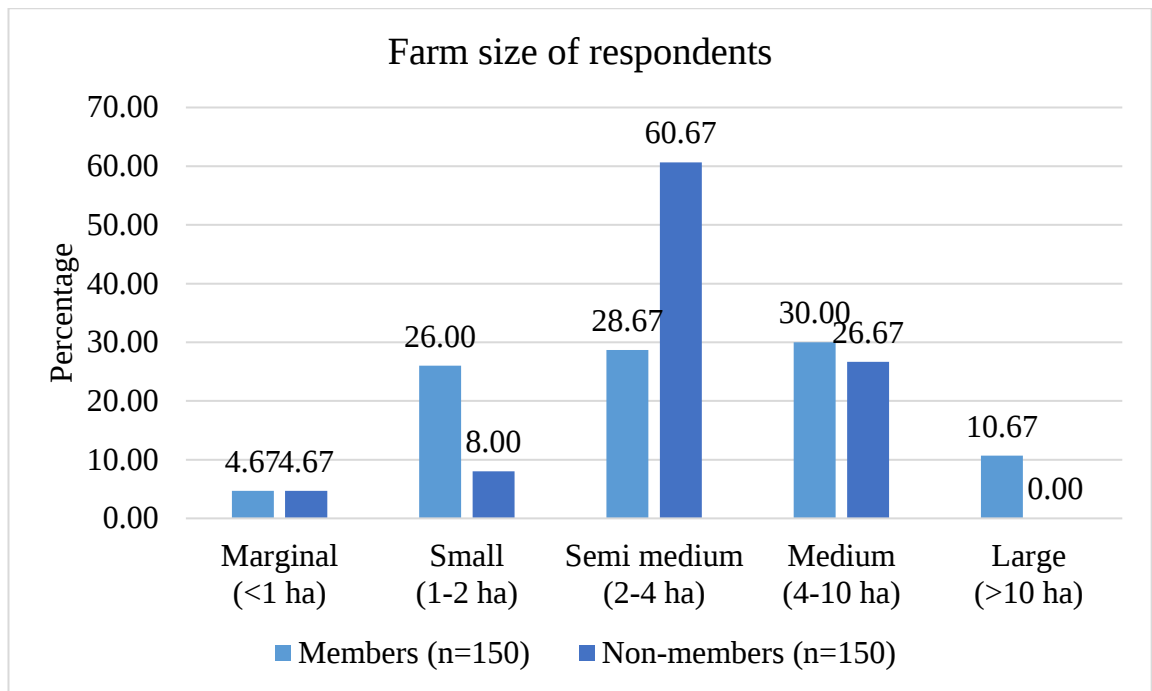


Fig.21: Distribution of the respondents according to their farm size

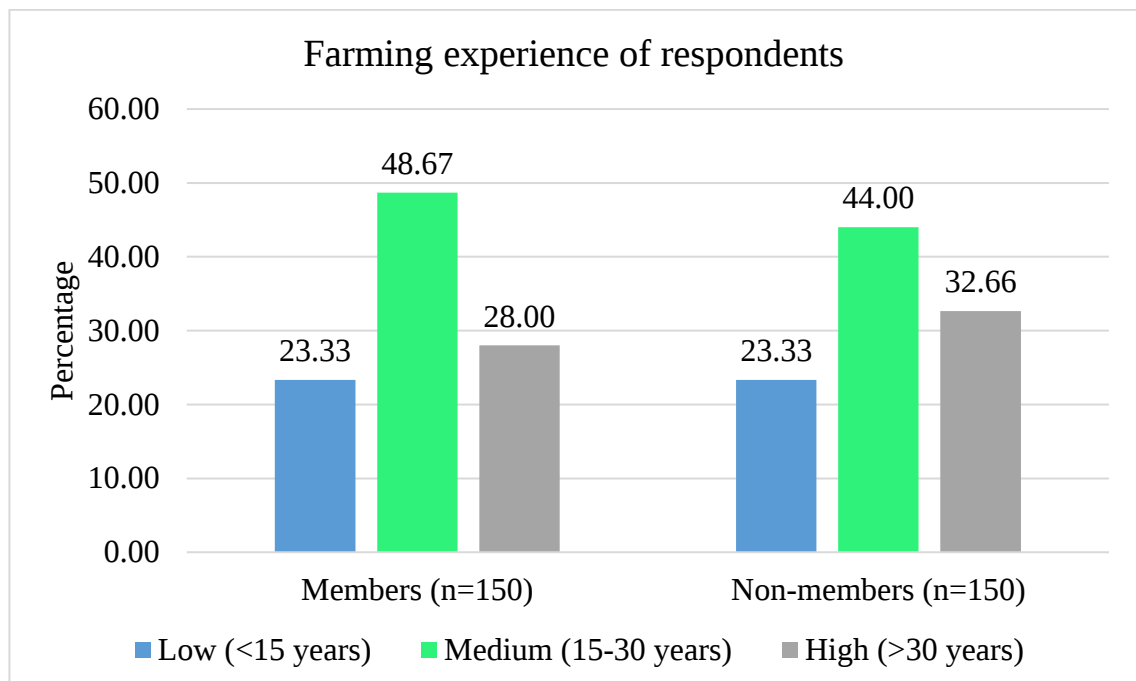


Fig.22: Distribution of the respondents according to their farming experience

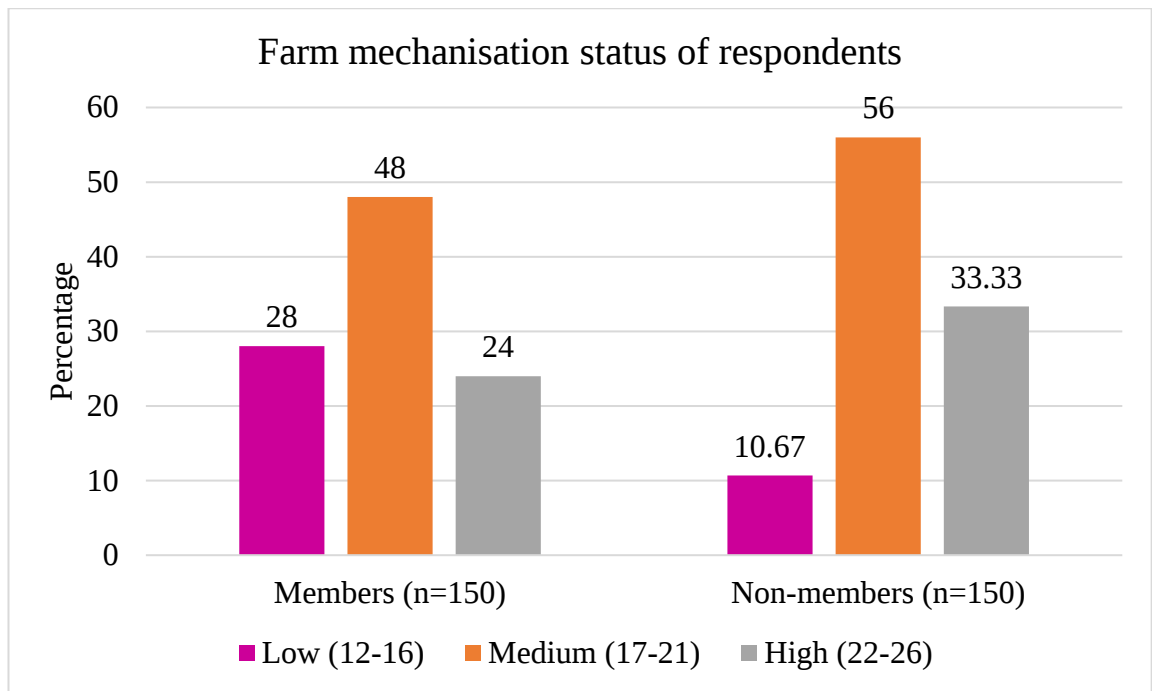


Fig.23: Distribution of the respondents according to their farm mechanization status

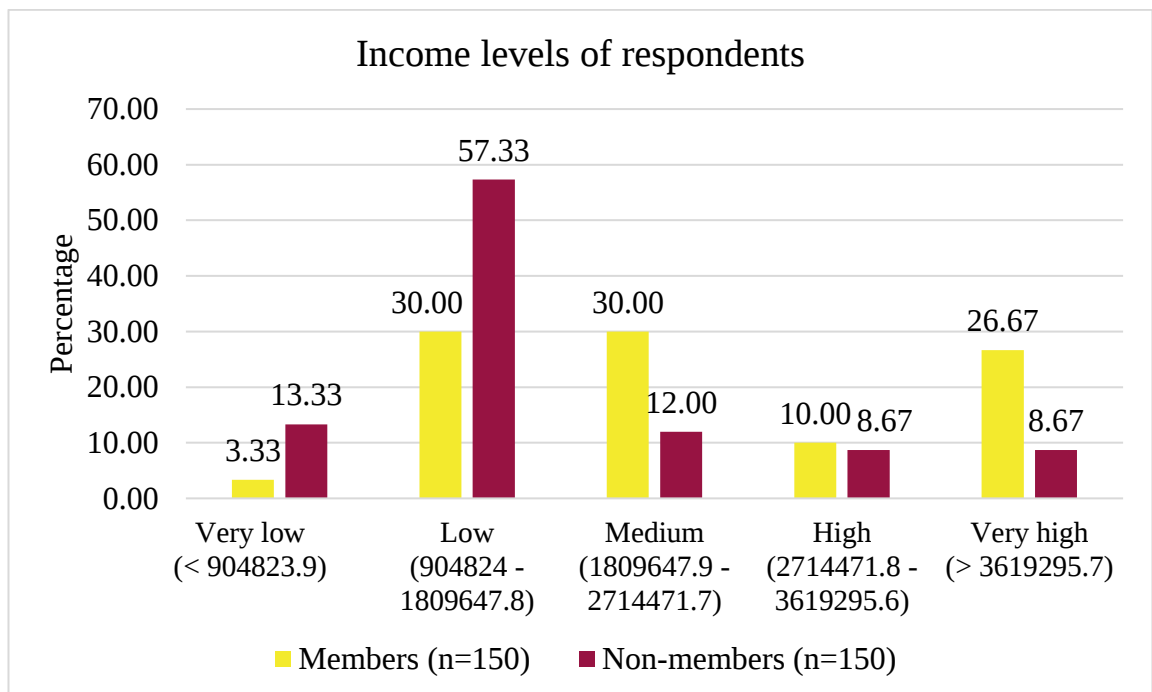


Fig.24: Distribution of the respondents according to their income levels

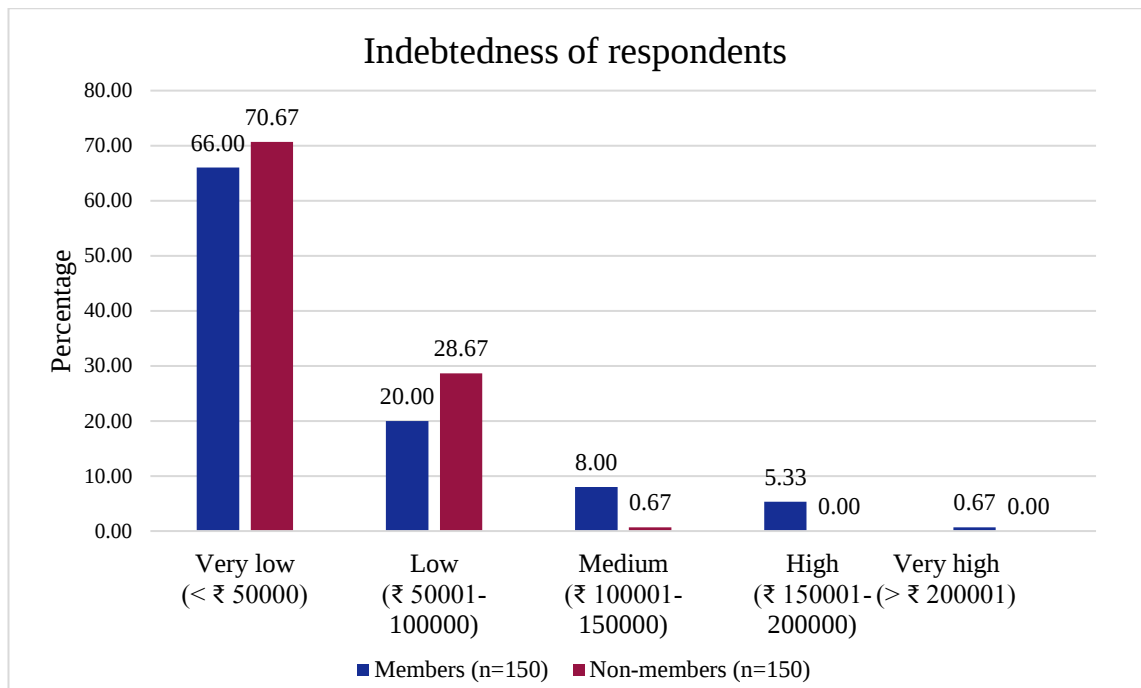


Fig.25: Distribution of the respondents according to their indebtedness



Fig.26: The supply chain of Red gram products for members under FPO

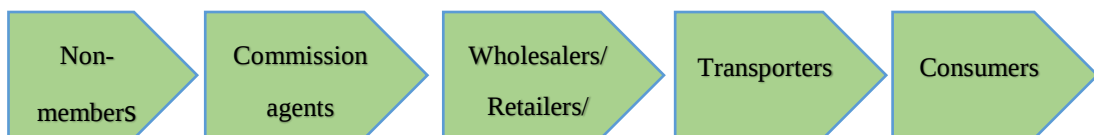


Fig.27: The supply chain of Red gram products for non-members

4.2.4 Socio-psychological variables

4.2.4.1 Participation in group/ community activities

It was observed in table 4.11 that majority of member farmers had high (50.67 %) level of participation as against medium (56.00 %) level of participation of non-member farmers.

The awareness of various extension and community activates along with motivating efforts of FPOs towards socio-economic development of farmers resulted in medium to the higher level of participation and many of them perceived that participation had improved their socio-economic and psychological conditions.

The medium level of participation was noticed in the case of non-members because of the efforts of the government to provide necessary farming facilities. But in most cases, participation was observed might be to get material benefits only.

Similar results were observed in the studies of Raghavendra *et al.* (2005) and Bikadakatti *et al.* (2011).

Table 4.31 Distribution of respondents according to their participation in group/ community activities.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	23	15.33	52	34.67
2.	Medium	51	34.00	84	56.00
3.	High	76	50.67	14	9.33
	Total	150	100.00	150	100.00

4.2.4.2 Information seeking behavior

It could be seen from table 4. that majority of the member farmers had medium level of information seeking behaviour (40.67 %) followed by high (39.33 %) and low (20.00 %) information seeking behaviour whereas, majority of non-member farmers had medium level (44.67 %) of information seeking behavior followed by low (40.00 %) and high (15.33 %).

The medium to a high level of information seeking behavior was observed in the case of member farmers because of the constant efforts of FPOs in providing the necessary information from authentic sources like government departments and private agencies. The new forms of sources of information and their effectiveness had also been playing a key role in attracting the farmers to gather new information and updating their knowledge with respect to market information, new cultivation practices, etc. In addition to that, the participation in FPOs had helped members to find the right source of information and good networking with other actors. This found to have an influence on the improved information seeking behavior.

Table 4.32 Distribution of respondents according to their information seeking behavior.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	30	20.00	60	40.00
2.	Medium	61	40.67	67	44.67
3.	High	59	39.33	23	15.33
	Total	150	100.00	150	100.00

The findings were in agreement with the results of studies conducted by Bikadakatti *et al.* (2011), and Rajput *et al.* (2016).

4.2.4.3 Leadership ability

Table 4.13 indicates a medium level of leadership ability in both the cases of respondents including members (37.33 %) and non-members (54.00 %).

Majority of the member farmers had medium to high leadership ability because of the fact that the membership in the FPOs had empowered them in such a manner that their psychological characteristics found to be improved. By observing the activities of FPOs the member subconsciously developing their ability to deal with peer group members. The members had been acquiring qualities like initiating group activities, caring for people rather than things, respecting each other's feelings, taking responsibilities for activities, etc.

But in case of non-members due to mediocre participation in groups and community activities, the leadership ability was found to be low to medium.

Table 4.33 Distribution of respondents according to their leadership ability.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	44	29.33	55	36.67
2.	Medium	56	37.33	81	54.00
3.	High	50	33.33	14	9.33
	Total	150	100.00	150	100.00

4.2.4.4 Capacity building

It was observed from table 4.14 that majority of member farmer had a medium level of the capacity building (40.00 %) unlike low (54.67 %) level of capacity building of non-members.

Table 4.34 Distribution of respondents according to their capacity building.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	37	24.67	82	54.67
2.	Medium	60	40.00	50	33.33
3.	High	53	35.33	18	12.00
	Total	150	100.00	150	100.00

The medium to a high level of capacity building of member farmers was observed because with the advent of FPOs the members got to understand their strengths and weaknesses and were able to adapt themselves to changing conditions by developing necessary competencies for current as well as new vocations.

But for non-members, the extent of adjustment was difficult because of the medium level of participation and exposure.

4.2.4.5 Risk orientation

It was stated from table 4.15 that majority (36.67 %) of the member farmers had a medium level of risk orientation as compared to a low level (48.67 %) of risk orientation of non-member farmers.

There was a medium to a high level of risk orientation among member farmers. Due to the intervention of FPOs the members were started looking farming as a business activity rather than a mere occupation. The facilities provided by FPOs enabled them to take up calculated risk by understanding the possible consequences. It was also noticed that the members started following suitable cropping patterns because of the timely relevant information provided by FPOs.

Similar results were observed in the studies of Natikar (2001), Chidananda (2008), Sidram (2008) and Akkamahadevi (2016).

Table 4.35 Distribution of respondents according to their risk orientation.

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	45	30.00	73	48.67
2.	Medium	55	36.67	51	34.00
3.	High	50	33.33	26	17.33
	Total	150	100.00	150	100.00

4.2.4.6 Innovativeness

It was observed from table 4. 16 that, majority (42.67 %) of the member farmers had high level of innovativeness followed by medium (34.67 %) and low (22.67 %), whereas majority (54.67 %) of the non-member farmers had medium level of innovativeness followed by low (26.67 %) and high (18.67 %).

As per the table, there was a medium to high innovativeness among the member farmers of FPOs when compared to low to medium level of innovativeness among non-members.

The members were of the opinion that the demonstration conducted by FPOs about advanced cultivation practices had helped them to understand the technicalities and could

adopt them before the average members of the society. The awareness creation and knowledge generation efforts of the FPOs had played a major role in improving the innovativeness characteristics of the members

Table 4.36 Distribution of respondents according to their innovativeness

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	34	22.67	82	54.67
2.	Medium	52	34.67	40	26.67
3.	High	64	42.67	28	18.67
	Total	150	100.00	150	100.00

But among non-members, the irregular exposure to perceived attributes of innovation had put them in helpless conditions thus most of them were wrongly following practices or still following traditional ways of cultivation.

The findings were in agreement with the results of studies conducted by Natikar (2001), Sidram (2008) and Akkamahadevi (2016).

4.2.4.7 Achievement motivation

It was observed from table 4.17 that majority of farmers had medium (44.00 %) achievement motivation as against low (72.67 %) achievement motivation of non-members.

Table 4.37 Distribution of respondents according to their achievement motivation

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	32	21.33	109	72.67
2.	Medium	66	44.00	39	26.00
3.	High	52	34.67	2	1.33
	Total	150	100.00	150	100.00

The FPO had opened new prospects of farming as a business activity for the members which encouraged them to take up new challenges and achieve a better standard of living.

4.2.4.8 Self-confidence

It was observed from table 4.18 that majority of member farmers had a medium level (41.33 %) of self-confidence followed by high (33.33 %) and low (25.33 %) whereas the majority of non-member farmers had a low level (61.33 %) of self-confidence followed by medium (29.33 %) and high (9.33 %).

The interventions of FPOs had been helping the member farmers to improve their behavior in terms of showing positive intent to take up work, not comparing themselves with others, taking responsibilities for own actions, etc.

Table 4.38 Distribution of respondents according to their self-confidence

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	38	25.33	92	61.33
2.	Medium	62	41.33	44	29.33
3.	High	50	33.33	14	9.33
	Total	150	100.00	150	100.00

4.2.4.9 Communication behavior

It was observed in table 4.19 that majority of member farmers had medium (47.33 %) communication behavior when compared to low (46.67 %) communication behavior of non-member farmers.

Majority of the members perceived that their communication behavior had increased in terms of use of verbal and non-verbal communication, use of soft skills, being non-judgemental and listening to others opinions, etc. The interaction effects during FPO meetings and peer group conversations had enabled the members to notice and improve their soft skills.

But in the case of non-members, medium to low communication behavior was observed due to the low level of participation, information seeking behavior, leadership ability, etc.

Table 4.39 Distribution of respondents according to their communication behavior

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	34	22.67	70	46.67
2.	Medium	71	47.33	70	46.67
3.	High	45	30.00	10	6.67
	Total	150	100.00	150	100.00

4.2.4.10 Decision-making power

It was observed in table 4.20 that majority of member farmers had medium (42.00 %) level of decision making power when compared to low (48.67 %) decision making the power of non-member farmers.

Table 4.40 Distribution of respondents according to their decision-making power

Sl. No.	Category	Member farmers (n=150)		Non-member farmers (n=150)	
		Frequency	%	Frequency	%
1.	Low	35	23.33	73	48.67
2.	Medium	63	42.00	43	28.67
3.	High	52	34.67	34	22.67
	Total	150	100.00	150	100.00

With the intervention of FPOs, the members were able to take independent decisions at the farm as well as home management by considering the opinions of others and pledging to fulfill decisions by completing actions.

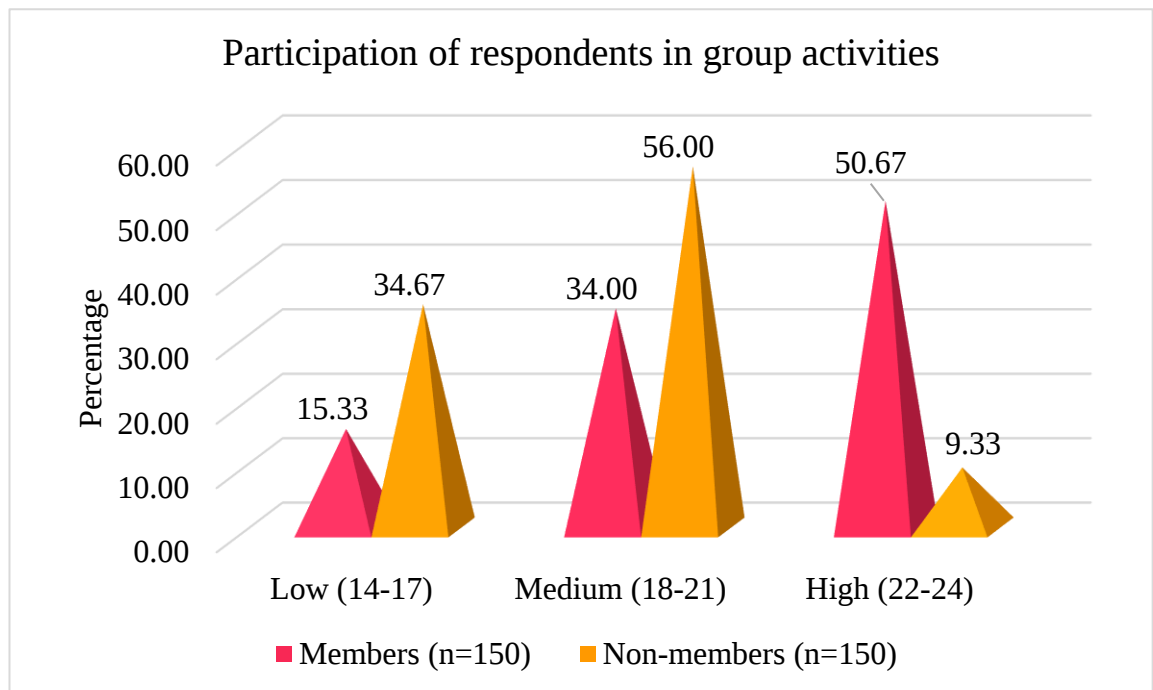


Fig.28: Distribution of the respondents according to their participation in group/community activities

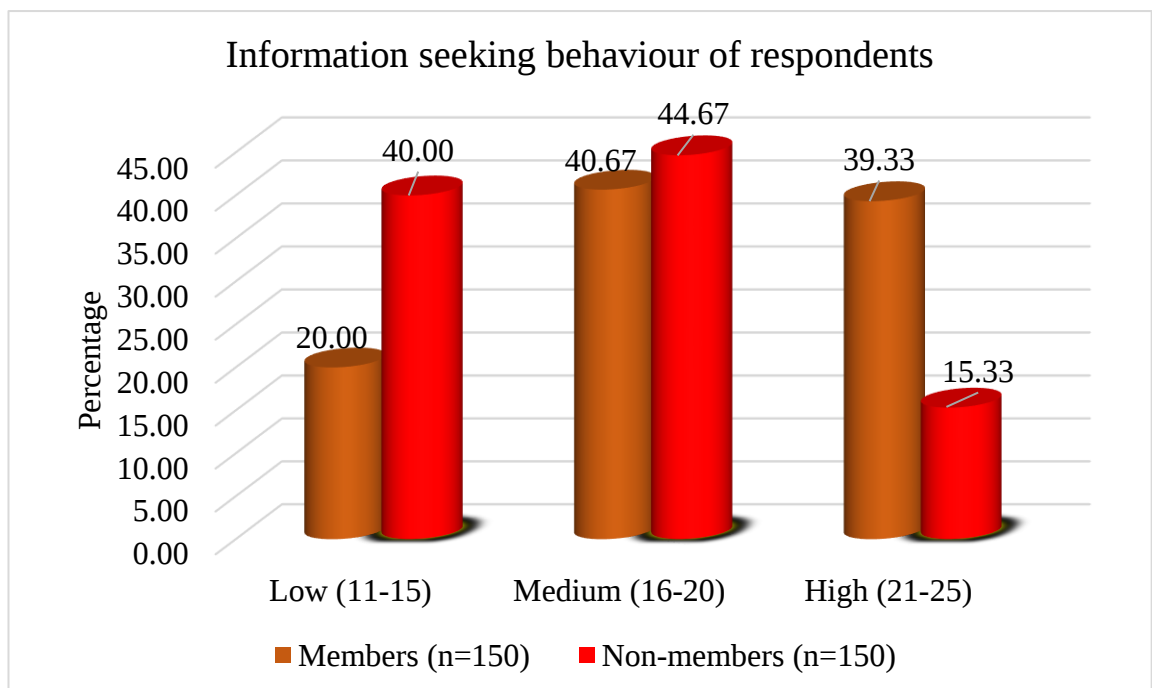


Fig.29: Distribution of the respondents according to their Information seeking behaviour

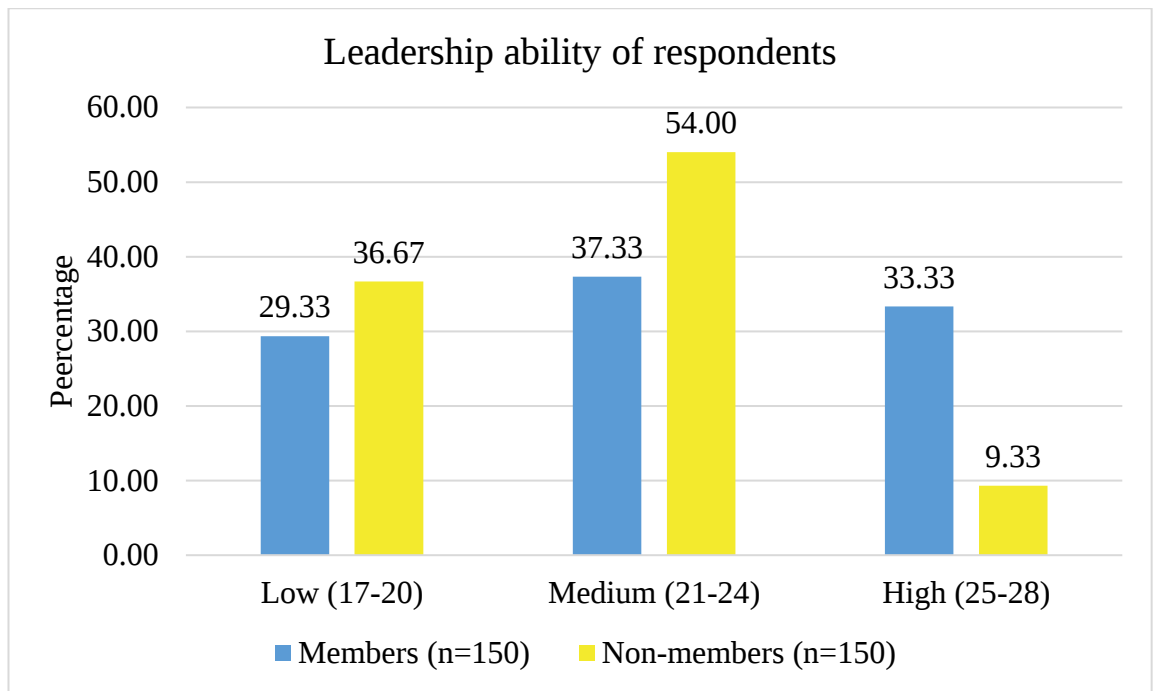


Fig.30: Distribution of the respondents according to their leadership abilities

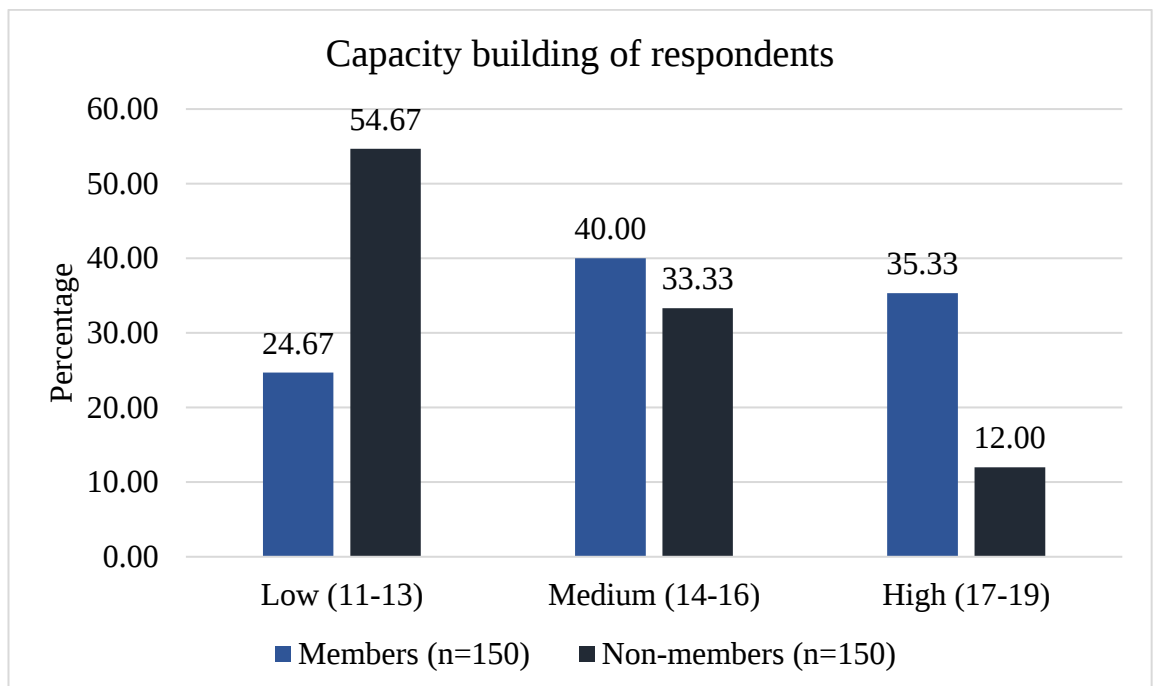


Fig.31: Distribution of the respondents according to their capacity building

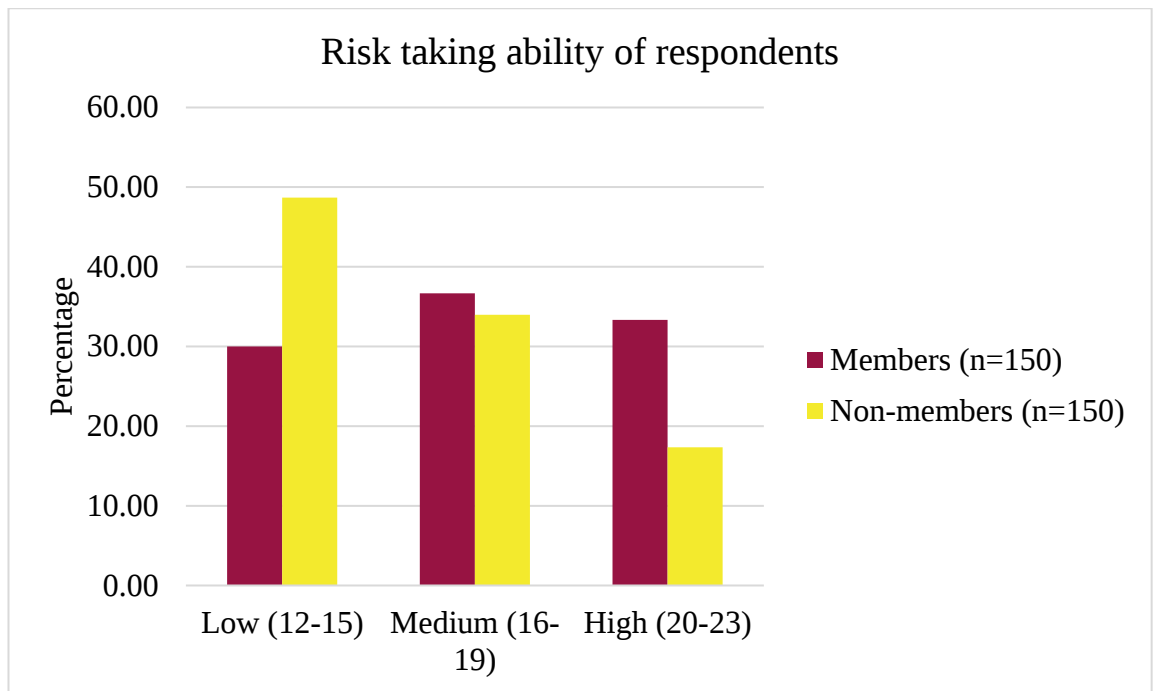


Fig.32: Distribution of the respondents according to their Risk taking ability

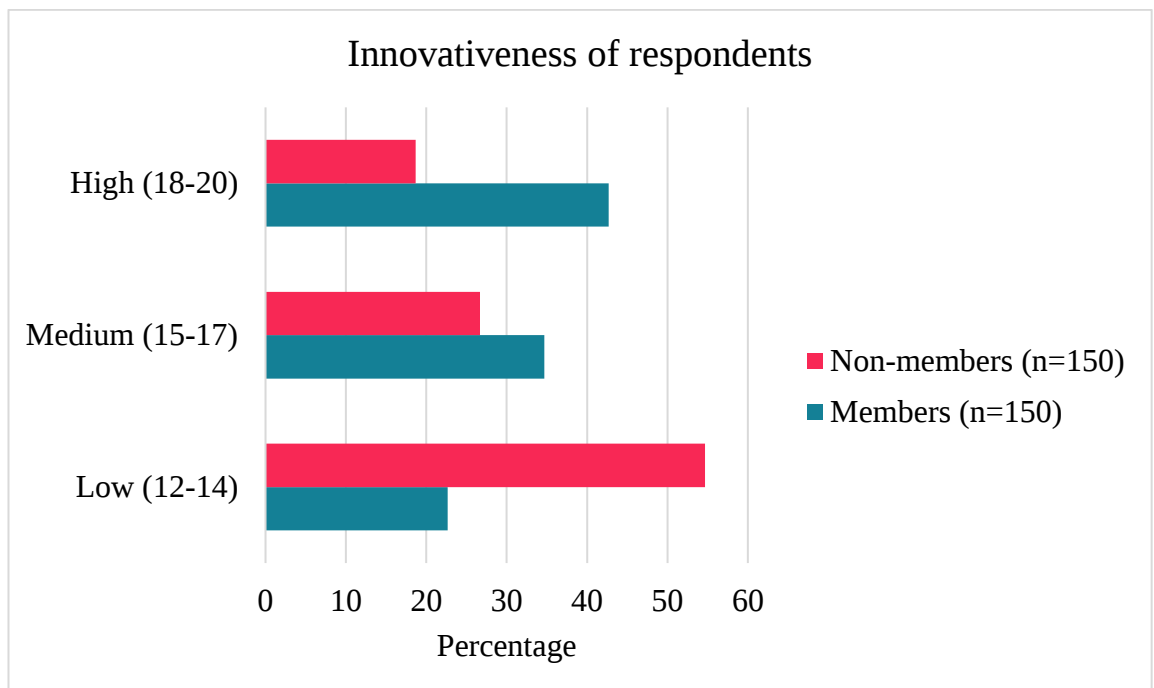


Fig.33: Distribution of the respondents according to their Innovativeness

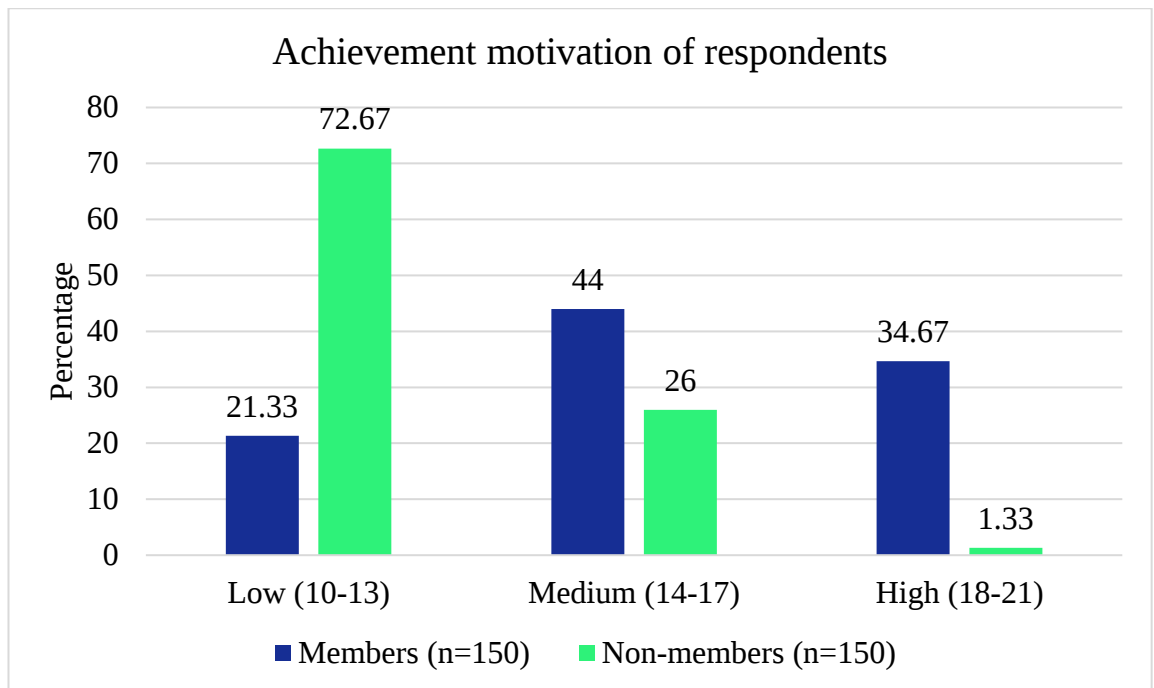


Fig.34: Distribution of the respondents according to their achievement motivation

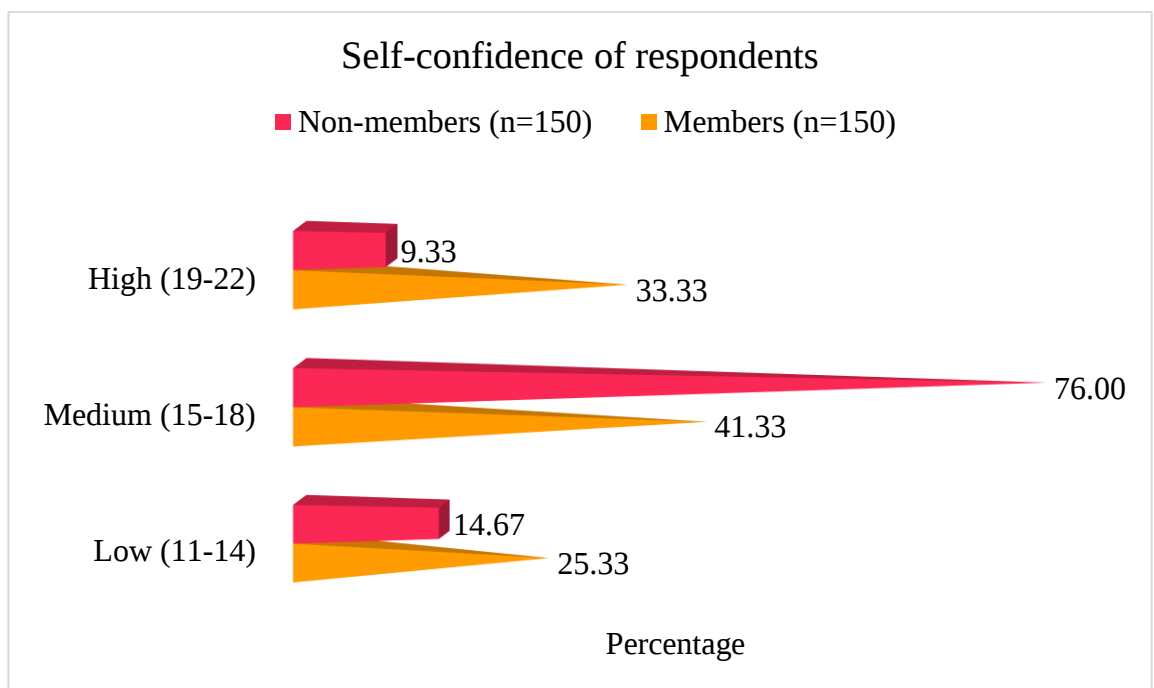


Fig.35: Distribution of the respondents according to their self-confidence

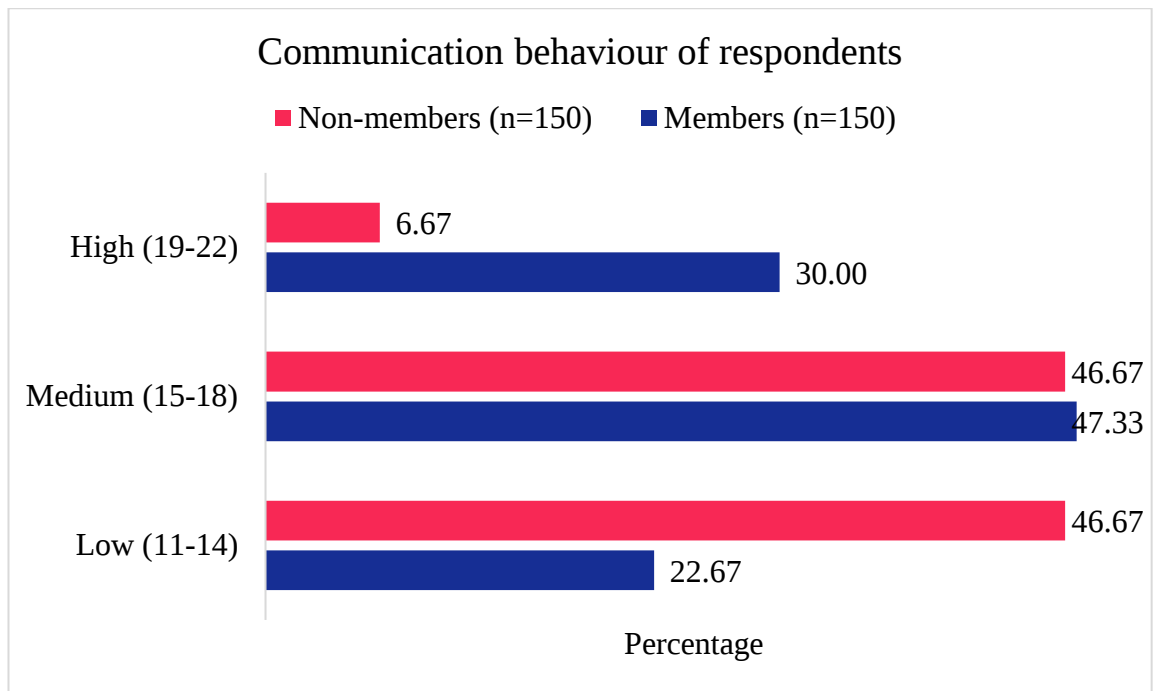


Fig.36: Distribution of the respondents according to their communication behaviour

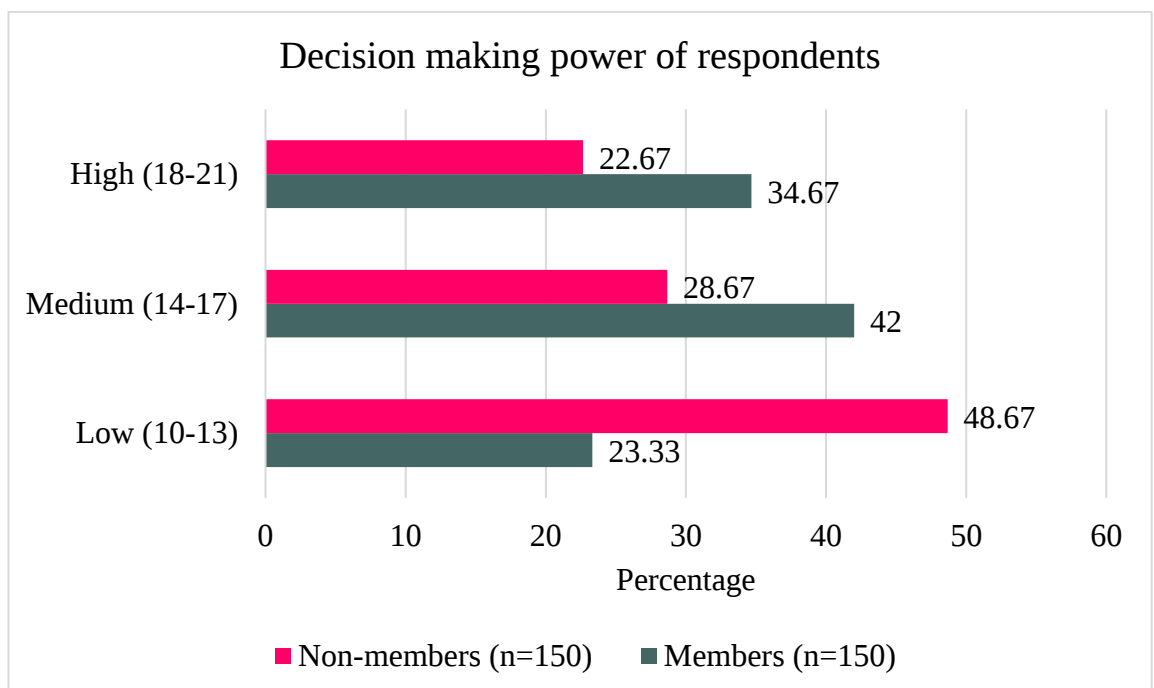


Fig.37: Distribution of the respondents according to their decision making power

4.2.4.11 Conclusions on socio-psychological characteristics

In conclusion, the participatory working nature of FPOs, enabling regular interaction among members, peer group influence and dynamic leadership of authorities of both resource agencies and FPOs (BoD) had been providing great insights on favorable behavior changes of members. Thus there was a considerable improvement in socio-psychological characteristics of members of FPOs than non-members.

4.3 Level of Knowledge of Member and Non-Member Farmers on Recommended Practices of red gram Cultivation

4.3.1 Distribution of member and non-member farmers in terms of their level of knowledge on red gram crop cultivation.

The data relating to the level of knowledge of the respondents on red gram crop cultivation practices were analysed and presented using the equal class interval method.

Table 4.41 Distribution of respondents according to their knowledge level in red gram crop cultivation.

Sl. No.	Level of knowledge	Member farmers (n=150)	Non-member farmers (n=150)
1.	Low	5 (3.33)	18 (12.00)
2.	Medium	36 (24.00)	92 (61.33)
3.	High	109 (72.66)	40 (26.66)
	Total	150 (100.00)	150 (100.00)

It was observed from table 4.41 that, majority (72.66 %) of the member farmers had high level of knowledge followed by medium (24.00 %) and low (03.33 %) whereas, majority of the non-member farmers had medium (61.33 %) level of knowledge followed by high (26.66 %), and low (12.00 %).

The findings related to the knowledge level of members were in contradiction with the results of studies of Raghavendra *et al.* (2005), Sidram (2008), Akkamahadevi (2016), Mohanakumara, *et al.* (2016), and Rajput *et al.* (2016). However, they were in agreement with the results of studies conducted by Bikadakatti *et al.* (2011) and Jadhav and Aski (2014).

4.3.2 The rank ordering of knowledge test items on recommended practices of red gram cultivation.

Table 4.42 states the item analysis of the member and non-member farmers on the level of knowledge possessed by them on red gram cultivation practices. It was noted from the table that ranks were assigned to all the technologies based on the total score obtained on each cultivation practice. The practices on which the members had high knowledge were month of sowing, usage of seed rates, length of nipping, number of seeds per hill, advantages of FYM application such as improvement in water holding capacity and microbial activity, advantage of *Rhizobium* on reducing nitrogen requirement, conditions for seed treatment, methods of disease management, varieties suitable for rain-fed conditions and insecticide used for control of *Helicoverpa* were ranked 1st followed by spacing for red soils, advantages, and timings of nipping (2nd), providing irrigations at critical stages and square plantation (2nd), soil sample collection (3rd), soil test based fertilizer application (4th), seed treatment, wilt management (5th), adoption of IPM (6th) respectively, whereas adopted farmers had the lowest level of knowledge on the use of biological pesticides.

In case of non-member farmers' category, practices like knowledge on insecticides for *Helicoverpa* and timings of sowing ranked first, followed by advantages of growing resistant varieties and TS3R (2nd), integrated pest management for insect control (3rd), seed rate for mono-cropping and *Rhizobium* treatment (4th), crop rotation for disease control (5th) and so on. They had the least level of knowledge on potassium requirement for red soils and the importance of CaCl_2 for improving germination.

It was evident from the table that the member farmers of FPOs had a high level of knowledge, compared to non-member farmers. This was because the members were frequently exposed to the ideas of red gram cultivation practices through field demonstrations conducted by the interested farmers, ABAs, etc. The business plan of FPOs was also associated with providing backward linkages for red gram cultivation such as the supply of necessary inputs like seeds, fertilizers, and pesticides which in turn transmitted the knowledge on technical aspects of cultivation. The farmers were also given the opportunity to get exposure through study tours, lectures by scientists of KVKs, agricultural colleges. Members show comparatively lower knowledge on the aspects like seed treatments with CaCl_2 which induces better germination, seed drying after harvesting to get nine per cent moisture, fertigation through drip irrigation, potash requirement for red soils as they were not aware of these practices.

Table 4.42 The rank order of items of knowledge test based on frequencies

Sl. No	Statement	Members		Rank	Non-members		Rank
		Correct			Correct		
1	The month of sowing for red gram	150	100	I	150	100.00	I
2	Time of application of FYM is	130	86.67	IX	110	73.33	VI
3	Quantity of FYM to be applied per acre is _____ tonnes.	136	90.60	VII	70	46.67	XI
4	Seed rate _____ kg/acre for monocrop.	150	100.00	I	125	83.33	IV
5	To control wilt _____ is used for seed treatment.	136	90.60	VII	65	43.33	XII
6	Length of nipping _____ cm	150	100.00	I	84	56.00	X
7	Seed rate required for transplanting is _____ kg/acre.	150	100.00	I	65	43.33	XII
8	The spacing between rows and plants is ___& ___ respectively for red soils.	148	98.67	II	110	73.33	VI
9	Spacing between rows and plants is ___& ___ respectively for black & irrigated soils.	146	97.33	VIII	35	23.33	XV
10	Recommended number of seeds per hill is _____	150	100.00	I	35	23.33	XV
11	Advantage/s of nipping is/are _____	148	98.67	II	84	56.00	X
12	The critical stages of irrigation water management ___& _____	146	97.33	IV	95	63.33	VIII
13	Thorough coverage of acre of land requires _____ liter of spray	96	64.00	XIII	65	43.33	XII
14	Potash requirement is only for red soils.	36	24.00	XVI	0	0.00	XVII
15	Application of FYM improves water holding capacity.	150	100.00	I	110	73.33	VI
16	Nipping can be practiced in any variety of red gram	125	83.33	X	65	43.33	XII
17	Seed treatment with Rhizobium reduces 50 per cent Nitrogen requirement.	150	100.00	I	125	83.33	IV

18	Crop rotation can reduce disease incidence	150	100.00	I	116	77.33	V
19	Cocktail mixtures of chemicals should be avoided	137	91.33	VII	29	19.33	XVI
20	Integrated pest management is the best way to control insects	150	100.00	I	130	86.67	III
21	Seed treatment with CaCl_2 improves uniform germination and drought resistance.	94	62.67	XIV	0	0.00	XVII
22	Application of FYM increases microbial activity in the soil	150	100.00	I	110	73.33	VI
23	Nipping is done after 45 DAS.	148	98.67	II	84	56.00	X
24	Seed treatment should be done in shady conditions	136	90.67	VII	41	27.33	XIV
25	The same insecticide should not be used for repeated sprayings for the control of insects.	147	98.00	III	29	19.33	XVI
26	Growing resistant varieties of red gram and crop rotation are the best methods of disease management.	150	100.00	I	135	90.00	II
27	If the product should be dried to get up to 9 per cent of moisture, they can be stored up to a period of 180 days.	83	55.33	XV	55	36.67	XIII
28	Fertilizers can be provided through drip irrigation.	116	77.33	XII	65	43.33	XII
29	Name any red gram variety(is) which are suitable for rain-fed conditions	150	100.00	I	93	62.00	IX
30	What are the duration of Asha and BSMR-736 varieties?	140	93.33	V	93	62.00	IX
31	What is the duration of TS3R variety?	150	100.00	I	135	90.00	II
32	What is the best time for spraying chemicals?	138	92.00	VI	99	66.00	VII
33	Name the micronutrients required for red gram cultivation	123	82.00	XI	35	23.33	XV
34	Name any insecticide used for the control of <i>Helicoverpa</i> .	150	100.00	I	150	100.00	I

Whereas non-member farmers had the highest knowledge on insecticide for *Helicoverpa* control as most of the land got infested with this insect. They also had some level of knowledge on time of sowing as the red gram cultivation was one of the mandatory crops grown every year. Since the member farmers of FPOs were adopting unique and advanced ways of red gram cultivation few of the non-members of operating as well as non-operating areas were getting awareness which in turn improving their knowledge. The mandatory works of the department of agriculture such as providing inputs, subsidies were also creating awareness among the non-member farmers. Some of the literate non-member farmers were also getting awareness through electronic and print media and also with the fellow farmer's interactions in the village.

Since the member farmers of FPOs are adopting unique and advanced ways of red gram cultivation few of the non-members of FPO operating as well as non-operating areas were getting awareness regarding new technologies which in turn improving their knowledge.

Table 4.43 Comparison of level of knowledge of respondents on red gram cultivation base on the z-score.

Sl. No	Particulars	Members (n=150)	Non-members (n=150)
1	Mean knowledge	31.31333333	15.42666667
2	Z score	42.38*	

* Significant at 0.05 per cent significance level

The z test was applied to compare the significance of the difference between knowledge levels of red gram cultivation between members and non-members. It was observed from the table 4.43 that the calculated z value was greater than table z value. Hence the null hypothesis stating there was no difference in the means of knowledge levels of red gram cultivation between members and non-members was rejected.

4.3.3 Application of logistic regression analysis to study the relationship between knowledge and independent variables of members of FPO

4.3.3.1 Results

Table 4.44 Logistic regression report of the effect of independent variables on knowledge of member farmers

Name of variable	Estimate	Std. Error	z value	Pr(> z)	Exp
(Intercept)	-7.98****	2.06	-3.87	0.00	
AgeLow	0.33	0.65	0.50	0.61	1.39
AgeHigh	0.97	0.73	1.33	0.18	2.64
Functional	-1.39	1.57	-0.88	0.37	0.25
Primary	-0.07	1.18	-0.06	0.95	0.93
Secondary	0.71	1.07	0.65	0.51	2.03
Intermediate	0.83	1.13	0.72	0.46	2.28
Undergraduate	1.96	1.22	1.61	0.10	7.10
FamilysizeMedium	0.89	0.57	1.57	0.11	2.45
FamilysizeHigh	1.55*	0.82	1.89	0.05	4.69
FarmsizeLow	0.45	0.61	0.73	0.46	1.56
FarmsizeHigh	0.37	0.68	0.54	0.58	1.44
IndebtednessMedium	0.74	0.59	1.24	0.21	2.10
IndebtednessHigh	1.58	1.16	1.36	0.17	4.84
IncomeMedium	2.57**	1.02	2.52	0.01	13.07
IncomeHigh	3.35****	1.30	2.58	0.01	28.48
ISBMedium	0.84	0.69	1.33	0.18	2.31
ISBHigh	1.42**	0.72	1.97	0.04	4.14
InnovativenssMedium	0.30	0.70	0.42	0.67	1.34
InnovativenssHigh	1.42*	0.75	1.88	0.05	4.14
SupportiveenvironmentMedium	0.99	0.68	1.44	0.14	2.69
SupportiveenvironmentHigh	0.18	0.71	0.24	0.80	1.19
GroupcohesivenessMedium	1.19**	0.60	1.97	0.04	3.29
GroupcohesivenessHigh	1.97**	0.77	2.56	0.01	7.21
GroupsustainabilityMedium	1.13*	0.60	1.88	0.06	3.08

GroupsustainabilityHigh	0.04	0.78	0.04	0.96	1.04
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Significance codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 '.' 1

Null deviance: 202.69 on 149 degrees of freedom

Residual deviance: 129.87 on 124 degrees of freedom

AIC: 181.87

In the table 4.44, the low-income variable was significant at .01 level. Whereas under medium income, high information seeking behavior, medium, and high group cohesiveness were significant at 0.05 level of significance. The variables like high family size, high innovativeness, and medium group sustainability were significant at 0.1 level. The negative sign (direction) of the coefficient of the estimated logistic function indicated the decreasing effect of the independent variable on the dependent variable. Functional and primary schooling had a decreasing impact on the knowledge of the members.

4.3.3.2 Odds ratio Exp (B) from the table indicated that

(a) Knowledge and age of members

Farmers belonged to low and high age group has 1.39 and 2.64 times more respective chance of knowing about red gram cultivation practices than those who belonged to the medium age group.

With the gain in education and with the advancement of media sources the members in low age group show interest towards knowing about advanced practices of cultivation. In the case of high age groups, by virtue of having high farming experience show a high level of knowledge.

(b) Knowledge and education of members

Level of education had a good impact on the knowledge level of member farmers. It can be seen from the table that members with secondary, intermediate and under graduation level of education have 2.03, 2.28 and 7.10 times respective chance of gaining knowledge about red gram cultivation practices when compared to that of members belonging to the illiterate category.

The increase in the level of education would obviously increase the awareness towards new information which in turn increases their knowledge.

(c) Knowledge and family size of members

Farmers belonged to medium and high family size group has 2.45 and 4.69 times more respective chance of knowing about red gram cultivation practices than those who belonged to the low age group.

With a large number of members in a family, the gathering of information increases, in turn, the knowledge increases. Hence the FPOs are providing multiple memberships to members of the same family.

(d) Knowledge and farm size of members

In the farm size category, the farmers with low and high farm size group had 1.56 and 1.44 times respective chance of gaining knowledge when compared to that of members belonging to medium farm size group.

With the intention of increasing the income, the farmers with low farm size are trying to aware of new information. The FPOs also have been showing more concern towards small and marginal farmers to improve their overall conditions.

(e) Knowledge and indebtedness of members

The chances of increasing knowledge at the medium and high category of indebtedness were 2.10 and 4.84 times more respectively when compared with those in low indebtedness category.

The increase in debts necessitates the members to gather and adopt advanced practices of cultivation to pay off their debts. The FPOs are showing extra concern to uplift the conditions of its members by providing adequate knowledge.

(f) Knowledge and income of members

The members belonged to the medium and high-income group have 13.07 and 28.48 times respective chance of gaining knowledge about red gram cultivation practices when compared to that of the low-income group.

Higher income groups show a natural tendency towards accepting new ideas.

(g) Knowledge and members' information seeking behavior

Members with medium and high information seeking behavior have 2.31 and 4.14 times respective chance of increasing their knowledge when compared to those who have low information seeking behavior.

The FPOs have been helping the farmers by providing authentic information on cultivation practices during every crop season and the advancement of sources of

information like mobile media and television are helping the farmers to get aware of real-time information thus increase in information seeking behavior was helping the member to gain knowledge.

(h) Knowledge and members' innovativeness

Being respectively in medium and high innovativeness groups gives them 1.34 and 4.14 times greater odds of being known about the practice compared to those having low innovativeness.

The FPOs have been helping to build the confidence of its members about advanced practices through demonstrations and repeated exposure. Thus the members are showing interest in knowing about new practices of farming.

The FPOs have been working towards improving not only socio-economic conditions but also the psychological characteristics of the member farmers hence overall development creates intrinsic motivation for members to aware of advanced cultivation practices.

(i) Knowledge and supportive environment of FPOs

Members belonging to FPOs having medium and high supportive environment have 2.69 and 1.19 times respective chance of gaining their knowledge when compared to those belonging to FPOs with a low supportive environment.

The FPOs having medium and high supportive environment provides 2.69 and 1.19 times respective chance to its members to gain their knowledge when compared to those FPOs with a low supportive environment.

The FPOs have gained the confidence of its members by helping to improve their farm as well as family conditions. Hence they are showing interest in knowing advanced cultivation practices presented by the FPOs.

(j) Knowledge and group cohesiveness in FPO

Members belonging to FPOs having medium and high group cohesiveness have 3.29 and 7.21 times respective chance of gaining their knowledge when compared to those belonging to FPOs with low group cohesiveness.

(k) Knowledge and group sustainability in FPO

Members belonging to FPOs having medium and high group sustainability have 3.08 and 1.04 times respective chance of gaining their knowledge when compared to those belonging to FPOs with low group sustainability.

4.3.3.3 ROC curve

The area under the ROC curve for the full model was 0.8662 and this was considered as excellent discrimination. The ROC curve was presented in figure 37.

4.3.3.4 Confusion matrix:

Table 4.45 Classification table showing predicted and observed knowledge level scores.

Classification table	Knowledge level predicted			
Knowledge level observed		Unknown	Known	% correct
	Unknown	60	22	73.17
	Known	19	49	72.05
Overall percentage				72.61

From the table 4.45, we conclude that

- (a) The model has correctly predicted 73.17 per cent observations as unknown and 26.82 per cent are incorrectly classified.
- (b) Whereas 72.05 per cent of the observations were correctly predicted as known by the model and 27.94 per cent are incorrectly classified.
- (c) The overall correct percentage was 72.61 per cent, which reflects the overall good strength of the model.

4.3.3.5 Conclusion

From the above section of analysis, it can be concluded that variables such as age, secondary, intermediate and undergraduate levels of education, medium and high family size, low and high farm size, medium and high indebtedness, medium and high income, medium and high information seeking behavior, medium and high innovativeness of member farmers, medium and high supportive environment, medium and high group cohesiveness and medium and high group sustainability had influenced the increase of knowledge of member farmers on red gram cultivation practices.

Since the above variables have been used in fitting the logit model, the change agencies can contact such farmers with the above traits to impart significant knowledge changes.

4.4 Extent of adoption of red gram cultivation practices in crop production by the respondents

4.4.1 Distribution of respondents based on their extent of adoption of red gram cultivation practices

The data relating adoption of red gram cultivation practices by the respondents were analysed using equal class interval method.

From the table 4.46, it was evident that half of the member (50.00 %) had a medium level of adoption followed by high (26.67 %) and low (23.33 %) level of adoption.

Whereas more than half (63.33 %) of the non-member farmers had a medium level of adoption followed by low (25.33 %) and high (11.33 %) level of adoption.

In the case of member farmers the majority of farmers, adoption level ranges above medium category. Even though they had a high level of knowledge they were still reluctant in adopting certain practices of cultivation mainly due to vagaries of the monsoons. But the majority of the lead farmers irrespective of conditions were showing greater courage to adopt the practices and those farmers who were given with kit of inputs for the demonstration were also showing considerable adoption.

Table 4.46 Distribution of the respondents based on their overall adoption of red gram cultivation practices.

Sl. No.	Extent of Adoption	Member farmers (n=150)	Non-member farmers (n=150)
1.	Low	35 (23.33)	38 (25.33)
2.	Medium	75 (50.00)	95 (63.33)
3.	High	40 (26.67)	17 (11.33)

Even though red gram cultivation provided a major source of income for the non-members, they were not showing interest in adopting improved cultivation practices. The reasons could be their low to medium levels of knowledge and fluctuating market prices for the product was also decreasing their interest in the adoption of advanced practices that could increase their cost of cultivation.

Similar results were found in the studies of Sidram (2008), Mohanakumara, *et al.* (2016), and Akkamahadevi *et al.* (2018).

4.4.2 Practice-wise extent of adoption of red gram cultivating member farmers of FPO

It could be inferred from above table 4.48 that 97.22 per cent of respondents were following summer ploughing and hand weeding since these are more common and easy practices and already they have knowledge. The adoption of any recommended cultivation practices of red gram in particular normally depends on several factors like knowledge about practices, the extent of change agencies efforts, perceived attributes of practice like relative advantage, complexity, timely availability of inputs, the willingness of farmers, *etc.* However, it was also factual that all the recommended practices will not be adapted to some degree by all the members in a given social system. The result of table 4.47 presents a different level of adoption of red gram cultivation practices in terms of full adoption, partial adoption, and non-adoption. The results and discussions are presented practice-wise in the following paragraphs.

Cent per cent of member farmers had fully adopted the practices such as deep summer ploughing, sowing at right time with *Rhizobium* treated recommended quantity of seeds, application of recommended dosage of major nutrients and growth promoters. The practices such as ploughing and sowing at the right time are more common age-old practices that most of the farmer know.

Nearly 90 per cent of the members were cultivating recommended varieties such as TS3R, Asha, and Maruthi, *etc.* The reason for this behavior as perceived by members were the recommended varieties were more suitable for rain-fed conditions and under irrigated conditions Asha variety was suitable as it was resistant to both wilt as well as sterility mosaic disease.

With respect to spacing, about fifty per cent of the members were following recommended spacing in red soils whereas 36.67 per cent of them were partially adopting in black soils. The reason cited was the demonstrations conducted by FPOs under farmers conditions which convinced them.

Majority of members (74.67 %) were following intercropping with green gram, soybean, black gram, *etc.* growing of intercrops gave additional income as well as controlled weed infestation. The crops like jowar and maize were attracting birds which controlled insects to some extent. But with the advent of wild bores reduced the interest of farmers to grow these crops.

With respect to FYM application, nearly eighty per cent of the members applying a recommended dosage of FYM at the right time as they were knowing that application of FYM improves water holding capacity as well as increases microbial activity.

46.67 per cent of member farmers were using micronutrients like S and ZnSO₄. The demonstration practices by FPOs had inculcated some interest in member farmers to use this practice.

Nearly 32 per cent of member farmers were following the nipping practice. Those farmers who were growing long duration varieties under irrigated conditions were following the nipping practice as it improves crop yield.

With respect to weed management, nearly fifty per cent of members were practicing hand weeding (49.33 %) and pre-emergent spraying of herbicides (50.67 %) respectively. The shortage and high cost of manual labor were forcing farmers to adopt herbicides. Another reason was the inter-cropping had reduced weed infestation.

Majority of the members were following 2 times of inter-cultivation operations within 45 days of sowing (54.67 %).

Moisture conservation practice by opening dead furrows between rows was done by 41.33 per cent of members. The rain-fed conditions were forcing members to adopt moisture conservation practices and such information was furnished through demonstrations of FPOs.

About fifty per cent of members who were having water resources were providing irrigation at critical stages such as sowing, flowering and pod formation when the rainfall goes down.

In the case of disease management, the majority of the member farmers (97.33 %) were treating seeds with *Trichoderma* for the control of wilt. The easy availability, as well as the use of resistant varieties, were not allowing them to use any form of non-bio chemicals either for seed treatment or for spraying.

In the case of stem blight and sterility mosaic disease about 13.33 per cent and 39.33 per cent use chemicals respectively. The infestation of stem blight was less common in the areas under investigation and wherever there were sterility mosaic infestation farmers were growing resistant varieties like Asha. In addition to the above practices of disease management about fifty per cent of the members who were also rotating their crops once in two years.

Nearly eighty per cent of the members followed the manual form of harvesting whereas only 37.33 per cent used combine harvesters. The farmers were of the perception that the machine harvested crop was fetching them less yield as the quality of seeds get reduced instead they were following manual harvest the even though there was a problem of labor availability.

4.4.3 Practice-wise extent of adoption of red gram cultivation on non-member farmers of FPO

Table 4.49 indicated that cent per cent of the non-member was following deep summer ploughing as it was one of the age-old practices. About three fourth of the non-members were adopting recommended varieties (74.67 %) as the seeds were distributed through Raitha Samparka Kendras (RSKs) and some of them were adopting because of their peer group influence.

Majority of the non-members were sowing within the prescribed time (82.67 %) with recommended varieties of seeds (74.67 %). The non-member farmers who were using local varieties were adjusting their sowing time based on the onset of monsoons.

In case of the spacing, the majority of the non-member were following recommended seed rate partially (56.00 %) as well as partial maintenance of spacing in black (49.33 %) and red (56.00 %) soils. This was because they were of the perception that closer spacing gives higher yields and was even sowing more than two seeds per hill.

More than fifty per cent of all non-member was started treating seeds with *Rhizobium* and other biofertilizers (54.67 %) this was because of the efforts of line departments in providing necessary inputs and over the years non-member farmers also realized the importance of seed treatment.

More than fifty per cent of the non-numbers fully following intercropping (52.67 %) with green gram, soy bean, black gram, etc.

About sixty-five per cent of the non-member farmers for applying the required quantity of FYM at the right time either fully (44.67 %) or partially (20.67 %). Due to a labor shortage and lack of rainfall the maintenance of livestock was becoming a difficult task so there was a declining trend of application of yours FYM by non-member farmers in the study area.

With respect to chemical fertilizers, more than fifty per cent of non-member was applying the recommended dosage of macronutrients (54.67 %) but in the case of micronutrients, the majority were not at all adopting (57.33 %). The non-member farmers

might have not realized the importance of micronutrient application but about forty per cent of them were started applying growth promoters as the input dealers suggesting their application. Due to lack of rainfall and labor shortage most of the non-member farmers for not following the nipping practice.

In the case of weed management, the majority of the non-member was following hand weeding (64.67 %) but very few of them were applying chemical herbicides (20.00 %). The non-member farmers who are following inter-cropping are leaving their land without weeding as they feel it won't affect the yield.

One-third of the non-members were following inter-cultivation operations and the majority of them were not following moisture conservation practices (74.00 %). Those non-member farmers with irrigation facilities for partially providing supplementary water for their land.

With respect to insect management all the non-member farmers for spraying insecticides for the control of pod borer but in most cases, they were applying more than the required dosage. Nobody had adopted NSKE or NPV for the control of pod borer. 44.67 per cent of the non-member farmers were using insecticides for the control of pod fly and *Maruca* species.

In case of disease management about one-fourth of the non-member, farmers were treating seeds with chemicals for the control of wilt however they were also mixing *Trichoderma* simultaneously as the recommendations were not clearly understood by the non-member farmers. No farmer was aware of controlling measures of stem blight and about one fourth was controlling sterility mosaic virus by applying chemicals. About twenty per cent of non-members were following crop rotation for the control of the disease.

In case of harvesting the majority of the non-member farmers were employing laborers (72.00 %) for harvesting but very few were adopted combine harvesters (28.00 %).

4.4.4 Comparison of extent of adoption of practice-wise cultivation of members and non-members of FPOs.

This section compares the difference in adoption behaviors of member and non-member farmers of FPOs. Members and non-members showed the difference to the extent of more than fifty per cent in the adoption of practices such as the use of growth promoters

(80.00 %), treating seeds with *Trichoderma* (77.33 %) and following recommended seed rate (58.67 %).

Less than fifty per cent of the difference was observed in practices like irrigation water management (49.33 %), treating seeds with bio-chemicals such as *Rhizobium*, PSB, and CaCl_2 etc. (45.33 %), application of macro-nutrients (45.33 %), applying insecticides for control of pod fly and *Maruca* species (44.00 %), maintaining spacing in red (44.00 %) soils and recommended FYM application (34.67 %).

The reasons for the above variations were mainly due to the interventions of FPOs on member farmers. The FPO had a huge impact on changing the adoption behavior of member farmers. By thoroughly analysing the cost and returns of red gram cultivation, FPOs are developing strategies to disseminate recommended practices of cultivation to realize above average income. Member farmers were of the opinion that the continuous efforts of FPOs have helped them to change their adoption behavior. Through field demonstrations, they are assisting farmers to realize the potential of technology. With the repeated exposure to recommendations as well as the availability of the input at a cheaper cost as compared to the market prices were making the adoption process looks effortless. FPOs were also helping them to realize the importance of growing red gram as a commercial crop. FPOs were also supporting them to realize MSP for their produce which in turn create interest for growing with much more confidence.

Table 4.47 Comparison of extent of adoption of respondents on red gram cultivation base on the z-score.

Sl. No	Particulars	Members (n=150)	Non-members (n=150)
1	Mean adoption	59.86	43.5
2	Z score	26.31*	

* Significant at 0.05 per cent significance level

The z test was applied to compare the significance of the difference between the extent of adoption of red gram cultivation between members and non-members. It was observed from the table that the calculated z value was greater than table z value. Hence the null hypothesis stating there was no difference in the means of extent of adoption of red gram cultivation between members and non-members was rejected.

Table 4.48 Practice-wise extent of adoption of red gram cultivating member farmers of FPO

Sl. No.	Recommended cultivation practices	Full Adoption	Partial Adoption	Non Adoption
1	Deep summer ploughing	150 (100.00)	0 (0.00)	0 (0.00)
2	Recommended Varieties: [TS-3R, BSMR 736, Asha, WRP-1 and Maruthi]	134 (89.33)	16 (10.67)	0 (0.00)
3	Sowing time: [May-July]	150 (100.00)	0 (0.00)	0 (0.00)
4	Spacing :			
a)	[120 X30 cm black soils]	22 (14.67)	55 (36.67)	73 (48.67)
b)	[90X20 red soils]	77 (51.33)	24 (16.00)	49 (32.67)
5	Seed rate: [5-6 kg/acre]	150 (100.00)	0 (0.00)	0 (0.00)
6	Seed treatment {Rhizobium [200 gm/acre], P.S.B [200 gm/acre], CaCl ₂ [2gm/ lit of water]}	150 (100.00)	0 (0.00)	0 (0.00)
8	Intercropping [Soybean, Greengram, Blackgram, Maize, Jowar]	112 (74.67)	38 (25.33)	0 (0.00)
8	FYM			
a)	Quantity of application [3-5 t/acre]	119 (79.33)	31 (20.67)	0 (0.00)
b)	Time of application [3 weeks before sowing]	119 (79.33)	31 (20.67)	0 (0.00)
9	Chemical fertilizer [kg/acre]			
i)	Major nutrients [N:P:K::10:20:10]	150 (100.00)	0 (0.00)	0 (0.00)
ii)	Minor nutrient [S and/or ZnSo ₄ = 8:6]	42 (28.00)	28 (18.67)	80 (53.33)
10	Nipping [time and length]	31 (20.67)	17 (11.33)	102 (68.00)
11	Weed management			
a)	Hand weeding [2 times]	74 (49.33)	25 (16.67)	45 (30.00)
b)	Pre-emergent [Pendamethalin @ 2.50 ml /lit of water]	76 (50.67)	59 (39.33)	15 (10.00)
c)	Post emergent [Imazathopyr @ 2.0 ml /lit of water]	0 (0.00)	76 (50.67)	74 (49.33)
12	Inter cultivation [1-2 times within 45 days]	82 (54.67)	68 (45.33)	0 (0.00)
13	Moisture conservation practice [by opening dead furrows between rows]	62 (41.33)	88 (58.67)	0 (0.00)
14	Irrigation water management at critical stages	74 (49.33)	16 (10.67)	60 (40.00)

15	Growth promoters (Planofix @ 0.25 ml /lit of water]		150 (100.00)	0 (0.00)	0 (0.00)
16	Insect management				
i)	Pod borer	a) (Profenophos @ 2 ml or Indoxicarb @ 0.3 ml or Emamectin benzoate @ 0.2 gm or Flubendamide @ 0.15 gm / lit of water]	150 (100.00)	0 (0.00)	0 (0.00)
		b) NPV or <i>Trichogramma</i> or NSKE	7 (4.67)	44 (29.33)	99 (66.00)
ii)	Pod fly	a) Methomil @ 0.6 gm or Imadachlopid @ 0.2 ml + 10 gm jiggery	96 (64.00)	52 (34.67)	2 (1.33)
iii)	Maruca spp.	a) Profenophos @ 2 ml/ lit of water or dichlorovos 2.5 ml/liter water	96 (64.00)	52 (34.67)	2 (1.33)
17	Diseases management				
i)	Wilt	a) Seed treatment with Captan 80WP (2gm/kg) or Thairam 75 WP [2gm/kg] or Carboxyl 75WP [2gm/kg]	0 (0.00)	0 (0.00)	150
		b) Seed treatment with Trichoderma (4gm/kg)	146 (97.33)	4 (2.67)	0 (0.00)
ii)	Stem blight	a) Metalaxyl @ 4 gm / kg of seed	20 (13.33)	0 (0.00)	130
iii)	Sterility mosaic	a) Dicofol 18.5 EC [2.5ml/lit] or Xidematan methyl 50 EC [1.5ml/lit]	12 (8.00)	47 (31.33)	91 (60.67)
v)	Crop rotation once in two years		74 (49.33)	25 (16.67)	51 (34.00)
18	Method harvesting				
a)	Manual		119 (79.33)	31 (20.67)	0 (0.00)
b)	Combined harvester		31 (20.67)	25 (16.67)	94 (62.67)

Values inside the parenthesis () indicated the percentage

Table 4.49 Practice-wise adoption levels of red gram cultivating non-member farmers of FPO

Sl. No.	Recommended cultivation practices	Full Adoption	Partial Adoption	Non Adoption
1	Deep summer ploughing	150 (100.00)	0 (0.00)	0 (0.00)
2	Recommended Varieties: [TS-3R, BSMR 736, Asha, WRP-1 and Maruthi]	112 (74.67)	13 (8.67)	25 (16.67)
3	Sowing time: [May-July]	124 (82.67)	26 (17.33)	0 (0.00)
4	Spacing :			
a)	[120 X30 cm black soils]	3 (2.00)	74 (49.33)	73 (48.67)
b)	[90X20 red soils]	11 (7.33)	84 (66.00)	55 (36.67)
5	Seed rate: [5-6 kg/acre]	62 (41.33)	88 (58.67)	0 (0.00)
6	Seed treatment {Rhizobium [200 gm/acre], P.S.B [200 gm/acre], CaCl ₂ [2gm/ lit of water]}	82 (54.67)	37 (24.67)	31 (20.67)
8	Intercropping [Soybean, Greengram, Blackgram, Maize, Jowar]	79 (52.67)	34 (22.67)	60 (24.67)
8	FYM			
a)	Quantity of application [3-5 t/acre]	67 (44.67)	31 (20.67)	52 (34.67)
b)	Time of application [3 weeks before sowing]	67 (44.67)	31 (20.67)	52 (34.67)
9	Chemical fertilizer [kg/acre]			
i)	Major nutrients [N:P:K::10:20:10]	82 (54.67)	43 (28.67)	25 (16.67)
ii)	Minor nutrient [S and/or ZnSo ₄ = 8:6]	4 (2.67)	60 (40.00)	86 (57.33)
10	Nipping [time and length]	7 (4.67)	25 (16.67)	118 (78.67)
11	Weed management			
a)	Hand weeding [2 times]	97 (64.67)	22 (14.67)	61 (40.67)
b)	Pre-emergent [Pendamethalin @ 2.50 ml /lit of water]	30 (20.00)	20 (13.33)	100 (66.67)
c)	Post emergent [Imazathopyr @ 2.0 ml /lit of water]	0 (0.00)	20 (13.33)	130
12	Inter cultivation [1-2 times within 45 days]	30 (20.00)	20 (13.33)	100 (66.67)
13	Moisture conservation practice [by opening dead furrows between rows]	27 (18.00)	12 (8.00)	111 (74.00)
14	Irrigation water management at critical stages	0 (0.00)	62 (41.33)	88 (58.67)

15	Growth promoters (Planofix @ 0.25 ml /lit of water]		30 (20.00)	34 (22.67)	86 (57.33)
16	Insect management				
i)	Pod borer	a) (Profenophos @ 2 ml or Indoxicarb @ 0.3 ml or Emamectin benzoate @ 0.2 gm or Flubendamide @ 0.15 gm / lit of water]	0 (0.00)	0 (0.00)	0 (0.00)
		b) NPV or <i>Trichogramma</i> or NSKE	0 (0.00)	150 (100.00)	99 (66.00)
ii)	Pod fly	a) Methomil @ 0.6 gm or Imadachloprid @ 0.2 ml + 10 gm jiggery	34 (22.67)	86 (57.33)	2 (1.33)
iii)	Maruca spp.	a) Profenophos @ 2 ml/ lit of water or dichlorovos 2.5 ml/liter water	34 (22.67)	86 (57.33)	2 (1.33)
17	Diseases management				
i)	Wilt	c) Seed treatment with Captan 80WP (2gm/kg) or Thairam 75 WP [2gm/kg] or Carboxyl 75WP [2gm/kg]	12 (8.00)	111 (74.00)	150 00.00)
		d) Seed treatment with Trichoderma (4gm/kg)	34 (22.67)	86 (57.33)	0 (0.00)
ii)	Stem blight	b) Metalaxyl @ 4 gm / kg of seed	0 (0.00)	150 (100.00)	130
iii)	Sterility mosaic	b) Dicofol 18.5 EC [2.5ml/lit] or Xidematan methyl 50 EC [1.5ml/lit]	22 (14.67)	115 (76.67)	91 (60.67)
v)	Crop rotation once in two years		30 (20.00)	34 (22.67)	86 (57.33)
18	Method harvesting				
a)	Manual		108 (72.00)	42 (28.00)	0 (0.00)
b)	Combined harvester		42 (28.00)	0 (0.00)	108 (72.00)

Values inside the parenthesis () indicated the percentage

4.4.5 Application of logistic regression analysis to study the relationship between adoption and independent variables of members of FPO

Table 4.50 Logistic regression report of the effect of independent variables on adoption by member farmers

	Estimate	Std. Error	z value	Pr(> z)	Exp
(Intercept)	-4.78**	2.24	-2.13	0.03	
AgeLow	1.19**	0.52	2.28	0.02	3.27
AgeMedium	0.39	0.55	0.71	0.48	1.48
FamilysizeLow	0.41	0.68	0.61	0.54	1.51
FamilysizeMedium	0.13	0.60	0.22	0.82	1.14
FarmsizeMedium	0.39	0.50	0.79	0.43	1.48
FarmsizeHigh	1.12*	0.61	1.83	0.07	3.07
IndebtednessMedium	0.33	0.58	0.57	0.57	1.39
IndebtednessHigh	0.31	1.00	0.31	0.76	1.36
IncomeMedium	0.47	0.88	0.53	0.59	1.59
IncomeHigh	2.03*	1.16	1.74	0.08	7.60
InnovtotalMedium	0.70	0.54	1.30	0.19	2.02
InnovtotalHigh	2.08****	0.61	3.40	0.00	7.97
GroupcoheMedium	0.06	0.57	0.11	0.91	1.07
GroupcoheHigh	0.04	0.61	0.07	0.95	1.04
GroupsustMedium	0.43	0.53	0.81	0.42	1.53
GroupsustHigh	0.01	0.71	0.02	0.99	1.01
`Supp env`	0.18	0.19	0.93	0.35	1.20
Knownew2medium	0.12	0.56	0.21	0.83	1.12
Knownew2High	1.05*	0.60	1.74	0.08	2.86

Significance codes: 0 '****' 0.001 '***' 0.01 '**' 0.05 '*' 0.1 '.' 1

Null deviance: 198.21 on 149 degrees of freedom

Residual deviance: 152.95 on 130 degrees of freedom

AIC: 192.95

In table 4.50, the variable, high innovativeness was significant at .001 level. Low age show significance at 0.05 level. Whereas high farm size high-income and high knowledge level were significant at 0.1 level.

4.4.5.1 Odds ratio Exp (B) from the table indicated that

(a) Adoption and age of members

Members belonged to low and medium age group has 3.27 and 1.48 times respective chance of adopting red gram cultivation practices when compared to those belonging to high age group.

The members belonging to low and medium age groups show more confidence in adopting a practice than the old age group. The old age farmers were more inclined towards following the old age traditional practices.

(b) Adoption and family size of members

The odd for the chance of adoption of red gram cultivation practices increase by 1.51 and 1.14 times for the members belonging to low and medium-sized families respectively than those who have a high family size.

The lower number of members in the family reduces conflicts in making decisions about adopting a practice.

(c) Adoption and farm size of members

In the farm size category, farmers belonging to medium and high farm size group have 1.48 and 3.07 times chance of adoption when compared to those belonging to low farm size group.

Increase in farm size allows members to take risks in trailing and adopting new cultivation practices.

(d) Adoption and indebtedness of members

The chances of adoption by members having a medium and high level of indebtedness are 1.39 and 1.36 times more when compared with those in low indebtedness category.

With the intention of solving their indebtedness problems, the members with medium to high debts show more tendency towards adopting advanced cultivation practices.

(e) Adoption and income of members

Members with medium and high income have 1.59 and 7.60 times respective chance of adopting red gram cultivation practices when compared to those belonging to the low-income group.

Higher income groups show a natural tendency towards accepting new ideas.

(f) Adoption and members' innovativeness

Members with medium and high innovativeness have 2.02 and 7.97 times respective chance of adopting a practice of red gram cultivation than those with low innovativeness.

The farmers with high innovativeness show high confidence in adopting the new practices. The FPOs are helping their members to develop entrepreneurial qualities like risk bearing, developing intrinsic motivation, effective use of resources, etc. so that they adopt the practices before the average farmers of the social system.

(g) Adoption and group cohesiveness in FPO

Members belonging to such FPOs with medium and high group cohesiveness have 1.07 and 1.04 times respective chance of adopting red gram cultivation practice when compared to those belonging to FPOs with low group cohesiveness.

Cohesiveness binds the members of the group to share mutual help and influence the better decisions of each other. Hence groups with medium to high cohesiveness encourages their members to try and adopt recommended cultivation practices.

(h) Adoption and group sustainability in FPO

Members belonging to such FPOs with medium and high group sustainability have 1.53 and 1.01 times respective chance of adopting red gram cultivation practice when compared to those belonging to FPOs with low group sustainability.

Sustainability in a group indicates that there was a sense of satisfaction among members to be a part of the group. The FPOs have been maintaining a sustainable environment in the group so that members have confidence in practicing new practices shown by the FPOs

(i) Adoption and supportive environment of FPOs

The odds for the adoption of recommended cultivation practices increase by 1.20 times with one unit increase in a supportive environment.

The FPOs have been gaining the confidence of its members by providing adequate support for the farm as well management hence increases in supportive environment adds up to the adoption of recommended cultivation practices of red gram.

(j) Adoption and members' knowledge level

The farmers with the medium and high level of knowledge about red gram cultivation practices have 1.12 and 2.86 times respective chance of adopting them than those with low knowledge.

The increase in knowledge level provides confidence for adopting advanced cultivation practices. Hence, The FPOs through their interventions like demonstrations, etc., providing adequate knowledge to members so that they can adopt the practices.

4.4.5.2 Confusion matrix:

Table 4.51 Classification table showing predicted and observed adoption scores of member farmers

Classification table	Extent of adoption predicted			
Extent of adoption observed		Non-adopted	Adopted	% correct
	Non-adopted	33	14	70.21
	Adopted	23	80	77.67
Overall percentage				73.94

From table 4.51, it can be concluded that

- (d) The model has correctly predicted 70.21 per cent observations as non-adopted and 29.79 per cent were incorrectly classified.
- (e) Whereas 77.67 per cent of the observations were correctly predicted as adopted by the model and 22.33 per cent were incorrectly classified.
- (f) The overall correct percentage was 73.94 per cent, which reflects the overall good strength of the model.

4.4.5.3 ROC curve

The area under the ROC curve for the full model was 0.8169 and this was considered as good discrimination. The ROC curve was presented in figure 38.

4.4.5.4 Conclusion

From the above section of the analysis, it can be concluded that variables such as low and medium age, low and medium family size, medium and high farm size, medium and high indebtedness, medium and high income, medium and high innovativeness, medium and high group cohesiveness, medium and high group sustainability and

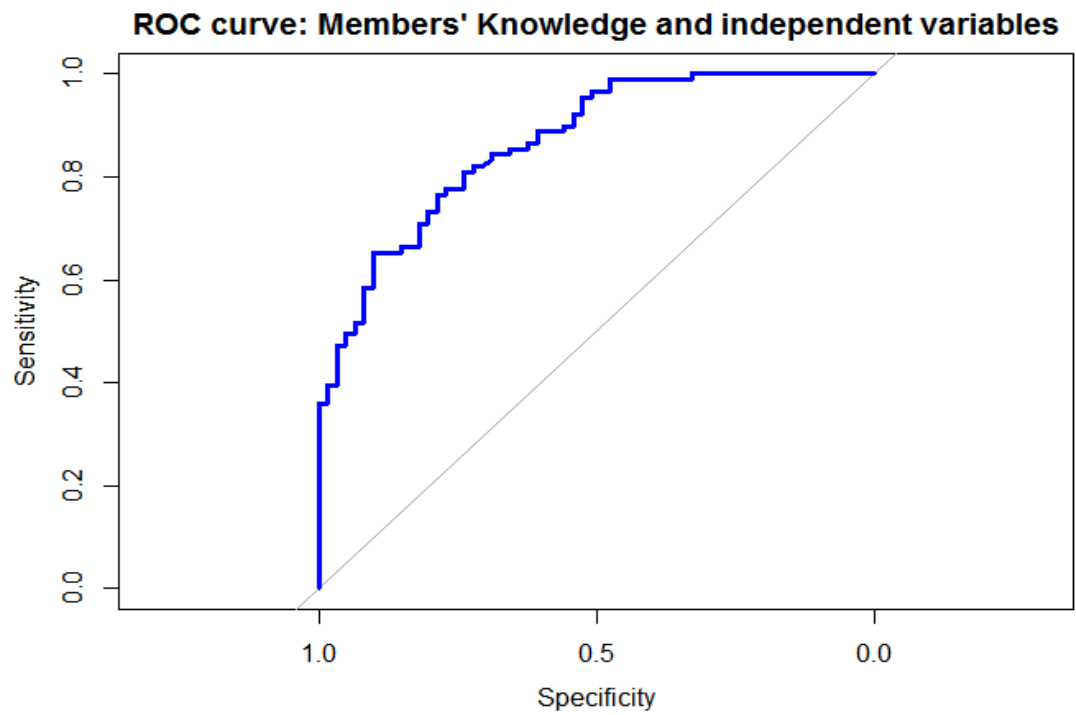


Fig.38: ROC curve showing the influence of independent variables on knowledge levels of member farmers

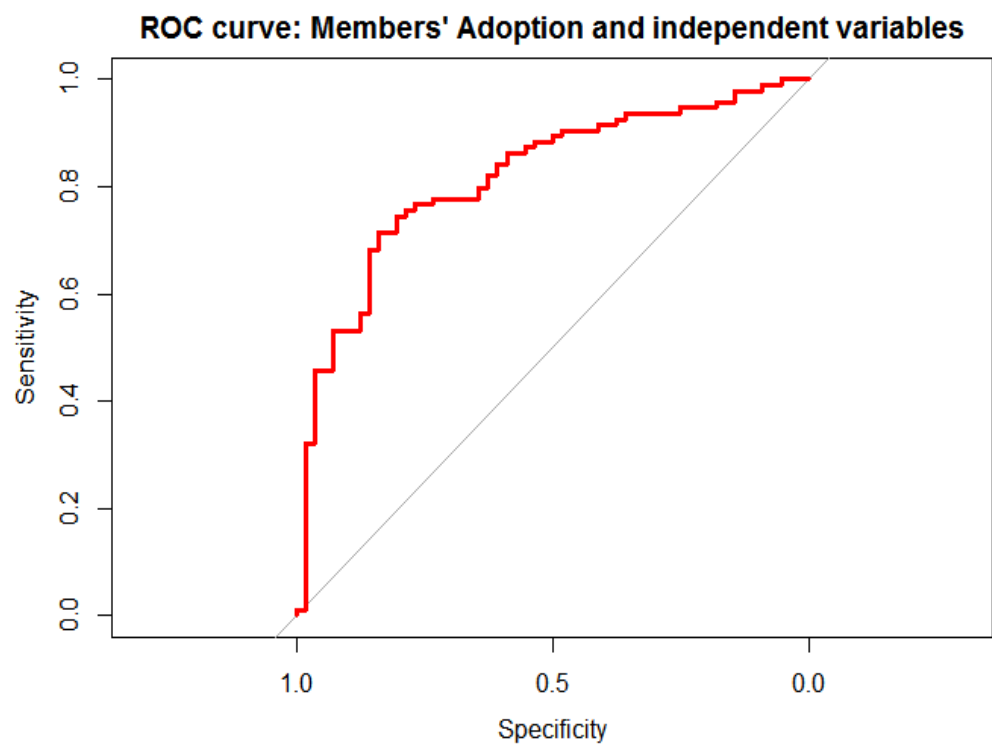


Fig.39: ROC curve showing the influence of independent variables on the extent of adoption of member farmers

knowledge of the member farmers had influenced the increase of adoption of member farmers on red gram cultivation practices.

If the change agencies focus on the farmers with the above traits, there would be more chance of adoption of advanced cultivation practices.

4.5 To Analyse the Linkages of Farmer Producer Organisations with Governmental and Non-Governmental Organisations.

4.5.1 Linkages of FPOs assisted by VLRC with governmental organisations

It was evident from table 4.52 that all the FPOs under the assistance of VLRC had been maintaining an association with many of the government organisations for various purposes. The level of networking and purpose discussed in this section. The extent of linkage and the importance was presented in the venn diagram figure 39. The degree of importance of linkage was expressed in terms of very high, high and low based on the frequency of contacts such as regularly, sometimes and occasionally respectively.

4.5.1.1 For technical support and inputs

1. KVK, Kalaburagi: the KVK offered services such as soil testing, conducting demonstrations in the area, technical advice, etc. The degree of importance of linkage was high because the FPOs maintained contact for few times in a year when the need arises.

2. Department of agriculture (Kalaburagi): the AOs and AEO with the assistance of ADA were helping the FPOs by providing technical information regarding GAPs as well as inputs like seeds (TS3R), urea, DAP, micro-nutrients like Gypsum. The degree of importance of linkage was very high because the FPOs maintained regular contact with the RSKs as well as ADA office.

3. UAS Raichur: the college of agriculture under UAS Raichur maintained a close association with the FPOs. They supply jala which was an organic formulation made of vermicomposting by-products. They also provided technical information. The degree of importance of linkage was very high.

4. IFFCO, Kalaburagi: this semi-government organisation aided by supplying fertilizers like DAP, urea in large quantities. The degree of importance of linkage was very high.

4.5.1.2 For marketing

1. SFAC and National Commodity and Derivatives Exchange Limited (NCDEX) jointly procure the produce especially red gram from the FPOs. The degree of importance of linkage was very high.

Table 4.52 Linkages of FPOs assisted by VLRC with governmental organisations

Sl. No.	Partner Name	Partner Location	Partnership Purpose	Frequency of contacts
1	Krishi Vigyan Kendra	Kalaburagi	Technical support and inputs	Sometimes
2	Department of Agriculture - Assistant Director of Agriculture (ADA), Agricultural officer (AO) and Assistant Agricultural officer (AAO)	Kalaburagi for RKPCL, (Aland for NKPCL) and (Sedam for BKPCL)	Technical support and inputs	Regularly
3	UAS Raichur	Raichur and Kalaburagi	Technical Support and inputs	Regularly
4	IFFCO	Kalaburagi	Fertiliser	Regularly
5	NCDEX	Mumbai and Kalaburgi	Marketing	Regularly
6	APMC	Kalaburagi	Marketing	Regularly
7	CWC	Kalaburagi	Storage	Sometimes
8	Pragati Krishna Grameena Bank	Kalaburagi	Finance	Regularly
9	NABARD	Bangluru	Grant	Regularly
10	Small Farmer Agribusiness Consortium	Delhi	Marketing	Regularly

2. APMC: the FPOs get the support of APMC of Kalaburagi, Aland, and Sedam respectively to market their produce. In addition to that, the FPOs get market-related information from APMC. The degree of importance of linkage was very high.

4.5.1.3 For Storage

1. Central Warehousing Corporation (CWC) and State Warehousing Corporation (SWC): the central warehousing corporation helped the FPOs in storing the procurements. The degree of importance of linkage was high only during the times of procurement of the produce.

4.5.1.4 For financial support:

1. NABARD provided technical support as well as grants for the resource agencies to assist the FPOs. The degree of importance of linkage was very high.

2. Pragati Krishna Grameena Bank (PKGB): this cooperative bank supports the members by providing the financial assistance and the FPOs operate their current bank accounts in the branches of Nandur (K), Munnalli and Mudhol respectively. The degree of importance of linkage was very high.

4.5.2 Linkages of FPOs assisted by VLRC with non-governmental organisations

4.5.2.1 Resource Institute

1. VLRC: The Vrutti Livelihood Resource Centre was the resource institute for the establishment of FPOs. For the first three years, they had provided all the facilities to stabilize the FPOs. From the third year onwards they started supporting in the business of FPOs. The FPOs formed an agreement stating that the VLRC had to establish a network of support for forward and backward facilities and the FPOs, in turn, will share fifty per cent of their profit to VLRC. The degree of importance of linkage was very high

2. The VLRC maintains good rapport with other NGOs such as ISAP, MYRADA, etc. to avoid the overlapping of formation of FPOs in the same villages. The degree of importance of linkage was low.

4.5.2.2 Financial support

1. Micro-finance institute- Sanghamitra: It is a micro-finance institution operationalized in the year March 2000 to provide financial assistance to Self-help affinity groups. The FPOs helped the female members of Shareholders' families to organise into SHG and providing the credit facilities. The degree of importance of linkage was very high.

2. Ananya finance for inclusive growth, a Non-Banking Finance Company (NBFC) operated by Ahmedabad-based non-profit organisation called Friends of Women's World Banking (FWWB). The NGO was promoted by Self-Employed Women's Association (SEWA) bank. It provided financial assistance for the SHG of FPOs. The degree of importance of linkage was high.

Table 4.53 Linkages of FPOs assisted by VLRC with non-governmental and private organisations

Sl. No	Partner Name	Partner Location	Partnership Purpose	Frequency of contacts
1	VLRC	Kalaburagi	Resource institute	Regularly
2	NGOs	Kalaburagi	Extension/networking	Sometimes
4	MFI-Sanghmitra	Kalaburagi	SHG Finance	Regularly
5	Mindtree	Bengaluru	IT	Occasionally
6	Selco Foundation	Bengaluru	Enterprise Development	Occasionally
7	APPI	Bengaluru	Grant	Regularly
8	Edelgive	Mumbai	Grant	Occasionally
9	NBFC-FWWB, AFL	Ahmedabad	Grants for SHG	Sometimes
10	AXIS bank	Kalaburagi	Financial transactions	Regularly
11	WASSAN	Hyderabad	Technical support	Occasionally
12	Dal Millers	Kalaburagi	Trading/marketing	Regularly
13	Commission Agent	Kalaburagi	Trading/Marketing	Regularly
14	Local Input Market	Kalaburagi	Seed, pesticide, fertiliser	Regularly

3. AXIS bank: the FPO operates saving bank transactions through AXIS bank. It also provided direct benefit transfer of price for the product to each and every farmer of FPOs. The degree of importance of linkage was very high.

4. APPI: Ajim Premji's Philanthropic Initiatives provide a grant for the potential and needy farmers to take up Agribusiness. The degree of importance of linkage was very high.

5. Edelgive foundation: is one of the strategic philanthropic arms of Edelweiss group committed to addressing the socio-economic inequalities faced by women and girls. This foundation granted financial support for SHGs. The degree of importance of linkage was low.

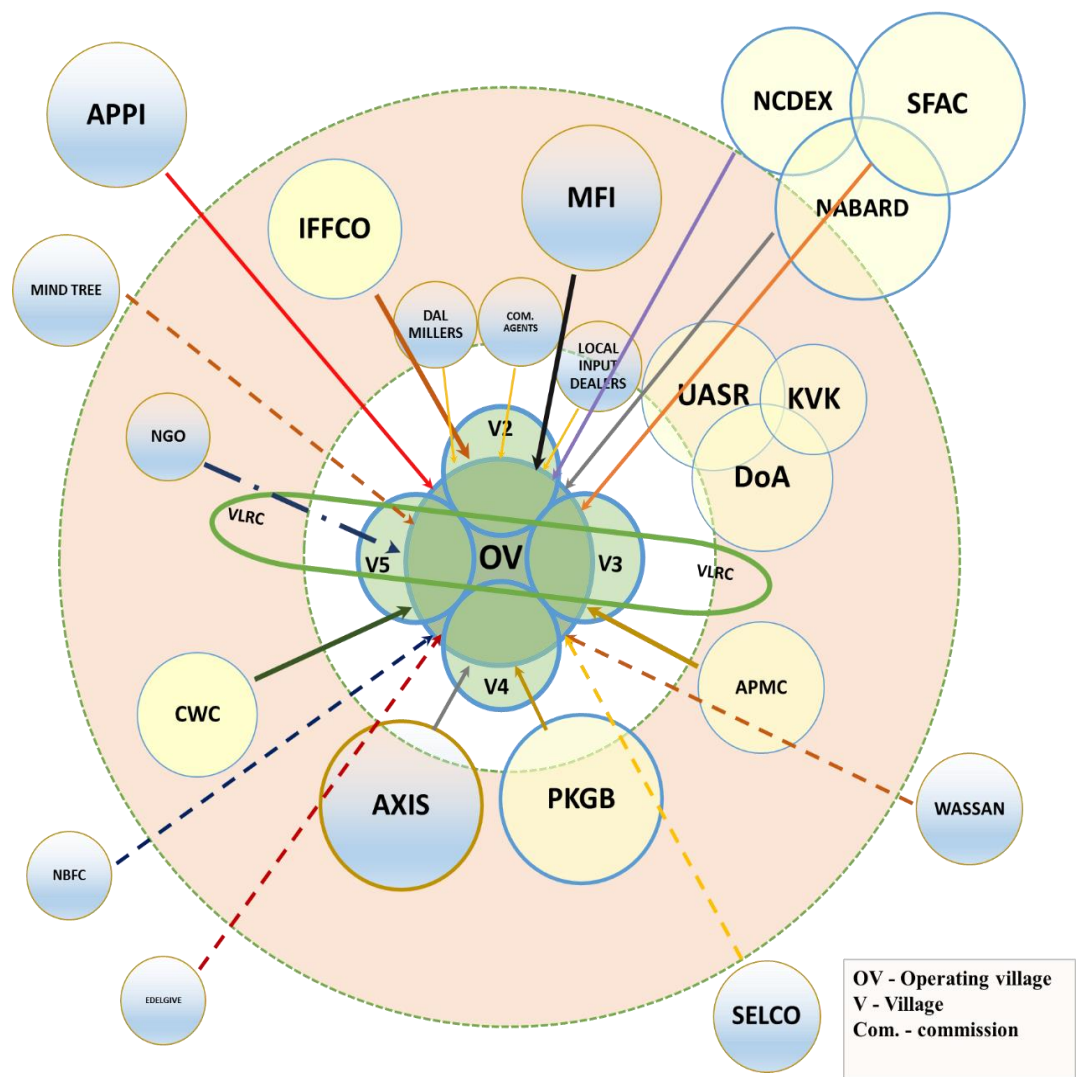


Fig.40: Venn diagram showing the network linkages of FPOs under VLRC

4.5.2.3 Technical support:

1. WASSAN: Watershed Support Services and Activities Network, Hyderabad. It provides technical support for VLRC about working with farmers' organisations. The degree of importance of linkage was low.

4.5.2.4 Input supply:

1. Local input markets: the coordinators of the FPOs supply the necessary inputs for the farmers from the local as well as distant markets. The degree of importance of linkage was very high.

4.5.2.5 Trading and marketing:

1. The FPOs also get the help of dal millers and commission agents to make dal and marketing their produce. The degree of importance of linkage was very high.

4.5.3 Linkages of FPOs assisted by ISAP with governmental organisations

It was evident from the table 4.54 that all the FPOs under the assistance of ISAP had been maintaining an association with many of the government organisations for various purposes. The level of networking and purpose discussed in this section.

4.5.3.1 For technical support and inputs

1. KVK, Bidar: the KVK offered services such as soil testing, conducting demonstrations in the area, technical advice, etc. The degree of importance of linkage was very high.

2. Department of agriculture (Bidar): the AOs and AEO with the assistance of ADA were helping the FPOs by providing technical information regarding GAPs as well as inputs like seeds (TS3R), urea, DAP, micro-nutrients like Gypsum. The degree of importance of linkage was very high.

3. UHS Bagalkot: the FPOs had been contacting the college of agriculture, Bidar under UAS Raichur for technical guidance. The degree of importance of linkage was very high.

4. IFFCO, Bidar: this semi-government organisation aided by supplying fertilizers like DAP, Urea, etc. The degree of importance of linkage was very high.

4.5.3.2 For marketing

1. SFAC and NCDEX jointly procure the produce especially red gram from the FPOs. The degree of importance of linkage was very high.

2. APMC: the FPOs also get the support of APMC of Bidar, Bhalki, and Basavakalyana respectively to market their produce. The degree of importance of linkage was very high.

4.5.3.3 For Storage

1. CWC and SWC centers located at Bidar, Bhalki, and Basavakalyana: had been helping the FPOs in storing the procurements. The degree of importance of linkage was high.

Table 4.54 Linkages of FPOs assisted by ISAP with governmental organisations

Sl. No.	Partner Name	Partner Location	Partnership Purpose	Frequency of contacts
1	Krishi Vigyan Kendra	Bidar	Technical Support and inputs	Regularly
2	Department of Agriculture - Assistant Director of Agriculture	Bidar	Technical Support and inputs	Regularly
3	UHS Bagalkot	Raichur and Bidar	Technical Support and inputs	Regularly
4	NCDEX	Mumbai and Bidar	Marketing	Sometimes
5	APMC	Bidar	Marketing	Sometimes
6	CWC	Bidar	Storage	Sometimes
7	IFFCO	Bidar	Fertilizer	Regularly
8	District Cooperative Central bank	Halbarga, Basavakalyana & Bidar	Financial support	Regularly
9	NABARD	Bangluru	Grant	Regularly
10	Small Farmer Agribusiness Consortium	Delhi	Marketing	Regularly

4.5.3.4 For financial support:

1. NABARD provided technical support as well as grants for the resource agencies to assist the FPOs. The degree of importance of linkage was very high.

2. District Cooperative Central bank: this cooperative bank located at Halbarga and Basavakalyana had been supporting the members by providing the financial assistance

like loans and the JKSMCL and BSMCL had been operating their current bank accounts in the branches of Halbarga and Basavakalyana respectively. The degree of importance of linkage was very high.

4.5.4 Linkages of FPOs assisted by ISAP with non-governmental organisations

Table 4.55 Linkages of FPOs assisted by ISAP with non-governmental and private organisations

Sl. No.	Partner Name	Partner Location	Partnership Purpose	Frequency of contacts
1	ISAP	Bidar	Technical support	Regularly
2	NGOs	Bidar and Kalaburagi	Extension/Networking	Sometimes
3	MFI-Sanghmitra	Bidar	SHG Finance	Regularly
4	Morocco philanthropic foundation	South Africa	Grants	Regularly
5	Oriental bank	Halbarga, Basavakalyana & Bidar	Financial transactions	Regularly
6.	Nationalised banks	Bidar, Bhalki & Basavakalyana	Financial support	Regularly
6	Dal Millers	Halbarga, Basavakalyana & Bidar	Trading/Marketing	Regularly
7	Commission Agent	Halbarga, Basavakalyana & Bidar	Trading/Marketing	Regularly
8	Local Input market	Halbarga, Basavakalyana & Bidar	Seed, pesticide & fertiliser	Regularly

4.5.4.1 Technical support:

1. ISAP: Indian Society of Agribusiness Professionals, New Delhi, was the resource institute for both the FPOs. Even after their withdrawal of agreement of association the

FPOs were getting technical support as well as networking support. The degree of importance of linkage was very high.

2. The ISAP maintains good rapport with other NGOs such as VLRC, MYRADA, etc. to avoid the overlapping of formation of FPOs in the same villages. The degree of importance of linkage was low.

4.5.4.2 Financial support

1. Micro-finance institute- Sanghamitra: It is a micro-finance institution operationalized in the year march 2000 to provide financial assistance to self-help affinity groups. The FPOs helped the female members of shareholders' families to organise into SHG and providing the credit facilities. The degree of importance of linkage was very high

2. Oriental bank: the FPO operates saving bank transactions through Oriental bank. It also provided direct benefit transfer of price for the product to each and every farmer of FPOs. The degree of importance of linkage was very high.

3. Nationalized banks such as Oriental bank, Canara bank, etc., were providing financial support to members based on their membership with the FPOs. The degree of importance of linkage was very high.

4.5.4.3 Input supply:

1. Local input markets: the coordinators of the FPOs supply the necessary inputs for the farmers from the local as well as distant markets. The degree of importance of linkage was very high.

4.5.4.4 Trading and marketing:

1. The FPOs also get the help of dal millers and commission agents to make dal and marketing their produce. The degree of importance of linkage was very high.

4.5.5 Observations made from the above results

In conclusion, the FPOs under the VLRC had a great network of linkages with the government as well as non-governmental organisations. The agreement on profit sharing with VLRC might have boosted the resource institute to establish and maintain good contacts with other organisations. But in some cases like NKPCL, the FPO (BoD) itself had been leveraging its bargaining power to get inputs and services. However, in the case of FPOs under ISAP, the withdrawal of support services had cost the FPOs in losing its business linkages with organisations.

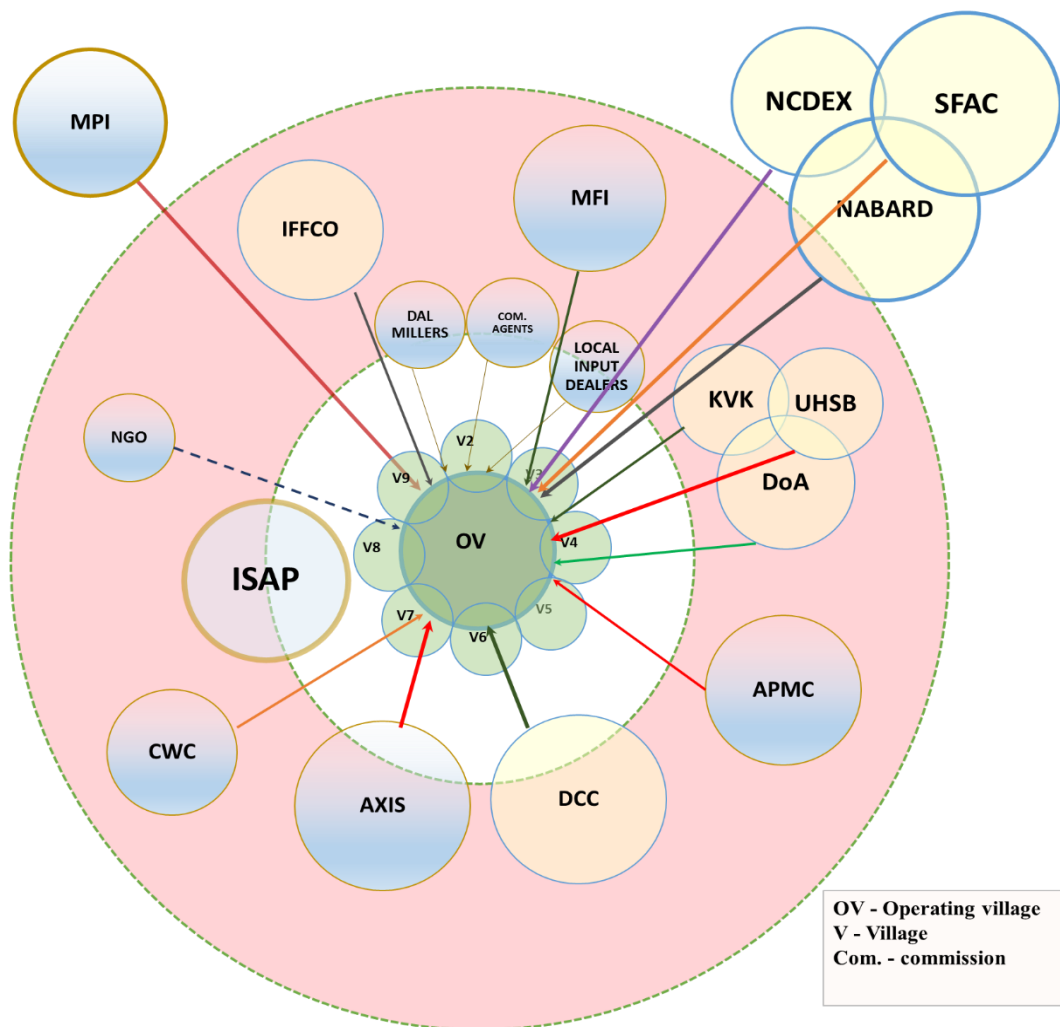


Fig.41: Venn diagram showing the network linkages of FPOs under ISAP

Hence there must be a supporting agency exclusively for establishing and linking business networks with other organisations or else the FPOs should be empowered to develop capabilities to establish linkages on their own. The government should take proper actions on this aspect.

Similar findings were observed in the studies of Carroll and Bebbington (2001), and Ragasa and Golan (2012).

4.6 To Study the Income Generation Aspects of Members and Non-Members of Farmer Producer Organisations.

Income generation aspects provide a comprehensive understanding of FPOs ability to change the livelihood of its members in financial terms. The difference in the impact of FPOs intervention of income generation of members and non-members was studied in this objective.

This section furnishes details about cost and returns of red gram cultivation for members and non-members, input services provided and various income raising interventions or business plans of FPOs which are presented under following headings.

4.6.1 Costs and returns of red gram cultivation

In this part, the cost and returns of red gram cultivation are compared between members and non-members of FPOs.

The major crops produced in the area of FPO operation were red gram and banana in Rohini, tur, gram and sunflower in Nisarga, red gram, tur and groundnut under BKPCL, red gram, soybean and tur in JKSMCL and red gram, soybean, black gram and chickpea in BSMCL. Even though there were many major crops grown under each FPO, one of the common crops under the area of operation was red gram. Hence the cost and returns for red gram cultivation were compared between member and non-members.

It was observed from table 4.57 that the members had incurred **11.06 per cent** lesser cost for red gram cultivation when compared to that of non-members. Due to the intervention of FPOs the cost of inputs like seeds, fertilizers, and pesticides had reduced by 27.40, 28.00 and 29.96 per cent respectively. The FPOs had been providing the recommended quality inputs at a lower cost as compared to market costs which helped the member to realized lower costs for the red gram cultivation. In addition to that, the cost of transportation and other miscellaneous costs were reduced at the range of 55.81 per cent when compared to that of non-members. This was because in most cases FPOs had been providing necessary inputs to their members at their villages itself which

reduced unnecessary movement of members for the purchase of inputs and if at all any member wanted a particular input which was not found available in FPO, the staff would purchase that on behalf of them.

Table 4.56 Comparison of cost of cultivation and returns of members and non-members of FPOs.

Sl. No.	Operations (Per acre)	Particulars	Members (N=150)	Non-members (N=150)	% change
1	Land Preparation	Ploughing - tractor use	1413.33	1450.00	2.53
		Levelling	480.00	500.00	4.00
		Farm yard manure/ton	1666.67	1622.00	-2.75
2	Seed Purchase	Seed Cost	447.20	616.00	27.40
3	Seed Treatment	<i>Trichoderma, Rhizobium</i>	300.00	94.33	-218.03
		Labour	88.00	37.60	-134.04
4	Fertiliser	Urea	103.00	503.67	79.55
		DAP	1290.00	1733.33	25.58
		K2O	13.33	13.33	0.00
		Total	1406.33	2250.33	37.50
5	Sowing	Labour	237.33	264.33	10.21
		Tractor-	1000.00	1018.33	1.80
6	Nipping	To get more tillers	125.33	70.67	-77.35
7	Growth promoters (in ml)		510.00	349.00	-46.13
8	Irrigation	Pump, pipe line, labour	245.00	139.33	-75.84
9	Weed management & inter-culture		1100.00	1181.67	6.91
10	Important pests and diseases	To kill pest	3046.67	4350.00	29.96
		Labour	656.67	743.33	11.66

11	Other Costs for buying and bringing seeds to the farm		220.93	500.00	55.81
12	Harvesting the crop	Multi-crop harvester	275.33	371.00	25.79
		Labour	1950.00	1870.00	-4.28
		Tractor	1205.67	985.20	-22.38
13	Cost (in ₹)		16374.47	18411.27	11.06
	Returns				
14	Main yield (in quintals)		5.18	4.89	-5.93
16	Gross return (in ₹)		31217.33	26243	-18.95

In case of returns, the members had **18.95 per cent** gain in returns when compared to that of non-numbers. It may be due to the efforts of FPOs in helping members to realize minimum support price when their produce was procured by SFAC. Non-members were struggling to get minimum support price due to irregular procurement policies of the state government and a large number of actors in the market channels. In addition to that the average yield per acre of members had also increased by 5.93 per cent when compared to that of non-members this might be due to the application of growth promoters following nipping, providing irrigation during critical stages of crop growth and treating seeds with biochemicals.

Further, the z test was applied to compare the significance of the difference between costs and returns of red gram cultivation between members and non-members. It was observed from the table 4.57 that the calculated z value was greater than table z value. Hence the null hypothesis stating there was no difference in the means of costs of red gram cultivation between members and non-members was rejected. In case of returns also the calculated z value was greater than table z value. Hence the null hypothesis stating there was no difference in the means of returns of red gram cultivation between members and non-members was rejected.

The findings of the study were in agreement with the results of Singh *et al.* (1981), Prasad *et al.* (2001), Benagi *et al.* (2004), Pavankumar (2007), and Kandeegan (2015).

Table 4.57 Comparison of costs and returns of red gram cultivation between members and non-members based on the z-score.

Sl. No.	Particulars	Members (n=150)	Non-members (n=150)
1	The average cost of cultivation	16620.27	18411.27
2	Z score	9.36*	
3	Average returns of cultivation	31217.33	26243
4	Z score	8.91*	

* Significant at 5 per cent significance level

4.6.2 Determinants of returns of red gram cultivation for members and non-members.

Cobb Douglas production function was employed to find out the influence of variable costs on the yield of red gram. Variables like costs of FYM, seed, seed treatment, urea, DAP, pesticides, labour, and machine labour and other costs were taken into study. A dummy variable was introduced to find out the effect of membership of respondents on the yield of red gram cultivation. R software was utilized to find out log-log production function and the results were presented in the table 4.58.

Table 4.58 Estimation of determinants of returns of red gram cultivation of respondents.

Variables	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	8.38***	0.64	13.18	< 2e-16
Dummy	0.14***	0.03	5.07	7.05E-07
log(FYM)	0.07*	0.03	2.42	0.01
log(`Seed Cost`)	0.23***	0.03	7.48	8.75E-13
log(Seed treatment)	0.01*	0.003	2.45	0.02
log(`Other Costs`)	0.01	0.02	0.43	0.67
log(Urea)	0.002	0.002	0.99	0.32
log(DAP)	-0.29***	0.06	-4.57	7.26E-06
log(Pesticides)	0.07	0.04	1.83	0.07
log(Labour)	0.02*	0.01	2.17	0.03
log(`machine labour`)	0.12*	0.05	2.55	0.01

Significance codes: '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1

Residual standard error: 0.1083 on 289 degrees of freedom

Multiple R-squared: 0.7, Adjusted R-squared: 0.6896

F-statistic: 67.43 on 10 and 289 DF, p-value: < 2.2e-16

In table 4.58, the dummy variable, and seed cost were significant at 0.001 level of significance. The cost of seed treatment, FYM, labour, and machine labour were significant at 0.05 per cent level of significance. In addition to that, the cost of pesticides was significantly affecting returns at 0.1 level of significance. However, the variable with negative estimate value that was the cost of DAP was negatively affecting yield at 0.001 level of significance.

Results in table 4.58 indicated that if a non-member joins FPO, his/her returns will increase by 14 per cent [$\exp(0.1394) = 1.14$]. The members being supported by the FPOs in getting both backward services such as inputs and services at a lower cost as well as forward linkage services in terms of MSP price for their products but the non-members were still struggling to get the benefits of inputs as well as producer's share in consumer's rupee.

4.6.3 Inputs services provided

The FPOs under VLRC had been providing recommended inputs to its members at lower than market cost. The table 4.59 indicated the list of inputs provided by the FPOs under VLRC and the difference in the cost when compared with the market cost.

The FPOs were providing a total of thirty-four inputs such as seeds, fertilizers, pesticides, fungicides, weedicides, growth promoters as well as some of the house products such as tea powder, solar lamp, etc.

Table 4.59 List of input availability in FPOs under VLRC and the comparison of their costs with market costs

Sl. No.	Input	FPO price (in ₹)	Market price (in ₹)	% change	Sl. No.	Input	FPO price (in ₹)	Market price (in ₹)	% change
	Seeds					Fungicide			
1	Red gram (TS3R)	60	80	25.00	19	Biostadt Supermate 250mg	230	350	37.50
2	Banana seedlings	12	15	20.00		Weedicides			
	Total	72	95	24.21	20	Weedblock	880	1000	12.00
	Fertilizers				21	Syngenta Fernoxone 500gm	160	275	41.82
3	Urea	330	450	26.67		Total	1040	1275	18.43
4	DAP IFFCO 50kg	1250	1500	16.67		Growth enhancers			
5	MOP (Jaikisan) 50kg	850	1200	29.17	22	Growrich plus 100ml	150	250	40.00
6	Jaikisan NPK 19:19:19 25kg	2125	2600	18.27	23	Growrich plus 250ml	250	350	28.57
7	Magnesium sulphate 1kg	60	100	40.00	24	Nanozim Xtrude granules 15kg	1250	1500	16.67
8	Sulpho-50 (25kg bag)	1850	2300	19.57	25	Nanozim drip 1lt	600	800	25.00
9	Mangala Setright 50kg	400	560	28.57	26	Nanozim Extra Power 100gm	130	200	35.00
10	Boon-45 (25kg)	2350	2500	6.00	27	Nanozim Flowerin 250ml	240	320	25.00
	Total	9215	11210	17.80	28	Jeevamrutha	50	100	50.00
	Pesticides				29	Ere jala	110	160	31.25
11	Ticket 250g	500	800	37.50	30	Micro combi 1lt	200	425	52.94
12	Ticket 500g	1000	1600	37.50		Total	2980	4105	27.41
13	Ticket 1kg	2000	3200	37.50		Other products			
14	Chlorgaurd 20EC 1lt	250	400	37.50	31	Tadpal	1600	2500	36.00
15	Nanozim Thiomax 100gm	250	330	24.24		Household products			
16	Nanozim Inclaim 100gm	650	800	18.75	32	Coconut oil	67	74	9.46
17	Perfek 1lt	950	1125	15.56	33	Solar lamp	600	685	12.41
	Total	5600	8255	32.16	34	Total	687	784	12.37

Table 4.60 List of input availability in FPOs under ISAP and the comparison of their costs with market costs

Sl. No.	Inputs	FPO price (in ₹)	Market price (in ₹)	% change
	Seed/planting material			
1	Red gram (TS3R)	60	75	20.00
	Fertilizers			
2	Urea	350	450	22.22
3	DAP IFFCO 50kg	1250	1500	16.66
4	MOP (Jaikisan) 50kg	850	1200	29.16
5	Jaikisan NPK 19:19:19 25kg	2200	2600	15.38
6	Mangala Setright 50kg	400	560	28.57
	Total	5050	6310	19.96
	Growth enhancers			
7	Fighter	750	950	21.05
8	Duplex	230	275	16.36
9	Nano-power	200	248	19.35
	Total	1180	1473	19.89

From table 4.59, it can be observed that there was 24.21 per cent decrease in the cost of planting material of FPOs when compared with that of market cost. In a similar way the cost of fertilizers, pesticides, fungicides, growth enhancers provided by FPOs were 17.80, 32.16, 37.50, 18.43 and 27.41 per cent respectively lesser than that of market prices. The FPOs have been making use of bargaining power to get an extra concession on the price of inputs. The VLRC was helping them to contact the supply agency directly and establish a contract with them. The FPOs under VLRC had been establishing linkages and contract with Ajio-Biotech Private Limited, Biostadt Private Limited for growth enhancers. To get pesticides such as Ticket, Nanozim products, etc. they had contracted with Garuda Private Limited and Biostadt Private Limited. The FPOs were getting the help of the state department of agriculture and other government aided institutes like

IFFCO, agricultural universities, etc. to supply seeds and fertilizers for their farmers at subsidized rates.

However, table 4.60 indicated that the cost of inputs such as planting materials, fertilizers and growth enhances provided by FPOs under ISAP were reduced respectively by 20.00, 19.96 and 19.89 per cent when compared to market costs.

Due to limited linkages the farmers were getting a lesser supply of inputs from the input agencies except for seeds and fertilizers which were supplied from the department of agriculture. The members were given mini-kits of inputs under the OCP project of Morocco, South Africa. The inputs included seedlings of BSMR for transplanting or 5 kg red gram seeds, 50 kg DAP, and Fighter (1 kg) for each member on a rotation basis which made FPOs avoid establishing contracts with other agencies for supply of inputs to their members. But after the withdrawal of agreement with ISAP, due to lack of financial capital the FPOs could not establish contracts with inputs supply agencies.

4.6.4 Income generating agri-enterprises supported by FPOs

Table 4.61 List of agri-enterprises initiated and supported by the FPOs

Sl.No.	Agri-enterprise	NKPCL	BKPCL	JKSMCL	BSMCL	RKPCL
1	Poultry	✓	✓	✓	✓	
2	Sheep/goat farming	✓	✓	✓	✓	
3	Mini-dal mill		✓	✓	✓	
4	Shavige and papad making		✓			
5	Jeevamrutha and garlic & chilli decoction making		✓			

The FPOs had been providing various business strategies for their members to generate income and improve living conditions and the same was presented in table 4.61. It was observed that NKPCL and BKPCL under VLRC had provided financial support to small and marginal member farmers to take up small scale agribusiness activities like poultry rearing, sheep/goat rearing, and mini dal mill. In addition to this, the BKPCL had provided support for taking up shavige and papad making and jeevamrutha and garlic & chilli decoction making units. Two farmers were selected by BoD from each of NKPCL

and BKPCL and provided financial assistance for doing poultry farming and sheep rearing. The foundation had also provided a subsidy of ₹ 50000 and ₹ 16000 to set up mini dal mill and shavige machine to Sri Bhavani Mahila Swasahaya Sangha and Adishakti Mahila Swasahaya Sangha respectively which were under the control of BKPCL.

The FPOs under ISAP with the help of financial assistance from the Morocco-based philanthropic organisation had provided assistance for taking up poultry and sheep farming. Each member was provided with 2 chickens and 1 sheep/goat rotation basis.

4.7 To Elicit the Constraints as Perceived by Members and to Suggest the Suitable Strategies for Effective Functioning of Farmer Producer Organisations.

4.7.1 Results

The respondents had been facing many constraints in the functioning of FPOs as well as farming activities which were analysed using the weighted mean score and presented hereunder.

4.7.1.1 Operational and technical constraints in FPOs as perceived by the members of FPOs

Table 4.62 showed that majority of the members were facing problems with respect to irregular procurement of produce (75.00) followed by inadequate infrastructure facilities (71.17), and lack of staff (60.17). However, the organisation was not taking the whole of members' produce (41.17), centralized administration (40.83) and political interference (38.33) were the least observed constraints.

The members of the study area were facing problems with respect to the procurement of their produce. There was no proper coordination between central and state governments where could be observed in shifting of procurement licenses between societies under Gram Panchayat (state government) and NCDEX of SFAC (central government). The societal procurements restricted only for four quintals per farmer which was against the twenty quintal procurement in case of FPOs. There was an immediate transfer of payments within one or two months in case of FPOs but it was found delayed up to 8 to 10 months in case of the societies. Hence the shareholders felt that FPOs should be permitted every year for procuring their produce

In case of infrastructure facilities, most of the member farmers were of the opinion that there were no proper infrastructure facilities like storage, processing units et cetera in FPOs. Even though there were structures of storage in FPOs under ISAP, the capacity

was limited to 1000 quintals only and the relative distance from the villages was hindering the farmers to harness the benefits.

Table 4.62 The rank order of operational and technical constraints as perceived by the members of FPOs **N=150**

Sl. No.	Technical and operational constraints	Weighted mean score	Rank
1	Irregular procurement of produce	75.00	I
2	Inadequate infrastructure facilities	71.17	II
3	Lack of staff	60.17	III
4	Credit facilities are not available	58.67	IV
5	Distant location from centre village	53.00	V
6	Inadequate transportation facilities	42.67	VI
7	Organisation procures produce of non-members	42.50	VII
8	The organisation is not taking the whole of members' produce	41.17	VIII
9	Centralized administration	40.83	IX
10	Political interference	38.33	X

In the case of staff adequacy, there was no adequate ground level staff for the service of farmers. Except for the villagers who were assisted by ABAs in FPOs of VLRC, the remaining farmers felt that they were facing difficulty in getting the benefits of the FPOs. Under ISAP registered FPOs, there was no sufficient working force to reach the farmers. The board of directors themselves providing assistance to their members.

Similar constraints were expressed in the studies of Bebbington *et al.* (1994), Gra *et al.* (1989), Snehalatha and Reddy (1998), Bharathi (2005), and Chandargi (2007).

4.7.1.2 Organizational constraints in FPOs as perceived by the members of FPOs.

It could be observed from the table 4.63 the members faced the problem with respect to the non-uniform rotation of governing body (51.50) followed by evidence of competition among villages for getting benefits (48.83), and competition among members

to achieve key positions in the organisation (48.50). However, lack of team spirit (40.17) and opposition of each other's view during meetings (36.67) were the least observed constraints.

The above trend was observed due to the existence of stable BoM over a period of time. Even though the process of election was followed after every three years, few members felt that there was a need for change in leadership.

Table 4.63 The rank order of organisational constraints in FPOs as perceived by the members of FPOs. N=150

Sl. No.	Organizational constraints	Weighted mean score	Rank
1	Governing body is not rotated uniformly	51.50	I
2	There is a competition among villages for getting benefits	48.83	II
3	Each tries to achieve key positions in the organisation	48.50	III
4	Personal gain is of utmost importance than the group goals	48.33	IV
5	Benefit sharing is not uniform	47.67	V
6	Members share formal relationships	40.33	VI
7	Lack of team spirit	40.17	VII
8	Members always oppose each other in the meetings	36.67	VIII

The findings of the study were in agreement with the results of studies conducted by Snehathatha and Reddy (1998), Stockbridge *et al.* (2003), Raghuprasad *et al.* (2004), Dhakal (2013), and Gundlach (2013).

4.7.1.3 Constraints related to NGOs' support as perceived by members of FPOs

The respondents perceived some of the problems with respect to the functioning of NGOs. From table 4.64, it could be observed that the majority of members felt that NGOs were focusing only on resource-rich areas (61.00), followed by the profit motive (59.67), forcing their own organisational agenda on FPOs (55.50). But interfering in the decision making the process of FPOs (45.83) and inability to guide coordinators and ABAs (44.50) were the least observed constraints.

It was observed that distant villagers were the most dissatisfied with the functioning of FPOs. They felt that NGOs were focusing only near the centers of operations. The aspect of profit motive was found in case of VLRC. Even though there was an agreement with respect to profit sharing in business in the range of 50:50 between NGO and FPO (BoD), the members were feeling dissatisfied because they were of the opinion that the resource institute was not helping in negotiating with the input agencies. They also felt that there were possibilities of partnership between agencies and NGOs for profit sharing.

Table 4.64 The rank order of constraints related to NGOs' support as perceived by members of FPOs **N=150**

Sl. No.	NGOs' constraint	Weighted mean score	Rank
1	Focussing only on resource-rich areas	61.00	I
2	Profit motive	59.67	II
3	Forcing their own organisational agenda on FPOs	55.50	III
4	Focussing only on progressive farmers	52.33	IV
5	Interfere in the decision-making process of FPOs	45.83	VI
6	Exploiting the members to meet their objectives	45.50	V
7	Unable to guide coordinators and ABAs	44.50	VII

4.7.1.4 Comparison of technical constraints of red gram cultivation as perceived by the respondents of FPOs.

The problems faced by the member farmers with respect to the technical aspects of red gram cultivation were labour shortage/costly wages (75.00) followed by lack of proper infrastructure (implements, irrigation facilities, power and electricity) (71.17), lack of financial support (51.16), and high incidence of diseases and pests, crop failure (48.66). Since members were receiving quality inputs and guidance in a timely manner they did not feel much issues regarding getting inputs and guidance.

Whereas, in case of non-member category the constraints identified were labour shortage/ costly wages (75.00), lack of technical guidance about cultivation (72.50), untimely, costly and poor quality inputs (70.00), lack of proper infrastructure facilities

such as implements, irrigation facilities, power and electricity etc. (65.33), high incidence of diseases and pests, crop failure (63.00) and lack of financial support (55.16).

Table 4.65 Comparison of technical constraints of red gram cultivation as perceived by the respondents of FPOs.

Sl. No.	Technical constraints	Members [n=150]		Non-members [N=150]	
		WMS	Rank	WMS	Rank
1	Untimely, costly and poor quality inputs	33.33	V	70.00	III
2	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)	71.17	II	65.33	IV
3	High incidence of diseases and pests, crop failure	48.66	IV	63.00	V
4	Labour shortage/ Costly wages	75.00	I	75.00	I
5	Lack of financial support	51.16	III	55.16	VI
6	Lack of technical guidance about cultivation	25.00	VI	72.50	II

In conclusion, the members have been receiving great support from FPOs with respect to technical guidance as well as input facilities. Due to proper guidance, the members are efficiently combatting pests and diseases but the non-members were deprived of adequate guidance related to red gram cultivation. But labor-related problems, lack of infrastructure facilities, financial assistance were the common problems in both cases. Unless the FPOs get support from the government side, they even could not solve these issues.

The results were in agreement with the findings of, Shashikant *et al.* (2012), Chodavadia, *et al.* (2013), and Ahire *et al.* (2015).

4.7.1.5 Comparison of technical constraints with respect to the cultivation of major crops other than red gram as perceived by the respondents of FPOs.

Table 4.66 represented various constraints indicated by respondents with respect to technical operations of cultivation of crops other than red gram. Majority of member farmers expressed that labor shortage/ costly wages (75.00) was a major constraint

followed by lack of proper infrastructures such as implements, irrigation facilities, power and electricity (64.66), and high incidence of diseases and pests, crop failure (51.16). Whereas lack of technical guidance about cultivation practices was a least observed constraint.

Table 4.66 Comparison of technical constraints with respect to the cultivation of major crops other than red gram as perceived by the respondents of FPOs.

Sl. No	Technical constraints	Members [n=150]		Non-members [N=150]	
		WMS	Rank	WMS	Rank
1	Untimely, costly and poor quality inputs	42.83	V	70.00	III
2	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)	71.17	II	65.33	IV
3	High incidence of diseases and pests, crop failure	61.00	III	63.00	V
4	Labour shortage/ Costly wages	75.00	I	75.00	I
5	Lack of financial support	48.66	IV	55.16	VI
6	Lack of technical guidance about cultivation	36.16	VI	72.50	II

In the case of non-members, the major constraints were labour shortage/ costly wages (75.00), lack of technical guidance about cultivation (72.50), and untimely, costly and poor quality inputs (70.00).

The major crop being red gram had been receiving greater attention than other crops, however, the inputs like growth promoters, insecticide and pesticides are more or less common for other pulse crops grown in the area. Hence the farmers have been using the same. But according to members, for the crops other than pulses like wheat, paddy, vegetables, flower crops, etc. the technical guidance provided by the FPOs were not sufficient. In the case of RKPCL, banana cultivators were getting assistance only in terms of reduction in the cost of seedlings at the rate of ₹ 3 per seedling. Apart from this, they were not receiving any technical guidance.

In the case of BKPCL, a cluster of villages was having paddy cultivation areas but the farmers were not satisfied with the facilities provided by the FPO.

4.7.1.6 Comparison of marketing constraints with respect to red gram cultivation as perceived by the respondents of FPOs.

The members and non-member farmers perceived constraints faced by them with respect to the marketing aspects of the cultivation of red gram.

It could be observed from the table 4.67 that for the majority of the member farmers lack assured procurement facilities (71.00) was the most serious constraint followed by price fluctuation (69.33), lack of well-developed storage facilities (65.00). However, a lack of market awareness (36.33), and exploitation by middlemen and traders (34.17) were the least observed constraints.

But for the non-members price fluctuation (74.16) was the most serious constraint followed by lack of assured procurement facilities (73.67), exploitation by middlemen and traders (73.16) and too many intermediaries in non-FPO based supply chain (73.00). Distant market and high cost of transportation (71.66), lack of well-developed storage facilities (70.00), and lack of well-developed processing facilities (66.83) were the least observed constraints.

In the case of members, due to lack of coordination between central and state governments in deciding upon the procurement policy of red gram crop, the members have been facing serious problems. The central government procurement guidelines do not limit the FPOs to procure the entire produce of the farmers but in the case of state government procurements, the procurement quantity was restricted to 4 quintals per farmers. Even though there are prescribed MSP for red gram products, there was a huge difference in price when they sold their produce to non-government agencies. The FPOs have been empowered members to exercise the bargaining/negotiating power to avoid distress sale of their produce.

But for the non-members, the unorganized supply chain system consisting of traders and middlemen exploited them by providing less price for their products.

The results were in agreement with the findings of Shashikant *et al.* (2012), Chodavadia, *et al.* (2013), and Ahire *et al.* (2015).

4.7.1.7 Comparison of marketing constraints with respect to the cultivation of major crops other than red gram as perceived by the respondents of FPOs

The respondents also faced problems with respect to market facilities in case of cultivation of crops other than red gram which were presented in the table 4.68.

Table 4.67 Comparison of marketing constraints with respect to red gram cultivation as perceived by the respondents of FPOs.

Sl. No	Marketing constraints	Members [n=150]		Non-members [N=150]	
		WMS	Rank	WMS	Rank
1	Price fluctuation	64.00	IV	74.16	I
2	Lack of market awareness	34.17	X	72.66	V
3	Too many intermediaries in non-FPO based supply chain	51.17	V	73.00	IV
4	Distant market and the high cost of transportation	42.67	VII	71.66	VIII
5	Exploitation by middlemen and traders	50.50	VI	73.16	III
6	Delayed payment	41.66	VIII	72.00	VII
7	Illiteracy and Lack of unity among members	36.33	IX	72.50	VI
8	Lack of well-developed storage facilities	69.33	II	70.00	IX
9	Lack of well-developed processing facilities	65.00	III	66.83	X
10	Lack of assured procurement facilities	71.00	I	73.67	II

It could be observed from the above table 4.69 that majority of the member farmers felt there was a lack of assured procurement facilities (74.16), followed by price fluctuation (72.00) and lack of organised marketing system (71.66). However, the members were least bothered about the issues like distant market and the high cost of transportation (50.50) and illiteracy and lack of unity among members (41.66). Unlike red gram procurement, the other crops were not being taken by the government. The farmers were of the opinion that the provision of the assured price for their products would give a sense of satisfaction for their work. Due to the unorganized supply chain, the farmers felt exploited by a lot of intermediaries. The FPO had been helping farmers in respect of providing backward linkages but no forward linkages were provided till date.

In the case of non-members, the major constraints perceived were price fluctuation (75.00), lack of assured procurement facilities (73.67), and exploitation by middlemen and traders (73.16). But the issues like lack of infrastructure facilities like storage (70.00) and processing (66.83) facilities least bothered the non-members.

Table 4.68 Comparison of marketing constraints with respect to the cultivation of major crops other than red gram as perceived by the respondents of FPOs.

Sl. No.	Marketing constraints	Members [n=150]		Non-members [N=150]	
		WMS	Rank	WMS	Rank
1	Price fluctuation	72.00	II	75.00	I
2	Lack of market awareness	53.66	VII	72.50	VI
3	Distant market and the high cost of transportation	50.50	IX	72.00	VII
4	Exploitation by middlemen and Traders	70.00	IV	73.16	III
5	Delayed payment	64.66	VI	72.66	V
6	Illiteracy and lack of unity among members	41.66	X	73.00	IV
7	Lack of an organised marketing system	71.66	III	71.66	VIII
8	Lack of well-developed storage facilities	65.00	V	70.00	IX
9	Lack of well-developed processing facilities	64.00	VII	66.83	X
10	Lack of assured procurement facilities	74.16	I	73.67	II

4.7.2 Suggestions

The respondents have expressed various suggestion for the improvement of conditions affected by the constraints. The following tables provide detailed information about the suggestion of respondents which are rank ordered based on frequencies and percentages.

4.7.2.1 Suggestions given by the respondents for overcoming technical and operational constraints of FPOs.

Table 4.69 The rank order of suggestions given by the respondents for overcoming technical and operational constraints of FPOs.

Sl. No.	Suggestions	Frequency	%	Rank
1	Regular procurement of produce every year	150	100.00	I
2	Providing adequate infrastructure facilities	122	81.33	II
3	Increasing the number of technical staff	109	72.67	III
4	Establishing operating centers at each village	109	72.67	III
5	Providing credit as well as subsidy facilities	105	70.00	IV
6	Providing transport facilities	100	66.67	V
7	Procurement of whole produce from the members	82	54.67	VI
8	Procure from non-members after considering members	60	40.00	VII
9	Running of FPO in democratic nature.	52	34.67	VIII
10	Avoid the political inference	36	24.00	IX

Table 4.69 depicted the suggestions for overcoming technical and operational constraints related to FPO functioning as perceived by the member farmers. It showed that majority of the respondents were expressing that FPO should regularly procure their produce every year (100.00 %) as the most important suggestion followed by providing adequate infrastructure facilities like storage, processing units etc. (81.33 %), increasing the number of technical staff as well as establishment of operating centers at each village (72.67 %).

The members were of the opinion that whenever the government procures their products, they are getting more than market price values and the immediate payments through direct benefit transfers have been helping solve financial problems like distress sale. Hence they urge for the procurement of their products every year.

They were also of the opinion that the opening of custom hiring centers, as well as retail shops at every village of operation, can help them in getting adequate infrastructure facilities for their farming operations.

4.7.2.2 Suggestions given by the respondents for overcoming organisational constraints of FPOs.

Table 4.70 The rank order of suggestions given by the respondents for overcoming organisational constraints of FPOs.

Sl. No.	Suggestions	Frequency	%	Rank
1	Equal importance to all the villages	111	74.00	I
2	Equal sharing of benefits among members	92	61.33	II
3	Equal chance to all the members to become the board of director	77	51.33	III
4	Creating an environment to help farmers to understand each other	60	40.00	IV
5	Maintain cooperation & coordination among members of the organisation.	58	38.67	V
6	Maintain team spirit for achieving organisational goals.	55	36.67	VI

The member farmers had expressed various suggestions for the improvement of organisational constraints in the FPOs in table 4.70 which indicated that FPOs should provide equal consideration to all the villages (74.00 %) was the most important suggestion followed by equal sharing of benefits among members (61.33 %), equal chance to all its members to become board of director (51.33 %), to create suitable environment to help farmers to understand each other (40.00 %), and maintain cooperation & coordination among members of the organisation (38.67 %).

The members felt that establishment of local operational centers at each and every village of operation could help them to get adequate infrastructure facilities in addition to that and rotation of board of management meetings at every village would provide adequate insight into the operation of their FPOs. They also requested for appointing a dedicated technical staff (ABAs) for each village.

4.7.2.3 Suggestions given by the respondents for improving NGO performance as perceived.

Table 4.71 The rank order of suggestions given by the respondents for improving NGO performance.

Sl. No.	Suggestions	Frequency	%	Rank
1	NGOs should give importance to all areas irrespective of resource availability	102	68.00	I
2	Their profit motive should be avoided	89	59.33	II
3	Should not force their own organisational agenda on FPOs	82	54.67	III
4	Focusing on small & marginal farmers for increasing the socio-economic conditions	78	52.00	IV
5	Allows the decentralized decision-making approach to maintaining stability/consistency of FPO.	68	45.33	V
6	Should guide coordinators and ABAs in an effective manner	66	44.00	VI

It was evident from table 4.71 that the majority of member farmers had expressed that NGOs should give importance to all areas irrespective of resource availability (68.00 %) was first and foremost suggest for the improvement of NGO related constraints followed by avoidance of their profit motive (59.33 %), not to force their organisational agenda on FPOs (54.67 %), should focus on small & marginal farmers for improving their socio-economic conditions (52.00 %), to allow decentralized decision-making approach to maintaining stability/consistency of FPO (45.33 %) and should guide coordinators and ABAs in regular effective manner (44.00 %).

4.7.2.4 Suggestions given by the respondents for overcoming technical constraints of red gram cultivation.

It was noticed from the table 4.72 that majority of members suggested for the provision of infrastructure facilities (81.33 %) like farm implements, power and irrigation facilities, etc. followed by the provision of inputs at subsidized rates (70.00 %). Only in case of FPOs under ISAP some of the members were getting custom hiring services. The farmers at distant villages were unable to avail the facilities of farm machinery. So the members asked for the provision of proper infrastructure facilities at each village. And in

case of inputs, if the cost of growth promoters, pesticides and weedicides could be subsidized by the government then it would be affordable to all the farmers.

Whereas in the case of non-members, cent per cent of them urged for the provision of inputs at subsidized rates, providing infrastructure facilities, and regular demonstrations of cultivation practices for the control of pests and diseases.

Similar results were observed in the study of Shashikant *et al.* (2012).

Table 4.72 The rank order of suggestions given by the respondents for overcoming technical constraints of red gram cultivation.

Sl. No	Suggestions	Members [n=150]		Non-members [N=150]	
		F (%)	Rank	F (%)	Rank
1	Provision of inputs at subsidised rates	105 (70.00)	II	150 (100.00)	I
2	Provision of infrastructure [implements, irrigation facilities, power, and electricity]	122 (81.33)	I	150 (100.00)	I
3	Providing technical guidance	36 (24.00)	V	113 (75.33)	II
4	Provision of credit facilities	78 (52.00)	III	95 (63.33)	III
5	Regular demonstrations for controlling pests and diseases	55 (36.67)	IV	150 (100.00)	I

4.7.2.5 Suggestions given by the respondents for overcoming technical constraints of cultivation practices other than red gram.

It was noticed from the table 4.73 that majority of members felt if they were provided with inputs at subsidized rates (78.67 %) and show demonstrations regarding the control of pests and diseases, they could easily follow multiple cropping systems.

Whereas in the case of non-members, provision of infrastructure facilities (100.00 %) followed by inputs facilities at subsidized cost (88.00 %) and regular demonstrations (88.00 %) could help them to follow multiple cropping systems.

The members were of the opinion that the FPOs were concentrating only on pulse related cropping systems. As the farmers are taking up commercial farming such as

vegetable, fruits, flowering crops, etc. they are suggesting for adaptation of FPOs to meet the changing needs of members.

Table 4.73 The rank order of suggestions given by the respondents for overcoming technical constraints of cultivation practices other than red gram.

Sl. No	Suggestions	Members [n=150]		Non-members [N=150]	
		F (%)	Rank	F (%)	Rank
1	Provision of inputs at subsidized rates	118 (78.67)	I	132 (88.00)	II
2	Provision of infrastructure (implements, irrigation facilities, power, and electricity)	112 (74.67)	II	150 (100.00)	I
3	Providing technical guidance	92 (61.33)	III	125 (83.33)	III
4	Provision of credit facilities	78 (52.00)	IV	95 (63.33)	IV
5	Regular demonstrations for controlling pests and diseases	118 (78.67)	I	132 (88.00)	II

4.7.2.6 Suggestions given by the respondents for overcoming marketing constraints of red gram cultivation practices.

Table 4.74 showed that cent per cent of the respondents felt their products should be procured every year by the government otherwise the government should ensure all the supply chains to procure at not less than MSP. They also urged for the establishment of an organised supply chain without many intermediaries so that they escape from the exploitation of middlemen and traders.

86 per cent of the members proposed for the provision of procurement centers at every village so that they can avoid transportation costs and provide immediate payments. Since some of the FPOs have provided storage and processing facilities only about 61.33 per cent suggested for the same and they also wish to get market awareness every cropping season (57.33 %).

Marketing being the crucial aspect of farming requires most of the attention from the government. Except for the aspects like giving market information, ensuring organised supply chain, the other services of FPOs would be activated only when the government gives permission for the procurement. Hence the FPOs should be empowered

either by the providing support of the government or by developing marketing strategies of their own.

Similar results were observed in the study of Shashikant *et al.* (2012).

Table 4.74 The rank order of suggestions given by the respondents for overcoming marketing constraints of red gram cultivation practices.

Sl. No	Suggestions	Members [n=150]		Non-members [N=150]	
		F (%)	Rank	F (%)	Rank
1	Regular procurement of products every year by the government	150 (100.00)	I	150 (100.00)	I
2	Provision of storage and processing facilities	92 (61.33)	III	150 (100.00)	I
3	Establishing an organised supply chain without many intermediaries in non-FPO based supply chain	150 (100.00)	I	150 (100.00)	I
4	MSPs should be strictly enacted in all the supply chain systems	150 (100.00)	I	150 (100.00)	I
5	Establishment of procurement centers at every village (Gram panchayats)	129 (86.00)	II	150 (100.00)	I
6	Ensure immediate payments through the direct benefit transfer system	86 (57.33)	IV	150 (100.00)	I
7	Providing market awareness at every crop season	86 (57.33)	IV	150 (100.00)	I

4.7.2.7 Suggestions given by the respondents for overcoming marketing constraints of crops other than red gram cultivation practices.

Table 4.75 indicated that cent per cent of the respondents felt their products should be procured every year by the government otherwise the government should ensure all the supply chains to procure at not less than MSP. They also urged for the establishment of an organised supply chain without many intermediaries so that they escape from the exploitation of middlemen and traders.

86 per cent of the members proposed for the provision of procurement centers at every village so that they can avoid transportation costs and provide immediate payments. Since some of the FPOs have provided storage and processing facilities only about 61.33

per cent suggested for the same and they also wish to get market awareness every cropping season (57.33 %).

Table 4.75 The rank order of suggestions given by the respondents for overcoming marketing constraints of other than red gram cultivation practices.

Sl. No	Suggestions	Members [n=150]		Non-members [N=150]	
		F (%)	Rank	F (%)	Rank
1	Regular procurement of products every year by the government	150 (100.00)	I	150 (100.00)	I
2	Provision of storage and processing facilities	92 (61.33)	III	150 (100.00)	I
3	Establishing an organised supply chain without many intermediaries	150 (100.00)	I	150 (100.00)	I
4	MSPs should be strictly enacted in all the supply chain systems	150 (100.00)	I	150 (100.00)	I
5	Establishment of procurement centers at every village (Gram panchayats)	129 (86.00)	II	150 (100.00)	I
6	Ensure immediate payments through the direct benefit transfer system	150 (100.00)	I	150 (100.00)	I
7	Providing market awareness at every crop season	86 (57.33)	IV	150 (100.00)	I

Marketing being the crucial aspect of farming requires most of the attention from the government. Except for the aspects like giving market information, ensuring organised supply chain, the other services of FPOs would be activated only when the government gives permission for the procurement. Hence the FPOs should be empowered either by the providing support of the government or by developing marketing strategies of their own.

Chapter V

SUMMARY AND CONCLUSIONS

5.1 INTRODUCTION

A Producer Organisation is a generic name that represents different forms of community organisations such as large cooperatives, Primary Agricultural Cooperative Societies (PACS), Self-Help Groups (SHGs), Federation of SHGs, Common Interest Groups (CIGs), Joint Liability Groups (JLGs), Farmers Club (FCs), and Producer Companies (PCs). Small Farmers Agribusiness consortium (SFAC), through Farmer Producer Organisations (FPOs) intends to work closely in support of the Department of Agriculture & Cooperation and the various state governments to enhance production, productivity, and profitability of small farmers in the country. Farmers will be organised in small neighbourhood informal groups which would be supported under the program to form associations/organisations relevant to their context including confederating them into FPOs for improved input and output market access and negotiating power. Small Farmers' Organisations such as cooperatives and FPOs are expected to enhance incomes, reduce costs of input purchases along with transaction costs, create opportunities for involvement in value-addition including processing, distribution, and marketing, enhance bargaining power and provide access to formal credit (Agarwal, 2010).

Since the FPOs have been established in the recent past there is less documentation regarding the formation, functioning and the problems faced by them. And also the knowledge and adoption levels of red gram farming practices will be recorded. So this study aims at documenting all those factors responsible for the functioning of FPOs.

5.2 OBJECTIVES OF THE STUDY

The **overall objective** of the study was to analyse the functioning of the FPOs in Karnataka and assess the impact of these groups on their constituent members.

The **specific objectives** of the study were:

1. To study the formation and functional aspects of Farmer Producer Organisations.
2. To study the profile characteristics members and non-members of Farmer Producer Organisations.

3. To study the knowledge level of members and non-members of Farmer Producer Organisations with respect to red gram farming practices.
4. To study the adoption level of members and non-members of Farmer Producer Organisations with respect to red gram farming practices.
5. To analyse the linkages of Farmer Producer Organisations with governmental and non-governmental organisations.
6. To study the income generation aspects of members and non-members of Farmer Producer Organisations.
7. To un-earthen the constraints as perceived by members and to suggest the suitable strategies for effective functioning of Farmer Producer Organisations.

5.3 RESEARCH DESIGN AND SAMPLING PROCEDURE

The ex-post facto research design was followed in the study. The state of Karnataka was purposively selected. Five FPOs were purposively selected based on the year of establishment. Two FPOs from Bidar district one each from Bhalki (JKSMCL) and Basavakalyan (BSMCL) taluk and three FPOs from Kalaburagi district with one each from Kalaburagi (RKPCL), Aland (NKPCL) and Sedam (BKPCL) taluk were selected. Red gram was taken as a common crop for all the FPOs. From each FPO thirty members were randomly selected and thirty non-members were selected from surrounding cluster of villages of each FPO thus forming a total of 300 respondents. Personal interview was conducted with the help of a structured interview schedule.

5.4 VARIABLES AND THEIR EMPIRICAL MEASUREMENT

5.4.1 Dependent variables

The dependent variables selected for the study were level of knowledge and extent of adoption.

5.4.2 Independent variables

The independent variables selected were- age, education, caste, family size, farm size, income, indebtedness, farming experience, farm mechanisation status, participation, information seeking behaviour, leadership ability, capacity building, risk orientation, innovativeness, achievement motivation, self-confidence, communication behaviour, decision making ability, supportive environment, group cohesiveness, group leadership, group role differentiation, communication process in the group, group sustainability, critical issues and team spirit.

5.5 SALIENT FINDINGS OF THE STUDY

5.5.1 Profile characteristics of the respondents

The findings regarding profile characteristics of the respondents indicated that majority of the members and non-member belonged to medium age group (57.33 % and 59.33 % respectively) with intermediate level of education (35.33 % and 34.67 % respectively), belonged to general caste (46.00 % and 46.67 % respectively) had 5-8 members per family (56.67 % and 68.67 % respectively), had medium (30.00 %) and semi-medium (60.67 %) farm size, medium farm mechanization status (56.00 % and 48.00 % respectively), medium (62.67 %) and high (49.33 %) level of income, medium (34.00 %) and high (58.00 %) level of indebtedness. They also had high (50.67 %) and medium (56.00 %) level of participation, medium level of information seeking behaviour (40.67 % and 44.67 % respectively), medium level of leadership ability (37.33 % and 54.00 % respectively), medium (40.00 %) and low (54.67 %) level of capacity building, medium (36.67 %) and low (48.67 %) risk orientation, high (42.67 %) and low (54.67 %) innovativeness, medium (44.00 %) and low (72.67 %) level of achievement motivation, medium level of self-confidence (41.33 % and 76.00 % respectively), medium (47.33 %) and low (46.67 %) level of communication behaviour and medium (42.00 %) and low (48.67 %) level of decision making power.

5.5.2 Formation and Functional aspects of FPOs

Findings with respect to formation revealed that except JKSMCL, all the FPOs were registered in 2013. FPOs under Vrutti Livelihood Resource Centre (VLRC) had five villages each whereas ten villages were clustered under FPOs of Indian Society of Agribusiness Professionals (ISAP). 61.02 per cent of board of directors faced problems in convincing farmers during formation. Majority of members enrolled into FPOs to get remunerative price for their crop to produce, however, due to the high membership fee, the majority of non-members (6.43 %) show reluctance in joining FPOs. Members under VLRC and ISAP had a high level of training (77.78 % and 86.67 % respectively). With respect to functional aspects, FPOs under VLRC and ISAP had medium level of supportive environment (51.11 % and 51.67 % respectively), high and medium level of cohesiveness (46.67 % and 60.00 % respectively), medium level of role differentiation (50.00 % and 71.67 % respectively), high and medium level of group leadership (44.44 % and 58.33 % respectively), medium level of communication (57.78 and 45.00 % respectively), medium level of group sustainability (56.67 % and 51.67 % respectively),

low critical issues (63.33 % and 50.00 % respectively) and medium level of team spirit (50.00 % and 45.00 % respectively).

5.5.3 Level of knowledge of the respondents

With respect to the level of knowledge on red gram cultivation practices, the majority of the members and non-members had a high and medium level of knowledge (72.66 % and 61.33 % respectively). There was a significant difference in the knowledge levels of members and non-members. The variables such as age, secondary, intermediate and undergraduate levels of education, medium and high family size, low and high farm size, medium and high indebtedness, medium and high income, medium and high information seeking behavior, medium and high innovativeness of member farmers, medium and high supportive environment, medium and high group cohesiveness and medium and high group sustainability had influenced the gain/increase of knowledge of member farmers on red gram cultivation practices.

5.5.4 Extent of adoption of the respondents

Majority of members and non-members had high (50.00 %) and medium (63.33 %) extent of adoption of red gram cultivation practices there existed a significant difference between them. The variables such as low and medium age, low and medium family size, medium and high farm size, medium and high indebtedness, medium and high income, medium and high innovativeness, medium and high group cohesiveness, medium and high group sustainability and knowledge of the member farmers had influenced the increase of adoption of member farmers on red gram cultivation practices.

5.5.5 income generation aspects of the respondents

With respect to the cost of cultivation of red gram cultivation, the members had incurred **11.06 per cent** lesser cost for red gram cultivation when compared to that of non-members and in case of returns they had gained **18.95 per cent** returns when compared to non-numbers. And there observed a significant difference between costs and returns of red gram cultivation between members and non-members. It was also noticed that if a non-member joins FPO, his/her returns will increase by 14 per cent.

5.5.6 Constraints and Suggestions as perceived by the respondents

5.5.6.1 Constraints as perceived by the respondents

Majority of members perceived that irregular procurement of produce and inadequate infrastructure facilities were the major technical constraints and non-uniform

rotation of governing body followed by competition among villages for getting benefits were the major organisational constraints. In addition to that members also felt NGOs were focusing on resource-rich areas followed by they were showing profit motive were the constraints related to NGO support.

With respect to the technical constraints in red gram cultivation, both for members and non-members felt labour shortage as the major problem. But the non-members also felt a lack of technical guidance and costly inputs as the serious constraints. In the case of marketing, members and non-members felt lack of assured procurement facilities and price fluctuations of produce as the major constraints respectively.

5.5.6.2 Suggestions as perceived by the respondents

Major suggestions expressed by the members to overcome technical constraints in FPOs were the provision of regular procurement of their products every year and giving equal importance to every village for overcoming organisational constraint. They also expressed that NGOs should give importance to all the areas irrespective of resource availability.

With respect to suggestions for overcoming technical constraints in red gram cultivation, respondents suggested for the provision of infrastructure facilities and inputs at subsidized rates. To overcome the marketing constraints of red gram cultivation, respondents suggested for the regular procurement, establishing organised supply chains in the non-FPO operated system.

5.6 IMPLICATIONS

The present study attempted to analyse the functioning and impact of FPOs in terms of improvement in knowledge and adoption of red gram cultivation practices as well as the supportive environment for overall development of socio-economic conditions of farmers and their family. The findings of the study clearly indicated that effective functioning of FPOs depend upon the combined efforts of the farmers as well as resource institutions. It was also noticed that the FPOs require adequate support of government as well as non-governmental organisations for smooth running of their business operations. The implications of the study representing the effect of functioning and impact of FPO on its members and the suitable recommendations for effective functioning were presented as follows

- Majority of membership under FPOs was found to be occupied by the middle aged farmers. Hence the government should support implementing agencies to focus

on attracting the rural youth to participate in group as well as community development activities so as to retain the future generations in agriculture.

- Majority of members under FPOs were male hence there is need for providing equal opportunities for participation of women farmers. The resource agencies should mobilise the women farmers by attaching SHGs to the FPOs. The male participants should also be sensitised regarding women empowerment and gender mainstreaming
- Majority of members under FPOs had 2 to 10 hectares of landholding which indicated limited representation of small as well as marginal farmers. Since the concept of FPOs focused on sustainable development of small and marginal farmers, the resource agencies as well as FPOs should be advised to focus on providing adequate membership facilities to small and marginal farmers.
- The low to medium level of farm mechanisation status of members of FPOs indicated the requirement of establishment of custom hiring service centres at each village of FPOs. The government to provide adequate financial support for the purchase of farm implements or they can allow the collaboration of custom hiring centres operated at Raitha Samparka Kendras (RSK) with the FPOs.
- The storage and processing facilities provided by FPOs were inadequate for their members. Hence the government should create sufficient infrastructure facilities for storage and processing of the produce. There is a need to create awareness regarding the facilities provided by the warehousing corporations.
- Even though the members of FPOs had medium level of information seeking behaviour, the members of FPOs were not well versed with the use of modern media tools like mobiles and internet communication. Hence the resource agencies should encourage the FPOs to effectively use mobile and internet media for the communication of real time information to their members.
- Majority of the members of FPOs were having medium level of psychological characteristics like leadership ability, capacity building, risk orientation, achievement motivation, self-confidence, communication behaviour and decision making power. This calls for the improvement of these characteristics through continuous exposure and effective training facilities.
- During the formation of FPOs majority of the initiating agencies felt that they found difficulty in convincing the farmers at the beginning. The personnel of

initiating agencies should be trained in coordination of group development process as well as effective communication skills especially soft skills like rapport building, conflict management and negotiation techniques so that the process of sensitisation and mobilisation would be effective. Both state and central governments should work together in collaboration for easy registration and provision of licences.

- High membership fee was considered to be one of the hindrances for entry of farmers into FPOs. Hence the government should create alternative solutions either providing initial financial capital for the FPOs or concision on entry fee.
- Those FPOs who have crossed their group size of 1000 farmers had not received the subsidy of ₹ one lakh from the government. Hence the government should not delay such operations.
- To encourage and enhance the enrolment of farmers and to spread the importance of group approach, the government should advice the FPOs and resource institutes to organise meetings at least once in 3 months and allow its members to share the benefits they have obtained through FPOs.
- Even though the FPOs had high and very high heterogeneous caste composition, the proportion of representation of minority and other castes were found to be low. Hence there is a need for providing equal opportunities for such farmers for entry into FPOs.
- Even though the members of FPOs had high levels of trainings, in most cases it was organised at the area of operation of FPOs itself. Because of inadequate funding, the FPOs could afford visits for limited number of members for limited number of places. Hence the government should provide adequate facilities for the FPOs to organised regular study tours and exposure visits for all the members of FPOs.
- Detailed analysis of organisational structure of FPOs indicated for the need of appointment of at least one ABA and a retail shop at each village under FPO.
- The agreement between resource institutions and FPOs had been providing greater advantages for the farmers as the resource agencies are helping in establishing network linkages, supplying the adequate inputs and information in timely manner, managing and coordinating the technical workers, etc. However, the withdrawal of support had put the FPOs under difficult conditions. The president

of FPO felt that they were unable to handle and coordinate all the activities of FPOs alone. Sometimes there existed difference of opinion in initiation of business activities like purchase of inputs, sale of produce, etc. Hence the government need to create suitable policies for providing support facilities for the FPOs.

- There is a need for regular updating of training as well as technical competencies of BOD and technical staff and members of FPOs by analysing their capacity building needs. Therefore the board of management should be adequately trained by the training institutions like MANAGE, KVK, and other state level institutions.
- The functional aspects of FPO processes such as supportive environment, group sustainability and group cohesiveness were positively influencing the increase of knowledge as well as adoption levels of red gram cultivation practices. The government should focus on developing effective strategies for enhancing and maintaining sustainable development of FPOs through constructive group dynamics so that the group approach could solve the problems of the farming community.
- The FPOs should maintain and update of database of each of its members containing personal profile, farming activities, training requirements, etc. every year
- The income generating activities of FPOs are providing great scope for their members in changing their standards of living. Hence the government should develop adequate business modules and encourage supporting agencies like philanthropic institutes to provide financial capital for taking up such activities.

5.7 STRATEGY FOR ENHANCING THE IMPACT OF FPOs

Based on the findings of the study following strategies are suggested for enhancing the functioning and impact of FPOs. Based on the present study, a strategic framework consisting of the following interventions are presented for the effective functioning of FPOs

- (a) Sensitisation of higher level administrators and policy makers by the resource institutes and line department of agriculture for frame working of effective procurement as well as labour policies.

- (b) Training of functionaries and personnel of resource institutions and supporting agencies by training institutes like MANAGE, EEI and SAMETI to motivate and provide support the FIGs and FPOs.
- (c) Sensitisation and mobilisation of farmers to organise into FIGs by ATMA and KVK and supporting them with financial as well as social capital.
- (d) Special focus should be given by resource institutes and supporting agencies for empowering rural farm women to participate in group as well as community activities.
- (e) Initiation of socio-economic and community development activities to attract and create awareness among the farmers regarding sustainable development of their farm and home.
- (f) Establishing and coordinating micro as well as macro level linkages with government as well as non-government organisations by the resource institutes.

5.8 FUTURE RESEARCH AREAS

- In this study, only NGO supported FPOs were taken for functioning and impact analysis. Future research studies can focus on taking up FPOs operated by various other organisations like government and private agencies which would offer scope for a greater generalisation and recommendations.
- A comparative study of pre and post intervention of FPO can be done as an impact study.
- An extensive longitudinal study can be conducted by selecting more number of personal, demographic, and psychological variables and with more group process variables as independent variables.
- Whole cropping pattern followed by the members of FPOs can be analysed in the future studies.
- Studies on attitude, entrepreneurial behaviour, and empowerment of members of FPOs can be taken up.
- Detailed study about the FIGs associated under each FPOs can be conducted to understand the internal dynamics of functional aspects of FPOs.

- Some of the tools of measurement used for the present study appear to be promising and convenient. However they need to be tried on large sample and cross validate with other similar measurements.

Empirical model

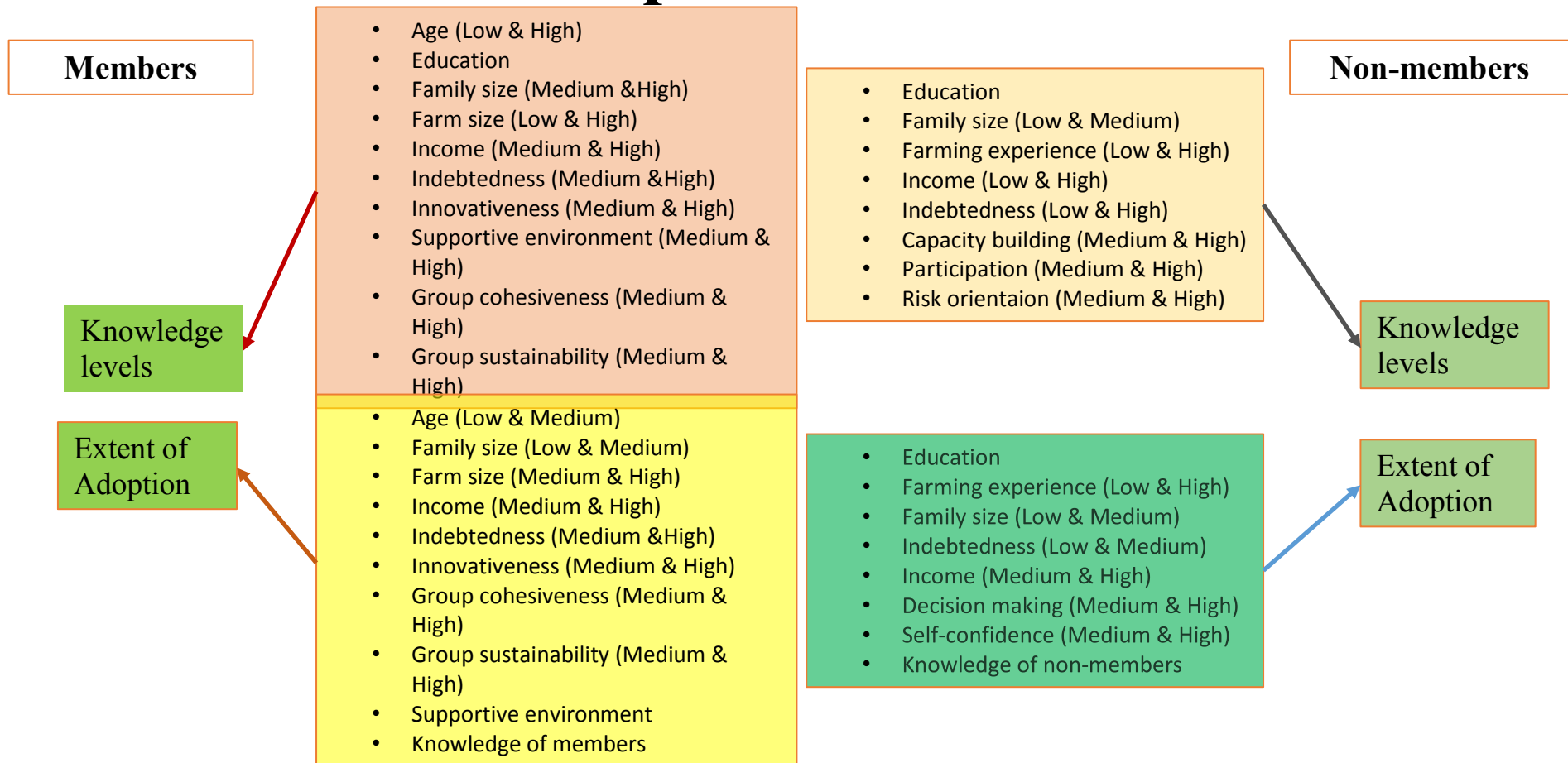


Fig.42: Empirical model of the study

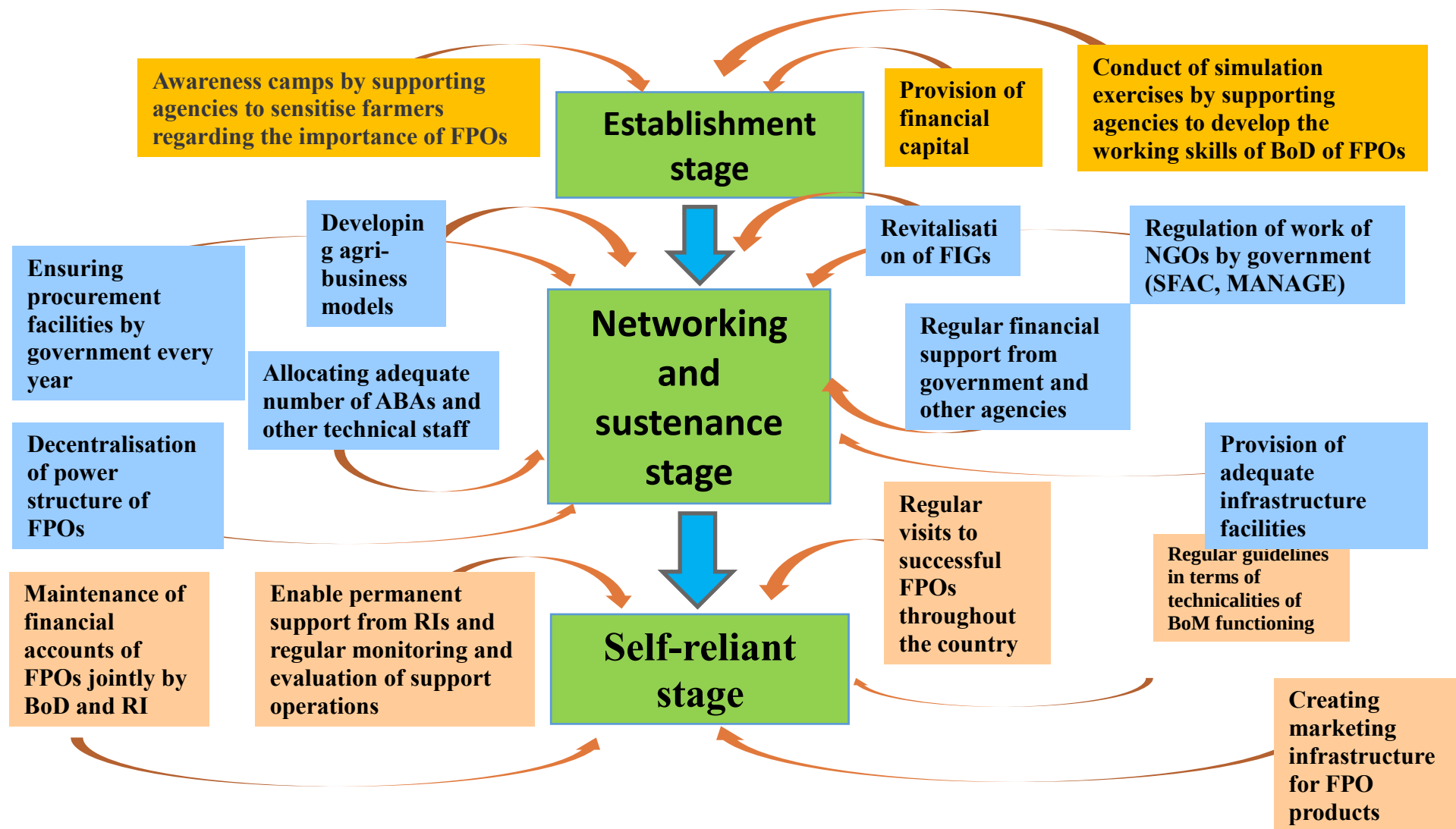


Fig.43: Strategies for effective functioning of FPOs

Some of the data collection photos



Fig.44: The Researcher in the office of RKPCL



Fig.45: The researcher with the president of NKPCL



Fig.46: The researcher with technical staff including a coordinator, a CEO and 3 Agri-business accelerators of BKPCL



Fig.47: The researcher with one of the members of FPO



Fig.48: The Researcher collecting data from one of the members of FPO



Fig.49: The researcher with the members having a mini-dal mill

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APPENDICES

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A STUDY ON FUNCTIONING AND IMPACT OF FPO IN KARNATAKA

Appendix A: Interview schedule for Members of FPOs

FPO name: _____

Member's name: _____

Place: _____

Taluk: _____

District: _____

A. PERSONAL CHARACTERISTICS

- 1) Age (in completed years): _____
- 2) Education: _____
- 3) Caste: _____ (SC/ST/OBC/General/Others)
- 4) Family size and composition:
 - a) Male: _____
 - b) Female: _____
 - c) Children: _____
- 5) Farm size: (in acres)
 - a) Irrigated land: _____.
 - b) Dry land: _____
 - c) Total: _____
- 6) Farming experience (in completed years): _____
- 7) Farm mechanisation status: _____

Sl. No	Statements	Owned	Available (taken on rent base)	Not available
	Hand implements			
1	Sickle or khurpi			
2	Hand weeding			
3	Sharp-edged sickle			
4	Weeding fork			
	Farm Implements			
1	Disc plough			
2	Cultivator			
3	Seed cum fertilizer plough			
4	Mouldboard plough			
	Mechanical implements			

1	Power tractors			
2	Power Sprayers			
3	Power Tillers			
4	Harvesters/threshers			
5	Trailers			

B. ECONOMIC VARIABLES

1) Family annual Income: _____ in ₹

Number of earning members: _____

Total annual income: _____

a) Farm income:

i) Agricultural crops: _____

ii) Horticultural crops: _____

iii) Dairy: _____

iv) Poultry: _____

v) Farm labour: _____

vi) Any other (specify): _____

b) Non-farm income

i) Business: _____

ii) Casual labour: _____

iii) Any other (specify): _____

2) Indebtedness: _____ in ₹

C. SITUATIONAL VARIABLES

1) Market facilities:

Please give details about

a) Information facilities: _____

b) Storage facilities: _____

c) Processing units: _____

d) Transportation facilities: _____

e) Insurance facilities: _____

f) Actors in current marketing channel:

i) Self-marketing:

ii) Village trader:

iii) Pre-harvest contractors:

iv) Commission Agents:

v) Wholesalers:

vi) Retailers:

vii) NGOs:

D. SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

Please indicate Extent of agreement of following characteristics on a three point continuum as Agree (3), undecided (2) and Disagree (1)

Sl. No.	Characteristics	Extent of Agreement		
		3	2	1
	Participation in group/community activities			
1	I actively participate in all activities of the group			
2	Participation has improved my standards of living both socially & economically.			
3	I participate only for the material benefits provided.			
4	I participate in group activities because it has always taken my consensus into consideration.			
5	I would like to perform alone rather than being in a group			
6	Participation has helped to improved my competitive spirit			
7	I feel collaborative learning is the best way to enhance/share knowledge & experiences			
8	I believe teamwork will help to get mutual benefits			
	Information seeking behavior			
1	I am always curious to know about new information related to agriculture			
2	I try to gather more information that has relative advantages			
3	I do not get confused to find authentic sources of information			
4	If I want particular information I will anyway try to get it			
5	I focus on only such information which are related to my occupation			
6	I feel any information in one or the other way to improve my knowledge			
7	I can find the right source of information and share it with others			
8	I try to keep myself up to date with new farming practices			
	Leadership ability			
1	I inspire the group to harness good opportunities			
2	I would like to initiate any group activity			
3	I try to motivate others to complete the tasks			
4	I always believe in doing the right things rather than doing things right			
5	I care for people rather than things			
6	I respect each other's feelings and emotions			
7	I would like to be a role model for others			
8	I take responsibilities for all goods and bad in the group			
9	I recognize & praise any good work &/or innovations happen in a group			
10	I give equal importance to all the members of the group			
	Risk orientation			
1	I believe that taking up a single activity is a risky affair than taking up more activities			
2	If I take up risky activity I tend to perform better			
3	I dare to take risky activities to get higher profits			

4	I put my whole heart and soul to achieve my goals			
5	Before taking up an activity, I will analyze its past, present, and future			
6	I am good at finding potential obstacles of a particular activity			
7	I can analyze and select suitable alternatives to overcome obstacles			
	Innovativeness			
1	I want to learn new ways of farming			
2	I will attend talks on improved cultivation practices			
3	I will surely adopt practices if they are promising.			
4	Do you believe that man's future is in the hands of God			
5	Somehow I believe that traditional ways of farming are the best.			
	Do you want your child/ren to become farmers?			
	It is better to enjoy today and let tomorrow take care of itself.			
	Achievement motivation			
1	If the goal is realistic and challenging I will take it up			
2	I can develop the necessary competence to achieve any activity			
3	I work until I get satisfaction			
4	Recognition for my work inspires me to set up more challenging tasks			
5	Any obstacle never stopped me doing my work			
6	I receive criticisms in a positive manner			
	Self-confidence			
1	I think of myself as a confident and successful person			
2	I take responsibilities for my actions			
3	When things go wrong I pity or blame myself			
4	I always encircle myself with likeminded people			
5	I always feel that I can achieve things I wish			
6	I don't care much for what others think of me			
7	I don't compare myself with others			
8	I always stay in the background when people meet			
	Communication behavior			
1	I can use clear and understandable words			
2	I use humor occasionally to reduce tension			
3	I listen to others before making my statements or conclusions			
4	I can read a topic and give a summary on it			
5	I try to remain non-judgemental and respect others opinions			
6	I always maintain eye contact with others while talking			
7	I use good and open posture and empathetic gestures			
	Decision-making power			
1	I take independent decisions at every stage of farm management			
2	I take independent decisions at every stage of home management			
3	I take opinions of others in my decision making			
4	If I take a decision I will commit myself to complete action			
5	I analyze all the alternatives before taking a decision			
6	I can influence the decisions of others			
	Capacity building			
1	I have the necessary capabilities and skills required to fulfill a vocation			
2	I can develop the necessary competencies necessary for a			

	particular activity			
3	I know my strengths and weaknesses			
4	I am adaptable to changing conditions			
5	I constantly assess my performances both by myself as well as from others			

Information specific to FPO membership

E. STRUCTURAL CHARACTERISTICS OF FPOS

1) Source of motivation for the members to join FPO

Sources	
NGO	
Self-motivation	
Family members	
Neighbors/Friends	
Bank	
Line departments	
FIG/SHG	
Others	

2) Reasons for joining as a member in FPO

Please indicate the degree of agreement of following aspects of your group on a three-point continuum as Agree (3), undecided (2) and Disagree (1)

S.N.	Reasons	3	2	1
1	To get remunerative price			
2	Immediate payment			
3	To buy quality inputs at lower cost			
4	To get technical assistance for better cultivation			
5	To get rid of difficulties in marketing the produce			
6	To make use of assets and infrastructure facilities			
7	To get access to PHM facilities			
8	To find out new employment/ income generating opportunities			
9	No political interference			
10	To improve household assets			
11	Any other (specify)			

3) Training and capacity building programmes of FPOs

S. No.	Training undergone	
1	Awareness about new cultivation practices	
2	Demonstration on advanced crop cultivation practices	
3	Study tours/exposure visits	
4	Trainings for women SHG/FIG on micro-finance aspects	

4) Supportive environment

Please indicate the extent of a supportive environment in FPO on a three-point continuum as supportive (3), undecided (2) and least/ no supportive (1)

S.N	Components	Supportiveness		
		3	2	1
	Institutional resource support			
1.	Credit/finance from Banks/ Cooperatives			
2.	Inputs for farming/ economic activity			
3	Market facilities			
4	Training institutions for capacity building			
5	Drudgery reduction technologies for household			
6	Drudgery reduction technologies for farm			
	Health & nutritional support			
1	Family planning facilities			
2	Immunization facilities			
3	Education on preventive and curative diseases			
4	Safe drinking water/ Sanitation facilities			
	Educational support			
1	Functional literacy (adult education)			
2	Schools for children			

F. FUNCTIONAL CHARACTERISTICS

1) Group processes operating in FPO

Please indicate the degree of agreement of following aspects of your group on a three-point continuum as Agree (3), undecided (2) and Disagree (1)

S.N	Components of group processes	3	2	1
Group cohesiveness				
1	Members encourage/support each other in the group			
2	Members have common interest and share group goals			
3	There is an informal relationship among members			
4	I feel satisfied and will never quit the group			
5	I feel all the members are loyal to the group			
6	Members rely on one another in the group			
7	There is healthy competition and criticism among group members			
Group role differentiation				
1	Members suggest/recommend solutions to group problems			
2	Members stimulate group into action whenever interest drops			
3	Members share their ideas/ opinion with others			
4	Members mediate in solving group conflicts			
5	Members compromise their individual opinions for the group harmony			
6	Members encourage and praise others			

7	Few members block the activities/ interaction of the group to get attention to oneself			
8	Few members isolate themselves from other group members			
Group leadership				
1	Group leaders share joy & maintain the liveliness of the group			
2	He/ she is always responsive, approachable and dependable			
3	Group leaders maintain constancy in conducting group activities			
4	Well aware of personal and group emotional reactions and handles them properly			
5	Admits mistakes/errors if need be			
6	Group leader identifies feelings of members and helps to solve their personal or work life problems			
7	He/she maintains positive & informal relationship with members			
8	Sincerely supports and compliments members contributions			
9	Explores choices and their consequences with members			
10	Helps members to identify his/her competencies and lacunae			
Communication process in the group				
1	Group members depend on informal leaders for getting information			
2	When good communication happens, it is praised			
3	Members are allowed to express their feelings out loud without hesitation.			
4	Group remains patient when someone has difficulty in expressing a thought/putting idea in words			
5	Information flows easily from one clique to another within the group			
6	Group members are not kept informed about important events or activities			
7	Informal and friendly interactions occur in the group			
8	Members discuss about their personal problems with others in the group			
9	We frequently gather and discuss all the problems and solutions regarding group activities			
10	Verbal communication is mostly used to pass responsibilities from leaders			
11	We use non-verbal communications to show our positive and negative emotions			
Group sustainability				
1	Open and voluntary membership			
2	Equitable gender participation			
3	Regular training and capacity building			
4	Democratic decision making			
5	Establishment of common properties of FPO			
6	One voting right per family			
7	Establishment of sound networking with the other organisations			
Critical issues in group				
1	Too much focus on topics of lesser importance			
2	Meeting times are not managed well			
3	Meetings often do not start on time			
4	Group can't take actionable decisions			

5	There are large number silent persons in the group			
6	Lack of follow through on tasks			
7	Lack of creativity			
Team spirit				
1	Our group is comfortable speaking freely			
2	We work by confirmation, not assumption			
3	The group is open for constructive feedback			
4	We are committed to common objectives			
5	Group clearly defines roles and responsibilities for each members			
6	We appreciate/value each other's skills and opinions			

2) Critical issues of group meetings

Please specify the issues discussed regularly during group meetings.

Farming related (___)/ economic (___)/ personal problems (___)/ community problems (___)/ welfare activities for women, children (___) and youth development (___).

3) Factors influencing the sustainability of FPO

Please indicate the degree of influence of following aspects on your group on a three-point continuum as Greater extent (GE), to some extent (SE) and least extent (LE).

Sl. No	Particulars	Influence		
		GE	SE	LE
1	Identification/availability of income generating opportunities for the members			
2	Generation of adequate income from FPO enterprises			
3	Infrastructure for the creation of employment opportunities			
4	Marketing facilities for the produce			
5	Job oriented training to members			
6	Increased multiples of bank advance to FPO			
7	Lower interest rates on the bank advance to FPO			
8	Larger loans for the farmers			
9	Grants from the external agencies/ government			
10	Avoiding formation of FPO near bank linked FPO			
11	Increased interest rate on FPO deposits			
12	Adequate training of members in day-to-day operations of FPO			
13	Increase in members saving contribution			
14	Prompt recovery of loans			
15	Subsidized loans to be given for members			

G. INCOME GENERATION ASPECTS

1) Cost of cultivation of red gram farming

Cost of cultivation	Red gram
VARIETY	
AREA	
I. VARIABLE COST	
A. Labor cost	
Land preparation	
Sowing	
Weeding	
Plant protection	
Harvesting	
Threshing & Winnowing	
Total (A)	
B. Material cost	
FYM/Compost	
Seeds	
Seed Treatment	
Fertilizers	
Plant protection	
Irrigation/drainage	
Interest on working capital	
Total (B)	
Total variable cost (I)	
PRICE INFORMATION	
Main yield	
By produce yield	
Gross return	

2) Other Income from activities

- i) _____
- ii) _____
- iii) _____
- iv) _____

b) The extent of reduction in the costs of various activities

Sl. No	Costs	Details	Amount (₹)
1	Input cost		
2	Packaging cost		
3	Transportation cost		
4	Storage cost		
5	Manpower/labour cost		
6	Cost of seeking information		
7	Additional processing cost		
8	Cost of interest		
9	Cost of damage and losses		

H. NETWORK LINKAGES OF FPOS

1) Government institutions

Please indicate Yes or No and your status for the following items

Sl. No	Networks	Purpose	Frequency of contact
1			
2			
3			
4			

2) Non-government institutions

Please indicate non-governmental organizations with which you are associated

Sl. No	Networks	Purpose	Frequency of contact
1			
2			
3			
4			
5			

I. CONSTRAINTS

1) Operational and technical constraints as perceived by the members of FPOs

Please indicate the serious of constraints based on a three-point continuum as Most serious (3), Serious (3) and not serious (1)

Sl. No	Technical and Operational constraints	3	2	1
1	Irregular procurement of produce			
2	Inadequate infrastructure facilities			
3	Lack of staff			
4	Credit facilities are not available			
5	Distant location from centre village			
6	Inadequate transportation facilities			
7	Organization procures produce of non-members			
8	The organization is not taking the whole of members' produce			
9	Centralized administration			
10	Political interference			

2) Organizational constraints in FPOs as perceived by the members of FPOs

Sl. No	Organizational constraints	3	2	1
1	Governing body is not rotated uniformly			
2	There is a competition among villages for getting benefits			
3	Each tries to achieve key positions in the organization			
4	Personal gain is of utmost importance than the group goals			
5	Benefit sharing is not uniform			
6	Members share formal relationships			
7	Lack of team spirit			
8	Members always oppose each other in the meetings			

3) Constraints related to NGOs' support as perceived by members of FPOs

Sl. No	Constraints	3	2	1
1	Focussing only on resource-rich areas			
2	Profit motive			
3	Forcing their own organizational agenda on FPOs			
4	Focussing only on progressive farmers			
5	Interfere in the decision-making process of FPOs			
6	Exploiting the members to meet their objectives			
7	Unable to guide coordinators and ABAs			
8	Focussing only on resource-rich areas			

4) Technical constraints of Red gram cultivation

Sl. No	Technical constraints	3	2	1
1	Untimely, costly and poor quality inputs			
2	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)			
3	High incidence of diseases and pests, crop failure			
4	Labour shortage/ Costly wages			
5	Lack of financial support			
6	Lack of technical guidance about cultivation			
7	Untimely, costly and poor quality inputs			
8	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)			

5) Marketing constraints with respect to Red gram cultivation

Sl. No	Marketing constraints	3	2	1
1	Price fluctuation			
2	Lack of market awareness			
3	Too many intermediaries in non-FPO based supply chain			
4	Distant market and the high cost of transportation			
5	Exploitation by middlemen and traders			
6	Delayed payment			
7	Illiteracy and Lack of unity among members			
8	Lack of well-developed storage facilities			
9	Lack of well-developed processing facilities			
10	Lack of assured procurement facilities			

J. SUGGESTIONS

Appendix B: Interview schedule for non-members of FPOs

Member's name: _____

Place: _____

Taluk: _____

District: _____

A. PERSONAL CHARACTERISTICS

- 1) Age (in completed years): _____
- 2) Education: _____
- 3) Caste: _____ (SC/ST/OBC/General/Others)
- 4) Family size and composition:
 - a) Male: _____
 - b) Female: _____
 - c) Children: _____
- 5) Farm size: (in acres)
 - a) Irrigated land: _____.
 - b) Dry land: _____
 - c) Total: _____
- 6) Farming experience (in completed years): _____
- 7) Farm mechanisation status: _____

Sl. No	Statements	Owned	Available (taken on rent base)	Not available
	Hand implements			
1	Sickle or khurpi			
2	Hand weeding			
3	Sharp-edged sickle			
4	Weeding fork			
	Farm Implements			
1	Disc plough			
2	Cultivator			
3	Seed cum fertilizer plough			
4	Mouldboard plough			
	Mechanical implements			
1	Power tractors			
2	Power Sprayers			
3	Power Tillers			
4	Harvesters/threshers			
5	Trailers			

B. ECONOMIC VARIABLES

Family annual Income: _____ in ₹

Number of earning members: _____

Total annual income: _____

a) Farm income:

i) Agricultural crops: _____

ii) Horticultural crops: _____

iii) Dairy: _____

iv) Poultry: _____

v) Farm labour: _____

vi) Any other (specify): _____

b) Non-farm income

i) Business: _____

ii) Casual labour: _____

iii) Any other (specify): _____

2) Indebtedness: _____ in ₹

C. SITUATIONAL VARIABLES

1) Market facilities:

Please give details about

a) Information facilities: _____

b) Storage facilities: _____

c) Processing units: _____

d) Transportation facilities: _____

e) Insurance facilities: _____

f) Actors in current marketing channel:

i) Self-marketing:

ii) Village trader:

iii) Pre-harvest contractors:

iv) Commission Agents:

v) Wholesalers:

vi) Retailers:

vii) NGOs:

D. SOCIAL-PSYCHOLOGICAL CHARACTERISTICS

Please indicate Extent of agreement of following characteristics on a three point continuum as agree (3), undecided (2) and disagree (1)

SN	Characteristics	Extent of agreement		
		3	2	1
	Participation in group/community activities			
1	I actively participate in all activities of the group			

2	Participation has improved my standards of living both socially & economically.			
3	I participate only for the material benefits provided.			
4	I participate in group activities because it has always taken my consensus into consideration.			
5	I would like to perform alone rather than being in a group			
6	Participation has helped to improved my competitive spirit			
7	I feel collaborative learning is the best way to enhance/share knowledge & experiences			
8	I believe teamwork will help to get mutual benefits			
	Information seeking behavior			
1	I am always curious to know about new information related to agriculture			
2	I try to gather more information that has relative advantages			
3	I do not get confused to find authentic sources of information			
4	If I want particular information I will anyway try to get it			
5	I focus on only such information which are related to my occupation			
6	I feel any information in one or the other way to improve my knowledge			
7	I can find the right source of information and share it with others			
8	I try to keep myself up to date with new farming practices			
	Leadership ability			
1	I inspire the group to harness good opportunities			
2	I would like to initiate any group activity			
3	I try to motivate others to complete the tasks			
4	I always believe in doing the right things rather than doing things right			
5	I care for people rather than things			
6	I respect each other's feelings and emotions			
7	I would like to be a role model for others			
8	I take responsibilities for all goods and bad in the group			
9	I recognize & praise any good work &/or innovations happen in a group			
10	I give equal importance to all the members of the group			
	Risk orientation			
1	I believe that taking up a single activity is a risky affair than taking up more activities			
2	If I take up risky activity I tend to perform better			
3	I dare to take risky activities to get higher profits			
4	I put my whole heart and soul to achieve my goals			
5	Before taking up an activity, I will analyze its past, present, and future			
6	I am good at finding potential obstacles of a particular activity			
7	I can analyze and select suitable alternatives to overcome obstacles			
	Innovativeness			
1	I want to learn new ways of farming			
2	I will attend talks on improved cultivation practices			
3	I will surely adopt practices if they are promising.			
4	Do you believe that man's future is in the hands of God			

5	Somehow I believe that traditional ways of farming are the best.			
	Do you want your child/ren to become farmers?			
	It is better to enjoy today and let tomorrow take care of itself.			
	Achievement motivation			
1	If the goal is realistic and challenging I will take it up			
2	I can develop the necessary competence to achieve any activity			
3	I work until I get satisfaction			
4	Recognition for my work inspires me to set up more challenging tasks			
5	Any obstacle never stopped me doing my work			
6	I receive criticisms in a positive manner			
	Self-confidence			
1	I think of myself as a confident and successful person			
2	I take responsibilities for my actions			
3	When things go wrong I pity or blame myself			
4	I always encircle myself with likeminded people			
5	I always feel that I can achieve things I wish			
6	I don't care much for what others think of me			
7	I don't compare myself with others			
8	I always stay in the background when people meet			
	Communication behavior			
1	I can use clear and understandable words			
2	I use humor occasionally to reduce tension			
3	I listen to others before making my statements or conclusions			
4	I can read a topic and give a summary on it			
5	I try to remain non-judgemental and respect others opinions			
6	I always maintain eye contact with others while talking			
7	I use good and open posture and empathetic gestures			
	Decision-making power			
1	I take independent decisions at every stage of farm management			
2	I take independent decisions at every stage of home management			
3	I take opinions of others in my decision making			
4	If I take a decision I will commit myself to complete action			
5	I analyze all the alternatives before taking a decision			
6	I can influence the decisions of others			
	Capacity building			
1	I have the necessary capabilities and skills required to fulfill a vocation			
2	I can develop the necessary competencies necessary for a particular activity			
3	I know my strengths and weaknesses			
4	I am adaptable to changing conditions			
5	I constantly assess my performances both by myself as well as from others			

E. INCOME GENERATION ASPECTS

1) Cost of cultivation of red gram farming

Cost of cultivation	red gram
VARIETY	
AREA	
I. VARIABLE COST	
A. Labor cost	
Land preparation	
Sowing	
Weeding	
Plant protection	
Harvesting	
Threshing & Winnowing	
Total (A)	
B. Material cost	
FYM/Compost	
Seeds	
Seed Treatment	
Fertilizers	
Plant protection	
Irrigation/drainage	
Interest on working capital	
Total (B)	
Total variable cost (I)	
PRICE INFORMATION	
Main yield	
By produce yield	
Gross return	

2) Other Income from activities

- i) _____
- ii) _____
- iii) _____
- iv) _____
- v) _____

b) The extent of reduction in the costs of various activities

S.N	Costs	Details	Amount (₹)
1	Input cost		
2	Packaging cost		
3	Transportation cost		
4	Storage cost		
5	Manpower/labour cost		
6	Cost of seeking information		
7	Additional processing cost		
8	Cost of interest		
9	Cost of damage and losses		

F. CONSTRAINTS

1) Technical constraints of red gram cultivation

Please indicate seriousness of following constraints on a three point continuum as most serious (3), undecided (2) and less serious (1)

Sl. No	Technical constraints	3	2	1
1	Untimely, costly and poor quality inputs			
2	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)			
3	High incidence of diseases and pests, crop failure			
4	Labour shortage/ Costly wages			
5	Lack of financial support			
6	Lack of technical guidance about cultivation			
7	Untimely, costly and poor quality inputs			
8	Lack of proper infrastructure (implements, irrigation facilities, power, and electricity)			

2) Marketing constraints with respect to red gram cultivation

Please indicate seriousness of following constraints on a three point continuum as most serious (3), undecided (2) and less serious (1)

Sl. No	Marketing constraints	3	2	1
1	Price fluctuation			
2	Lack of market awareness			
3	Too many intermediaries in non-FPO based supply chain			
4	Distant market and the high cost of transportation			
5	Exploitation by middlemen and traders			
6	Delayed payment			
7	Illiteracy and Lack of unity among members			
8	Lack of well-developed storage facilities			
9	Lack of well-developed processing facilities			
10	Lack of assured procurement facilities			

G. SUGGESTIONS

Appendix C: Interview schedule for Board of Management members

FPO name: _____

Governing Member's name: _____

Place: _____

Taluk: _____

District: _____

1) Organisational composition of FPOs

Sl. No.	Particulars	
1	Number of governing members	
a.	Male	
b.	Female	
3	Number of CEOs	
4	Number of co-ordinators	
5	Secretary	
5	Number of ABAs	
6	Shareholders	
7	Non-shareholders	

2) Details about Board of Management meetings

Sl. No.	Particulars	Details
1	The BoM meets	
a	Once in a month	
b	As and when needed	
2	Place of meeting (at office)	
3	Average member attendance per meeting	
a	Above 90 per cent	
b	80-90 per cent	
4	Average period of conducting meetings (1.5-3 hours)	
a	Follow up on decisions of previous meetings	
b	Verification of accounts/ document	
c	Addressing the problem of members related to farming	
d	Taking up new activities	
e	Selection of beneficiaries for project interventions (subsidy/ other provisions)	
f	Deciding upon the business plan of FPO	

3) Details of licenses information

Sl. No	Licence	Details
1	Fertilizer storage and sale license	
2	Pesticides storage and sale license	
3	Seed storage and sale license	
4	APMC mandi license	
5	Trader license	

B. NETWORK LINKAGES OF FPOS

1) Government institutions

Please indicate Yes or No and your status for the following items

Sl. No	Networks	Purpose	Frequency of contact
1			
2			
3			
4			
5			

2) Non-government institutions

Please indicate non-governmental organizations with which you are associated

Sl. No	Networks	Purpose	Frequency of contact
1			
2			
3			
4			
5			

C. SUGGESTIONS

Appendix-II

Difficulty index, discrimination index and rpbis values for knowledge test items

Sl. No.	Frequencies of correct answer of respondents in four extreme groups				Total frequencies of correct answers by all six groups	% of giving correct responses	Difficulty index	Discrimination power index	Rpbis
	G-1	G-2	G-5	G-6					
1	12	12	10	8	53	73.61	91.66	0.17	0.9NS
2	12	11	10	11	56	77.77	91.66	0.08	.172 NS
3	10	9	5	7	47	65.27	64.58	0.29	-.056 NS
4	12	11	9	4	52	72.22	75.00	0.42	.308**
5	10	12	3	0	43	59.72	52.08	0.79	.287*
6	11	9	6	4	39	54.16	62.50	0.42	.366**
7	4	3	2	2	30	41.66	22.91	0.13	.124 NS
8	11	9	7	5	51	70.83	66.66	0.33	.256*
9	11	11	8	5	49	68.05	72.91	0.38	.340**
10	9	8	4	9	39	54.16	62.50	0.17	-.029 NS
11	11	9	11	8	48	66.66	81.25	0.04	.140 NS
12	12	7	1	0	29	40.27	41.66	0.75	.205 NS
13	12	7	2	0	36	50.00	43.75	0.71	.223 NS
14	12	11	10	10	55	76.38	89.58	0.13	.125 NS
15	10	9	5	1	45	62.50	52.08	0.54	.236*
16	11	12	4	1	45	62.50	58.33	0.75	.249*

17	11	10	8	7	45	62.50	75.00	0.25	.151 NS
18	11	9	11	9	46	63.88	83.33	0.10	.008 NS
19	11	10	8	5	52	72.22	70.83	0.33	.268*
20	11	9	4	4	47	65.27	58.33	0.5	.048 NS
21	5	3	2	4	28	38.88	29.16	0.08	-.008 NS
22	5	0	0	0	21	29.16	10.41	0.21	.073 NS
23	10	10	7	8	50	69.44	72.91	0.21	.151 NS
24	4	0	0	0	12	16.66	8.33	0.17	.066 NS
25	11	8	7	4	45	62.50	62.50	0.33	.234*
26	11	10	7	8	51	70.83	75.00	0.25	.151 NS
27	12	10	8	5	48	66.66	72.91	0.38	.268*
28	11	9	4	4	37	51.38	58.33	0.5	.041 NS
29	12	11	10	5	55	76.38	79.16	0.33	.454**
30	10	11	2	0	41	56.94	47.91	0.79	.236*
31	10	9	5	1	33	45.83	52.08	0.54	.235*
32	12	12	5	0	41	56.94	60.41	0.79	.343**
33	11	12	4	0	42	58.33	56.25	0.79	.295*
34	11	9	5	3	46	63.88	58.33	0.5	.041 NS
35	11	9	5	3	42	58.33	58.33	0.5	.041 NS
36	10	11	3	0	37	51.38	50.00	0.75	.236*
37	12	11	9	5	43	59.72	77.08	0.38	.323**
38	10	10	9	6	52	72.22	72.91	0.21	.308**

39	12	9	7	6	53	73.611	70.83	0.33	.268*
40	6	3	2	3	26	36.11	29.16	0.17	.130 NS
41	11	10	7	8	55	76.38	75.00	0.25	.151 NS
42	6	3	2	3	32	44.44	29.16	0.17	.130 NS
43	5	0	0	0	21	29.16	10.41	0.21	.073 NS
44	12	7	1	0	41	56.94	41.66	0.75	.193 NS
45	12	9	5	0	42	58.33	54.16	0.67	.313**
46	12	10	5	0	43	59.72	56.25	0.71	.333**
47	12	10	5	0	44	61.11	56.25	0.71	.333**
48	10	10	5	1	31	43.05	54.16	0.58	.249*
49	12	10	9	7	44	61.11	79.16	0.25	.380**
50	6	0	0	1	22	30.56	14.58	0.21	-.125 NS
51	11	10	3	0	41	56.94	50.00	0.75	.295*
52	5	2	1	1	24	33.33	18.75	0.21	.103 NS
53	6	3	2	3	26	36.11	29.16	0.17	.130 NS
54	8	2	0	1	27	37.50	22.91	0.38	-.066 NS
55	6	0	0	0	22	30.55	12.50	0.25	.073 NS
56	4	1	0	0	20	27.77	10.41	0.21	.066 NS
57	5	0	0	0	22	30.56	10.41	0.21	.066 NS
58	11	8	7	6	49	68.056	66.66	0.25	.234*
59	11	10	9	7	54	75.00	77.08	0.21	.308**
60	11	9	5	4	41	56.94	60.41	0.46	.048 NS

61	S	5	3	2	3	29	40.27	27.08	0.13	.130 NS
62	i	10	11	2	0	40	55.55	47.91	0.79	.236*
63	g	11	11	3	0	35	48.61	52.08	0.79	.295*
64	n	10	11	2	0	43	59.72	47.91	0.79	.243*
65	i	10	10	5	1	43	59.72	54.16	0.58	.249*
66	f	2	0	0	0	16	22.22	4.167	0.08	.041 NS
67	c	12	7	2	1	40	55.55	45.83	0.67	.088 NS
68	a	11	10	8	6	48	66.66	72.91	0.29	.245*
69	n	10	11	3	0	42	58.33	50.00	0.75	.279*
70	t	5	0	0	0	16	22.22	10.41	0.21	.066 NS
71	a	9	6	3	3	34	47.22	43.75	0.38	.188 NS
72	o	2	0	0	0	16	22.22	4.167	0.08	.041 NS
73	.	12	12	10	11	55	76.38	93.75	0.13	-.059 NS
74	1	6	0	0	1	22	30.55	14.58	0.21	-.125 NS
75	%	10	11	3	0	41	56.94	50.00	0.75	.236*
76		12	10	12	9	52	72.22	89.58	0.04	.044 NS

*Significant at 0.01 % level of probability,

** Significant at 0.05 % level of probability, NS: Non Significant

List of items considered for determining the level of knowledge of farmers on the recommended cultivation practices of red gram

1. Soil (s) suitable for red gram cultivation is/are
a) Red b) black c) both
2. Saline-Alkaline and waterlogged soils are unsuitable for Red gram cultivation
3. Red gram can be transplanted in all types of soils
4. Month of sowing for red gram *
a) May-July c) September- October c) both
5. Time of application of FYM is *
a) 1week before sowing b) 5 weeks before sowing c) 3 weeks before sowing
6. Amount of FYM to be applied per acre is _____ tonnes. *
a) 10 b) 2.5-3 c) 5
7. Requirement of compost containing potash per acre is
8. Application of FYM improves water holding capacity *
9. Application of FYM increases microbial activity in the soil *
10. Application of FYM may fulfil nutrient requirement
11. Fine tilth and weed free land are the prerequisites for red gram cultivation
12. Requirement of Zinc per acre is _____kg
13. Requirement of copper sulphate per acre is _____kg
14. Quantity of DAP required per acre is _____kg
15. Potash requirement is only for red soils *
16. Micronutrients required for red gram cultivation _____ & _____.*
17. Recommended NPK requirement ____:____:____ kg/acre
a) 10:20:10 b) 100:50:100 c) 30:10:30
18. Name the varieties which are resistant to wilt disease.
19. Name the variety(ies) which are suitable for rainfed conditions *
20. Maruti variety is susceptible to _____disease
21. Varieties which are resistant to both wilt and Sterility mosaic disease are
22. Name the white seeded variety.
23. Is there any hybrid variety in Redgram? Yes/No
24. WRP-1 is not suitable for Sterility mosaic disease affected areas

25. Crop duration of Asha and BSMR-736 is 180 to 195 days *
26. Maruti (ICP-8863) is a short duration variety of Redgram True/False
27. Crop duration of TS3R is 150 to 155 days *
28. Variety suitable for transplanting is BSMR-736 Yes/No
29. Seed rate _____Kg/acre for monocrop. *
- a) 4-5 b) 1-3 c) 8-10
30. Seed rate required for transplanting is _____Kg/acre. *
31. Seed treatment with CaCl_2 improves uniform germination and drought resistance *
32. Seed treatment with Rhizobium reduces 50 per cent Nitrogen requirement *
33. Seed treatment should be done in shady conditions *
34. Amount of Rhizobium required for 200 g per acre.
35. Amount of PSB required for 200 g per acre.
36. To control wilt _____ is used for seed treatment. *
- a) Trichoderma b) PSB c) Rhizobium
37. Spacing between rows and plants is _____ and _____ respectively for red soils *
38. Spacing between rows and plants is _____ and _____ respectively for black & irrigated soils. *
39. Recommended number of seeds per hill is _____ *
40. Name any two crops with which Red gram can be intercropped
41. Which method is/are used for the control of weeds in red gram?
- a) Mechanical b) biological c) chemical d) all the above
42. Name the pre-emergent Herbicide _____
- Cyhalofol butyl (Clincher) b) 2,4-D c) Pendamethalene
43. Name the post-emergent Herbicide _____
- Cyhalofol butyl (Clincher) b) Imazathopyr c) Pendamethalene
44. Post emergent spray is given after _____ days of sowing
45. Length of Nipping _____cm *
46. Nipping is done after 45-50 DAS True/False*
47. Advantage/s of Nipping is/are _____ *
48. Nipping can be practiced in any variety of Red gram Yes/No*
49. Name the critical stages of irrigation water management _____ & _____.*
50. Drip irrigation is best suited only for transplanted red gram Yes/No

51. Fertilizers can be provided through drip irrigation *
52. Name the moisture conservation practices followed in red gram _____ & _____.
53. Name the 2 important insect species in redgram _____ & _____.
54. HaNPV is best suited for the control of *Helicoverpa armigera*. True/False
55. Use of pheromone trap is the physical method of *Helicoverpa* control. Yes/No
56. Trichogramma can be introduced to infested field to control *Helicoverpa*
57. Name any plant product which can control *Helicoverpa*
58. Cocktail mixtures of chemicals should be avoided Yes/No*
59. Name any insecticide used for the control of *Helicoverpa*. *
60. Name any insecticide used for the control of Maruca spotted pod borer.
Chlorpyrifos/Acephate
61. Name any insecticide used for the control of pod fly
Monocrotophos/Profenophos/Acephate
62. Thorough coverage of acre of land requires _____ litre of spray *
63. Spraying should be done during early morning or evening hours of day. True/False*
64. Same insecticide should not be used for the control of insects. True/False*
65. Integrated pest management is the best way to control insects in redgram Yes/No*
66. Name the 2 important diseases in redgram _____ & _____.
67. Wilt is soil borne fungal disease hence deep ploughing should be followed before sowing True/False
68. Growing resistant varieties of red gram for particular disease is the best method of disease management. Yes/No*
69. Crop rotation can reduce disease incidence. True/False*
70. Name any chemical used for the seed treatment to control wilt disease
71. Intercropping with Jowar/maize can reduce wilt disease True/False
72. Phytophthora leaf spot can be controlled by treating seeds with Metalaxil + Mancozeb. True/False
73. Early removal of infested plants can reduce spread of disease Yes/No
74. Name any chemical used for the seed treatment to control sterility mosaic virus disease.

75. If the produce should be dried to get up to 9 per cent of moisture, they can be stored up to period of 180 days True/False*
76. Use of combined harvester does not affect the quality of seeds Yes/No

* Items selected for the study

Extent of adoption of recommended cultivation practices of red gram

Sl. No	Recommended cultivation practices		Full adoption	Partial adoption	Non adoption
1	Deep summer ploughing				
2	Recommended varieties: [TS-3R, BSMR 736, Asha, WRP-1 and Maruthi]				
3	Sowing time: [May-July]				
4	Spacing :				
a	[120 X30 cm black soils]				
b	[90X20 red soils]				
5	Seed rate: [5-6 kg/acre]				
6	Seed treatment {Rhizobium [200 gm/acre], P.S.B [200 gm/acre], CaCl ₂ [2gm/ lit of water]}				
7	Intercropping [Soybean, Greengram, Blackgram, Maize, Jowar]				
8	FYM				
a	Quantity of application [3-5 t/acre]				
b	Time of application [3 weeks before sowing]				
9	Chemical fertilizer [kg/acre]				
i	Major nutrients [N:P:K::10:20:10]				
ii)	Minor nutrient [S and/or ZnSO ₄ = 8:6]				
10	Nipping [time and length]				
11	Weed management				
a	Hand weeding [2 times]				
b	Pre-emergent [Pendamethalin @ 2.50 ml /lit of water]				
c	Post emergent [Imazathopyr @ 2.0 ml /lit of water]				
12	Inter cultivation [1-2 times within 45 days]				
13	Moisture conservation practice [by opening dead furrows between rows]				
14	Irrigation water management at critical stages				
15	Growth promoters (Planofix @ 0.25 ml /lit of water]				
16	Insect management				
i	Pod borer	a) (Profenophos @ 2 ml or Indoxcarb @ 0.3 ml or Emamectin benzoate @ 0.2 gm or Flubendamide @ 0.15 gm / lit of water]			
		b) NPV or <i>Trichogramma</i> or NSKE			
ii	Pod fly	a) Methomil @ 0.6 gm or Imadachloprid @ 0.2 ml + 10 gm jiggery			

iii	Maruca spp.	a) Profenophos @ 2 ml/ lit of water or dichlorovos 2.5 ml/liter water			
17	Diseases management				
i	Wilt	a) Seed treatment with Captan 80WP (2gm/kg) or Thairam 75 WP [2gm/kg] or Carboxyl 75WP]2gm/kg]			
		b) Seed treatment with Trichoderma (4gm/kg)			
ii	Stem blight	a) Metalaxyl @ 4 gm / kg of seed			
iii	Sterility mosaic	a) Dicofol 18.5 EC [2.5ml/lt] or Xidematan methyl 50 EC [1.5ml/lt]			
v)	Crop rotation once in two years				
18	Method harvesting				
a	Manual				
b	Combined harvester				