SOCIO-ECONOMIC IMPACT OF MECHANISATION IN PADDY GROUP FARMING

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2020-11-079

DEPARTMENT OF AGRICULTURAL EXTENSION EDUCATION

COLLEGE OF AGRICULTURE

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By

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2023

DECLARATION

I, hereby declare that the thesis entitled "**Socio-economic impact of mechanisation in paddy group farming**" is a bonafide record of research done by me during the course of research and that it has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society

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CERTIFICATE

Certified that this thesis entitled **"Socio-economic impact of mechanisation in paddy group farming"** is a record of research work done independently by **Mr. Sreejith K J (2020-11-079)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.

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LIST OF ABBREVIATIONS

Abbreviations	Expansion
AMOSC	Agro Machinery Operation Service Centre
ASC	Agro Service Centres
ATMA	Agricultural Technology Management Agency
GDI	Group Dynamics Index
LSG	Local Self Governments
MSP	Minimum Support Price
MKSP	Mahila Kisan Sashakthikaran Pariyojana
MGNREGP	Mahatma Gandhi National Rural Employment Guarantee Act
MKSP	Mahila Kisan Sashaktikaran Pariyojana
MAMTU	Mobile Agro Machinery Training Unit
NRLM	National Rural Livelihood Mission
PASC	Primary Agricultural Credit Society
PCA	Principal Component Analysis
RKVY	Rashtriya Krishi Vikas Yojana
SHG	Self Help Groups
SDP	State Domestic Product

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Introduction

Chapter 1
Introduction

Agriculture in Kerala in recent times has been characterised by general stagnation and a substantial decline in the area and production of food crops. The share of agriculture and allied activities in State Domestic Product (SDP) fell from around 22 per cent in 1999–2000 to 8.8 per cent in 2013–14, and is currently hovering around the same level. The share of the primary sector as a whole went down from 29 per cent to 9.2 per cent during this period (GoK, 2015). Correspondingly, the share of the tertiary sector went up from about 51 per cent to nearly 71 per cent. There was marginal growth in the contribution of the secondary sector during this period. The status of agriculture as a major provider of employment has also declined at a rapid pace. Thus the economy of Kerala is in the middle of a major structural shift, characterized by a substantial decline in the percentage share of agriculture in terms of both income and employment and the emergence of the services sector as the mainstay of the economy.

Kerala, being a consumer state, is primarily reliant on neighbouring states for its staple meal i.e rice and daily vegetable intake. Paddy farming as a primary occupation has become unprofitable due to rising costs and a severe labour shortage. Many farmers and agricultural labourers have moved towards non-farm sector due to low income, poor dignity and increased drudgery within the farming sector.

Kerala produces less than 20 percent of its rice requirements and relies on other States for the rest. The area under paddy cultivation, as well as production, is steadily declining. In 1975-76, the area under paddy cultivation was 8.85 lakh hectares and production was 13.65 lakh tonnes, but in 2011-12, the area was reduced to 2.08 lakh hectares and production was reduced to 5.69 lakh tonnes; i.e. a drop of more than 75 percent in area and 58 percent in production occurred in less than 40 years. This decline has occurred in all regions of the State, including the major paddy production tracts of Kuttanad and Kole, as well as Palakkad. The reasons for the decline are changes in cropping patterns and conversion of paddy fields for commercial and noncommercial purposes.

The crisis is more than just a relative decline in agriculture; it also includes an absolute decline in employment, production, and income generated by the sector, worsening food security, and increasing indebtedness and misery among farmers and agricultural labourers (Harilal and Eswaran 2018). Large-scale conversion and filling of wetlands, primarily paddy lands, has been reported almost everywhere in the State, causing an ecosystem crisis. The decline in agriculture has a knock-on effect on allied activities such as animal husbandry, poultry, village industries, and the rural economy in general.

Farmers in Kerala despise paddy cultivation because it is unprofitable, with high cultivation costs and very low prices. Hence the State needs a suitable strategy in order to make paddy cultivation profitable and viable. As paddy farming is labour intensive and labour costs are the most expensive component, the best strategy will be one that controls and reduces labour costs while increasing paddy productivity. Thus, farm mechanization and a collective approach in paddy cultivation are the best strategies for increasing paddy production.

Paddy cultivation needs appropriate mechanisation to cope with the increased cost of cultivation due to high wages and scarcity of labourers. It is the only way to bring back the farmers who turned away from paddy cultivation. Farm mechanization will also help to overcome the labour crisis and increase the efficiency of the farm labour force. Adoption of farm mechanization will give farmers the option for raising a second crop which would help to increase yield and income of farmers. However, the fragmented agricultural landholding and the relatively high cost of mechanisation is a major problem in Kerala for implementing farm mechanization and thus arose the concept of mechanization through paddy group farming.

While mechanization was seen as a solution, challenges such as the lack of trained workers and high equipment costs hindered progress. To address these issues, Kerala Agricultural University introduced the concept of the Food Security Army (FSA), under which human resource development in the agricultural mechanization sector gained focus. The Agricultural Human Resources Development Programme launched by the University in 2008 under Rashtriya Krishi Vikas Yojana (RKVY) included the

innovative concept of the Agro Machinery Operation Service Centre (AMOSC), which employed master trainers as experts in machinery operations, service, and maintenance, and trainers for the FSA. These trainers also operated the Mobile Agro Machinery Training Unit (MAMTU) to train and develop a new group of Food Security Army in various parts of the State. The creation of the FSA was instrumental in bringing back prosperity in the agrarian sector and building an invaluable human resource dedicated to the farming sector.

Haritha Karma Sena or Green Sena, a community-driven initiative for paddy mechanisation introduced by the Government of Kerala has been another unique venture in transforming rice cultivation practices in the state. Haritha Karma Sena has empowered local communities, particularly labourers, through intensive training programmes and workshops and have been equipped with the skills to effectively use mechanized equipment and machinery. Group farming *Samithies* were also equipped by providing them with the necessary resources, knowledge, and support to adopt mechanization and sustainable techniques in rice cultivation. The Local Self Governments (LSGs) in collaboration with various agricultural agencies, offered financial support, and subsidies for purchasing and leasing options for machinery procurement. This assistance has made mechanization affordable and accessible, enabling small-scale farmers to benefit from advanced mechanisation technology without excessive financial burden. *Haritha Karma Sena* has also greatly contributed to increased rural employment opportunities. The mechanization of rice cultivation requires skilled labor for machinery operation, maintenance, and repair. This has generated employment avenues for local communities, thus addressing the issue of rural unemployment.

The first Green Army (The Agricultural Labour Bank) was formed by Wadakkanchery Block Panchayat, in Thrissur District of Kerala, wherein the Gramapanchayat and the State Department of Agriculture jointly formed the skilled workforce comprising of women and men. It was formed as a part of an Integrated Rice Rejuvenation Programme, widely known as the “Wadakkanchery Model” and also aimed at providing maximum days of jobs and ensuring social security for the rural labourers.

The advent of Mahila Kisan Sashakthikaran Pariyojana (MKSP), a component of the National Rural Livelihood Mission (NRLM), which has been carried out under the stewardship of *Kudumbasree* collective farming has also given a fillip to the process of farm feminization in Kerala.

Various paddy mechanization projects initiated in the State during the past decade and institutionalisation of labour banks with the support of LSGs might have contributed to increase in paddy productivity, farm income, employment and improved living standards of rural labourers in Kerala.

Scope of the Study

The farm mechanization program in rice cultivation in Kerala could have a significant socio-economic impact on the agricultural sector. The mechanization through group farming approach could have resulted in the retention of paddy area and the cultivation of some barren land in various regions. Through the group farming approach, the authorities were successful in identifying production constraints in various areas and regions and developing separate productivity-boosting packages. Mechanization can lead to a significant increase in rice productivity in Kerala. Advanced machinery such as rice transplanters, threshers and combine harvesters have reduced the time and effort required for various farming operations. This could result in higher crop yields and improved overall productivity in rice cultivation. With the use of mechanized equipment, tasks that were once labor intensive and time-consuming could now be completed more efficiently and within the appropriate time. Mechanized operations could save labour and time, thereby reducing cost of cultivation. By replacing labor-intensive tasks with machinery, farmers could experience reduced physical strain and improved occupational safety. Farmers can be exposed to advanced agricultural practices, including precision farming, integrated pest management, and improved irrigation methods. This could enhance their knowledge and skills, enabling them to adopt more sustainable and efficient farming practices.

Hitherto only a few studies were conducted to assess the impact of farm mechanization among the farmers and labourers in rice cultivation. There is no

specific research study on the socio-economic impact of mechanisation through paddy group farming. Hence the present study was undertaken to assess the impact of farm mechanization among the stake holders in paddy group farming. The study was conducted with the following objectives.

1) Analysis of perception of farmers and farm labourers on the socio-economic impact of mechanization in paddy group farming
2) Delineation of group dynamics factors that contribute to the implementation of mechanisation through *Padasekara Samithies* and
3) Explore the challenges faced in continuing mechanization in paddy.

Significance of the study

Introduction of mechanisation through paddy group farming has initiated the transformation of paddy cultivation in Kerala and thereby had an impact on the livelihood of stakeholders by several means. The study will be extremely beneficial to the Kerala State Department of Agriculture and other Development Departments in formulating strategies to shore up paddy production in the State. This study might be greatly beneficial to administrators, planners, researchers and extension functionaries in developing and implementing relevant policies for sustainable agriculture development in Kerala as well as India. The current study would also provide valuable information about the perception and the challenges faced by the stakeholders in adopting mechanization through paddy group farming.

Limitations of the study

Despite the fact that the investigation was carried out with great care in order to make the study more thorough and accurate, it had some limitations. The current study was subjected to the usual inherent constraints that a student researcher faces because it was part of a master's degree program. The following are the study's limitations:

1. The study's findings may not be generalizable because it was limited to only 160 respondents within who represented the entire community of paddy farmers and labourers in Kerala.

2. The investigation was also hampered by the typical constraints of a student researcher, such as a lack of time, money, and other resources.

3. The study's findings were based on paddy farmers and labourers responses, and their precision was determined by whether the farmers responses were biased or unbiased.

4. The study was limited to only two blocks with maximum paddy cultivation in Palakkad district namely Alathur and Chittur block and despite the fact that honest and deliberate attempts were made in selecting the variables for the current study, certain variables may still be missing

Organization of the study

The report of the research study on the “Socio-economic impact of mechanisation in paddy group farming” has divided into six chapters.
The first chapter depicted the problem statement under consideration. The significance of the study, its objectives, and its limitations were also revealed.

The second chapter, titled 'Review of Literature,' included a review of relevant literature as well as the findings of previous research studies on similar topics conducted in various locations.

The third chapter, titled 'Methodology,' described the research methods, techniques, and tools employed, as well as the procedure used in the current investigation.

The fourth chapter, titled 'Results and Discussion,' is concentrated on the current study's findings and relevant discussion.

The fifth chapter includes a 'Summary and Conclusion' of the investigation as well as study findings.

The sixth chapter included cited literature, appendices, and an abstract.

Review of literature

Chapter 2

REVIEW OF LITERATURE

A comprehensive literature review is an important part of any research project. The current study investigated the socio-economic impact of mechanisation in paddy group farming. Very few research studies have been published on this topic so far. In light of this, existing research studies on the various aspects of the research issue have been thoroughly evaluated in compliance with the study objectives. The following subheads provide a chronological overview of relevant work in this topic.

2.1 Paddy group farming

2.2 Need for mechanisation through paddy group farming

2.3 Benefits of mechanisation in paddy group farming

2.4 Profile, social & psychological characteristics of the respondents

2.5 Group dynamics effectiveness indicators

2.6 Impact of mechanisation in paddy group farming

2.7 Challenges in adopting mechanisation in paddy group farming

2.1 Paddy group farming

Group farming, alternatively known as community farming, is a livelihood approach which consists of a group of small and marginal farmers, and landless poor in a village who work together to utilize the cultivable waste lands or under-utilized lands to earn their livelihoods (Francis, 2001)

Agarwal (2018) pointed out that the importance of collective action for commons management and many countries around the world are implementing policies of decentralization, where control over natural resources is shifted from governments to local resource users. By operating a contiguous plot and sharing implements, smallholders can increase their productivity and profitability over individual family farms.

Farmers who have common problems and are voluntarily willing to work in a group would join the FRG (Farmer Research Groups) approach. Participation has become a widely accepted strategy for conducting research and development projects (Anandajayasekeram *et al.,* 2008).

Labour bank is an attempt to mobilize rural man power potential in a useful manner to benefit the society as a whole (Lijo and Siddayya, 2011). Agricultural development policy for Kerala state has included a policy for labour bank (Policy No.45) during the year 2011. According to the policy, labour bank is considered as the source support for agricultural labourers at panchayath level.

Group farming have also been suggested to have the potential to empower women by reducing labor and ease inequality in peasant agriculture as tenant and marginal farmers can increase their collective bargaining power, e.g. with landlords, governments and markets (Sugden, 2016)

The labour bank takes up work on farms from the Padasekhara Samitis on contract, and a labour team is allotted to a padasekharam as per the requirement. The wage rates of labourers and charges for machinery are collectively decided through consultations between representatives of the labour bank, farmers representing the padasekharam, and panchayat representatives. (K. N. Harilal and K. K. Eswaran, 2018)

2.2 Need for mechanisation through paddy group farming

According to Sang (2016) traditional paddy cultivation was a labour intensive and back-breaking job. Introduction of appropriate mechanisation technologies is essential to replace many of the highly labour-dependent activities associated with paddy cultivation. Proper mechanisation helps the farmers to get high paddy yields. Farmers could achieve better cropping intensity through the progressive introduction of mechanization and other labour saving technologies.

According to Singh (2002) commercialisation of agriculture is possible only through mechanisation. The technological improvements in Indian agriculture have brought about revolutionary changes in agriculture production. The higher wage rate for

labour and increasing cost of other agricultural inputs has led to the adoption of mechanisation in farm operations. Mechanisation makes all farm operations easy and the farmer can earn better yield from their field.

Prabakar *et al.* (2011) reported that labour scarcity was the cause for decrease in productivity level of almost all crops, it led to change in cropping pattern. The reasons for labour scarcity in agriculture were high wage rate in other locally available jobs, seasonal availability of agricultural jobs, and low status for agricultural jobs. The solution for overcoming the labour scarcity is adoption of labour saving implements and technologies

Scarcity of farm labourers is a grave concern for the farmers, who may not even hesitate to abandon farming. The acute shortage of agricultural labourers in the state has led to the delay in crop establishment, poor crop growth, no or untimely weeding, irrational use of fertilizers, insufficient irrigation to crops etc., which has pressed Indian farmers to shift from farming to non-farm activities. A mechanised collective approach is important so as to tackle the risks associated within and to improve the savings (Baba *et al.,* 2021).

According to Sajeena (2012), adoption of appropriate farm technologies and implementation through group farming in Nedumbassery grama panchayat to expand the area under paddy cultivation since 2002-03 was successful in controlling and reducing the conversion of paddy lands, protecting the existing paddy area and to bring more fallow land under cultivation.

2.3 Benefits of mechanisation in paddy group farming

Farm mechanization has been associated with increasing farm size, decrease in migration of labour out of farming, and the development of agriculture as a specialized commercial activity. (Lingard and Wicks, 1983)

Gertler and Murphy (1987) found that the group farms reduced machinery investment per acre by about one third while concurrently having access to larger and more efficient equipment. Furthermore, cooperative members utilized new technologies and personal safety equipment with greater frequency.

Agricultural mechanization has the potential to produce social opportunities and outcomes for small-scale farmers. It can reduce the risk of low yields and helps in increased cropping intensity and timely planting, weed control and harvesting, and can facilitate storage, resulting in better food security and improved nutrition for the farm family (Sims *et al.*, 1997)

According to Singh (2005), commercialisation of agriculture is possible only through mechanisation. The technological improvements in Indian agriculture have brought about revolutionary changes in agriculture production. The higher wage rate for labour and increasing cost of other agricultural inputs has led to the adoption of mechanisation in farm operations. Mechanisation makes all farm operations easy and the farmer can earn better yield from their field.

According to Verma (2006), in addition to decreasing the production cost, farm mechanisation improved the productive capacity of smallholder farms and consequently their income.

FAO and UNIDO (2008) reported that increasing productivity, increasing the level of cultivated land, strengthening the market for rural economic growth and ultimately improving the livelihoods of farmers are the goals of mechanization.

Das (2012) observed that mechanization was very essential for raising the rice productivity in upland rain fed and low land and to increase the cropping intensity in irrigated farms. Mechanization of small farms played a very important role in increasing the rice production and productivity by completing the field operations at time.

According to Dharsana and Ravichandran (2014), in a study on impact of labour bank was conducted on 30 agricultural labourers of selected block. Results indicate that majority respondents were of middle aged category with secondary school education, with minimum of two trainings attended under the Green army. The results further revealed that empowerment in leadership, social recognition, stabilised income and decision making were observed more.

According to Dharsana and Ravichandran (2014), in a study on impact of labour bank, a significant difference in the average income per month was observed before and after joining in the green army (Rs.4116 and Rs.9666 respectively). Increased employment generation of labourers results in increased man days. The man days before and after joining green army was 96 and 147 days per year respectively.

Alam (2014) reported that the major opportunities of farm mechanization were increased production and productivity and mechanization could help the people to earn more and made their life devoid of drudgery and attain socio-economic prosperity.

According to Amadi and Ekezie (2016), **t**here are lots of benefits that accrued from the use of agricultural mechanization in farming process in that it ensures increased productivity, reduces time spent in the farm, preserve the quality of production, and reduces spoilage and wastage of farm produce and so on.

Through labour banks, a dependable and assured labour force for carrying out farm operations in time and with higher levels of professionalism. Machine costs were also less for these farmers as compared to the market rates. The expansion of the gross cultivated area of paddy in Wadakkanchery block panchayat from nearly 3,000 hectares to about 4,850 hectares in 2006-07 can be attributed to these collective efforts. (N. Harilal and K. K. Eswaran, 2018)

2.4. Profile, social & psychological characteristics of the respondents

2.4.1 Profile characteristics of respondents

2.4.1.1 Age

According to Sridhar (2002), among the paddy farmers in Karnataka, 44.67 percent of the respondents were in their middle years, 28 percent were youngsters, and 27.3 percent belonged to old age group

Raghunandhan (2004) in a study of adoption of integrated nutrient management by the paddy farmers in Kerala noted that, among the 45 percent of the respondents were

middle aged, followed by 36.25 percent of the elderly, and just 18.5 percent of the respondents were young.

Kumaran (2008) found among the paddy farmers in Palakkad district that 59 percent of the respondents were over the age of 65 and 25 percent of the farmers were of age in the range of 45 to 65.

According to Lekshminarayanan and Shankaranarayanan (2011) among the brinjal growers in Karnataka found that roughly 36.70 percent of the farmers were young, followed by the elderly with 33.33 percent and the middle aged with 30 percent.

According to Kavad *et al.* (2015) among the tribal farmers, 65 percent of the respondents were in the middle age group, 18 percent were in the young age group, and just 17 percent were in the old age group.

Sharma *et al.* (2015) found among the paddy farmers that 56.67 percent of the respondents were in their mid-twenties, 26.67 percent were in their forties, and only 16.67 percent were in their twenties.

2.4.1.2 Education

Trivedi (1994) reported that, nearly half of tribal farmers respondents (48.00%) were illiterate, while more than half of tribal respondents (52.00%) were literate, generally with an elementary education.

According to Kosambi (1997), the majority of contact farmers (66.67%) had completed secondary school, whilst 42.67 percent and 40.00 percent of non-contact farmers had completed primary and secondary education, respectively.

Patel (2005) in the study on Impact of Training Programme on Knowledge of Dairy Farm Women in Gujarat reported that, more than two-fifths (44.00%) of the respondents were illiterate, while half (50%) of the respondents had completed primary or secondary school.

Purnima (2005) found that 32.08 percent of respondents had completed primary school, followed by 31.67 percent who were functionally literate and 20.84 percent who had completed middle school.

According to Throat (2005), among the sample of farmers chosen for the study, nearly one-third of the respondents (34.55%) were having secondary education and around two-fifths of the respondents (39.09%) had a college degree. Only 7.27 percent of the respondents had educational levels up to primary education.

According to Sharma *et al.* (2015), only 5 percent of respondents have education beyond high school, with 60 percent of respondents having completed their high school education, followed by 35 percent having completed their primary education.

2.4.1.3 Training received

According to Jaganathan (2004), 57 percent of vegetable farmers had a medium level of training and 10 percent having high level and remaining having a low level of training.

According to Shinde (2016), 44.16 percent of cotton growers received only one training, whereas 31.67 percent, 14.17 percent, and 10.00 percent received two, three, and more than three times of training, respectively.

According to Akhil (2017), in a study on impact of trainings on farm mechanization in paddy, observed that positive impact have been occurred in case of knowledge level, skill level, employment opportunity, income level, asset creation and savings among the trainees.

According to Chaudhary (2013), who led a study on the role of farm women in agriculture operations, the majority (70.83 percent) of farm women received training, while the remainder (29.17 percent) did not.

According to Maya *et al.* (2018), the majority of turmeric farmers (68 %) had only received up to one level of training in improved turmeric cultivation practises. 17 percent of farmers had received no training, while 2 percent had received more than three training sessions.

2.3.1.4 Occupational status

Dalapathi (2010) revealed that, farm labour was the primary occupation of 58.4 percent of the respondents, followed by agriculture and self-employment for 19.3

percent, non-agricultural labour for 15.6 percent, and non-agricultural self-employment for 5 percent.

According to Shilpa (2013), 36.66 percent of respondents relied solely on agriculture for their livelihood, 36.66 percent relied on agriculture and private employment, and just 8.33 percent of respondents relied on agricultural and government work.

Biswas *et al.* (2014) noticed that 58.3 percent of respondents engaged primarily in agriculture, followed by 13.89 percent in their own occupation, 11.1 percent in business and labour, and just 5.56 percent in other occupations.

Barman *et al.* (2016) noticed that 44 percent of the trainees were farmers who also worked as skilled labourers, followed by 33.33 percent who just worked in agriculture, 14.67 percent who worked in agriculture and business activities, and 5.33 percent who worked in agriculture and service.

Kaur (2016) among the working farm women noticed that, 54.1 percent of the respondents were involved in farming, 16.5 percent in business activities, and 8.2 percent in services.

2.4.2 Socio-economic characteristics of the respondents

2.4.2.1 Extension contact

According to Angadi *et al.* (2016), the majority of respondents (73.34%) had a medium degree of extension interaction. They also observed that farmers' awareness of improved paddy growing practises was low. Only 12.50 percent of brinjal farmers were found to have a high degree of extension contact, compared to 14.16 percent of respondents who had low levels of extension contact.

According to Gujar *et al.* (2017) study on the entrepreneurial behaviour of potato farmers, more over half of the respondents (60.83%) fell into the medium group for extension engagement, followed by the low category (21.66%), and the high category (17.50%).

Gujar *et al.* (2017) found that more than half of the respondents (60.83 %) were in the medium category of extension participation, followed by the low category (21.66 %),

and 17.50 percent were in the high category in their study of potato farmers entrepreneurial behaviour.

According to Singh (2020), in the study of knowledge and adoption of post-harvest management practises in mango cultivation, more than half of the brinjal farmers (55.83 %) were in the low category of extension contacts, followed by the medium category (23.34 %), and 20.83 percent were in the high category.

2.4.2.2 Social participation

According to Reddy (2003), the majority of the respondents (60%) had a moderate level of social participation among paddy farmers

According to Milkah (2006), around 44.7 percent of respondents had a medium level of social participation, 41.6 percent had a lower level of social participation, and 13.5 percent had a higher level of social participation.

According to Manoj (2008), 62.5 percent of the respondents in the KVK adopted villages exhibited a medium degree of social participation, while the higher and lower levels of social participation were each 18.25 percent.

Prabhu (2011) examined MGNREGP in his research. In Palakkad, 95 percent of respondents took part in grama sabha meetings, according to the data.

2.4.2.3 Annual income

According to Joshi (2004), 44.54 percent of respondents had a high yearly income (above Rs. 60,000/-). However, low income (under Rs. 30,000/-) and medium income (between Rs. 30, 000 and 60,000/-) comprises of, 31.82 percent and 23.64 percent respectively.

In a study by Kumaran (1997), it was found that 66 percent of respondents had annual incomes of less than Rs. 30,000, of which 32 percent had a household income of less than Rs. 20,000.

Prabhu (2011) found that 54.45 percent of respondents obtained a wage between Rs.30001 and Rs.45000 per year, while 41.11 percent got a wage between Rs. 15001 and Rs.30000 per year.

According to Kaur and Aulakh (2015), 67.3 percent of trainees had an annual salary of one lakh, and the remainder trainees earned between one and two lakhs.

According to Barman *et al.* (2016), 44 percent of respondents had a low income (up to Rs 20000/annum), 30.67 percent had a very high income (above Rs 50000/annum), 14.67 percent had a higher income status (Rs 30001 to Rs 50000), and only 10.66 percent had a medium income (Rs 20001 to Rs 30000).

2.4.2.4 Area under paddy cultivation

According to Reddy (2005), 64 percent of farmers had semi-medium sized paddy cultivation land, 22 percent of farmers had medium sized paddy area, 10.67 percent of farmers had small sized paddy area, and 3.33 percent of farmers had large sized land holdings.

Lekshminarayanan and Shankaranarayan (2011), among the farmers in Tamilnadu revealed that 36.7 percent of respondents had big area under cultivation, followed by medium land holders with 33.33 percent, and small land holders with 30 percent.

Ram (2015) found that over half (40.66%) of rice farmers had medium-sized rice-growing landholdings, while 34.67 percent of farmers had small-sized holdings and 16.67 percent had marginal holdings. Only 8 percent of the respondents were classified as having considerable landholdings.

According to Barman *et al.* (2016), 49.33 percent of the trainees were small farmers with 1 to 2 ha, followed by semi-medium farmers with 2-4 ha, 18.67 percent of the trainees were marginal farmers with less than 1 ha, and just 4 percent of the farmers were medium level (4-10ha).

Kumar (2016) observed that 63.33 percent of respondents had cultivation on 1 to 2 hectares, while 35.83 percent had less than 1 hectare.

2.4.2.5 Extent of mechanisation

Group farms reduced machinery investment per acre by about one third while concurrently having access to larger and more efficient equipment. Furthermore,

cooperative members utilized new technologies and personal safety equipment with greater frequency, had more crop diversification (Gertler and Murphy, 1987).

According to Sang (2016) introduction of appropriate mechanisation technologies is essential to replace many of the highly labour dependent activities associated with paddy cultivation. Rice cultivation involves mechanisation beginning with land preparation till harvesting.

According to Harilal and Eshwar (2018) given the shortage of labour, especially for labour intensive operations, such as transplanting and harvesting, the labour bank embarked on the path of mechanisation.

2.4.3 Psychological characteristics of the respondents

2.4.3.1 Economic motivation

According to Gamit (1993) among the groundnut farmers found that the majority of respondents (70.83%) reported medium to low economic motivation.

According to Purnima (2005), 42.08 percent of respondents reported a high level of economic motivation, whereas 35.00 percent had a medium level of motivation among the extension personnels.

Patel (2005) reported that, more than three-fifths of the respondents (64.00%) had medium economic motivation, followed by 22.00 percent and 14.00 percent with low and high economic motivation, respectively among the tribal farmers in orissa

According to Nagesha (2005), three-fourths (80.84%) of the respondents shown a medium degree of economic motivation, with 11.66 percent demonstrating a lower level and only 7.50 percent demonstrating a higher level.

2.4.3.2 Achievement motivation

Birajdar (2002) pointed that 47.50 percent of respondents had a high degree of success motivation, followed by 42.50 percent who had a low level of achievement motivation, and just 10 percent who had a medium level of achievement motivation.

Nagesha (2005) reported that three fourth of the respondents (80.84%) had a medium degree of achievement motivation, followed by 11.66 percent who had a lower level

of achievement motivation and just 7.50 percent who had a higher level of success motivation.

Ravi (2007) reported that, 30.00 percent of the respondents had a very high degree of achievement motivation, 32.50 percent had a low level of achievement motivation, and only 37.50 percent had a medium level of success motivation.

Kumar *et al.* (2012) revealed that, 50.83 percent of respondents had a medium degree of success *motivation*, followed by 40 percent who had a higher level of achievement motivation, and 9.17 percent who had a low level of achievement motivation.

Chandran (2015) pointed that, respondents had a medium degree of achievement motivation (72%), followed by a high level of achievement motivation (28%).

2.4.3.3 Innovativeness

According to Mukherjee (2003) in a study regarding PLA assessed that, the creative intervention had a greater impact in increasing production.

According to Nagesha (2005), three-fourths (80.84%) of the respondents shown a medium degree of innovativeness, with 11.66 percent demonstrating a lower level and only 7.50 percent demonstrating a higher level.

According to Chinchu (2011), 58 percent of the state horticultural mission Kerala's beneficiary farmers were excellent inventors and early adopters of innovative agricultural practises.

Rubeena (2015) pointed that 56.67 percent of respondents had a medium degree of innovativeness, followed by 23.33 percent who had a low level of innovativeness, and 20 percent who had a high level of innovativeness among the members of ATMA

Kumar (2015) among the onion farmers found that 60 percent of respondents had a medium level of innovativeness, followed by 20 percent each of high and low levels of innovativeness.

2.4.3.4 Scientific orientation

According to Parashar (2004) in a study on adoption of rose cultivation around 78 percent of the respondents had a medium scientific orientation, followed by a low scientific orientation (20 %).

According to Kher *et al*. (2005), 42.31 percent of the respondents had a medium level of scientific orientation, followed by 30.77 percent who had a higher level of scientific orientation, and 26.9 percent who had a lower degree of scientific orientation among the paddy farmers

Chouhan *et al.* (2013) among the sugarcane growers found that 67.50 percent of the respondents had a medium level of scientific orientation, followed by 17.50 percent who had a higher level of scientific orientation, and 15 percent who had a lower degree of scientific orientation.

Kumar (2015) in a study on impact assessment of the farmers trainings found that 62 percent of respondents had a medium level of scientific orientation, with 21 percent having a low level and 17 percent having a high level of scientific orientation who enrolled on farmers field school

2.4.3.5 Risk orientation

Throat (2005) in a study regarding an analysis of poultry entrepreneurs knowledge about management practices revealed that, medium risk takers accounted for 66.67 percent of the respondents, high risk takers accounted for about 22.73 percent and low risk takers accounted for 10 percent.

Rabari (2006) found that 66.7 percent of tomato farmers had a medium risk orientation, followed by 20 percent who had a low risk orientation, and 13.33 percent who had a medium risk orientation among the tomato growers in Anand district, Gujarat.

Venkataswarao *et al.* (2012) discovered that 47 percent of respondents had a higher risk orientation and 60 percent had a medium risk orientation.

According to Rubeena (2015), 63.3 percent of the selected respondents had a medium level of risk orientation, whereas 20 percent had a higher risk orientation and only 16.67 percent had a lower risk orientation in a comparative study of ATMA members in Trivandrum and Kottayam districts.

Barman *et al.* (2016) found that 49.33 percent of respondents had a higher risk-taking ability, 40 percent had a lower risk-taking ability, and only 10.67 percent had a medium level of risk-taking ability in a study regarding impact of training programmes.

2.4.3.6 Attitude towards collectivism

Verma and Singh in a study on farmers in Punjab (2000) reported that, 40.00 percent of respondents had a moderately favourable opinion toward attitude towards collectivism.

Mandavi (2002) pointed that, the majority of respondents (66.02%) had a medium attitude toward collectivism, followed by a high (17.48%) and a low (16.50%) degree of attitude among a study on communication behaviour of village extension workers working under T&V system in Anand district of Gujarat state

Purnima (2005) found that exactly half of the respondents (50.00%) had a favourable opinion toward collectivism, with 36.25 percent having a more favourable attitude and 13.75 percent having a less favourable attitude among the women SHG's in north coastal zone of Andhra Pradesh

2.5 Group dynamics effectiveness indicators

According to Kumaran (2008) higher the degree of group cohesiveness, greater is the group performance, satisfaction and participation. Cohesiveness causes more harmonious behaviour in group member.

Vipinkumar (1999) in the study on group dynamics of self help group farmers found that group atmosphere was the most important sub dimension of effective group dynamics.

Bhatt (2009), in his study on group dynamics of women SHGs identified the nine dimensions of group dynamics viz; team work, group cohesiveness, participation, group leadership, group atmosphere, interpersonal trust, task functions and achievement of SHGs, which determine the achievement of common goal of the group.

Akhil (2017), in the study on impact of trainings on rice mechanization in Kerala reported that more than one-third of the trainees (38%) became members in Self Help Groups (SHG's) to promote mechanization through group farming, just above one-fourth of the trainees (27%) adopted mechanisation on their own farm and just above one-tenth of the trainees (12%) purchased farm machinery on their own for livelihood.

Dewangan (2019) in the study on group dynamics of women groups towards entrepreneurial development in agriculture found a very high, positive and significant contribution of group dynamics effectiveness towards entrepreneurial attributes of rural women entrepreneurs. The result of the study advocated that enhancing group dynamics among rural women groups would lead to increase in entrepreneurial abilities of women.

2.6 Impact of mechanisation in paddy group farming

Group farms reduced machinery investment per acre by about one-third while concurrently having access to larger and more efficient equipment. Furthermore, cooperative members utilized new technologies and personal safety equipment with greater frequency, had more crop diversification, and an average of 50 percent more livestock per unit of land area (Gertler and Murphy, 1987).

According to Haque (2018), the introduction of mechanised cultivation has increased the standard of living of rural labourers in Karnataka. Distribution of household expenditure revealed that labourers spent more money on cloth, education, food, and health care as compared to the pre-mechanization period indicate that the standard of living of labourers increased to some extent.

According Miah & Islam (2002) among the farmers in Karnataka, the numbers of working days for farm activities have been moderately increased in the study area. It shows that there is about 20 percent average increase in annual working days of rural labourers and their family members respectively due to mechanization.

Effective utilization of farm machineries was possible only through group farming in Kerala situations and this helped in carrying out various operations without any time lag. The problem of labour scarcity is completely avoided through group farming where in machineries were used for various operations making it less expensive for individuals. (Saravan, 2013)

According to Hegazy *et al.* (2013) agricultural mechanisation has created value in agricultural production practices through more efficient use of labour, timeliness of operations, and more efficient input management.

According to Zhang *et al.* (2014) in his study in Odisha has demonstrated a positive association between mini-tiller adoption and labor wages. The adoption of mini-tillers has attenuated labour shortages for crop establishment.

2.7 Challenges in adopting mechanisation in paddy group farming

James and Mohammed (1988) identified the following constraints to paddy group farm mechanization in Kerala: a) small size of holdings, b) fragmented holdings, c) economic backwardness of farmers, d) lack of sufficient credit facilities, e) lack of promotional subsidies, f) unemployment problem, g) inadequacy of research and fields trials, h) lack of location-specific and production oriented research on the farm machinery using electric power, i) lack of appropriate equipment to suit the regional requirements of the state, j) scanty infrastructural facilities for extension activities in the field of farm machinery, k) lack of facilities to train farmers in the use of improved farm equipment and absence of village artisans to supply hand-tools and animal drawn implements.

Increased wage rates and other input costs, scarcity of farm labourers to operate machines on time, and lack of fair prices for paddy etc., has created inertia among the

paddy cultivators and they have either shifted the paddy farms for cultivation of other crops requiring less labour or leave the land uncultivated (Sukumaran *et.al.,* 2010).

According to Harilal and Eshwar (2018), low level of mechanisation in Kerala's agriculture can be attributed to a number of factors, of which the stunted development of capitalism in agriculture is an important one. Most cultivators in the State cultivate small or tiny holdings, and have not been able to invest in costly machinery.

Pandey (2021) reported that the major challenges of collective farm mechanization were fragmented small land holdings limited use of farm machinery and use of traditional hand tools which caused problem of low output capacity, human drudgery and low yields. There was no mechanization strategy by the State for sustainable agricultural development.

Maharjan *et.al*. (2013) stated that Labor out-migration in Nepal has resulted in rising workforce wages due to labour shortages. Farmers are unable to manage agricultural machinery operations in a timely manner due to manpower shortages and rising wages and the effects are more serious for labor-intensive crops such as rice.

Parashunath *et al*. (2016) analysed the constraints of farmers in utilizing custom hiring service of tractor based farm machineries in Karnataka using Garett ranking technique. The results revealed that Lack of timely availability of tractor services (I), High cost of custom hiring services during peak season (II), Inadequate availability of tractor services (III), Quality of service is lacking in CHS (IV), Overlapping of fam operations (V), Lack of awareness about availability of CHS in public sector (VI), Discriminant charges (VII) and Procedure of getting tractor service is tedious (VIII) were the major constraints.

Research methodology

Chapter 3

RESEARCH METHODOLOGY

A specific and planned approach to solving research problems is known as research methodology. The objectives of the research study should be assessed systematically utilising a well-structured and organised research methodology. In order to find meaningful solutions to field-level problems, the researcher must not only know and understand research methods, but also use the appropriate tools. The methodology for the current study was presented in this chapter under the following subheads:

3.1 Research design

3.2 Description of the study area

3.3 Sampling procedure used

3.4 Variables and their empirical measurement

3.5 Statistical tools employed for analysis of the data

3.1 Research design

The present study used an *ex-post facto* research design. *Ex-post facto* research is a systematic empirical study in which the researcher has no direct control over independent variables because they have already manifested themselves in the study.

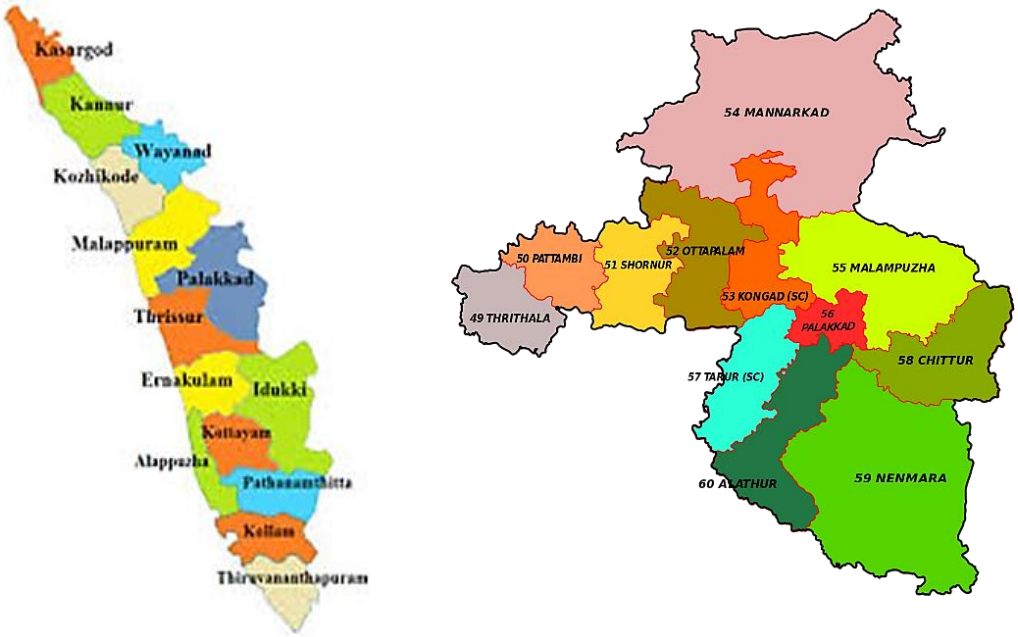
3.2 Description of the study area

Palakkad district was purposefully chosen for the research study because it has the highest area under paddy cultivation in Kerala. Paddy cultivation in the district accounted for 48903.31 ha of total food crop area in 2020-21 which is 94 percent of the overall food grain production area in Palakkad district and contributed 37.23 percent of the overall paddy production in Kerala.

3.2.1. Profile of the Palakkad district

The district has vast stretches of lush green paddy fields, with tributaries of Bharathapuzha river criss-crossing it. It is surrounded by Tamil Nadu state in the east and north, Thrissur district in the south west and Malappuram district in the northwest. It is also the largest producer of Paddy in the state, popularly called 'Nellara' or the grain warehouse of Kerala. Furthermore, its economy is based mostly on agricultural activities, with both cash and food crops being grown.

Figure 3.1 Map showing the study area of Palakkad district



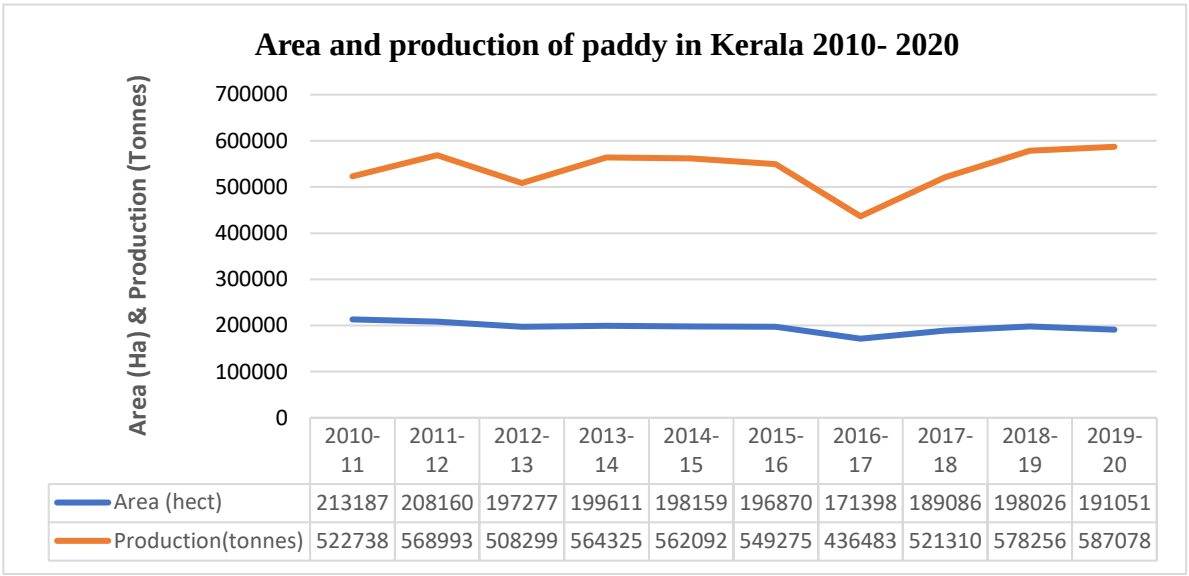
3.2.2 Location of the Palakkad district

Palakkad district has a total geographical area of 4,480 square kilometres, accounting for 11.55 percent of the state's total geographical area. It was in the state's central region, covering the plains of the midland and the mountains of the highlands. Kerala has been divided into eight agro-ecological zones named and twenty-three agro-ecological units based on altitude, rainfall, soil, and topography. The Palakkad district comes under the Palakkad plain as the agro-ecological zone. Two blocks namely Chittur and Alathur were selected for the study. Among these two blocks Alathur comes under the northern foothill zone and Chittur coming under the Palakkad Eastern plains of the agro-ecological unit.

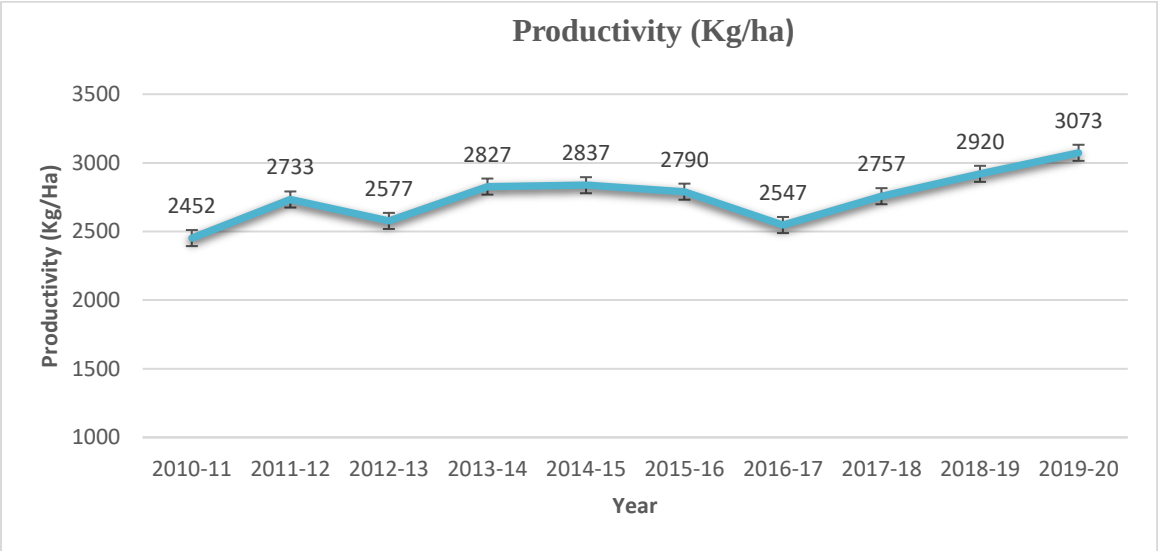
3.2.3 Changing trend in paddy cultivation in Kerala from 2010-11 to 2019-20

The actual data on productivity of paddy at district level from 2010-11 to 2020-21 are given in Fig.3.1. From the figure 3.2, it is clear that there is improvement in the productivity of paddy in Kerala. When considering the area under paddy from 2010-11 to 2019-20, shows a normally decreasing trend, even though there is a minor fluctuation during 2014-15. Lack of labourers and increase in cost of cultivation and wages of labours stands against the progress of paddy cultivation.

Fig.3.2 Trend in area, production and productivity of paddy 2010-20



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Area (hect)	213187	208160	197277	199611	198159	196870	171398	189086	198026	191051
Production(tonnes)	522738	568993	508299	564325	562092	549275	436483	521310	578256	587078



Between 2010–11 and 2020–21, the area under rice cultivation in Kerala decreased by 22136 hectares and the production of rice in the State increased by 64240 tonnes. The average productivity of rice cultivation in Kerala rose from 2,452 kg/hectare in 2010-11 to 3,073 kg/hectare in 2020–21. Eventhough there is steady decline in paddy cultivation in Kerala through the 2010s and 2020s, there is increasing trend of productivity in Kerala. Productivity in rice cultivation is relatively higher in the study area, i.e Alathur and Chittur block of Palakkad district. The yield levels of 3,000 kg/hectare are quite common in this region, which is higher than the State-wide average (2,557 kg/hectare).

3.2.4 Land utilization pattern

Land utilization pattern followed in Palakkad district (2019-20) was depicted in Table 3.1.

Table 3.1: Land utilization pattern followed in Palakkad district 2019-20

Land usage pattern	Area (ha)	Total percentage (%)
Total geographic region	447584	100
Forest area	136257	30.4
Land laid to non-agricultural uses	47068	10.5
Current fallow land	10733	2.3
Fallow other than current fallow	13255	2.9
Cultivable wasteland	20911	4.6
Net area sown	201783	45
Area is sown more than once	74571	16.6
Gross cropped area	276353	61.7
Barren and uncultivable land	1286	0.28
Land under still water	15292	3.4

Source: Directorate of Economics & Statistics, GOK (2019-20)

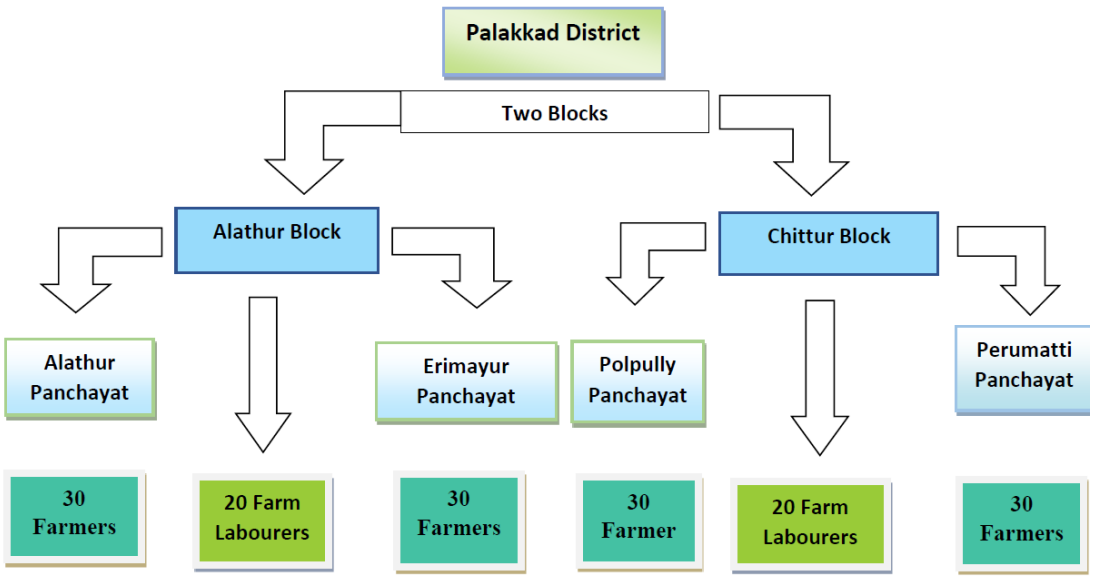
3.3. Sampling procedure

Sampling can be defined as the process of taking a subset of subjects that is representative of the entire population. For the selection of samples in the study, Respondents were selected by multistage sampling method

3.3.1. Selection of the respondents

Palakkad district was purposively selected for the study as it has maximum area under rice cultivation in Kerala and also owing to the presence of different types of successful group farm mechanisation interventions in paddy. Two blocks representing maximum area of paddy cultivation and where different rice mechanization programs implemented were selected from the district. 120 farmers and 40 farm labourers were selected randomly from the *Padasekhara Samithies* / labour groups where mechanization was practiced, to constitute a total sample size of 160 respondents.

Fig.3.3 Flow chart of sampling method employed in the research study



3.3.2 Method of data collection

Both primary and secondary data were collected for the study. Primary data on various socio-economic and psychological aspects, group dynamic factors and impact of mechanisation through group farming was collected from 120 paddy farmers and 40 farm labourers. In accordance with the study's objectives, a detailed interview schedule was developed. Using a pre-planned interview schedule, a pilot study was conducted among paddy farmers and farm labourers in the Palakkad district. The interview schedule was modified based on the responses of selected respondents. Appendix VI contains the interview schedule used in the study. Secondary data were

collected from literatures, published reports, KVK records etc. and Directorate of Economics and Statistics, Government of Kerala and so on.

3.4. Variables and their empirical measurements

The parameters for this study were determined by reviewing the available literature, similar research, and consulting with experts in the domain. The selected variables were presented to a panel of 20 judges, who were asked to rate their relevance on a five-point scale from most to least relevant. Each item's relevancy index was derived using the responses of 20 judges.

Table 3.2. Variables selected for the study

A	**Dependent variable**
1	Perception on socio-economic impact of mechanisation in paddy group farming
2	Group dynamics index
B	**Independent variables**
1	Age of the respondents
2	Gender
3	Education
4	Area under paddy cultivation
5	Annual income
6	Extent of mechanization
7	Training received
8	Social participation
9	Extension contact
10	Economic motivation
11	Achievement motivation
12	Self confidence
13	Innovativeness
14	Scientific orientation
15	Risk orientation
16	Attitude towards collectivism
17	Occupational status

3.4.1 Dependent Variable

3.4.1.1 Perception of farmers on Socio-economic impact of mechanisation in paddy group farming

For assessing the perception on socio-economic impact of farm mechanization through paddy group farming among the farmers and labourers, nine impact factors for farmers and seven impact factors for labourers were identified. Perceived impacts were measured with statements scored on a five-point continuum. Scores were given by the respondents for the statements under each impact factor based on their perception and experience on mechanization through group farming. Finally an overall impact index was computed for each respondent to analyse the perceived impact of farm mechanization.

3.4.1.1.1 Impact on yield

Significant yield difference in the crop after implementing mechanization is analysed as per this variable. Perceived percentage change in paddy yield after mechanisation is reviewed from the respondents. Scale developed by Adam (1996) with suitable modifications was used for the study.

Table 3.3 Perceived percentage change in yield

Perceived percentage change	Score
<12%	1
12 – 22%	2
>22%	3
Range: (8, 27) Mean: 16.54	

3.4.1.1.2 Impact on time spend on farming activities

Through farm mechanisation, there would be a significant impact in the operational time of carrying out a particular farm activity. Whether the farmers could save time in doing operations due to the adoption of mechanisation was enquired. The impact on time spend is analysed using five statements, here each statement has to be scored in five point continuum.

3.4.1.1.3 Impact on access to assets

Access to assets means whether the farmers were able to get the machines at ease at their requirement. The impact on access to assets was analysed using four statements where each statement has to be scored in five point continuum.

3.4.1.1.4 Impact on income

Mechanisation might have helped in cost cutting of operations, which were manually done before mechanisation. Increase in income could be due to increase in yield, saving of cost on farming, or access to profitable assets for the operations etc. Scale adopted by Islam (2002) with suitable modifications was used.

Table 3.4 Perceived percentage change in income

Perceived percentage change	Score
<10%	1
10 – 20%	2
>20%	3
Range: (5, 25) Mean : 14.38	

3.4.1.1.5 Impact on knowledge gained on benefits of paddy mechanisation

By the introduction of new interventions, farm mechanisaton has paved ways to innovate the farmers and help them adopt in their field itself. Knowledge on how efficiently and timely cultural operations could be carried out using new interventions is conceived by the farmers. For scoring the given impact, four statements were given. Scores are given based on the five point continuum.

3.4.1.1.6 Impact on livelihood

An individual's livelihood involves the capacity to acquire necessities in order to satisfy the basic needs of themselves and their household. The impact on general economy and wellbeing of the family is reviewed by this variable.. For scoring the given impact, five statements were given. Scores are given based on the five point continuum.

3.4.1.1.7 Impact on post harvest operations

Losses could be reduced by the better handling of harvest by the use of machines. Quality and better priced grains cold be gained by the intervention of machines in the post harvest operations. For scoring the given impact, five statements were given. Scores are given based on the five point continuum.

3.4.1.1.8 Impact on savings in cost of cultivation

Cost effective operations could be carried out by the adoption of mechanisation. Since mechanisation is done on a collective manner under a particular *Padashekara samithi,* cost of carrying out operations can be reduced considerably. For scoring the given impact, five statements were given. Scores are given based on the five point continuum.

3.4.1.1.9 Impact on land cultivated

Mechanisation could have paved way to extend the area under paddy cultivation to additional land. Hence, increase in the area of paddy cultivation after mechanization was enquired. Scale adopted by Singh (2012) with suitable modifications was used.

Table 3.5 Perceived percentage change in area

Perceived percentage change	Score
<10%	1
10 – 20%	2
>20%	3
Range: (4, 25) Mean : 12.46	

3.4.1.2 Perception of Labourers on the socio-economic impact of mechanisation in paddy group farming

3.4.1.2.1 Impact on employment

Through mechanisation labourers could gain more number of working days and the wages could also be increased. Labourers could manage themselves their time to undertake non-farm activities in the off season. For scoring the given impact, an

arbitrary scale was developed using four statements. Scores are given based on the five point continuum.

3.4.1.2.2 Drudgery reduction

The drudgery involved in farm operations could be reduced by ergonomically improved farm technologies. For scoring the given impact, an arbitrary scale was developed using five statements. Scores are given based on the five point continuum.

3.4.1.2.3 Impact on income

Household income includes the income from doing the farm and non-farm activities. Introduction of mechanisation has paved way to facilitate new income generating activities. For scoring the given impact, arbitrary scale was developed using five statements. Scores are given based on the five point continuum.

3.4.1.2.4 Impact on skills gained

As a part of mechanisation, skills such as machine operational skills, and machine repair and maintenance skills were gained by the labourers. Scale developed by Miah (2002) with suitable modifications was used to score the component.

Table 3.6 Skills gained by the labourers

Sl. No	Skills gained	Score
1	Operational skills	1
2	Operational + Machine repair & maintenance skills	2

3.4.1.2.5 Impact on Livelihood

An individual's livelihood involves the capacity to acquire necessities in order to satisfy the basic needs of themselves and their household. The impact on general economy and wellbeing of the family is reviewed by this variable. For scoring the given impact, four statements were given. Scores are given based on the five point continuum.

3.4.1.2.6 Impact on entrepreneurial initiatives

Mechanisation could pave way for new entrepreneurial initiatives and income generating interventions like custom hiring centres etc. For scoring the given impact, three statements were given. Scores are given based on the five point continuum.

3.4.1.2.7 Impact on asset creation

By initiating mechanisation as profitable business enterprise, assets could be acquired in due course of time by the labourers. For scoring the given impact, four statements were given. Scores are given based on the five point continuum.

3.4.3 Computation of Socio-economic Impact Perception Index

An overall socio-economic impact perception index has been obtained for each individual by assigning suitable weights and relevant equation.

Steps for computing index using Principal Component Analysis (PCA)

- Collection of data on relevant variables
- Normalization of variables
- Assignment of weights using PCA

Normalization of variables

$$\frac{\text{Actual value} - \text{Min value}}{\text{Max value} - \text{Min value}}$$

Weightage of impact factors

Based on the analysis of data using PCA (Principal component analysis) weightage has been computed for all the impact factors as the sum product of eigen value with its respective factor loadings.

$$\textbf{Socio-economic impact perception index} = \frac{\Sigma XiWi}{\Sigma Wi} \times 100$$

$\Sigma XiWi$ = sum of normalized scores multiplied by weightage of the components

$$Wi = \Sigma \left| Lij \right| Ej$$

where,

Wi is the weight of ith indicator

Ej is the eigen value of the jth factor

Lij is the loading value of the ith unit of grouping on jth factor

i = 1,2,3,…..n indicators

j = 1,2,…. Factors or principal components (PCs)

The Socio-economic impact perception Index was calculated for all respondents using the given formula. The respondents were classified into three categories based on the Socio-economic impact perception Index, namely low, medium, and high, using mean and standard deviation.

3.4.4 Group dynamics index

In the present study, Group dynamics of members of paddy farming groups was quantified using an index called Group dynamics index (GDI) developed by Bhatt (2009). A set of nine indicators relevant to measuring GDI was adopted from the scale developed by Bhatt (2009).

Group dynamics index in paddy farming groups was operationalized as the sum total of dynamics among group members, depending on established indicators. The index was calculated by dividing the GDI score by the sum of all weightage scores. All factors were measured using structured interview schedules and standard scales.

3.4.5 Operationalization and measurement of the indicators

3.4.5.1 Participation

Participation was operationally defined as the level of involvement of group members in group meetings, discussions, and activities. To measure this, five statements (three positive and two negative) were arranged on a five-point continuum of very low, low, medium, high, and very high, with positive statements scoring 1,2,3,4, and 5, and negative statements scoring 5,4,3,2 and 1. The scores received on each item were added to each member's participation score. Scores could vary from 5 to 25. With the use of the mean and standard deviation, the respondents were divided into three categories: low, medium, and high.

3.4.5.2 Team work

Teamwork was defined as the amount to which group members maintain unity, work together to achieve their goals, and are willing to give credit to combined teams. This indicator was measured using five statements (two positive and three negative) placed on a five-point scale of very low, low, medium, high, and very high. Statements were rated in 5-point continuum as done in the case of previous variable. Based on the

obtained scores the sample was categorised into three groups with the help of mean and standard deviation.

3.4.5.3 Decision making process

This indicator was operationally defined as the degree to which a member makes a decision with the participation of the other members of the group, makes decisions without the topic drifting, supports others' decisions in consensus, attempts to get other members to participate in decision making, and feels recognised for her contribution to the decision making process. 5 statements (4 positive and 1 negative) were put in a 5 point continuum as done in the case of previous variable. Based on the total obtained scores, the sample was categorised into three groups with the help of mean and standard deviation.

3.4.5.4 Group atmosphere

For the purposes of this study, group atmosphere can be operationalized as the degree to which a group member perceives a warm and welcoming environment in the group, where individuals are free to express their own opinions without bringing about conflict among themselves. The statements were assessed based on a five-point scale and the sum of the score was obtained. Based on the total score, the respondents were divided into three categories: low, medium, and high using mean and standard deviation.

3.4.5.5 Group cohesiveness

This indicator is operationally defined as the number of units in a group in terms of interpersonal attraction, members' ability to get along with psychological or social interactions, feelings of loyalty, pride, cooperation, and identification with the group. Statements were rated in 5-point continuum as done in the case of previous variable. With the use of the mean and standard deviation, the respondents were divided into three categories: low, medium, and high.

3.4.5.6 Group leadership

Group leadership was defined as the nature and style of the group leader's or his influence group members for effective group functioning. The nature of influence

was assessed using five statements (three positive and two negative) placed on a five-point scale. The score on each item was added to get the total score on nature of influence of a respondent. With the use of the mean and standard deviation, the respondents were divided into three categories: low, medium, and high.

3.4.5.7 Interpersonal trust

Interpersonal trust is the major determinant of degree of solidarity and positive feelings held by the member towards the group. In this study, it was operationally defined as the degree to which the member trusts other group members and perceives them to have faith in her. It is assessed using five statements (three positive and two negative) placed on a five-point scale and the score on each item was added to get the total score on nature of influence of a respondent. With the use of the mean and standard deviation, the respondents were divided into three categories: low, medium, and high.

3.4.5.8 Task function

The degree to which a group member was involved in roles related to the achievement of the group's purpose, such as initiating action, seeking information, seeking opinion, giving information, giving opinion, elaborating, summarising, and testing feasibility, was operationalised as task function. The statements were assessed based on a five-point scale and the sum of the score was obtained. Based on the total score, the respondents were divided into three categories: low, medium, and high using mean and standard deviation.

4.7.2.7 Achievements of the group

This variable was operationalised in the current study as the level of performance of the group as perceived by the member, as well as the performance of the respondent himself as a group member. The statements were assessed based on a five-point scale and the sum of the score was obtained. Based on the total score, the respondents were divided into three categories: low, medium, and high based on mean and standard

Calculation of Group dynamics index

Based on the analysis of data using PCA (Principal component analysis) weightage has been computed for all the indicators as the sum product of eigen value with factor loadings.

Table 3.7 Distribution of group dynamics indicator with respective weights using PCA

Indicator	Weightage for farmers	Weightage for labourers
Participation	2.34	5.68
Team work	2.13	3.12
Group atmosphere	1.69	2.79
Decision making process	4.25	2.24
Group cohesiveness	2.51	2.45
Group leadership	3.41	3.23
Interpersonal trust	1.76	1.89
Task function	2.27	1.75
Achievement of the group	2.10	2.21

$$\text{Group dynamics score} = \frac{R_1 \times W_1}{M_1} + \frac{R_2 \times W_2}{M_2} \ldots + \frac{R_n \times W_n}{M_n}$$

R1, R2….. Rn = Score obtained from respondents for each indicator

M1, M2……Mn = Maximum score that can be get for each indicator

W1, W2…..Wn = Weightage score of each indicator received

$$\text{Group dynamics index} = \frac{\text{Group dynamics score} \times 100}{\Sigma W_i}$$

The Group dynamics index was calculated for all responders using the given formula. They were classified into three categories based on the Group Dynamics Index, namely low, medium, and high, using mean and standard deviation.

3. 4. 2 Independent variables

3.4.2.1 Age

It was defined as the age group of farmers and labourers at the period of the research in years. The respondents were divided into three categories.

Table.3.8 Age category of the respondents

S. No	Age group	Age (years)
1	Young age	< 35
2	Middle age	36-55
3	Old age	> 55

3.4.2.2 Area under paddy cultivation

The entire paddy cultivation area by the respondents was observed. The scale developed by Argade (2010) was modified and used in the investigation. The data was analyzed using frequency and percentage analysis.

Table 3.9 Area under paddy cultivation

S. No	Area (acres)	Score
1	<50 cents	1
2	50-100 cents	2
3	1-2.5 acres	3
4	2.5-5 acres	4
5	>5 acres	5

3.4.2.3 Education

The term education referred to the respondents' level of formal education. The variable was measured using the method proposed by Trivedi (1994), with some

modifications. Respondents were asked to categorize their educational level into one of four categories.

Table 3.10. Education status of paddy farmers

S. No	Educational status	Score
1	Primary schooling	1
2	Secondary education	2
3	Higher secondary education	3
4	Graduate and above	4

3.4.2.4 Annual income

Annual income was operationalized as the total income obtained by an individual in a year from both agriculture and non-agricultural activities. The data was analyzed by using the scale developed by Saravan (2012).

Table 3.11. Farmers annual income

Sl. No	Categories	Score
1	< 3.5 lakhs	1
2	3.5 – 7.5 lakhs	2
3	> 7.5 lakhs	3

Table 3.12. Labourers annual income

Sl. No	Categories	Score
1	< 1.5 lakhs	1
2	1.5 – 2 lakhs	2
3	>2 lakhs	3

3.4.2.5 Extent of mechanisation

The extent to which the machineries are employed to carry out various cultural operation is obtained. Eight practices were recorded for which mechanisation is widely used in case of rice cultivation. Tractor/tiller, conoweeder, sprayer, transplanter, thresher, combined harvester, winnower and bailer are widely used. Each

machinery adopted was given a score 1 based on which each individual will represent their extent of mechanisation in their paddy area in a scale with total score of eight.

3.4.2.6 Training received

It was described as a time-limited intensive learning method for a group of paddy farmers and labourers. To measure the training obtained by rice farmers / labourers, the approach used by Shivacharan (2014) was used with slight modifications

Table 3.13. Training received

S. No	Category	Score
1	Training not received	0
2	Training received	1

3.4.2.7 Occupational status

Occupation is the sum total of all the activities in which a person engages on a regular basis and earns money. It was measured using scale developed by Priya (2011) with slight modifications

Table 3.14 Occupational status of farmers & labourers

S. No	Category of farmers	Score
1	Farming	1
2	Farming + Non farm activities	2

S. No	Category of labourers	Score
1	Farm labourer	1
2	Farm labourer + Cultivator	2
3	Farm labourer + Non farm activities	3

3.4.2.8 Social participation

The degree to which rice farmers and labourers were involved in various social groups and activities was referred to as social participation. Farmers were classified as

either non-members or members, and their level of participation was classified as either regularly, occasionally, or not at all. The scoring system for this variable was as follows.

Table 3.15. Social participation

S. No	Social participation	Score
1	Never	0
2	Occasionally	1
3	Regular	2

3.4.2.9 Extension contact

Extension contact refers to a farmer's relationship with various extension agencies, as well as his involvement in various extension activities or programmes coordinated by these agencies, such as meetings, seminars, field days, exhibitions and so on

Table 3.16 Extension agency contact

S. No	Frequency of contact	Score
1	Never	0
2	Occasionally	1
3	Regular	2

3.4.2.10 Achievement motivation

The respondents' desire for achievement or the fulfilment of greatness was operationalized as achievement motivation. People fulfil their needs in diverse ways and are on their way to success for varied reasons. The scale created by Geetha (2002), with minor modifications, was used to assess achievement motivation. The items in the scale were scored on a 5-point scale ranging from strongly agree, agree, undecided, disagree, strongly disagree, with weightages of 5,4,3,2, and 1 for positive statements and 1.2,3.4, and 5 for negative statements.

3.4.2.11 Self confidence

Self-confidence is defined as a feeling of trust in one's own abilities, traits, and judgement. Mannambeth's (2000) scale, with minor adjustments, was used to assess self-confidence. Statements were scored on a 5-point continuum of strongly agree, agree, undecided, disagree, strongly disagree, with weightages of 5,4,3,2 and 1 for positive statements and 1,2,3,4 and 5 for negative statements, as in the previous variable.

3.4.2.12 Innovativeness

Innovativeness is characterized as a person's behavioural pattern that demonstrates an interest and desire to adopt new farming techniques, as well as an interest in incorporating such advancements into his farm operations. The Peter (2014) scale, with minor modifications, was utilised in the study. The statements were assessed on a five-point scale.

3.4.2.13 Scientific orientation

It is characterized as an individual's proclivity to apply scientific procedures and decision-making processes. Prabhu's (2011) scale, with minor adjustments, was used to assess scientific inclination. Statements were rated in 5-point continuum.

3.4.2.14 Risk orientation

Risk is defined as a respondent’s orientation toward risk and uncertainty, as well as the courage he or she acquires to face issues in the implementation of mechanisation. Risk orientation scale of Kumar (2007) was used to assess the risk orientation of labourers.

3.4.2.15 Attitude towards collectivism

This variable was operationalized as the group member's degree of positive or negative feelings about the process of organising and collectively enhancing their performance as well as of the group. Statements were rated in 5-point continuum. Based on the obtained scores the sample was categorised into three groups with the help of mean and standard deviation.

3.4.3 Challenges faced by farmers and labourers

Challenges perceived by the farmers and labourers were recorded by individually interviewing the respondents with the help of schedules specifically designed for this purpose. Garret ranking method is used to evaluate the challenges faced by them.

3.5 Statistical tools employed for analysis of the data

For analysis and drawing inferences, the following statistical parameters were used. The parameters used were as follows.

3.5.1 Frequency and percentage distribution

Frequency distribution were used to determine the distribution pattern of respondents based on variables. Frequency distributions shows the actual number of observations falling in each range. To standardize the sample, percentages were used to determine the number of people who would fall into specified range or categories.

3.5.2 Arithmetic mean

The arithmetic mean is the simplest and most widely used measure of a mean, or average. It is computed by dividing the total number of observations by the sum of all observed values. The letter X represents the arithmetic mean.

$$\text{Arithmetic mean } (X) = \frac{x1 + x2 + x3 + \cdots + xn}{N}$$

Where,

n = Total number of observations

x1, x2 … xn = Individual scores

3.5.3 Standard deviation

The square root of the mean of the sum of squares of the deviation from the mean of the distribution is the standard deviation. It is used to comprehend the distribution pattern of the study's independent variables.

$$\sigma = \sqrt{\frac{\sum^{n} (xi - X)^2}{(n-1)}}$$

Where,

σ = Standard deviation

xi = Score of i^{th} respondents

$\sum$= Mean

n = Number of respondents

3.5.4 Spearman coefficient of correlation (rs)

For determining the significant relationship between the dependent and independent variable, Spearman's rank correlation coefficient was analysed. It basically measures how well the relationship between two variables could be represented using a monotonic function

3.5.5 Garrett ranking

Garrett's ranking technique was used to rank the preference indicated by the respondent on different factors. As per this method, respondent have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value. Here we have ranked the challenges faced by farmers and labourers in the mechanisation through paddy group farming.

3.5.6 Software used for statistical analysis

The data were coded and analysed using the SPSS - 22 version, which is available at College of agriculture, Vellanikkara. The results of the data analysis are reported in the following chapter, along with detailed discussion and supporting views.

Results and Discussion

Chapter 4

RESULTS AND DISCUSSION

The current chapter is dealing with the presentation of data analysis and results. Based on the study's objectives, data were collected from farmers and farm labourers in the Palakkad district using a well-structured and pre-tested interview schedule. The data was analysed and concluded into valid and significant inferences using relevant analytical tools to achieve the research objectives. The findings are organised into the following sections:

4.1 Profile characteristics of paddy farmers and farm labourers

4.2 Perceived socio-economic impact of mechanization through paddy group farming

4.3 Group dynamic factors affecting paddy mechanisation

4.4 Challenges in group farm mechanization

4.1 Profile characteristics of paddy farmers and farm labourers

The investigator would be able to interpret the data if he or she had a thorough understanding of the respondents' socioeconomic and psychological characteristics. Data were collected from 160 respondents comprising 120 farmers and 40 farm labourers. The study included sixteen independent variables that represented socio-economic and personal characteristics of the respondents. Following are the findings of data analysis on profile characteristics:

4.1.1 Age

The age group of paddy farmers and farm labourers who were the respondents in the present study is given in Table 4.1. It could be observed that the majority of the paddy farmers (85.8 %) fall under the old age group which is above 55 years followed by 14.2 per cent of farmers belonging to the middle age category. Among the farm labourers, majority (87.5%) belong to the middle age category and rest of the respondents belong to the old age category (12.5%). None of the farmers and labourers belonged to the young age category.

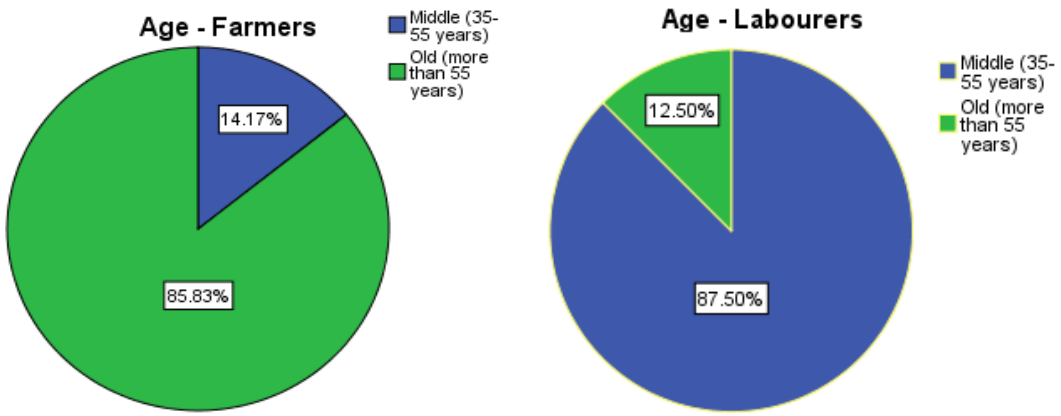
This indicates that very less young people come forward towards paddy cultivation, while many of the old farmers continue farming. Labour in paddy is season bounded, while many of the young workers are seeking regular job or engaged in non-farm work. The results are in conformity with the findings of Singh (2005).

Table 4.1 Distribution of paddy farmers and labourers according to their age

S. No	Age group (years)	Farmers	Labourers
1	Young age (< 35years)	0 (0)	0 (0)
2	Middle age (36-55)	17 (14.2)	35 (87.5)
3	Old age (> 56 years)	103 (85.8)	5 (12.5)
	Total	**120 (100)**	**40 (100)**

(Figures in parentheses indicate total percentage)

Figure.4.1 Age of farmers & labourers



4.1.2 Gender

The respondents were classified based on their gender and given in Table 4.2. It is evident from the Table 4.2 that majority of the farmers are male (75%). Among the labourers, 50 per cent of the labourers were female. Here female labour groups were found much organised towards paddy cultivation than the male labourers. Most of the local male labourers prefer to go for non-agricultural works like construction works etc, and migrant labourers from other States are found to work in the agricultural sector.

Table 4.2 Distribution of respondents according to gender (n=160)

Sl.No	Category	Farmers	Labourers
1	Male	90 (75)	20 (50)
2	Female	30 (25)	20 (50)

(Figures in parentheses indicate total percentage)

4.1.3. Educational status

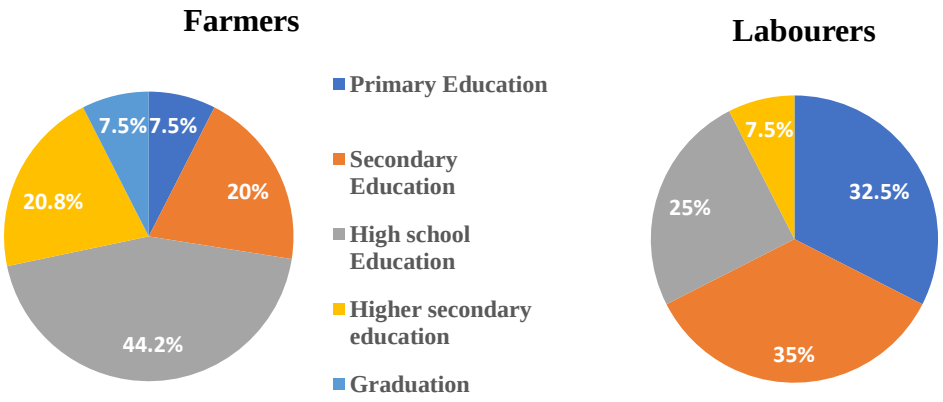
It could be observed from the results in Table 4.3 that the majority of the farmers were having high school education (44.16%) followed by higher secondary education (20.83%). But in the case of labourers most of them were having secondary education (35%) followed by primary education (32.5%). The probable reason for higher educational level of farmers could be due to high literacy rate prevalent in the state.

Table 4.3 Distribution respondents based on educational status

Sl. No	Educational status categories	Farmers	Labourers
1	Primary education	9 (7.5)	13 (32.5)
2	Secondary education	24 (20)	14 (35)
3	High school education	53 (44.16)	10 (25)
4	Higher secondary education	25 (20.83)	3 (7.5)
5	Graduation	9 (7.5)	0 (0)
Total		**120 (100)**	**40 (100)**

(Figures in parentheses indicate total percentage)

Figure 4.2 Educational status of farmers and labourers



4.1.4 Training received

Figure 4.3 Training received by the respondents

(Figures in parentheses indicate total percentage)

It is evident from the Fig 4.3 that only a few farmers have received training in farm mechanisation. It is because the farmers go for hired labour and machinery rather than self-operating the machines in their field. Even though *Padashekhara samities* own the machinery, the members don't have the technical skill to operate and were not able to get sufficient skilled labourers for its operation and maintenance. It could be concluded that there is not adequate skilled labour in order to carry out timely mechanisation activities in rice cultivation and hence the *Padasekhara Samithies* depend on hired labourers along with machines from other States.

Table 4.4 Training received by labourers

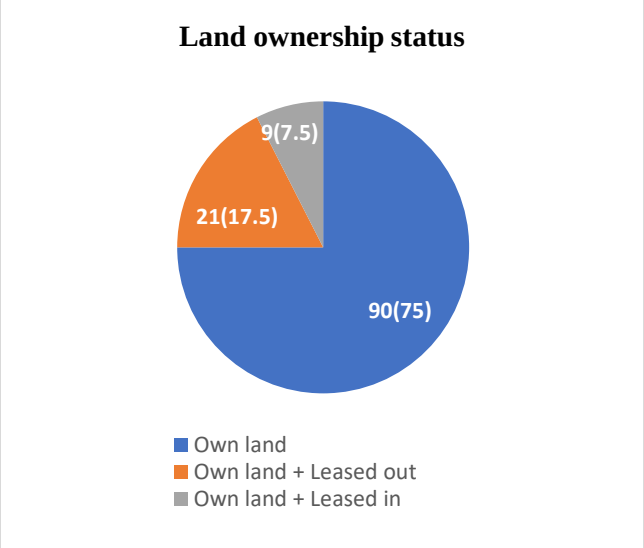
Sl.No.	Mechanical operations	Training received	Skills applied
		No of respondents	No of respondents
1	Ploughing	30 (75)	20 (50)
2	Transplanting	18 (45)	10 (25)
3	Weeding	40 (100)	20 (50)
4	Spraying	40 (100)	28 (70)
5	Harvesting	40 (100)	36 (90)
6	Bailing	15 (37.5)	10 (25)

(Figures in parentheses indicate total percentage)

Training received by labourers for various cultural operations have been recorded in Table 4.4. Labourers have attended various training programmes on paddy mechanisation organized by Kerala Agricultural University for various field operations. Most of the labourers have received training on ploughing, transplanting, weeding and harvesting. Ploughing, harvesting and bailing operations are mainly carried out by male labourers. Women labourers have received training mainly for transplanting, weeding and spraying operations.

4.1.5 Land ownership status

Figure 4.4 Land ownership status of farmers



The land ownership status of the farmers been depicted in the Fig.4.4. Ninety per cent of the farmers were cultivating paddy in their own land and 21 per cent of the farmers have given some area of land on lease. Nine per cent of the farmers have leased in some of the land so that mechanical operations could be done for a larger area at ease along with their main paddy land.

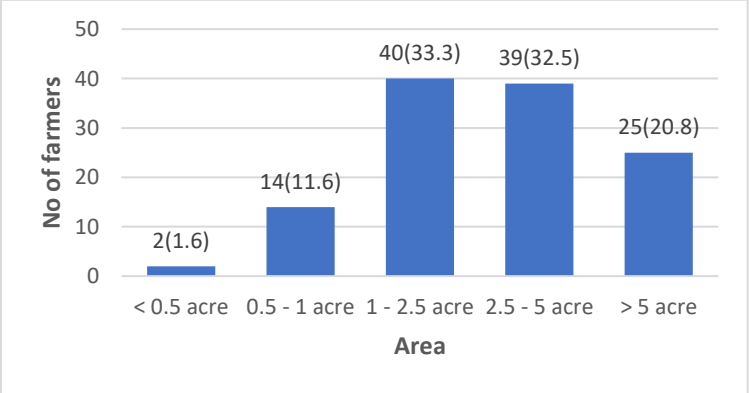
4.1.6 Area under paddy cultivation among farmers

Table 4.5 Area under paddy cultivation among farmers

Sl. No	Area under paddy cultivation	No of respondents
1	<0.5 acre	3 (2.5)
2	0.5 – 1 acre	14 (11.6)
3	1 – 2.5 acre	40 (33.3)
4	2.5 – 5 acre	38 (31.6)
5	>5 acre	25 (20.8)

(Figures in parentheses indicate total percentage)

Figure 4.5 Area under paddy cultivation among farmers

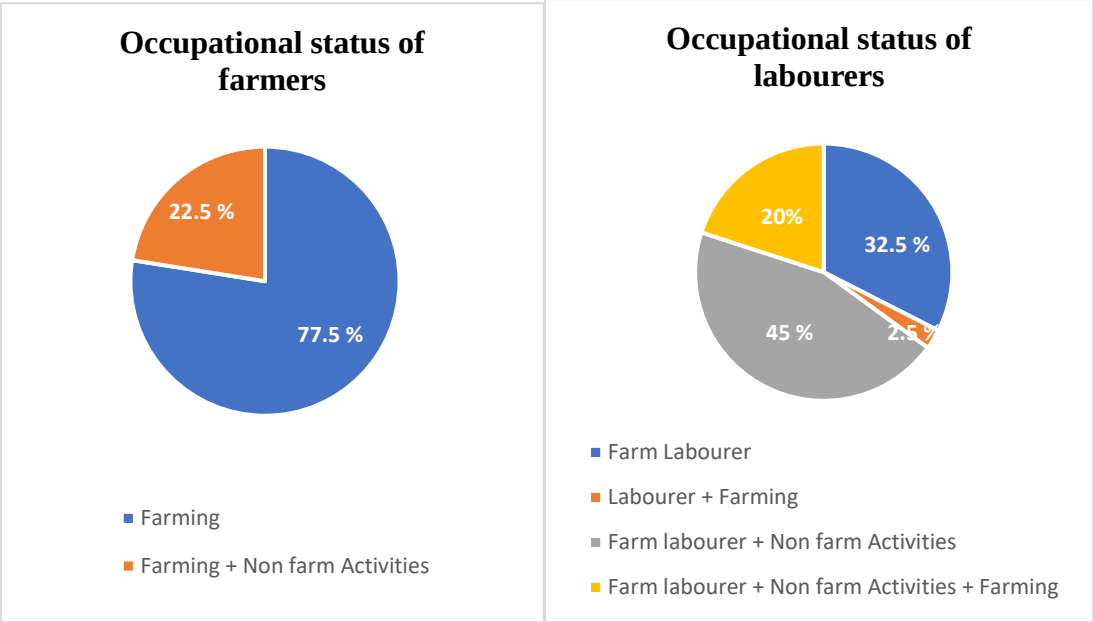


(Figures in parentheses indicate total percentage)

From the Table 4.5 it is evident that the majority of the farmers (33.3%) are having a paddy area of 1-2.5 acre (0.4 -1.0 Ha) followed by (31.6%) with an area of 2.5 -5 acres (1-2 Ha). The average area under paddy cultivation was found to be 3.21 acre (1.28 Ha). A few farmers also (2.5%) have an area of less than 0.5 acres (< 0.2 Ha). However, as mechanization was carried out in group farming mode, even farmers with very small land holding could be benefitted.

4.1.7 Occupational status

Figure 4.6 Occupational status of farmers and labourers



It could be noted from the Fig 4.6 that 77.5 percent farmers have farming as their only source of income, while 22.5 percent of them are carrying out non-farm activities along with farming. Since agricultural labour is seasonal in nature, the labourers during off season carry on non-farm activities (45%). A few labourers (20%) carry on paddy cultivation too along with their occupation as agriculture labourers. These labourers cultivate in leased-in land which helps them to earn additional income. As the labourers gained all the skills in mechanisation, leased land cultivation could be adopted as a profitable option.

4.1.8 Annual income of farmers and labourers

Table 4.6 Annual income of farmers

Sl. No	Category of farmers	No of respondents
1	< 3.5 lakhs	35 (29.1)
2	3.5 – 7.5 lakhs	61 (50.8)
3	> 7.5 lakhs	24 (20)
(Min, Max) = (2.1 lakhs, 11.2 lakhs) Mean = 5.21 lakhs		

(Figures in parentheses indicate total percentage)

Table 4.7 Annual income of labourers

Sl. No	Category of labourers	No of respondents
1	< 1.5 lakhs	26 (65)
2	3.4 - 2 lakhs	10(25)
3	>2 lakhs	4(10)
(Min, Max) = (0.85lakhs, 2.5 lakhs) Mean = 1.65 lakhs		

(Figures in parentheses indicate total percentage)

From the Table 4.6 & 4.7 it is evident that most of the farmers and labourers (50.8% and 25%). are having an income under the medium level category. An average annual income of about 5.21 lakhs and 1.65 lakhs is obtained for the farmers and labourers respectively. Since rice cultivation is seasonal in nature, the income from paddy cultivation for farmers and labourers occurs only for two seasons. Paddy farmers in the study area were undertaking other crop production and allied activities, which substantially contributed to their annual income. Income of the labourers is also based on the number of working days received in a year. During the off-season agricultural labourers go for carrying out non-agricultural operations and get an additional income.

4.1.9 Extension contact

Table 4.8 Extension contact of farmers and labourers

Farmers categories	Frequency
Low <18.4	2 (1)
Medium 18.4-37.6	94 (79)
High >37.6	24 (20)
Mean = 28 S.D = 9.6	

Labourers categories	Frequency
Low < 21.6	7 (17.5)
Medium <21.6 - 43.95	20 (50)
High >43.95	13 (32.5)
Mean = 32.77 S.D = 11.17	

(Figures in parentheses indicate total percentage)

It is observed from the results in Table 4.8 that majority of the farmers (79%) and labourers (50%) fall under the medium level of extension contact. 20 percent of the farmers are in good contact with the extension agents like Agricultural officers, etc.

and in the case of labourers, 32.5 percent of the respondents are having high extension contact.

4.1.10 Social participation

Table 4.9 Social participation of farmers and labourers

Farmers categories	Frequency
Low <21.8	5 (3)
Medium 21.8-33.4	92 (78.8)
High >33.4	23 (19.2)
Mean =27.6 S.D = 5.8	

Labourers categories	Frequency
Low <22.48	8 (20)
Medium 22.48 – 35.65	18 (45)
High >35.65	14 (35)
Mean = 29.06 S.D = 6.58	

(Figures in parentheses indicate total percentage)

Results from the Table 4.9 show that 19.2 percent of the farmers are having higher social participation owing to their membership in *Padashekhara samithies*, farmer cooperatives, milk cooperatives etc. Majority of the farmers (78.8%) and labourers (45%) fall under the medium category of social participation followed by the high-level category.

The results could be due to the fact that the selected farmers were part of the *Padashekhara samithies* and they might be having good extension contact with various officials like agricultural officers, panchayat officials , ATMA agents etc. By working as a member in padashekhara samities/labour groups, the members got more exposure to society which increased their social participation.

4.1.11 Extent of mechanisation

Table 4.10 Extent of mechanisation

Sl. No	Categories	No of respondents
1	Low <4	16 (13.3)
2	Medium 4-6	74 (61.6)
3	High >6	30 (25)
Total		120 (100)

(Figures in parentheses indicate total percentage)

Results from the table 4.10 revealed that most of the farmers followed a medium level of mechanisation (61.6%) followed by high extent of mechanisation (25%). Transplanting, spraying, harvesting and bailing are the most common mechanized operations followed by the paddy farmers. However in some areas like Chittur block, where the water table in paddy fields is higher, it is difficult to operate transplanter and hence they go for manual transplanting.

4.1.12. Economic motivation

Table 4.11 Economic motivation of farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <75.89	27 (22.5)	Low < 56.88	9 (22.5)
2	Medium 75.89- 89.77	66 (55)	Medium 56.88 – 77.36	25 (62.5)
3	High >89.77	27 (22.5)	High >77.36	6 (15)
Mean =82.88 S.D =6.94			Mean= 67.12 S.D = 10.24	

(Figures in parentheses indicate total percentage)

The results from the table 4.11 shows that majority of the farmers (55%) and labourers (62.5%) come under the medium level category of economic motivation. It is evident from the Table 4.11 that a majority farmers are having higher level of economic motivation (22.5%) compared to labourers (15%). This could be because of the paddy farmers earnest motive to reduce the cost of cultivation and sustain paddy farming without incurring loss. The results are in conformity with the findings of Dharsana and Ravichandran (2014).

4.1.13. Achievement motivation

Table 4.12 Achievement motivation of farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <76.31	28 (23.3)	Low <70.37	6 (15)
2	Medium 76.31 – 88.75	80 (66.7)	Medium 70.37 – 83.03	28 (70)
3	High >88.75	12 (10)	High >83.03	6 (15)
Mean: 82.53 SD: 6.22			Mean: 76.7 , SD: 6.33	

(Figures in parentheses indicate total percentage)

From the Table 4.12, it could be viewed that the majority of the farmers (66.7%) and labourers (70%) were having a medium level of achievement motivation. Only 10 per cent of the farmers are found to have higher achievement motivation and 23.3 per cent had a low achievement motivation. This could be due to the fact that the farmers frequently incurred losses in rice cultivation due to insect-pests, weeds, and climatic factors. But in the case of labourers 15 percent each of the respondents is having high and low achievement motivation. It could be due to the fact that labourers would be able to get non-agricultural work even during the off-season.

4.1.14. Innovativeness

Table 4.13 Innovativeness of farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <70.2	18 (15)	Low <66.74	6 (15)
2	Medium 70.20 – 89.92	95 (80)	Medium 66.74 – 82.86	28 (70)
3	High >84.92	6 (5)	High >82.86	6 (15)
Mean: 80.06 SD: 9.86			Mean: 74.8 SD: 8.06	

(Figures in parentheses indicate total percentage)

It is evident from the Table 4.13 that the majority of the farmers (80%) and labourers (70%) come under the medium level category. 15 per cent of the labourers were found

to have high innovativeness while only 5 percent of farmers fell under high innovativeness category. Various socio-economic characteristics like old age of paddy farmers and less achievement motivation etc. might have contributed to their lower innovativeness. The farmers who had been practicing farming for years became part of collective farming once they felt it was more efficient and effective in resource pooling and thus were able to continue paddy cultivation. When mechanization was introduced in collective mode it was a boon for these farmers. Acquisition of new skills through paddy mechanisation programmes could have been a factor related with comparatively high innovativeness of labourers. The results of Nair (2011) are in line with this finding.

4.1.15. Self confidence

Table 4.14 Self confidence of farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <67.72	19 (15.8)	Low <68.4	6 (15)
2	Medium 67.72 – 86.35	86 (71.7)	Medium 68.4 – 83.84	25 (62.5)
3	High >86.35	15 (12.5)	High >83.84	9 (22.5)
Mean: 77.03 SD: 9.31			Mean: 76.12 SD: 7.72	

(Figures in parentheses indicate total percentage)

From the Table 4.14 it is evident that majority of the farmers (71.7%) and labourers (62.5%) come under medium level category. 12.5 per cent of the farmers is having higher self-confidence followed by low level category (15.8%). Old age of the farmers could be a factor determining their lower self-confidence. As the paddy farmers in the State are part of collective farming, they might be able to overcome various psychological disadvantages like lower self-confidence, low achievement motivation etc. In the case of labourers 22.5 per cent fall under high level category followed by low level category (15%). Participation in labour banks could have definitely boosted their self-confidence and achievement motivation.

4.1.16. Scientific orientation

Table 4.15 Scientific orientation of farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <74.01	18 (15)	Low <68.77	7 (17.5)
2	Medium 74.01-87.65	75 (62.5)	Medium 68.77 – 78.83	26 (65)
3	High >87.65	27 (22.5)	High >78.83	7 (17.5)
Mean: 80.83 SD: 6.82			Mean: 73.8 SD: 5.08	

(Figures in parentheses indicate total percentage)

Majority of the farmers (62.5%) and labourers (65%) are having medium level of scientific orientation. The results in Table 4.15 shows that 15 percent of the farmers and 17.5 percent of the labourers have low scientific orientation. Scientific orientation of the farmers (22.5%) is found to be higher than that of labourers (17.5%). The results are in conformity with the findings of Alam (2014).

4.1.17 Risk orientation:

Table 4.16 Risk orientation of farmers and labourers

Sl. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <67.04	26 (21.7)	Low <59.77	12 (30)
2	Medium 67.04 – 84.31	71 (59.2)	Medium 59.77 – 71.89	16 (40)
3	High >84.31	23 (19.2)	High >71.89	12 (30)
Mean: 75.67 SD: 8.63			Mean: 65.88 SD: 6.06	

(Figures in parentheses indicate total percentage)

The results in Table 4.16 shows that more than half of the farmers (59.2%) have medium risk orientation followed by low (21.7%) and high levels (19.2%). Mean score for risk orientation for the farmers (75.67 %) are found to be higher than that of labourers (65.88%). 30 percent of the labourers are having higher risk orientation. The results are in conformity with the findings of Sridhar (2002).

4.1.18 Attitude towards collectivism

Table 4.17. Attitude towards collectivism among farmers and labourers

S. No	Categories	No. of farmers	Categories	No. of labourers
1	Low <70.43	19 (15.8)	Low <82.59	5 (12.5)
2	Medium 70.43-82.49	82 (68.3)	Medium 82.59-91.41	24 (60)
3	High >82.49	19 (15.8)	High >91.41	11 (27.5)
Mean: 76.46 , SD: 6.03			Mean: 87 , SD: 4.41	

(Figures in parentheses indicate total percentage)

From the Table 4.17 it is seen that nearly 68 per cent of the farmers are having good attitude towards collectivism followed by 15.8 percent with a very high attitude towards collectivism. Only 15.8 percent of the farmers have low attitude towards the collective approach. Labourers also had a favourable attitude towards collectivism (27.5% belonged to the high category) while only 12.5 per cent of them are having low attitude towards collectivism. The results are in conformity with the findings of Bhatt (2009). This indicates that collective farming could be continued as a viable solution for various agrarian issues scuttling the farming sector in Kerala.

4.2 Perceived socio-economic impact of mechanization through paddy group farming

4.2.1 Weightage & percentage score of perceived socio-economic impact factors.

Weightage score of the perceived socio-economic impact have been computed by Principal Component Analysis (PCA) method and the percentage score has been calculated as mean score of each component.

Table 4.18 Weightage & percentage score of perceived socio-economic impact factors of farmers

Sl No	**Perceived impact factors**	**Weightage**	**Percentage score**
1	Time spend on farming activities	3.56	66.73
2	Livelihood	2.61	60.28
3	Access to assets	2.74	58.46
4	Yield	4.45	56.98
5	Income	2.37	53.21
6	Post-harvest handling benefits	2.13	53.05
7	Knowledge gained on benefits of paddy mechanization	3.10	51.78
8	Savings in cost of cultivation	1.72	50.32
9	Increase in area	1.86	49.87

The results in the Table 4.18 showed that higher percentage score is obtained for the factor time spend on farming activities followed by livelihood and access to assets. It could also be noted that highest weightage score was obtained for the factor yield. A higher variance observed on the yield data has resulted in the higher weightage of the component. Better yields could have been obtained due to timely management and mechanized intercultural operations. However, the mean score on the perceived impact on yield is less (56.98%) even though the weightage is higher.

The comparatively higher percentage score for perceived impact on livelihood and access to assets shows that they are the significant socio-economic impact factors due to paddy mechanization. Paddy farmers were able to satisfy their needs and they were

able to lead a healthy and better livelihood after the introduction of mechanisation. Padashekhara samities were able to buy some machineries like, winnower, sprayer, thresher etc of their own. Large machinery like transplanter and combined harvesters were provided by the State Department of Agriculture through various government schemes. Thus, even the very small and marginal farmers could have access to various machineries at affordable rate.

Better yields gained due to mechanization could have resulted in better income for the farmers as they have assured market through the State Civil Supplies Department (Supplyco) which procures the produce at MSP rate from the farmers. It is evident from the table that post-harvest operation also had a significant impact after the introduction of mechanisation and farmers were able to have clean and quality produce for selling to Supplyco. It is also worth to note that introduction of mechanisation paved way for the gain of new knowledge to the farmers. Even though farmers were able to save the cost of cultivation in comparison with doing operations manually in the current scenario, the cost of operating machinery became higher in Kerala as compared to other States. Farmers in Palakkad have to look upon private agents from Tamil Nadu who would provide agricultural workforce along with machineries at cheaper rate. It could also be noted from the results that increase in area under paddy cultivation due to mechanization was perceived as the least significant factor, as it gained the least percentage score (49.87%) and less weightage.

However, it could be concluded that mechanization might have helped in retaining the existing area under paddy cultivation by making easy and timely operations, rather than making an impact in increase of area under paddy cultivation.

Table 4.19 Weightage & percentage score of perceived socio-economic impact factors of labourers

Sl.No	**Perceived impact factors**	**Weightage**	**Percentage score**
1	Drudgery reduction	2.87	67.65
2	Employment	4.12	63.46
3	Income	3.41	62.14
4	Entrepreneurial initiatives	2.65	60.58
5	Skills gained	1.98	58.15
6	Livelihood	2.27	55.76
7	Asset creation	1.79	53.23

Results in the Table 4.19 shows that higher weightage score was gained for impact on employment (4.12) and household income (3.41). The percentage mean scores (67.65 and 63.46) were comparatively high for these factors. More impact on employment could be because the labourers were able to gain additional work days. They could also be able to gain maximum work in the season and were able to carry out nonfarm activities during off-season; as a result, more income could be generated. Mechanisation in paddy has resulted in drudgery reduction for the labourers as it has made tedious manual works carried out in an efficient manner using machinery. Agricultural labourers were able to transform themselves as skilled labourers which helped them in improving their livelihood and in creating assets like machinery or land. These results are in conformity with the findings of Akhil (2017), in a study on impact of the trainings on farm mechanization observed that positive impact have been occurred in case of knowledge level, skill level, employment opportunity, income level, asset creation and savings among the trainees.

Table 4.20 Distribution of paddy farmers on the perceived socio-economic impact index of mechanisation

Category of farmers	**Frequency**
Low < 46.81	23(18.3)
Medium 46.81 – 58.67	83(69.2)
High > 58.67	14(12.5)

Mean= 52.74, S.D= 5.98

(Figures in parentheses indicate total percentage)

The perceived impact index of farmers defines how much mechanisation has affected their socio-economic situation. The results in the Table 4.20 shows that 69.2 per cent of the farmers resides in the medium level category with a mean index score of 52.74. While 18.3 percent belonged to low category, 12.5 percent fell under the high category. It is observed that, 47.1 percent of the farmers fall above and 52.9 percent falls below the mean index score.

Table 4.21 Distribution of farm labourers on the perceived socio-economic impact index of mechanisation

Category of labourers	Frequency
Low < 49.67	8(20)
Medium 49.67 – 60.21	23(57.5)
High > 60.21	9(22.5)
Mean= 54.94, S.D= 5.27	

(Figures in parentheses indicate total percentage)

The results from the Table 4.21 shows that, 22.5 percent of the labourers perceived a higher impact due to mechanisation while 57.5 per cent of them had a medium level impact. It is observed that, 51.25 percent of the labourers fall above and 48.75 percent falls below the mean index score.

From the Table 4.20 and Table 4.21 it is evident that perceived socio-economic impact index of the labourers (54.94%) is found to be a bit higher than that of the farmers (52.74%), in comparison with their mean index scores. The gain in yield and saving in time spend on farming activities, knowledge gained on mechanization and improved access to assets and livelihood are the significant factors contributing to better socio-economic impact index due to mechanisation among paddy farmers. In the case of labourers, gain in employment, higher income and drudgery reduction are found to be the significant factors contributing to a higher socio-economic impact index due to mechanization.

4.3 Group dynamic factors affecting paddy mechanisation

4.3.1 Group dynamics factors of farmers

Farmers have organized themselves to form *Padashekhara samithies* (Group farms) to carry out paddy cultivation of a particular area. The members in a *Padashekhara samithi* ranges from 100-200, depending on the area under cultivation and the group dynamics and they function as registered groups as per by-law.

Table 4.22 Group dynamics factors of farmers

Indicator	Weightage	Percentage score
Participation	2.34	49.68
Team work	2.13	47.21
Group atmosphere	1.69	48.18
Decision making process	4.25	50.77
Group cohesiveness	2.51	47.34
Group leadership	3.41	51.41
Interpersonal trust	1.76	50.16
Task function	2.27	43.38
Achievement of the group	2.10	45.17

Fig 4.7 Weightage of group dynamic factors of farmers

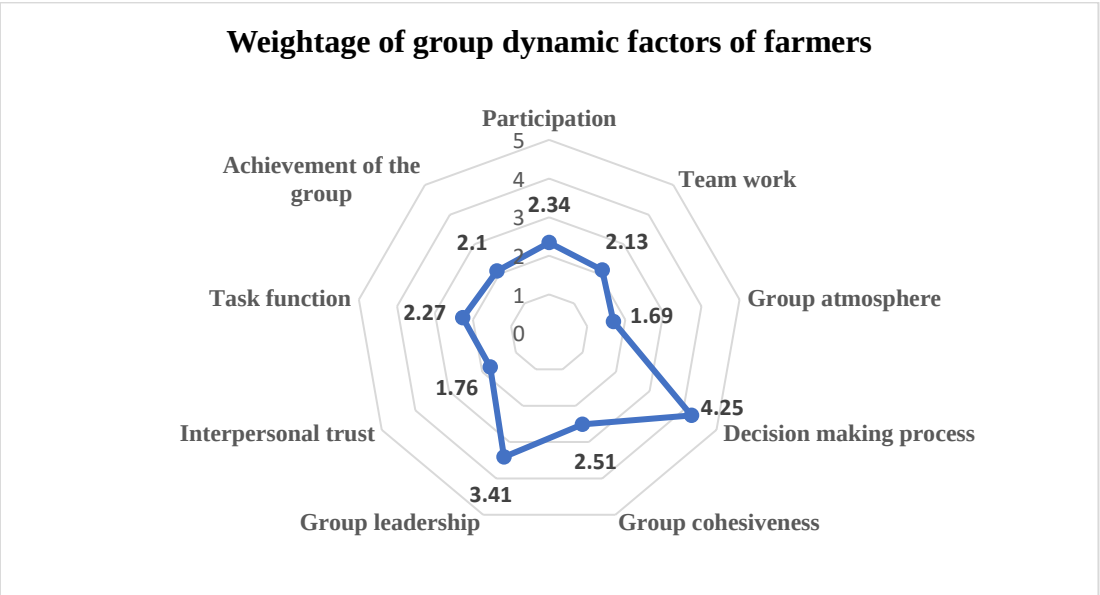
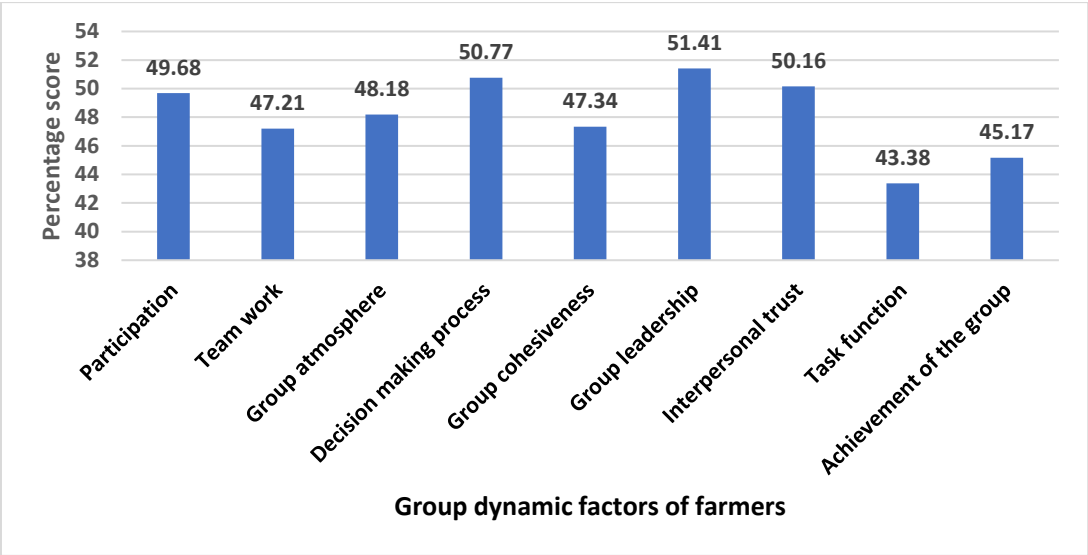


Fig 4.8 Group dynamic factors of farmers



Weightage score of the group dynamics indicators have been calculated through Principal component analysis and percentage score is calculated as mean score of each component.

Table 4.22 indicates that the decision making process is having a higher weightage since the whole crop plan is based on the combined decision of the group. Every farmer in the padashekhara samities participate themselves towards taking major decisions of the group. Final decision regarding the group will be taken by the president of that group after thorough discussion with the group members regarding many decisions from the date of sowing to harvesting. Group leadership is also found to be an important factor as it gained a higher weightage and higher percentage score. Maximum mean score is obtained for group leadership (51.41%) and decision making (50.77%) so as the major decisions on the field is based on that. Lowest weightage and less score is obtained for the group atmosphere as it gets affected by various political and psychological factors playing within the group. Interpersonal trust was found to be a significant factor in group dynamics of paddy groups. Various achievements of the group (43.38%) like fallow land conversion, extending of the paddy area, better yield etc was possible by mechanisation through paddy group farming.

4.3.2 Group dynamics factors of labourers

The labourers were organized under labour banks, called as 'Green army" under the administration of Block panchayats, through which they gained skills and assets for paddy mechanization activities. The State Department of Agriculture also supported labour banks in the scheme named Agro Service Centres (ASCs) through which they hold the machinery and do the operations by taking orders from *Padashekara samithies.* The group dynamics of labour groups is important for their smooth functioning and thereby maximising their employment in the season.

Table 4.23 Group dynamics factors of labourers

Indicator	Weightage labourers	Percentage score
Participation	4.68	49.12
Team work	3.12	47.45
Group atmosphere	2.79	44.61
Decision making process	2.24	48.67
Group cohesiveness	2.45	51.34
Group leadership	3.12	48.02
Interpersonal trust	1.89	47.32
Task function	1.75	46.68
Achievement of the group	2.21	45.35

Fig 4.9 Weightage of group dynamic factors of labourers

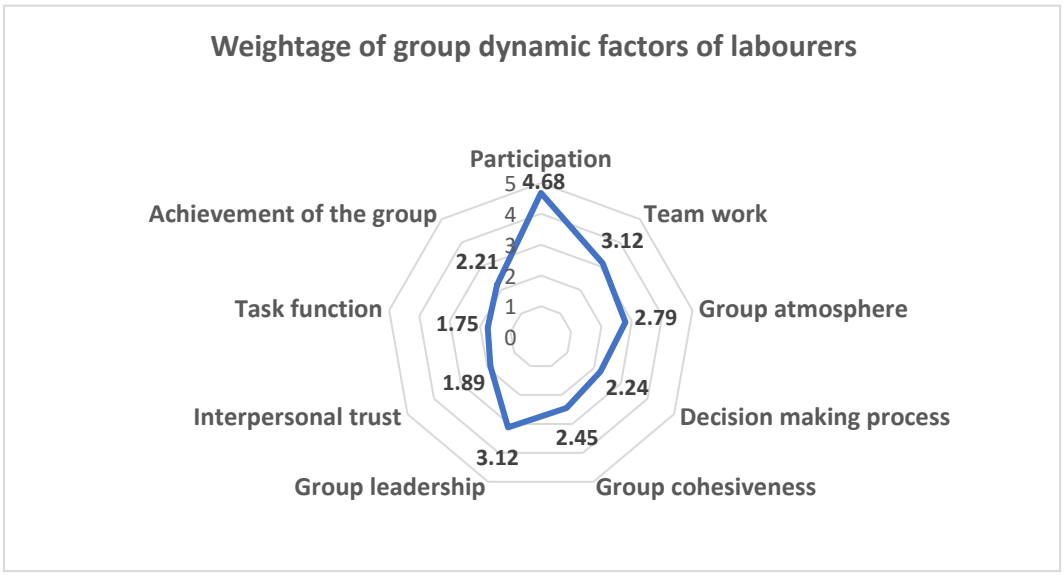


Fig 4.10 Group dynamic factors of labourers

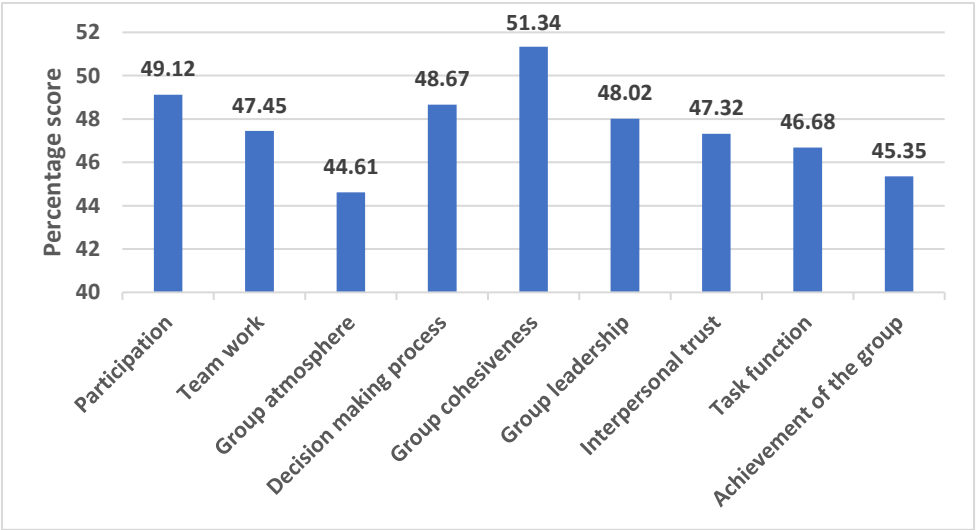


Table 4.23 shows that the factor participation of labourers is found to have higher weightage (4.68), followed by teamwork and group leadership (3.12). It means that these three factors showed maximum variance among the various group dynamics factors. However, group cohesiveness, participation, decision making process and group leadership in the labour groups emerged as the prominent group dynamics factors with higher percentage score.

Table 4.24. Distribution of farmers based on the Group dynamics index

GDI	Frequency
Low <53.17	22 (18.3)
Medium 53.17 – 67.36	83 (69.2)
High >67.36	15 (12.5)
Mean= 60.265, S.D= 7.095	

(Figures in parentheses indicate total percentage)

Table 4.25. Distribution of labourers based on the Group dynamics index

GDI	Frequency
Low <50.54	4 (10)
Medium 50.54 – 64.32	29 (72.5)
High >64.32	7 (17.5)
Mean = 57.43, S.D=6.89	

(Figures in parentheses indicate total percentage)

From the Table 4.24 and Table 4.25, it is found that majority of the farmers (69.2%) and labourers (72.5%) fall under the medium level category of Group dynamics, while 12.5 percent of the farmers and 17.5 percent of labourers come under the high GDI category. The results was on par with the results of Swapna (2022) who had also noted that majority of the women farmers (68%) who work in association with Self Help Groups had medium GDI score. It is observed that, 47.1 percent of the farmers fall above and 52.9 percent falls below the mean index score and in case of the labourers, 53.75 percent fall above and 46.25 percent falls below the mean index score. The mean GDI of farmers is found to be little higher (60.46%) than that of labourers (57.43%). This could be due to the fact that the paddy farmer groups *(Padasekhara Samithies)* has been effectively functioning in all the panchayats for a long period, since 1990s and all the activities under paddy cultivation are coordinated and implemented through them. Thus, mechanization also could be effectively undertaken by these farmer groups. On the other hand, the labour groups are actually the new initiative in the State during the paddy mechanization drive carried out in the

last ten years period. The group dynamics among labour groups would be a determining factor for their sustainability in the long run.

Table 4.26. Group dynamics index of selected *padashekharams*

Sl.No	Panchayat	Padashekharam	Group dynamics index
1	**Alathur**	Puthiyankanam	60.23
2	**Erimayur**	Nelliyampadam	57.36
3	**Perumatty**	Edaparamb	59.23
4	**Polpully**	Chirapadam	54.76

Table 4.27 Group dynamics index of labour groups in the study area

Sl.No	Block	Group dynamics index
1	**Alathur – MKSP**	61.27
2	**Chittur – PASC**	57.65

From the Table 4.26 we can conclude that the *puthiyankanam padashekharam* is having higher GDI (60.23%). This could be because the *puthiyankanam padashekharam* is much more active in organising padashekharam meetings and they have a consolidated decision making processes, involving the agricultural officer which records for their higher GDI of the group. Alathur MKSP consist of women labourers, who actively participates in doing various cultural operations during the crop season and maximum involvement of the women labourers are there for any occasion regarding the group work or decisions, which accounts for higher GDI among labourers as depicted in Table 4.27.

4.3.3 Relationship of independent variables with the GDI of farmers & labourers

Table 4.28 Correlation of independent variable with GDI of farmers

Independent variable	Spearman correlation coeficient
Age	-0.121
Education	0.067
Annual income	0.136
Extent of mechanization	-0.321
Area under paddy cultivation	-0.052
Land ownership status	0.175
Training received	0.014
Extension contact	0.472**
Social participation	0.318*
Economic motivation	0.141
Achievement motivation	0.031
Innovativeness	0.176
Self confidence	-0.142
Scientific orientation	0.023
Risk orientation	0.012
Attitude towards collectivism	0.186*
Occupational status	0.023
*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2tailed)	

From the table 4.28 it is evident that the variables like extension contact, social participation, scientific orientation, attitude towards collectivism is having a positive correlation with the GDI of the farmers. Since majority of the members of *padashekhara samities* comes under the medium level category of extension contact (as seen in table 4.5), the need for good group dynamics among the members is essential for sustained paddy paddy cultivation and mechanization. The members of the *samities* along with the guidance from the agricultural department takes major

decisions regarding the paddy cultivation. Social participation of members in various meetings and discussions regarding the field decisions is also important which correlates positively with the group dynamics of members. The formation of *padashekhara samities* is one among the reasons for the sustaining of paddy cultivation in Kerala. Group dynamics among the members is also important for the smooth functioning of *padashekhara samities* and better paddy cultivation.

Table 4.29 Correlation of independent variable with GDI of labourers

Independent variable	Spearman correlation coefficient
Age	-0.128
Education	-0.061
Annual income	0.117
Training received	0.279*
Extension contact	0.134
Social participation	0.046
Economic motivation	0.174
Achievement motivation	0.223*
Innovativeness	0.147
Self confidence	0.367*
Scientific orientation	0.412**
Risk orientation	-0.035
Attitude towards collectivism	0.129
Occupational status	0.131
*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2-tailed)	

Table 4.29 depicts the correlation of independent variable with GDI of labourers. It is evident from the Table 4.29 that the training received, extension contact, achievement motivation, self confidence and scientific orientation is having positive correation with the GDI of labourers. Since training programme regarding mechanisation occurs for members of the labour groups, it is important to have better group dynamics

among the group, thus carrying out the field work in a coordinated manner. The formation of labour groups is one among the reasons why farm labourers are now more scientifically oriented towards machineries and help them emerge as a skilled agricultural labourer. Being as a part of the group, labourers make potential use of the machineries available and do their best to do mechanization in the field within stipulated time. The coordinated efforts of the group members help increase the self confidence of the group members in doing mechanization.

4.3.4 Relationship of independent variables with the perceived socio-economic impact index of mechanization of farmers & labourers

Table 4.30 Correlation of independent variable with perceived socio-economic impact index of farmers

Independent variable	Spearman correlation coefficient
Age	-0.176*
Education	0.113
Annual income	0.267*
Extent of mechanization	0.521**
Land ownership status	0.136
Training received	0.468**
Extension contact	0.387*
Social participation	0.272*
Economic motivation	0.034
Achievement motivation	0.114
Innovativeness	0.332*
Self confidence	-0.056
Scientific orientation	0.023
Risk orientation	-0.122
Attitude towards collectivism	0.232*
Occupational status	0.178
*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2tailed)	

Table 4.30 indicates the correlation of independent variables with the perceived socio-economic impact index of farmers. It is evident from the table that the factors like extent of mechanisation, annual income, area under paddy cultivation, extension contact, social participation, innovativeness and attitude towards collectivism are having a significant positive correlation with the perceived impact index. Age is the variable that has a negative correlation (significant at 0.05 level) to the perceived socio-economic impact index. In comparison to the older generation, the younger generation was found to be more tech-savvy, and the elder generation would take more time to learn the most recent technologies. The extent of mechanisation is having the highest correlation with the perceived impact index. This could be due to the fact that more use of machinery has paved way to have more positive impacts on socio-economic factors.

As more paddy area is mechanized, more economical and ease for the farmers to carry out operations for a larger field area. Instead of using manual labour, adopting mechanisation has helped in reducing the cost of cultivation and thus helped in increasing their income, which resulted in creating significant positive impact on the lives of farmers. It is also important that farmers maintain a good extension contact for getting information and advice on farm mechanisation. Paddy farmers have a good relationship with the extension agents, especially the Krishibhavans and the scientists of KAU. Innovativeness of the farmers is another key factor in adopting mechanization.

Participation in mechanization programmes implemented through *padashekharams* and various other group activities is an indicator of good social participation and significant socio-economic impact. Farmers have realised that the existence of *padashekhara samiti* is a crucial factor in continuing rice cultivation and they believe that this collective approach of mechanisation could cause a positive socio-economic impact.

Table 4.31 Correlation of independent variable with perceived socio-economic impact index of labourers

Independent variable	Spearman corelation coeficient
Age	-0.042
Education	0.094
Annual income	0.227*
Training received	0.587**
Extension contact	0.311*
Social participation	0.112
Economic motivation	0.221*
Achievement motivation	0.135
Innovativeness	0.114
Self confidence	0.147
Scientific orientation	0.468**
Risk orientation	-0.106
Attitude towards collectivism	0.278*
Occupational status	0.012
*Correlation is significant at 0.05 level (2-tailed) ** Correlation is significant at 0.01 level (2-tailed)	

The results from the Table 4.31 shows that variables like annual income, training received, extension contact, economic motivation, scientific orientation and attitude towards collectivism had significant correlation with the perceived socio-economic index. The training received and scientific orientation are highly significant at 0.01 level of significance. The more a labourer had received the training, the better he became a skilled agricultural labourer and thus reflected in a higher perceived socio-economic impact index. According to Akhil (2017) training in farm mechanization received by labourers helped them in getting knowledge on the operation of machinery, increase in skill and developed a positive attitude among the trainees towards mechanization. This has resulted in increased employment opportunities and higher income level of the trainees. Various skills like operational skills and

maintenance skills were gained through training which helped to transform themselves as skilled agricultural workforce. The more scientific orientation among labourers in working with the machinery makes them more efficient in executing field operations. By becoming skilled agricultural labour, the members of labour groups are able to get better wages and income and more labourers are economically motivated towards a better standard of living. Extension contact and attitude towards collectivism are also crucial factors in the successful working of labour groups. The labour groups, being more organised, are getting recognition and benefits of various Government schemes.

Table 4.32 Correlation of group dynamics index with perceived socio-economic impact index

Factors	Correlation coefficient
Group dynamics index of farmers	0.426**
Group dynamics index of labourers	0.412**

Group dynamics index (GDI) of farmers and labourers is found to have a higher correlation with their perceived socio-economic impact index, as shown in Table 4.32. Group dynamics play a very important role in bringing about adequate group interaction and performance. Better group dynamics in paddy farmer groups as well as in labour groups might be definitely contributing to better performance in paddy mechanization activities; thereby resulting in improved socio-economic benefits to group members.

4.4 Challenges faced by farmers and labourers in continuing mechanisation through paddy group farming

To understand the challenges, Garrett scoring was carried out for 7 ranks.

Table 4.33. Percent position and its respective Garrett scores.

Rank	Percent position	Garrett Scores
1	7.14	78
2	21.42	66
3	35.71	57
4	50	50
5	64.28	43
6	78.57	34
7	92.85	22

Table 4.34 Challenges faced by farmers in continuing mechanisation

Sl No	Challenges for farmers	Mean Garrett score	Rank
1	Lack of timely availability of skilled labour at cheaper rate	68.8	1
2	Less & timely availability of machinery	60.5	2
3	Scattered land holdings	55.3	3
4	Climatic vagaries affecting mechanization	54.6	4
5	Machine failure in the field	48.3	5
6	Poor group dynamic factors	43.4	6
7	Less extension support	42.5	7

From the Table 4.34 it is understood that the lack of timely availability of skilled labour at cheaper rate is perceived as the major challenge in mechanistion. Locally available labour groups are few and availability could not be ensured on time. As the wage rate in Kerala is much higher as compared to other States, most of the

padashekara samithies depend on private agents who provide workforce along with machinery from neighbouring states. Even though *padashekara samithies* have machinery which had received through various schemes by the government, they are left unmaintained or not in a proper condition to use. Thus timely availability of machines is a major issue in the peak season. This finding calls for a need to mobilise more skilled workforce locally to meet the demand in peak period, especially transplanting and harvesting time.

It was also noted that large farms are more benefitted due to mechanization. Marginal farmers are reluctant to fully mechanise the operations in paddy cultivation. Most of the marginal farmers go for direct sowing and use machines only for harvesting.

Climatic vagaries are another major challenge in carrying on mechanization. Machines for harvesting can't be operated during rainy hours in the lands with high water table. Natural calamities during harvesting time is continued as a threat to many of the paddy farmers, even though combined harvesters are widely used in harvesting. Adequate machine servicing and repairing facilities are not available at local level and hence if machines get repaired during fieldwork, they have to depend on the service persons from the company, which causes delay in operations.

Table 4.35 Challenges faced by labourers in continuing mechanisation

Sl No	Challenges for labourers	Mean Garrett score	Rank
1	High cost of spare parts of machines and higher maintenance cost of machines	59.7	1
2	Lack of appropriate machines	53.3	2
3	Higher cost of machinery	48.8	3
4	Climatic vagaries affecting mechanization	46.6	4
5	Lack of training in skill improvement	42.6	5
6	Low amount of govt. subsidies for machinery	39.7	6
7	Lack of proper institutionalization of the group	37.8	7

Table 4.35 depicts the major challenges faced by labourers in continuing mechanisation. High cost of spare parts of machines and higher maintenance cost of machines is the major challenge faced by the labourers. In areas of Chittur where the water table is much higher as compared to other areas, transplanters could not be operated and so transplanting has to be carried out manually. Proper machinery for different topographies has to be conditioned so that dependency on the manpower to do the cultural operations could be avoided. Akhil (2017) also reported that the labourers found difficulty in getting the repair and maintenance service of the farm machinery, higher cost of spare parts, and their limited availability as the main problems faced by trainees in implementing farm mechanization.

The labourers require continuous skill improvement and training to use new agricultural implements. They don't have adequate skill in the repair and maintenance of the machinery. It is also difficult for labour groups to purchase machinery without adequate subsidies. During the mechanisation drive by the government, the subsidy for the machinery was about 90 per cent, but now it has been reduced to 50 per cent. Hence, more labour groups are not mobilised, even though there is high demand for labour in the peak season. Due to these reasons local labourers are not able to compete with private agents from other States who supply machines and workforce to the farmers.

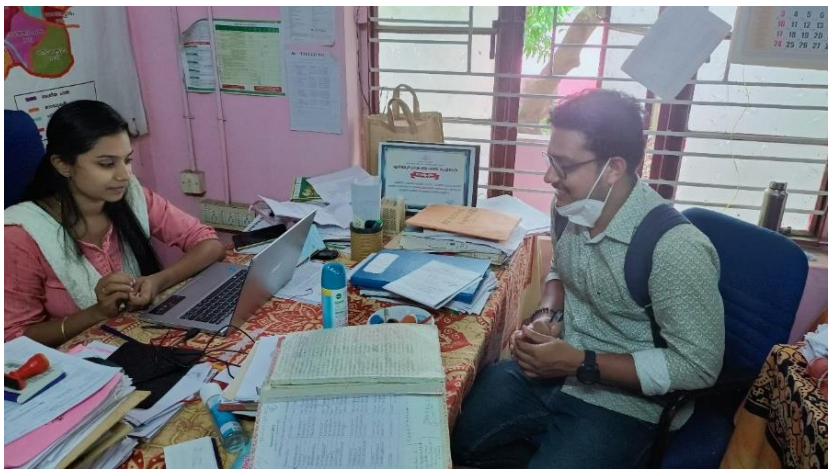
The labour groups needed continuous support from the Agriculture Department and Panchayats for regular skilling and smooth functioning. Proper institutionalization of the group and strengthening of group dynamics is also to be achieved.

Plate 1: Meeting with Agricultural officials

i) Meeting with Chittur ADA

ii) Meeting with Alathur ADA

iii) Meeting with Alathur ADA



iv) Meeting with Alathur AO

v) Meeting with Kannadi AO

Plate II : Field Survey with Farmers

Plate III : Field survey with farm labourers

Summary and Conclusion

Chapter 5

Summary and Conclusions

This chapter presents an overview of the current study's summary, key findings, conclusions, implications and recommendations for further research

The present study was undertaken with the following specific objectives

1. Analysis of perception of farmers and farm labourers on the socio-economic impact of mechanisation in paddy group farming
2. Group dynamics factors that contribute to implementation of mechanisation through Padasekara Samithies
3. Challenges faced in continuing mechanisation in paddy group farming.

The salient features of the study are summarized and presented below :

Profile characteristics of the respondents

- It could be observed that the majority of the paddy farmers (85.8 per cent) belonged to the old aged group which is above 55 years followed by 14.2 per cent of farmers under the middle age category(36 – 55 age)
- Most of the farmers were male (75 %). Among the laborers 50 percent of the respondents were females.
- Majority of the farmers (44%) had highschool education, while majority of the labourers (35%) had secondary education.
- 90 percent of the farmers were cultivating paddy in their own land, while 21 percent of the farmers had leased out a part of their land.
- Majority of the farmers (39%) had land area of 1-2.5 acre.
- 73 percent farmers followed farming as their only source of income, 27 percent of the farmers had non-farm activities too along with farming.
- Most of the farmers and labourers i.e 79 percent and 50 percent, fell in the medium category of extension contact
- 19.2 percent of the farmers were having higher social participation as they have membership in *Padashekhara samithies,* cooperatives, milk cooperatives

etc. Maximum of the farmers and labourers belonged to the medium category of social participation.

- Only 10 percent of the farmers is having higher achievement motivation, while majority of the farmers had medium level (40%) of achievement motivation
- Most of the farmers (71.7%) fell under medium category of self confidence while 22.5 percent of the labourers comes under high level .
- 17.5 percent of the farmers falls under high scientific orientation category, while 22.5 percent of the labourers is having high scientific orientation.
- Only 15.8 percent of the farmers had favourable attitude towards collective approach, while 27.5 percent of the labourers were having favourable attitude towards collectivism

Perceived Socio-economic impact of mechanisation in paddy group farming

- 69 percent of the farmers belonged to the medium level category of the impact index while 18.3 percent of them perceived a low socio-economic impact of mechanisation. An overall impact index of 52.74 is obtained for farmers. The impact of mechanization on factors of time spend on farming and livelihood gained higher score, 66.73 and 60.28 respectively
- 22.5 percent of the labourers perceived a higher impact due to mechanization while majority (57.5%) of them belonged to the medium category. An overall impact index of 57.5 is obtained for labourers. Drudgery reduction and employment gained were perceived as the major impact factors of paddy mechanisation among agricultural labourers.

Group dynamics index of the respondents

- Maximum mean score is obtained for Group leadership and decision making among the paddy farmer groups. Lowest mean score is obtained for the group atmosphere as it gets affected by various political and psychological reasons. Overall GDI of paddy farmer groups was found to be 60.3.
- Group cohesiveness and participation were the two group dynamics factors that gained higher mean score, 51.3 & 49.1 respectively for the labour groups. The overall GDI of labour groups was 57.43.

- The results of Spearman's Correlation of independent variables with socio-economic impact index showed that area under paddy cultivation, annual income, extension contact, extent of mechanisation, innovativeness and attitude towards collectivism had positive and significant correlation with the perceived socio-economic impact index of farmers. Age is found to have a negative correlations with the perceived impact index.
- Training received, annual income, extension contact, scientific orientation and attitude towards collectivism had positive and significant correlation with perceived socio-economic impact index in the case of labourers.

Challenges faced by farmers and labourers due to mechanisation in paddy group farming

- Shortage of timely and locally available skilled labour at cheaper rate to operate the machines available with *Padasekhara Samithies*
- Climatic vagaries and lack of availability of the machine suitable to the land conditions.
- Higher cost of spare parts of machines for repair and maintenance is the major challenge among labour groups
- Labourers need to improve their skills in repair and maintenance of machines.

Suggestions for improving the impact of paddy mechanisation

- Even though labour banks are functioning in various localities, they are not sufficient. More labour groups are to be mobilised to ensure adequate and timely supply of locally available skilled labour for paddy mechanisation. This would help to utilise many machineries owned by the farmer groups and also reduce the cost of mechanisation.
- Timely repair and maintenance of locally available machineries for its utilization.
- More suitable machinery for the local land conditions is also to be developed.
- Continuous training for skill improvement of labourers and group dynamic factors are important in sustaining efficient labour groups for paddy mechanization.

Suggestions for future line of research

- To generalize the findings, similar research can be conducted in other districts of Kerala, especially in Kuttanad area, with a larger sample size.
- Impact assessment studies can be conducted by comparing pre and post implementation of mechanization programmes.

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Chapter 6
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Appendices

APPENDIX I

KERALA AGRICULTURAL UNIVERSITY

College of Agriculture,

Vellanikkara, Thrissur – 680651

Dr. Smitha baby

Assistant professor

Dept. of. Agricultural Extension , CoA Vellanikkara

Vellanikkara

Date: _ - _ -23

Sir/ Madam,

Sub: PG Education – M.Sc. Research Project – Judges opinion requested – regarding

I would like to bring your kind notice that Mr. Sreejith K J (Ad. No. 2020-11-079) is committed to undertake a research study as part of his Post Graduate programme entitled "**Socio-economic impact of mechanisation in paddy group farming**" under my guidance.

The objective of the study is to analyse the perception of farmers and farm labourers on the socio-economic impact of group farm mechanization in paddy cultivation. Further it will delineate the group dynamics factors that contribute to implementation of mechanization through *Padasekara Samithies* and explore the challenges faced in continuing mechanization in paddy.

For this purpose, based on the available literature, the student has listed out a number of personal, social, psychological and economic variables which might have influenced the socio-economic impact of mechanisation.

Hence, I request you to kindly spare some time from your busy schedule to rate the listed variables by putting a tick mark (✓) in the appropriate column. You can also suggest variables which you feel important for the study and also rate them under the appropriate column. Your kind and quick response will help us to complete the study in time.

Thanking you

Yours faithfully,

Sd/-

Smitha Baby

Socio-economic impact of mechanisation in paddy group farming

Objectives:

4) Analysis of perception of farmers and farm labourers on the socio-economic impact of group farm mechanization in paddy cultivation;
5) Delineation of group dynamics factors that contribute to implementation of mechanization through *Padasekara Samithies* and
6) Explore the challenges faced in continuing mechanization in paddy.

Following independent variables are identified for the study: Please (√) mark the relevancy of the variables in the study in terms of MOR- Most Relevant, MR- More Relevant, R-Relevant, LR- Least Relevant and NR- Not Relevant against the appropriate column:

INDEPENDENT VARIABLES

S.No.	Variables	MOR	MR	R	LR	NR
1	**Age:** Refers to the number of calendar yearscompleted by the farmer at the time of interview					
2	**Gender:** It refers to social or cultural distinctionsassociated with being male or female.					
3	**Area under cultivation** : It refers to the total area of paddy cultivation of the farmers					
4	**Annual income** : Refers to the total income he obtained through paddy cultivaton or as a labourer					
5	**Education:** Refers to the extent of literacy obtained at the time of interview					
6	**Scientific orientation:** Refers to the degree to which a farmer/labourer is relatively ready to adopt scientific ideas					
7	**Training received :** Trainings received to farmers or labourers related to mechanization					

8	**Risk orientation:** Refers to the degree to which the farmer/labourer is oriented towards the risks and uncertainty in adopting new ideas in farming or mechanization					
9	**Household income:** It is the total income earned by all the members of a family from major and subsidiary occupational components.					
10	**Innovativeness:** Refers to the degree to which the farmer is relatively earlier in adopting new ideas					
11	**Information seeking behavior:** Refers to the degree to which the farmer is seeking information from different communication sources					
12	**Mass media exposure:** Refers to the degree to which the different mass media are utilized by the individual for getting information					
13	**Self-confidence:** Defined as the extent of feeling about one's own powers, abilities, and resourcefulness to perform any activity which the farmer desires to undertake					
14	**Occupational status:** Refers to whether paddy cultivation by farmer or agricultural labourer is their chief occupation or not					
15	**Social participation:** Refers to the degree of involvement of individual in formal and informal social organizations either as member or as office bearer which also includes the extent of participation in organizational activities					
16	**Extension contact:** Refers to the extent of contact of individual has with different extension agencies and also his participation in various extension activities or programmes like meetings, seminars, etc.. organized by these agencies					

17	**Cosmopoliteness:** Refers to the tendency of an individual to be in contact with outside village on the belief that all the needs of an individual cannot be satisfied within his own village					
18	**Economic motivation:** Refers to the drive of the farmer for occupational sources in terms of profit making and the relative value placed on economic ends					
19	**Experience in paddy cultivation** : Refers to the no of years of experience in doing farming.					
20	**Attitude towards collectivism** : Refers to the attitude of individuals towards the group/collective approach to carry out tasks					
21	**Extent of mechanization :** The degree to which farmers do mechanization for various practices in the field					
22	**Achievement motivation :** It refers to an individual's ability to building up their skills and behaviors so that they can tap into their highest potential					
23	**Environmental orientation:** Refers to the degree to which the farmer is concerned about hisenvironment					
24	**Leadership:** It is defined as the ability of a person to influence people to cooperate in achieving a goal					
25	**Credit orientation:** Refers to the favourable and positive attitude of a vegetable grower towards obtaining credit from institutional sources					
	Other variables, if any please specify and explain					

Name

Signature

Designation

Relevancy indices of independent variables

Sl. No.	Variables	Relevancy indices
1	Age	86.26*
2	Gender	86.07*
3	Experience in paddy cultivation	81.23
4	Credit orientation	80.16
5	Educational status	91.33*
6	Scientific orientation	91.43*
7	Leadership	80.00
8	Area under paddy cultivation	89.73*
9	Risk orientation	91.66*
10	Annual income	92.25*
11	Innovativeness	89.43*
12	Information seeking behaviour	70.22
13	Mass media exposure	79.33
14	Self-confidence	86.72*
15	Occupational status	87.13*
16	Trainings received	94.36*
17	Environmental orientation	63.03
18	Social participation	85.83*
19	Extension contact	93.33*
20	Cosmopoliteness	70.42
21	Economic motivation	86.36*
22	Household income	81.16
23	Achievement motivation	86.35*
24	Extent of mechanisation	92.61*
25	Attitude towards collectivism	89.87*

*** Variables selected for the study**

APPENDIX II

KERALA AGRICULTURAL UNIVERSITY
College of agriculture
Vellanikkara, Thrissur – 680651

Department of Agricultural Extension
Socio-economic impact of mechanisation in paddy group farming

INTERVIEW SCHEDULE FOR THE PADDY FARMERS

District: Palakkad Block: Panchayat:

Date:

A. Personal characteristics

1) Name of the respondent:

2) Contact :

3) Age :

4) Gender : ☐Male ☐Female

5) Education : (Tick the appropriate row)

Sl no	Category	
	Primary Education	
	Secondary Education	
	High school Education	
	Higher secondary education	
	Graduation and above	

6. Occupation: (Tick any of the following)

☐Farming ☐Farming + Labourer ☐Farming + Non farm Activities

7. Training received:

Whether you have undergone any type of training related to mechanisation : ☐Yes ☐No,

If Yes,

Sl. No.	Training Details/Organizer
A	
B	
C	

8. Crops and allied enterprises possessing

Sl. No	Crops and allied enterprises	Area (in Acres)
1	Rice	
2	Other Crops	
3	Livestock	
4	Others:	

9. Annual income: Please state your source-wise annual income in Rs.

Sl No	Income from	Rupess
1	Income from agriculture	
2	Income from labour	
3	Income from Non-farm activities	
4	Income from any other sources Mention: _____	

10. Area under paddy cultivation (Tick the respective row)

Sl. No	Area	
1	Less than 50 cents	
2	50-100 cents	
3	1-2.5 acres	
4	2.5-3 acres	
5	>3 acres	

11. Paddy Cultivation

Sl. No	Paddy cultivation	Area (Acres)
1	In his own land	
2	In land given on lease	
3	In land taken on lease	

13. Machineries possessing : ☐Own machine ☐Group owned ☐Both

Specify :

14. Machineries adopted in the field

☐ Tractor ☐Transplanter ☐ Combined Harvester ☐ Thresher ☐ Bailer

☐ Conoweeder ☐Sprayer

Others :

16.After mechanisation the yield of rice has been significantly increased. ☐Yes ☐No

If yes, percent increase : _____%

18. Labour cost saving was possible after mechanization . ☐Yes ☐No

If yes, percent saved : _____%

19. Income level has been increased after mechanization ☐Yes ☐No

If yes, Percent increase: _____%

B) Social charecteristics:

20. Social participation

Do you participate in the activity of any organization : ☐Yes ☐No

If yes please tick mark the relevant column

Organization / Institution	Frequency of meeting		
	Regularly	Occasionally	Never
Padashekharasamiti			
Gram panchayat			
Milk co-operatives			
Farm cooperatives			

21. Extension contact:

Sl.No	Extension agency	Frequency of meeting		
		Weekly	Occasionally	Never
1	Agriculture officer			
2	ATMA			
3	KVK/University scientist			
4	Master farmer			
5	Private agencies			

C. Psychological characteristics

22. Economic motivation:

Sl No	Statements	SA	A	UD	D	SD
1	A farmer should work towards more saving and economic profit					
2	A farmer should invest in any new income generating activity which could earn more money					
3	It is difficult for the farmer to make good start unless he/she is provided with good economic assistance					
4	The most important thing in life cannot be defined on economic status					

23) Achievement motivation

Sl No	Statements	SA	A	UD	D	SD
1	One should work hard at everything until he/she is satisfied with the result					
2	One should strive hard to succeed in his occupation despite of many challenges					
3	One should have determination to achieve certain things in life					
4	Work should come first more than rest					
5	One should set goals for one self and try to reach them					

24) Innovativeness

Sl No	Statement	SA	A	UD	D	SD
1	I want to learn new ways of enterprise management					
2	I d like adopt an improved practice in farm as soon as it is brought on my knowledge					
3	I prefer to wait and take my own time to adopt an improved practice					
4	A steady or regular job is good for a person					
5	It is too risky to try new ways to sustain the enterprise					

25) Self confidence

Sl No	Statement	SA	A	UD	D	SD
1	I feel no obstacle can stop me from achieving my final goals					
2	I am generally confident in whatever 1 do					
3	I am not interested to do things at my own initiative					

4	1 usually work out things myself rather than to get someone to show me					
5	I find myself worrying about something or the other					

26) Scientific orientation

Sl No	Statement	SA	A	UD	D	SD
1	New methods of farming give better result than the old method					
2	The way of farming by our forefathers is the best way of farming even today					
3	Even a farmer with a lot of farming experiences should use new methods of farming					
4	Though it takes much time for a farmer to learn new methods in farming it is worth the efforts					
5	Traditional methods has to be changed in order to raise the standard of living of the farmer					

27) Risk orientation:

Sl No	Statement	SA	A	UD	D	SD
1	A farmer should try mechanization practices only after the same have been successfully used by other farmers					
2	Trying an entirely new practice in farm mechanization involves risk but it is worth					
3	Management of mechanization of the farm is risky					

28) Attitude towards collectivism

Sl No	Statement	SA	A	UD	D	SD
1	Collective work has made significant improvement in the economic condition of the member					

2	Group farming promotes mutual cooperation and solves problems of the members					
3	Group farm mechanisation is for name sake and has nothing new to offer					
4	Groups make more effective discussions and solve problems more efficiently than individuals					
5	Marginal skills of people will be enhanced through collective approach					

D. Group dynamics indicators

1. Participation

Sl No	Statement	SA	A	UD	D	SD
1	All members are involved in the group activities					
2	I participate actively in group meeting and other activities					
3	I feel that the members are not interested and enthusiastic to participate in group activities					
4	I feel that the members are verbally and physically active in all group undertaking					
5	I usually remain silent in any discussion concerning the group					

2. Team work

Sl No	Statement	SA	A	UD	D	SD
1	The group works as team in all activities					
2	There are individuals in your group who insist on putting on their own show at the expense of the group					
3	I feel that the combined effort of the group brought much success					
4	I prefer to work alone without the help of my group members					

5	The leader guides the members and lead them as a team					

3. Group atmosphere

Sl No	Statement	SA	A	UD	D	SD
1	I prefer a friendly and congenial atmosphere in our group					
2	Everyone is given freedom to express the ideas, to agree and disagree					
3	I feel that the environment is not at all made comfortable for the slow shy people to come out and participate in group task					
4	Its not possible to suppress conflicts or unpleasant feelings in your group					
5	Every member was given a feeling of warm and friendly acceptance by the others					

4. Decision making procedures

Sl No	Statement	SA	A	UD	D	SD
1	I usually take decision concerning group with the involvement of other members of the group					
2	I feel that the majorities decision is valid as a part of group					
3	I feel that the members never seek my opinion in group decision					
4	Usually any group decision is taken jointly by all members in a participative manner					
5	I feel that the group takes high quality decisions all the time					

5. Group cohesiveness

Sl No	Statement	SA	A	UD	D	SD
1	I feel that the group worked well because the					

	members are attached to one another emotionally					
2	I feel dissatisfied and would like to quit the group at the earliest					
3	Members run to support each other during hardships					
4	There is unhealthy criticism and competition among the members					
5	The group members enjoy working with each other and manage any disagreement effectively					

6. Group Leadership

Sl No	Statement	SA	A	UD	D	SD
1	The group leader is sympathetic and helpful to other members in solving the problems at work and personal life					
2	The leader maintain good relation with members as well as other groups					
3	Group leader is less approachable and dependable					
4	Group leader is no control over the members and their actions					
5	Group leader maintains good contacts with all the organizations that benefit the group					

7. Interpersonal trust

Sl No	Statement	SA	A	UD	D	SD
1	I find it difficult to accept and support the ideas and decision of the majority					
2	There are too many misunderstandings among group members due to lack of faith					
3	I trust the group to rush to your aid immediately, whenever I face any problem					

4	Sometimes I rely on group members for taking certain major decision					
5	Members work towards achieving the common goals first and not for their personal					

8. Task Functions

Sl No	Statement	SA	A	UD	D	SD
1	The group used to propose solutions and suggest new ideas					
2	The group Seeks for information among the group members					
3	The group Seeks for opinion and suggestions of the other members					
4	The group Coordinates towards generating ideas and carrying out activities together					
5	The group test the feasibility before application of any nee idea					

9. Achievements of group

Sl No	Statement	SA	A	UD	D	SD
1	The group has participated actively in community asset generation					
2	The group has empowered members socially and economically after forming into Groups					
3	The group has put in a lot of efforts to raise the financial status of its members					
4	The group has put in a lot of efforts to raise the financial status of its members 5 The group has adopted new technology and novels designs to produce better quality product					

E. Socio-economic impact of mechanization among paddy farmers

1. Impact on savings in time spend on farming activities

Sl No	Statement	SA	A	UD	D	SD
1	The working hours per day in the field has decreased due to mechanization					
2	Farmers could find time to spend on non-farm activities too					
3	Timely management of farming activities could be done after mechanization					
4	I prefer to continue with mechanisation as it provides us some leisure time					
5	Uniformity in cropping stage is possible throughout the Padasekharam due to mechanisation					

2 Impact on land cultivated/ Increase in land area

i). I could take land on lease and started cultivating paddy ☐Yes ☐No

ii). I could extend paddy cultivation to additional area ☐Yes ☐No

iii). Fallow land could be converted to cultivable land through mechanisation ☐Yes ☐No

Mention area converted: _____acre

3. Impact on livelihoods

Sl No	Statement	SA	A	UD	D	SD
1	Due to mechanisation paddy farming is continued to be my major source of income					
2	I had substantial improvement in farm income after mechanization					
3	There has been an improvement in general economic wellbeing of my family (being healthy, happy, or prosperous) due to paddy mechanization					

4	More marketable surplus could be attained through mechanization					
5	I am able to undertake non-farm activities alomg with farming because of mechanisation					

4. Impact on knowledge gained on benefits of paddy mechanisation

Sl No	Statement	SA	A	UD	D	SD
1	Timely planting could be achieved through mechanisation					
2	Improved plant population density could be achieved through mechanization					
3	Fertilizer management could be done at ease through mechanization					
4	Better & efficient post harvesting is possible through mechanization					

5. Impact on access to assets (machineries for mechanisation)

Sl No	Statement	SA	A	UD	D	SD
1	Better access to machineries is possible as mechanization was done through padashekare samithies					
2	Machines could be availed on time as the mechanisation is done for the whole farm group					
3	Easy availablility of farm labourers for mechanisation is possible on time					
4	I don’t have to bother regarding repair and maintenance of machines used					

6. Impact on post harvest handling and marketing

Sl No	Statement	SA	A	UD	D	SD
1	Better pricing of goods is possible after mechanization through paddy group farming					
2	Reduced economic losses due to better post harvest handling is possible after mechanization					
3	Selling the goods to supplycco become more feasible after the introduction of mechanization					
4	Losses due to natural disasters could be reduced					

7. Impact on savings in cost of cultivation

Sl No	Statement	SA	A	UD	D	SD
1	Cost effective operations could be carried on as the mechanization is done for the whole padashekaram					
2	Hiring of permanent labour is no longer required for carrying out agricultural operations					
3	Mechanisation for an individual piece of land was not possible and costly, before the introduction of mechanization through group farming					
4	Padashekara samities have been allotted with some machineries under various schemes, and thus reduces the extra cost of hiring the machines.					

20. Challenges in mechanization for farmers in paddy group farming

Sl. No	Challenges	Rank
1	Lack of timely availability of skilled labour at cheaper rate	
2	Less & timely availability of machinery	
3	Fragmented land holdings	
4	Climatic vagaries affecting mechanization	
5	Machine failure in the field	
6	Poor group dynamic factors	
7	Less extension support	

Other challenges :

APPENDIX III

KERALA AGRICULTURAL UNIVERSITY
College of Agriculture
Vellanikkara, Thrissur – 680651

Department of Agricultural Extension

Socio-economic impact of mechanisation in paddy group farming

INTERVIEW SCHEDULE FOR THE PADDY LABOURERS

District: Block: Panchayat:

Date:

A. Personal Characteristics

1) Name of the respondent:

2) Contact

3) Age :

4) Gender: ☐ Male ☐ Female

5) Education : (Tick the appropriate row)

Sl No	Category	
	Primary Education	
	Secondary Education	
	High school Education	
	Higher secondary education	
	Graduation & Above	

6. Occupation: (Tick any of the following)

☐ Labourer ☐ Labourer + Farming ☐Labourer + Non farm Activities

☐ Labourer + Farming + Non farm Activities

7. Training received:

Whether you have undergone any type of training related to mechanisation : Yes / No,

If Yes,

Sl. No.	Name of training	Duration
A		
B		
C		

13. Machineries possessing : ☐ Own machine ☐ Group owned ☐ Both

Specify :

8.Skills learned

☐ Operational Skills ☐ Machine repair & Maintenance skills

9. Training received for

☐Ploughing ☐Harvesting ☐Bailing ☐Weeding ☐Spraying ☐Transplanting

10. Mechanisation done for

☐Ploughing ☐Harvesting ☐Bailing ☐Weeding ☐Spraying ☐Transplanting

Others (Specify) :

9. Crops and allied enterprises possessing

Sl. No	Crops and allied enterprises	Area (in Acres)
1	Rice	
2	Other Crops	
3	Livestock	
4	Others:	

10. Annual Income: Please state your source-wise annual income in Rs

Sl. No	Income	Rupees
1	Income from Agriculture	
2	Income from Labour	
3	Income from Non-farm activities	
4	Income from any other sources Mention: _____	

16. No of employment days in an year : _____ days

17. Income level has been increased after mechanization ☐Yes ☐No

If yes, Percent increase: _____%

19.I could reduce the drudgery after practicing farm mechanization ☐Yes ☐No

If yes, Percent decrease: _____%

B) Social charecteristics:

20) Social participation

Do you participate in the activity of any organization : ☐Yes ☐No

If yes please tick mark(v/) the relevant column

Organization / Institution	Frequency of meeting		
	Regularly	Occasionally	Never
Village panchayats			
Labour co-operatives			
Milk co-operatives			
Farm cooperatives			

21. Extension contact:

Sl.No	Extension agency	Frequency of meeting		
		Weekly	Occasionally	Never
1	Agriculture Officer			
2	ATMA			
3	KVK/University scientist			
4	Master farmer			
5	Private agencies			

C. Psychological characteristics

22. Economic Motivation:

Sl No	Statements	SA	A	UD	D	SD
1	A farm labourer should work towards more saving and economic profit					
2	A farm labourer should invest in any new income generating activity which could earn more money					
3	It is difficult to make good start unless he/she is provided with good economic assistance					
4	The most important thing in life cannot be defined on economic status					

23) Achievement motivation

Sl No	Statements	SA	A	UD	D	SD
1	One should work hard at everything until he/she is satisfied with the result					
2	One should strive hard to succeed in his occupation despite of many challenges					
3	One should have determination to achieve certain things in life					
4	Work should come first more than rest					
5	One should set goals for one self and try to reach them					

24) Innovativeness

Sl No	Statement	SA	A	UD	D	SD
1	I want to learn new ways of enterprise management					
2	I d like adopt an improved practice in farm as soon as it is brought on my knowledge					
3	I prefer to wait and take my own time to adopt an improved practice					
4	A steady or regular job is good for a person					
5	It is too risky to try new ways to sustain the enterprise					

25) Self confidence

Sl No	Statement	SA	A	UD	D	SD
1	I feel no obstacle can stop me from achieving my final goals					
2	I am generally confident in whatever 1 do					
3	I am not interested to do things at my own initiative					
4	1 usually work out things myself rather than to get someone to show me					
5	I find myself worrying about something or the other					

26) Scientific orientation

Sl No	Statement	SA	A	UD	D	SD
1	New methods of farming give better result than the old method					
2	The way of farming by our forefathers is the best way of farming even today					
3	Even a farmer with a lot of farming experiences					

	should use new methods of farming					
4	Though it takes much time for a farmer to learn new methods in farming it is worth the efforts					
5	Traditional methods has to be changed in order to raise the standard of living of the farmer					

27) Risk orientation:

Sl No	Statement	SA	A	UD	D	SD
1	A farm labourer should try farm mechanization practices only after the same have been successfully used by others					
2	Trying an entirely new practice in farm mechanization involves risk but it is worth					
3	Management of mechanization in the farm is risky					

28) Attitude towards collectivism

Sl No	Statement	SA	A	UD	D	SD
1	Collective work has made significant improvement in the economic condition of the member					
2	Group promotes mutual cooperation and solves problems of the members					
3	Mechanisation could not be carried efficiently through labour groups					
4	Groups make more effective discussions and solve problems more efficiently than individuals					
5	Marginal skills of people will be enhanced through collective approach					

D. Group Dynamics Indicators

29. Participation

Sl No	Statement	SA	A	UD	D	SD
1	All members are involved in the group activities					
2	I participate actively in group meeting and other activities					
3	I feel that the members are not interested and enthusiastic to participate in group activities					
4	I feel that the members are verbally and physically active in all group undertaking					
5	I usually remain silent in any discussion concerning the group					

30. Team work

Sl No	Statement	SA	A	UD	D	SD
1	The group works as team in all activities					
2	There are individuals in your group who seeks for personal gains at the expense of the group					
3	I feel that the combined effort of the group brought much success					
4	I prefer to work alone without the help of my group members					
5	The leader guides the members and lead them as a team					

31. Group atmosphere

Sl No	Statement	SA	A	UD	D	SD
1	I prefer a friendly and congenial atmosphere in your group					

2	Everyone is given the freedom to express the ideas, to agree and disagree					
3	I feel that the environment is not at all made comfortable for the slow shy people to come out and participate in group task					
4	It's not possible to suppress conflicts or unpleasant feelings in your group					
5	Every member was given a feeling of warm and friendly acceptance by the others					

32. Decision making procedures

Sl No	Statement	SA	A	UD	D	SD
1	I usually take decision concerning group with the involvement of other members of the group					
2	I feel that the majorities decision is valid as a part of group					
3	I feel that the other member never seeks my opinion in group decision					
4	Usually any group decision is taken jointly by all members in a participative manner					
5	I feel that the group takes high quality decisions all the time					

33. Group cohesiveness

Sl No	Statement	SA	A	UD	D	SD
1	I feel that the group worked well because the members are attached to one another emotionally					
2	I feel dissatisfied and would like to quit the group at the earliest					

3	Members run to support each other during hardships					
4	There is unhealthy criticism and competition among the members					
5	The group members enjoy working with each other and manage any disagreement effectively					

34. Group Leadership

Sl No	Statement	SA	A	UD	D	SD
1	The group leader is sympathetic and helpful to other members in solving the problems at work and personal life					
2	The leader maintain good relation with members as well as other groups					
3	Group leader is less approachable and dependable					
4	Group leader is no control over the members and their actions					
5	Group leader maintains good contacts with all the organizations that benefit the group					

35. Interpersonal trust

Sl No	Statement	SA	A	UD	D	SD
1	I find it difficult to accept and support the ideas and decision of the majority					
2	There are too many misunderstandings among group members due to lack of faith					
3	I trust the group to rush to your aid immediately, whenever I face any problem					

4	Sometimes I rely on group members for taking certain major decision					
5	Members work towards achieving the common goals first and not for their personal					

36. Task Functions

Sl No	Statement	SA	A	UD	D	SD
1	The group used to propose solutions and suggest new ideas					
2	The group Seeks for opinion and suggestions of the other members					
3	The group Coordinates towards generating ideas and carrying out activities together					
4	The group test the feasibility before application of any new idea					

37. Achievements of group

Sl No	Statement	SA	A	UD	D	SD
1	The group has participated actively in community asset generation					
2	The group has empowered members socially and economically after forming into Groups					
3	The group has put in a lot of efforts to raise the financial status of its members					
4	For the efficient mechanisation the group has adopted improved technologies					

E. Socio-economic impact on labourers

1. Impact on entrepreneural behaviour

Sl No	Statement	SA	A	UD	D	SD
1	Mechanisation has helped me in setting up service oriented startups/processing firm in paddy farming					
2	Realising mechansational benefits, paved way for me to become a paddy cultivator					
3	Agricultural mechanisation is a profitable business emterprise					

2. Impact on employment

Sl No	Statement	SA	A	UD	D	SD
1	Mechanisation gives me opportunity to continue as a farm labourer					
2	I could manage myself being as a farm labourer and a cultivator					
3	Overall employment days increased after introducing mechanization					
4	I am able to involve in non-farm activities once the farm work is over					

3. Impact on livelihood

Sl No	Statement	SA	A	UD	D	SD
1	I am able to fulfill my family needs & requirements after mechanization					
2	I am able to lead an happy and healthy family life after getting the benefits of mechanization					
3	I was able to improve my income due to mechanization so as my standard of living					
4	Eventhough my income has increased, I was unable to meet up with my expenses					

4. Impact on income

Sl No	Statement	SA	A	UD	D	SD
1	My family income enhanced considerably after adopting mechanization					
2	Wage rate has improved due to need for skilled work due to mechanization					
3	I was able to generate income even in the off season as I could involve in non farm activities					
4	Seasonal and uniform operations for a larger area has helped the farm work easy and could generate more work and greater income					
5	I could pursue both the farm and non-farm activities seasonally and significantly gets returns from that.					

F. Challenges in mechanisation for labourers in paddy group farming

Sl. No	Challenges	Rank
1	High cost of spare parts of machines and higher maintenance cost of machines	
2	Lack of appropriate machines	
3	Higher cost of machinery	
4	Climatic vagaries affecting mechanization	
5	Lack of training in skill improvement	
6	Low amount of govt. subsidies for machinery	
7	Lack of proper institutionalization of the group	

Other challenges :

Appendix IV

Weightage of group dynamics factors of farmers and labourers

Indicator	Weightage of farmers	Weightage of labourers
Participation	2.34	4.68
Team work	2.13	3.12
Group atmosphere	1.69	2.79
Decision making process	4.25	2.24
Group cohesiveness	2.51	2.45
Group leadership	3.41	3.12
Interpersonal trust	1.76	1.89
Task function	2.27	1.75
Achievement of the group	2.10	2.21

Appendix V

Weightage of perceived socio-economic impact of mechanization for farmers

Sl No	Perceived impact factors of farmers	Weightage
1	Time spend on farming activities	3.56
2	Livelihood	2.61
3	Access to assets	2.74
4	Yield	4.45
5	Income	2.37
6	Post-harvest handling benefits	2.13
7	Knowledge gained on benefits of paddy mechanization	3.10
8	Savings in cost of cultivation	1.72
9	Increase in area	1.86

Weightage of perceived socio-economic impact of mechanization for labourers

Sl.No	Perceived impact factors	Weightage
1	Drudgery reduction	2.87
2	Employment	4.12
3	Income	3.41
4	Entrepreneurial initiatives	2.65
5	Skills gained	1.98
6	Livelihood	2.27
7	Asset creation	1.79

SOCIO-ECONOMIC IMPACT OF MECHANISATION IN PADDY GROUP FARMING

By

SREEJITH K J

2020-11-079

ABSTRACT OF THE THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Science in Agriculture

Faculty of Agriculture

Kerala Agricultural University, Thrissur

DEPARTMENT OF AGRICULTURAL EXTENSION EDUCATION

COLLEGE OF AGRICULTURE VELLANIKKARA,

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KERALA, INDIA

2023

Abstract

Rice is a labour-intensive crop which requires a work-concentrated harvest. Farm mechanization is one of the important ways to overcome this situation. Paddy cultivation needs appropriate mechanisation to cope with the increased cost of cultivation due to high wages and scarcity of labourers. The mechanization through group farming approach, resulted in retention of paddy area and the cultivation of some barren land various regions. Through the group farming approach the authorities were successful in identifying production constraints in various areas and regions and developing separate productivity-boosting packages.

Over the past ten years, there has been a major emphasis on mechanization of paddy cultivation in the villages across Kerala, including Palakkad. An institutional arrangement based on collective organisation has overcomed the twin problems of labour shortage and lack of capital investment in machinery faced by small farmers. These collective ventures based on partnerships of farmers and labourers had the full support of the State government. Local governments are also providing financial support to purchase various machines as part of the mechanization drive in paddy cultivation. All these efforts have resulted in various socio-economic benefits to the paddy cultivators in Kerala. Hitherto few attempts has been made in the State to assess the socio-economic impact of rice mechanisation on farming community and hence the present study is attempted.

The current study entitled “Socio-economic impact of mechanisation in paddy group farming” was conducted in Palakkad district which was selected purposively as it has its maximum area under rice cultivation in Kerala and also owing to the presence of different types of successful group farm mechanisation interventions in paddy. Data were collected among 120 farmers and 40 farm labourers randomly from the *Padasekhara Samithies /labour banks* where mechanization is practiced, to constitute a total sample size of 160 respondents. Respondents has been selected by multistage sampling method among the two blocks i.e Alathur and Chittur which representing maximum area of paddy cultivation and where different rice mechanization programs implemented

The study results showed that majority of the farmers (85.8%) belonged to the old age category (>55 years) while majority (87.5%) of the labourers belonged to the middle aged category (35-55 years). A large proportion of the farmers is having high school education, while majority of the labourers is having secondary education. The study results showed that the average size of area under paddy cultivation is 2.97 acres. The group dynamics effectiveness index of farmers and labourers following the Bhatt (2009) scale was also computed. The results showed that, the group leadership holds the highest percentage score (51.41%) for the farmers, while group cohesiveness holds the highest score among the labourers (51.34%). The decision making process is found to have an higher weightage since that the decision is to be followed by all the members in the group.

Perceived Socio-economic impact Index of mechanisation in paddy group farming for each individual has been obtained. It could be concluded that majority of the paddy farmers (69%) had a medium impact due to mechanization while 18 percent of them had only low impact. While majority (57.5%) of the farm labourers perceived medium impact due to mechanization, 22.5 percent of them perceived a higher impact. Among the farmers the highest percentage score (66.73) was gained for the impact on time spent on farming. From the results it could be concluded that impact on drudgery reduction and employment gained were perceived as the major impacts of paddy mechanization among the labourers.

The profile charecteristics of farmers and labourers was analysed using the spearman correlation. The results inferred that, there exists a positive significant relationship between annual income, extension contact, innovativeness, area under paddy cultivation with the perceived socio-economic impact index. Age is found to have a negative and significant correlations with the perceived impact index. The independent variables viz. training received, annual income, extension contact, scientific orientation and attitude towards collectivism had positive and significant correlation with perceived impact index in case of labourers. A significant and positive correlation between GDI and Perceived Socio-economic impact index indicates that better group dynamics among the members of Padasekharam as well as labourer groups play a critical role in paddy mechanization

The challenges faced by the farmers and labourers for mechanisation in paddy group farming was analysed using garrett ranking. Eventhough the mechanisation is adopted in almost every Padasekharams, Lack of timely and local availability of skilled labour at cheaper rate to operate the machines available with Padasekhara Samithi. Higher cost of spare parts of machines for repair and maintenance is the major challenges among labourers. Majority of the labourers still needs to improve their skills in repair and maintenance of machines.