



RESEARCH REPORT ON

INSTITUTIONAL INNOVATIONS IN RESPONSE TO AGRARIAN MARKET CONSTRAINTS:

A COLLECTIVE CASE STUDY



Centre for Agrarian Studies
National Institute of Rural Development and Panchayati Raj
Ministry of Rural Development, Government of India
Rajendranagar, Hyderabad

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Dr. Surjit Vikraman

INSTITUTIONAL INNOVATIONS IN RESPONSE TO AGRARIAN MARKET CONSTRAINTS: A COLLECTIVE CASE STUDY

1. INTRODUCTION

Agriculture in India supports livelihoods of more than 60 per cent of the population. Hence, any transformation in the rural economy has to focus on strategies and interventions in the agriculture sector. There have been several policies and programmes in the recent past aimed at addressing various constraints in agricultural sector and equip them to face the challenges for sustainable rural transformation. Despite significant gains on production and productivity front, agriculture sector suffers from several constraints, primarily due to factor and product market distortions. These market imperfections and absence of appropriate policy mechanisms to address these constraints results in low levels of returns to cultivators and landless agricultural labourers. Several policy measures and reforms have been adopted to address these distortions and market imperfections. There is a significant change in the analytical framework that studied the role of agriculture production systems in sustainable rural transformation. A major change has been the shift in understanding the performance of agriculture sector based purely on economic parameters of productivity and efficiency, to its contribution to various ecological factors that has significant role in sustainable natural resource management and addressing the challenges of climate change. This increased the complexity of analysis of agricultural production systems and design meaningful interventions for sustainable rural transformation. The need of the hour is to build inclusive and sustainable institutional infrastructure that can address these agrarian market constraints. This will facilitate the process of rural transformation and improve rural livelihoods.

There are several innovative institutional mechanisms that have emerged to address these constraints. They have succeeded to an extent –though not able to find a complete solution- in improving these imperfections and provide support to communities through improvements in their livelihoods. Among them, two innovative institutions, which evolved in the state of Kerala stand unique. The first one, broadly termed as “Green Army” was formed in Thrissur district, Kerala, to address the constraint of labour shortage, and consequently higher cost of labour input for rice cultivation. The second one worth mentioning is that of an institutional innovation to address the output market constraints among rice growers. They formed a farmer’s group, and organised the forces of production, and actively intervened in the output market by launching their own product after processing. The Mayyil Rice Producer’s Company has made significant impact in the rice cultivation in a small village in Kannur district of Kerala, reviving the cultivation, promoting utilisation of traditional varieties as well as ensuring remunerative price for producers. It is important to study these institutional innovations, in terms of the process of formation, market imperfections it has addressed, inclusiveness of these institutions and their long-term sustainability.

The present study will focus on analysing the two selected institutional innovations in the State of Kerala in terms of the process of formation, its structure and composition, linkages with the existing institutional framework and the improvements in agrarian market constraints. The study will adopt an Institutional Analysis and Development (IAD) framework for analysing various dimensions of the institutional innovations. The insights and conclusions from the study will help in formulating appropriate policies, and introducing models of institutional innovations in rural areas for transforming rural livelihoods.

2. REVIEW OF LITERATURE

The study focuses on understanding the nature, characteristics and process of formation of select institutional innovations that has emerged in response to agrarian market- input and output- constraints. Hence the review of literature focuses specifically on the features of agrarian market constraints, institutional innovations to address those constraints and the theoretical frameworks and methodologies for analysing the features of these institutional innovations.

Agriculture production systems in India suffers from various bottle necks and constraints, largely due to distortions and imperfections in the factor and product markets and conducive policy environment which is inclusive and sustainable. There have been scholarly studies that address the impact of changes and distortions in the input and output markets on the cost of cultivation that affect farm business incomes and livelihoods of cultivators (Janakarajan, S, 2004; Surjit,V, 2008). The literature often focuses on imperfections in the market, which tend to affect cultivators with different sizes of holding (or belonging to different socio-economic classes) differently. Also, there is a large body of literature on imperfections and interlocking of input markets, specifically on the differential access of small cultivators and large cultivators to credit, fertilizer, irrigation and, extension services.

Lipton and Longhurst (1989) documented three factors on account of which small farmers received lower prices for their output than large farmers. First, a time-lag in the adoption of technologies between small and large farmers gave the latter an initial advantage. Secondly, large farmers were more able to store their output and sell it when prices increase in the lean season. Thirdly, large farmers received higher prices due to higher volumes of sale and lower transportation costs.

Harriss-White (2004) presents empirical evidence against the common wisdom that poor peasants are no longer at a disadvantage with respect to use of fertiliser. Using data from a village level-study in Tamil Nadu in 1993-94, she argued that non-price factors continued to be important in determining use of fertiliser. There is a large body of literature on the impact of the withdrawal of the policy of social and development banking after 1991 on the debt profiles (and consequently incomes) of the rural population (see the contributions to Ramachandran and Swaminathan 2005). Among various inputs, availability and access to credit for agricultural production (particularly formal credit) remains a major constraint affecting the production process and returns from cultivation. The distortions in rural credit market and issues related to inclusiveness of formal credit mechanisms with respect to various categories of cultivators, affects profitability of crop production resulting in low levels and unequal distribution of rural incomes (Ramachandran and Swaminathan, 2005). Such distortions in the factor and product markets vary widely across geographies, agro-ecologies and socio-economic categories (Prakashan and Johny, 2017; Nagaraj, 1981). These market imperfections and absence of appropriate policy mechanisms to address these constraints result in low levels of returns to cultivators and landless agricultural labourers. However, although such imperfections exist in agrarian markets, state intervention is said to have lowered imperfections faced by small cultivators in various input and output markets to an extent (Bhalla and Chadha, 1983, p. 47; Sen and Bhatia, 2004, p. 225).

Although well-functioning factor and product markets are important for competitiveness and growth of agriculture sector, the institutional framework within which they interact influence the functioning of these markets. Donellan, T., Harnahan. K., and Hennessey. T, (2000) defines institutional framework as the “systems of formal laws, regulations, and procedures, and informal conventions, customs and norms that broaden, mould and restrain socio-economic activity and behaviour”. The literature on theoretical framework for institutional innovation delineates two major aspects related to institutions; the definition and composition of institutional innovation and the processes of institutional innovation (Raffaelli and Glynn, 2015). There have been institutional innovations of various structure, composition and scale that have emerged around utilisation and management of various inputs and outputs for agricultural production. These institutions that have emerged out of needs to address constraints in factor and product markets related to agricultural production varies widely in process of formation, institutional framework, organisational composition and scale of operation. A detailed review and documentation of the importance and characteristics, forms, structure and organisation of such institutions in management of land, addressing imperfections in various factor and product markets in water, other common resources, is given in (Pal,S, Mruthyunjaya, Joshi, P K and Saxena, R, 2003 and Hall.A, Clark. N, Sulaiman, R. V. 2000).

There have been several policies and programmes aimed at addressing the constraints posed by these imperfections in various agrarian markets (input and output market constraints) that define the characteristics of agricultural production systems and impact the welfare of farming community. This has resulted in several institutional innovations at different parts of the country that have tried to address various market imperfections. There have been several attempts to address these constraints by various innovations in the institutional arrangements to effectively address the constraints around land and in making the commodity value chains more inclusive. These institutional arrangements had their beginning in the form of co-operatives, and later took the form of SHGs, Group Farming Committees, Farmers Interest Groups/Clubs and several forms of farmer's organisations to address the constraints in availability and access to factors of production (Shah, 2016; Trebbin, A., Hassler, M., 2012). The formation of Farmer Producer Organisations, Self-Help Groups in various domains and various Co-operative institutions aims at addressing these constraints. Small Farmers' Organizations such as cooperatives and FPOs are expected to enhance incomes, reduce costs of input purchases along with transaction costs, create opportunities for involvement in value-addition including processing, distribution and marketing, enhance bargaining power (Welsh, 1997; Agarwal, 2010), and provide access to formal credit (Braverman et al., 1991).

In this context, given the socio-economic situation and the changing policy environments, to improve the livelihoods of small holder farmer producers they should be supported with an institutional arrangement which can; a) create scale economies through horizontal co-ordination, aggregation and marketing of output and purchase of inputs, b) improved bargaining position, c) technical support in production, identifying and prioritising buyers, prices, quantity and quality of commodities traded, d) reducing transaction costs in seeking information and organising production and marketing and e) handle uncertainties and cushion risk in production and marketing (Trebbin, 2014; Shah, 2016). Singh, S and Singh, T 2013 has extensively reviewed the experiences of new generation co-operatives (NGCs) and Co-operative companies in selected developed and developing countries. Similarly, Trebbin 2014; Trebbin and Hassler, 2012 and Singh. S and Singh. T, 2013 has analysed the socio-economic background behind the formation of FPOs and the specific constraints which FPOs were designed to address in the Indian context and concludes that the experience so far with FPOs in India have been mixed with achievements and failures. They point out that the financial performance of most of the Producer Companies was weak with most of them making losses or very low profits. However, most of the Producer Companies did benefit the members in some way or the other, like employment generation, increase in income, higher market price, dividends, fair and prompt payments and self-respect and identity for small producers.

There is an increasing recognition in the literature that the nature and performances of individuals, groups and various sectors cannot be explained purely in terms of concepts and frameworks of economic efficiencies. It was argued that the environment and incentive structure created by various institutions determine the behaviour of economic agents, and institutions are as important as markets in defining economic performance (Williamson, 1985). This approach is reflected in the new institutional economics that has gained prominence in understanding socio-economic performances of development initiatives and strategies for rural transformation. It has been used in analysing agrarian relations, understanding the management of common property resources, systems for technology transfer, access to credit, marketing infrastructure and analysing the interactions between institutions and technology which can influence economic performance (Pal, S et.al, 2003). Ruttan, 1985 defines institutions as “the rules of a society or of organizations that facilitate coordination among people by helping them form expectations which each person can reasonably hold in dealing with others. They reflect the conventions that have evolved in different societies regarding the behaviour of individuals and groups relative to their own behaviour and the behaviour of others”.

Rural institutions play an important role in bringing rural transformation by improving the socio-economic status of communities. Their role in enhancing income levels through better profitability in agricultural production is widely recognised. India has a rich tradition in several innovative institutions to manage common natural resources and sustainable agricultural production systems. However, neglect of such institutions has led to several challenges creating imperfections in the agrarian markets (NAAS, 2007). There is a growing body of literature on the role of participatory management or collective action in sustainable management of natural resources. The demands for changes in the institutional setup or institutions are induced by changes in the relative resource endowments and by technical change (Ruttan, 1985). According to Ruttan, there are demand and supply factors that result in institutional innovations. The supply of institutional innovation is largely influenced by the cost of achieving social consensus. The growing disequilibrium as a result of the changes in factor endowments, product demand and technical change serves as powerful sources of demand for institutional innovations (*ibid.*, 1985).

There are five major approaches that have been used by various scholars to study various aspects of the institutional arrangements. They are a) property rights approach, b) game theoretic approach, c) transactions cost and limited information approach of new institutional economics, d) institutional innovations and e) institutional analysis and development approach (Reddy, 2000). These approaches understand and analyse the causes and nature of formation of institutions by individuals or groups as a result of collective action. Among the various approaches, Institutional Analysis and Development Approach (IAD) elucidated by Ostrom et.al. al. 1993 adopts a multi-layered approach, in contrast to the linear approach adopted by other approaches in understanding the performance and dynamics of collective action in managing common pool resources. The IAD framework concentrates on seven important components to analyse various common pool resources and nature of collective action in managing that. They are i) attributes of physical world, ii) attributes of community, iii) rules in use, iv) action arenas including action situations and actors, v) patterns of interactions, vi) outcomes and vii) evaluative criteria (Ostrom, 2005). It integrates in its overarching frame work of analysis methodologies of case studies, personal interviews, value chain analysis and other relevant methods of social research. Since its proposition during the 1990s as an integrated approach for analysing various aspects of institutions and its role in managing and sustaining common property resources through collective action, IAD has been widely used by scholars in varied geographies and ecologies (Imperial and Yandle, 2004; Smajgl, Leitch and Lynam T (Eds.), 2009; Mishra, and Kumar, 2007; Whaley, and Weatherhead, 2014; Clement, 2010). The distinguishing feature of IAD is that it integrates the knowledge, wisdom and analytical rigour of various disciplines of social science – political science, economics, anthropology, law, sociology, psychology and other related disciplines- in analysing and thus understanding how institutions affect the incentives for individuals and their behaviour (Ostrom, 2005).

Although IAD is considered as a comprehensive methodology for studying various aspects of institutions, several scholars argue that it focuses largely on the institutional sustainability and falls short of addressing important aspects of institutional innovation and change (Reddy, 2000).

3.OBJECTIVES OF THE STUDY

This is a detailed study of two institutional innovations that have been formed in response to constraints (input and output market constraints) in the agrarian markets in the State of Kerala. The study was undertaken with the following objectives.

- a) To study and document the process of formation of such institutions and the social, and economic factors that has facilitated this process by adopting Institutional Analysis and Development framework.
- b) To study the structure and composition of the new institutions that has emerged to address the agrarian market constraints (both factor and product markets).
- c) To analyse the sustainability of such institutions, and the social contributions in terms of creation of public goods and services for stakeholders.
- d) To understand the constraints and challenges faced by these institutions in addressing the agrarian market imperfections and potential ways of overcoming these.

4. DESCRIPTION OF STUDY AREA

The study focuses on two specific cases of institutional innovations that had happened in response to an input market and output market constraint in the agriculture sector in the State of Kerala. The first institutional innovation is the formation of “Green Army” which is an institutional arrangement to perform the agricultural production practices in an irrigated rice production system in Wadakkanchery Block of Thrissur district in Kerala. It also serves as an institution to protect the welfare, and ensure a decent standard of living through creation of employment opportunities for agricultural labourers in the region, who are the most vulnerable sections of the society. The second institutional innovation is a farmer’s group which has organised themselves into a Farmer Producer Organisation to sustain agricultural production and protect the livelihoods of households dependent on them. The Mayyil Farmer Producer Company in Mayyil Panchayat of Kannur district of Kerala has adopted a unique strategy of collectivisation of the agricultural operations to reap the benefits of performing operations collectively in scale, at the same time decentralising or disaggregating the output market activities. The two institutional innovations, focusing on input and output market respectively. A detailed description of the socio-economic and geographical features of the two study areas are given in the respective sections.

5. METHODOLOGY

This is a detailed study of two institutional innovations as a result of agrarian market constraints. Specifically, we are studying two institutional innovations that have emerged out of input and output market constraints. As the core focus of the study is on the nature, structure and process of formation of innovative institutions to address various market constraints, understanding the institutions in depth is very critical. Hence, we have adopted the Institutional Analysis Development (IAD) framework developed by Ostrom (1993) in studying various dimensions of these institutions. Within IAD, we have used the methods of analysis of secondary data and various sources of information, personal interviews, case studies, focus group discussions and value chain analysis to understand the process of institution formation, its structure and interactions with various components in the framework. The qualitative and quantitative data and information on institutions gathered through consultations with stakeholders of the selected institutions, interviews with key inform-

ants and focus group discussions.

The field work was carried out in three phases. The first phase of the field work was carried out during November 2018. In this phase we conducted, personal interviews, group discussions and interacted with the various actors engaged with the functioning of Green Army in the study area. This helped us to map the entire Value Chain of Green Army and identify the major actors in the value chain and the processes involved in the formation and functioning of the institution. The second phase of field work was carried out during February 2019. We conducted detailed interviews with the support of a semi-structured questionnaire to gather data and information related to the objectives of the study from various individuals who are part of Green Army and representatives of institutions engaged in functioning of this institution. The third phase was conducted during October 2019, primarily to validate the findings and to understand the continuity of activities of Green Army, its sustainability and prospective activities in the background of new policies and programmes in the sector.

6. KERALA'S AGRARIAN ECONOMY

Kerala's development experiences have received global recognition primarily because of the achievements in standard of living of its population, despite the stagnation in manufacturing sector. An add-on is that Kerala ranks the best in terms of Human Development Index in the country (Planning Commission, 2002)¹. Yet, Kerala's developmental initiatives continue to be questioned with its decline in primary sector and stagnation in the manufacturing sector leading to concerns around creation of sustainable livelihoods and employment opportunities to protect the achievements of the past. Along with the low level of productivity, low investment resulting in low employment rate in the economy of Kerala raise concerns about sustainable economic growth to preserve its past achievements in improving the standard of living of its population.

Since the end of 1990s, Kerala agriculture has been experiencing stagnation. The stagnation in Kerala's agriculture was visible in the reduction in the share of agriculture and allied activities in the state domestic product (SDP) from 22% in 1999-2000 to 8.83% in 2013-14. The NSSO surveys on employment and unemployment reveals that the share of agriculture and allied sectors in employment has fell down to almost half since 1983 to 2009-10. Since the mid of 1970s, there has also been a prominent fall in the area and production of food crops (GoK, 2014).

Both demand side and supply side factors have a significant role in the stagnation of Kerala's agriculture. Declining profitability resulted in farmers moving from agriculture sector. Agricultural labourers started shifting from agriculture to non-agriculture sector due to various uncertainty and insecurity attached with it, and opportunities in non-agriculture employment particularly, construction sector. There are other socio-economic factors that have contributed to this shift, primarily the role of migration for employment and remittances to the state economy in various ways. It raised the opportunity cost of land and accelerated the pace of conversion of agricultural land for non-agriculture purpose. Unfavourable cost benefit ratio, fluctuating price of farm produce, lack of skilled labour force and constraints of mechanisation strategies also contributed for the stagnation of Kerala's agriculture.

6.1 Sectoral shift in the Economy: Agriculture to Service Sector

Agriculture played an important role in Kerala's economy until mid-1980s. The emergence of employment opportunities in Middle East countries and consequent migration has driven economic prosperity fuelled by the petroleum boom in those regions in the 1970s. It brought a huge inflow of remittances to the state's economy which subsequently triggered the construction activities and non-agriculture use of land because of higher opportunity cost of land. It also led to an increase in demand of labourers in the non-agriculture sector, which raised the wage rates and increased cost of agricul-

1. Planning Commission (2002): National Human Development Report 2001, Government of India.

tural production. This in turn contributed to the declining profitability of agricultural production and the economy started shifting towards non-agriculture sector.

The stigma attached with agriculture work such as lack of dignity and social security, uncertainty in employment opportunities, low wage rates, number of working days and other benefits resulted in the shift of labourer from agricultural sector to other sectors. This situation led to the movement of agricultural labourers and farmers from cultivation to non-agriculture activities. There was a shift in the cropping pattern within the sector, from food crops to commercial crops (particularly perennial crops) due to higher profitability. The improved standard of living and higher consumption expenditure in the state resulted in shifting of people from agriculture to other sector due to its low profitability, and better opportunities in construction sector, industrial production and service sector.

These structural changes in the economy have given rise to several agrarian market constraints, both in factor and product markets, and these have significantly affected agricultural production in the State. However, the role of agricultural production and its importance in ensuring food and nutritional security to the population is very much vital to sustain the developmental achievements of the State. With this objective, several policies and programmes have been initiated by the State to revive the agricultural sector and sustain growth to ensure welfare of those dependent on them. Several institutions have emerged in response to these agrarian market constraints with the support of the State, PRIs, civil society and people's participation. Such initiatives to an extent addressed some of the constraints and have given a ray of hope for revival of agricultural sector in the State.

It is in this context of a declining importance of agriculture sector in Kerala's economy, and the emergence of various constraints in the factor and product markets in agricultural production, that this study on certain institutional innovations to address these challenges is undertaken.

6.2 Land Utilisation and Cropping Pattern

This section briefly describes the existing land utilisation in the State and the changes in cropping pattern over last few decades in the study areas. The change in land utilisation pattern in Kerala over the last three decades is shown in Table 1. The land utilisation pattern in the State and study districts are presented in Table 2. The most striking feature is the near stagnation of net sown area during 1980s to 1990s, which has declined during the 2000s. There has been a slight increase in the cropping intensity during the last three decades, and the extent of fallow land and other than current fallow land has remained almost the same. The land utilisation pattern is reflective of the sectoral characteristics of Kerala economy.

Table 1. Change in the land utilisation pattern in Kerala (in '000 hectares)				
No	Head of Classification	1980s-81 (%)	1990-91 (%)	2000-01 (%)
1	Total geographical area	3885 (100)	3885 (100)	3885 (100)
2	Forests	1082 (27.83)	1082 (27.83)	1082 (27.83)
3	Land put to nonagricultural use	270 (6.94)	297 (7.65)	354 (9.83)
4	Barren and uncultivable land	86 (2.21)	58 (1.5)	29 (0.75)
5	Permanent Pastures & other grazing land	5.4 (0.14)	2 (0.05)	1.6 (0.04)
6	Land under miscellaneous tree crops not included in net area sown	64 (1.65)	34 (0.89)	15 (0.4)
7	Cultivable waste	129 (3.32)	95 (2.43)	60 (1.53)
8	Fallow and other than current fallow	27 (0.7)	26 (0.68)	34 (0.87)

9	Current fallow	44 (1.12)	44 (1.14)	78(2.004)
10	Net area sown	2180 (56.1)	2247 (57.83)	2206 (56.78)
11	Area sown more than once	705 (18.15)	773 (19.9)	816 (20.99)
12	Total cropped area	2885 (74.25)	3020 (77.72)	3022 (77.77)
13	Cropping intensity	132.3	134.4	137

Source: Directorate of Economics and Statistics, 2003.

Category	Kerala Area (in Hectares)	Thrissur Area (in Hectares)	Kannur Area (in Hectares)
Gross cropped area	2584007	170978 (6.6% to Kerala)	221366(8.6%to Kerala)
Net cropped area	2015482	128469	187932
Cropping intensity	128	133	118
Land put to non-agricultural uses	441934	39026	37512
Current Fallow (up to 1 yr)	72008	9813	4069
Other fallow land (1 to 5 yrs)	55530	6031	3915
Cultivable waste	101379	10170	8405

Source: Department of Economic and Statistics, Government of Kerala

Figures in parenthesis indicates the share in per centage

6.3 Cropping pattern of Thrissur District and Wadakkanchery Block

Mythily (2006) argued that farmers' decisions play a crucial role in changes in the cropping pattern. Several factors such as price expectations, availability of labour, impact of government policies, agro-climatic situations, irrigation facilities, expected yield, cost of cultivation, and soil fertility influence cropping pattern changes. The opportunity cost of land will influence the preference of farmers to allocate their land for agricultural purposes or not, which crops to grow, how much area to allocate under each crop (Karunakaran, 2014). Parika and Narayana (1980) observed that the variety of crops to grow, and the area to be cultivated are the most critical decisions of farmers. Mani (2009) analysed different factors that influence the changes in cropping pattern of Kerala. These include the expected price of the crop, price of the competing crop, expected yield, variations in the climatic conditions, availability and efficiency of labour, cost of cultivation, irrigational infrastructure and soil productivity. A variety of price and non-price factors have a significant role in the farmer's decision regarding land allocation to various crops. Input and output prices have a major role in it. It includes harvest price of the crop in the last year, availability of minimum support price, harvest price of the competing crop in the last year, prices of inputs like fertilizers, pesticides, electricity, water and credit facility. Correspondingly, a number of non-price factors also influence the change in crop pattern. It includes the acreage and yield of the crop last year, availability of high yielding seeds and irrigation, procurement prices, facilities, rainfall, extension services. All these factors have a vital role in shift in cropping pattern of Kerala (Karunakaran, 2014).

Along with the decline in the share of agriculture in the economy during 1970s, it also experienced a sharp decline in the area under food crops, especially in paddy. There was expansion of area under cash crops and a domination of plantation crops over food crops due to its relatively higher profitability. According to Lakshmi and Pal (1988), the gradual shifting of the area from food crops like paddy to plantation crops like coffee and rubber, and cash crops like coconut and cashew had been one of the key changes that had taken place in Kerala's agriculture economy (Pal, 1988). Kerala's agricultural situation indicated a special focus on commercial crops. Only about one-fifth of the land is under food grains in Kerala against the national average of over three-quarters of land under food grains. The emergence of cash crops as a predominant sector over the last four decades is the most remarkable feature of Kerala's agricultural development.

Given this background of changes in Agriculture sector, the study tries to understand the various institutional arrangements that have emerged to address these changes. The "Green Army" in Wadakkanchery Block of Thrissur district in Kerala and the Mayyil Rice Producing Company which is slowly evolving as a Farmer Producer's Organisation in Kannur District of Kerala are two of such Institutional innovations to address agrarian market (input and output) constraints.

6.4 Physical feature of Thrissur District and Wadakkanchery Block

Thrissur district is the cultural capital and one of the important districts of Kerala situated in the central part of State. Spanning an area of about 3,032 km², the district is home to over 10 per cent of Kerala's population. The district is bordered by the districts of Palakkad and Malappuram to the north, and the districts of Ernakulam and Idukki to the south. The Arabian Sea lies to the west and Western Ghats stretches towards the east. Out of the total 16 Block Panchayats, Wadakkanchery is one of the important Block Panchayat with a population of 15,671 (2011 census) with an area of 15.0 sq.km.

Wadakkanchery Block Panchayat has the distinction of having the most productive and prosperous paddy cultivated areas in Thrissur district which is located on the two sides of 'Machad' mountain ranges. The Block Panchayat includes nine Gram Panchayats of Velore, Varavur, Thekumkara, Mundathicode, Mulurkara, Kadangod, Erumpetty, Deshamangalam and Wadakkanchery. Agriculture sector comprising of paddy and vegetable cultivation and cattle rearing was the major source of income and the region doesn't have any major industrial units and business enterprises. Hence primary sector is major source of livelihood and employment for households in the region.

6.5 Cropping pattern of Wadakkanchery Block Panchayat

The cropping pattern of Wadakkanchery Block during 2010-11 is presented in the Table 3. Coconut has the highest share of area of cultivation (41.5 per cent of the total area cultivated) and is followed by paddy with 19.8 per cent of total area under cultivation. There are three major seasons for paddy cultivation in the region. They are *virippu* (May- August), *mundakan* (August-December) and *puncha* (February-April). Majority of the cultivators grow two seasons of paddy in a year.

Table 3. Area under important crops in Wadakkanchery Block

Crops	Area (ha)	Percentage
Coconut	6420.00	41.53
Rice	3074.80	19.85
Areca nut	801.74	5.19
Pepper	367.21	2.38
Mango	749.57	4.85
Jack	507.47	3.28
Nendran banana	288.89	1.87
Plantain	474.10	3.07
Cashew	374.20	2.42
Tapioca	103.78	0.67
Vegetables	260.00	1.68

The following sections outline the characteristics of agriculture production system in the study area, the salient features and the constraints faced by the agriculture sector that has led to the creation of innovative institutions like the Green Army in Wadakkanchery.

As described in the previous sections, the agriculture in the study area is basically paddy cultivation in wetlands, along with coconut in homestead land. The nature of irrigation system in the region has resulted in the formation of *padashekharomas*, which are collectives of individual paddy fields that forms part of a watershed. The irrigation system is largely based on field-to-field irrigation, rather than individual plots getting irrigated separately. Hence it is very important that there is close co-ordination between owners of individual paddy fields for efficient and effective use of irrigation water. Moreover, the problem in most cases is with respect to handling water effectively to prevent flooding and submergence of crops. The geographic location of the region, and the nature of ownership pattern (with very small extent of ownership and operational holdings) demands that smaller plots are combined for various crop operations to effective water management. It also calls for performing various crop operations at a time for efficient water management, agronomic management practices, effective pest and disease control strategies and harvest and post-harvest operations.

6.6 Challenges faced by agriculture sector in Wadakkanchery Block

Based on detailed interviews with key functionaries of Wadakkanchery Block Panchayat, cultivators in villages in the Block, agricultural officers, Block development officer and agricultural labourers, we have summarised the major challenges faced by agricultural sector in the Block. The formation of Green Army was in response to these challenges that has adversely affected the performance of the sector during early 2000s. The major challenges were the following.

6.6.1 Lack of availability of irrigation water

Irrigation was the major issue in paddy cultivation. Earlier the shutter of the check dam for irrigation purpose was made by good quality wooden plate which was very costly. People used to steal that wooden plate and this affected regulation of water supply system in the area. They are now using an iron plate which is difficult to handle. This area is dependent on irrigation through canal system from Vazhani dam. However, the water supply was neither available on time nor properly organised due to the absence of a well-designed irrigation calendar. They faced labour shortage during critical crop operations like transplanting, weeding and harvesting stages of cultivation.

6.6.2 Low levels of remuneration

Agricultural labourers received very low remuneration compared to labourers in other sectors, particularly those engaged in construction sector. Due to the informal nature of work and lack of bargaining power relative wage rates and income levels were low. This resulted in the shift of labourers from agriculture to non-agriculture activities. They have to put higher physical effort for paddy cultivation. The working situation was not good due to drudgery involved in various crop operations and adverse weather conditions. They had to work in extreme hot weather conditions under the sun. Compared with a worker in the construction sector, agricultural labourer worked in harsh weather conditions with higher levels of drudgery and has to put more physical effort for work. This resulted in shortage of work force willing to work as agricultural labourers.

6.6.3 Uncertainty in work

Agrarian labour market was not an assured source of income and livelihood option for the labourers. There was no certainty about the sufficient working days for the labourers. They had to find their own source of employment. There is no social and economic security for the agricultural workers dependent on paddy cultivation in the region when compared with labourers in other sectors.

6.6.4 Social & Health Issues

There was less recognition, dignity and acceptance for agricultural labourers in the society. This created disincentive for workforce to participate in agricultural sector. People moved out from agrarian labour market in search of better job and livelihood options. This further added to the decline of agrarian sector. They have been facing health issues because of the drudgery involved in performing agricultural operations and this pushed many workers away from getting involved in agricultural production activities.

6.6.5 Lack of appropriate storage facility

Availability of proper and adequate storage facility is one of the significant factors that can determine profitability of paddy cultivation. If there is proper storage facility, farmers can store their produce till they get a remunerative price from the market and can support them from low prices and fall in price during the harvesting periods. Cultivators were selling their output at lower prices immediately after harvest, as they didn't have any storage facility to wait till the price improved.

6.6.6 Crop damage due to attack of wild animals

The major issue which the *padashekharams* face is that they are surrounded by forest, frequent attack of wild animals including rabbit, peacock and wild boar was rampant. They destroy the crop and cultivators suffer substantial losses. They tried several methods to deflect the wild animals and birds from damaging the crop but were not very effective. The farmers had demanded electric fencing energised by solar panels. But that involves huge financial investment which they couldn't afford.

All these constraints affected the returns from paddy cultivation in the region. Added to that, because of the relative disadvantages faced by agricultural labourers, they slowly shifted away from participating in agricultural production. They found better wages and economic prosperity in non-agricultural sector. This resulted in severe labour shortage and escalated the costs for cultivating paddy. Slowly, paddy cultivation in the area started declining. Apart from a mere decline in agricultural production, the leaders of the local body institutions in the region realised that this was affecting the socio-economic structure of the community. It was in this context that various stakeholders in the region started thinking of strategies to address these challenges and sustain the agricultural production which was once the core economic activity of the region.

7. THE FORMATION OF GREEN ARMY

The beginning of Green Army was based on the idea to form a skilled labour bank in the Wadakkanchery Block Panchayat under the GALASA scheme (Group Approach for Locally Adapted and Sustainable Agriculture) during 2008. It was a revolutionary step in the agriculture sector of the Kerala state. The idea of labour bank started due to the existence of agrarian constraints discussed in earlier sections. Despite several policies and programmes, the agriculture sector was not a profitable sector in Kerala due to the high cost of production and lack of labour availability.

The agriculture sector was following traditional practices without adopting modern technologies and methods. It was in this background that the Wadakkanchery Block Panchayat formed the labour bank in 2008. This was formed at a situation when farmers and agricultural labourers were moving out from the sector due to the declining profits and loss of confidence in agriculture sector as a livelihood option. The labour bank was thus aiming to regain that confidence and promote the agriculture sector as a major livelihood option that can contribute to food security in the State by enhancing agriculture production and productivity.

During 1996 paddy was grown in 4172 hectares of land, but it declined over the years due to severe labour shortage, increase in cost of cultivation, lack of irrigation facility, social support and disinterest in cultivation. Growing urbanization and increase in the returns to land diverted to non-agricultural activities led to conversion of agricultural land for infra-

structural activities. This led to the issues like farmers opting out of farming and resorting to conversion for non-agricultural activities and illegal land filling of barren paddy lands. The formation of Green Army was an outcome of understanding of these facts, and the realisation that these issues can be addressed only through the rejuvenation of paddy cultivation by a new institutional set up to effectively deal with these problems.

In 2008, Green Army was formed in Wadakkanchery Block Panchayat which consists of nine Panchayats. Agriculture, especially paddy cultivation was the major livelihood option in all these Panchayats. It was a decision by the Block Panchayat to initiate a project to improve the agriculture sector and enhance livelihood opportunity in the area. Lack of availability of agricultural labourers, higher cost of production makes the sector as a non-profitable one. The Block Panchayat decided to support the farmers and agricultural labourers by interventions in the agriculture sector.

Green Army was formed to address the issue of labourers and the agriculture crisis in the area. The major challenge they faced was that, there were jobs in the market other than agricultural work which were highly remunerative. Agricultural work was also seasonal job (a maximum of 60 days in year during the season) with low wages and lesser number of working days. Earlier, there was uncertainty in the number of working days and the scattered labourers had to find the job in the agriculture sector. The payment was also very less due to the informal and unskilled nature of work and lesser bargaining power of the agricultural labourers. The wages were as low as Rs. 140 per day for men and Rs. 100 per day for women during 2003.

Green Army intervened in this situation by introducing new changes in the organisation of labour force. They tried to attract the labourers, by unifying the scattered labourers into a single platform in various ways. This started with provision of a uniform, which gave them confidence and dignity, and later increased the wages to a reasonable level. The most important step was to introduce bonus, gratuity and special allowance to labourers during festival. There were 400 labourers in the beginning, which has decreased to 200 now, due to lack of enough working days. Zilla Panchayat (District Panchayat) and Gram Panchayat supported in various ways by providing financial assistance through allocation of various funds to the Block Panchayat. The financial support was provided by the convergence of various funds.

7.1 What is Green Army?

Green Army is legally registered organisation under The Travancore-Cochin Literary, Scientific and Charitable Societies Registration Act, 1955. This has the organisational structure of a charitable society, with an elected President, Secretary and an Executive Committee to take decision on the activities of Green Army. The trained members have been organised into teams of five to six members, led by a team leader. The team leader is assisted by a deputy team leader. Five teams constitute a group, led by a group leader. Members of the Green Army would be selected from among the agricultural labourers of small and marginal farmers in the Block Panchayat region. The major objectives of Green Army include undertaking activities to improve the agricultural production and productivity of the region (Block Panchayat) along with farmers and agricultural labourers. In addition to these they also focus on addressing the problems faced by agricultural labourers and communities engaged in agricultural production in the region. A detailed description of the activities of Green Army is presented in subsequent sections.

7.2 Objectives of formation of Green Army

The major objective for the formation of Green Army was to develop and support sustainable paddy cultivation which is one of the major livelihood options for the people. It aims to enhance the paddy cultivation as a profitable one, and develop a model that can contribute to food security and sustainable use of natural resources in the region. It plans to extend its activities by bringing fallow lands under rice cultivation through *padashekarasamitis*. It also aims to make interven-

tions among the labour force, to improve their welfare as well as address the constraints related to labour availability and labour use for paddy cultivation, which are the major constraints in agriculture sector. They formalised an institutional arrangement that will provide decent employment and improve the social status of agricultural labourers with adequate social security measures. The key objective of Green Army is to mechanise all the work of farmers for paddy cultivation including ploughing, bund forming, transplanting, pest controlling, harvesting winnowing, etc. This was the only way with which they could achieve the twin objective of ensuring affordable labour force for paddy cultivation with the limited labour force available for work, within the budget of farmers, and at the same time ensuring a decent and secure source of livelihood for agricultural labourers. This is also one of the largest project taken by the Local Self Government in Thrissur district and a unique initiative in the State in integrating various Panchayati Raj Institutions, agricultural departments, farmers, agricultural labourers with the support of financial resources from the Block and district Panchayat and from the state and central governments. Green Army enabled sufficiency in food grains in the region, making a significant contribution to the food security of the population and ensured a decent and secure source of livelihood for the agricultural labourers. The institution, through its strategic interventions by integrating various programmes and existing institutional infrastructure was able to achieve a balance between the competing demands of an agriculture sector grappled with the issue of rising labour costs and unavailability of labour force, and a labour force faced with work conditions and returns which are relatively less remunerative than non-agricultural sector work.

7.3 Process of Organisation of Green Army & Issues faced

The process of organisation of Green Army has been huge task for the key functionaries of the Wadakkanchery Block Panchayat. They gathered the farmers and agricultural labourers and conducted a series of seminars and meetings regarding the importance of agriculture and to create awareness to conserve the agricultural production practices in the area in more scientific manner. Initially they faced lot of issues during the process of organisation of labour bank. Initially, the Panchayat representatives were not in favour of the institutionalisation of the labour force. But later they came to join Green Army after recognising its works and activities. Later, there was significant support from the representatives of Panchayati Raj Institutions from ward level to district level in the part of process of setting up the organisation. Technical support for the formation of Green Army was provided by Kerala Agricultural University and Non-Governmental Organisation (NGO) named Maithri in various ways such as training, expert consultations and advice for formalisation as an institution. The most important and critical support and contribution was given by the farmers in the region who strengthened the *padashekarasamiti* and supported the labourers who joined the Green Army.

They faced a number of problems during the organisation of labour bank. There were so many concerns raised about the practicability and possibility of formation of Green Army during its organisation. Initially, the labourers and farmers were also not very confident about the idea and the feasibility of its work and activities. But they got enough confidence after a series of initial training programmes during the formation process. The labourers didn't need to demand any work from Green Army, they will be allotted the available work after discussing with the group leaders. Earlier anyone who is seeking and willing to do agricultural work could register and join the Green Army. But now, only those who are part of MGNREGA can only join the Green Army.

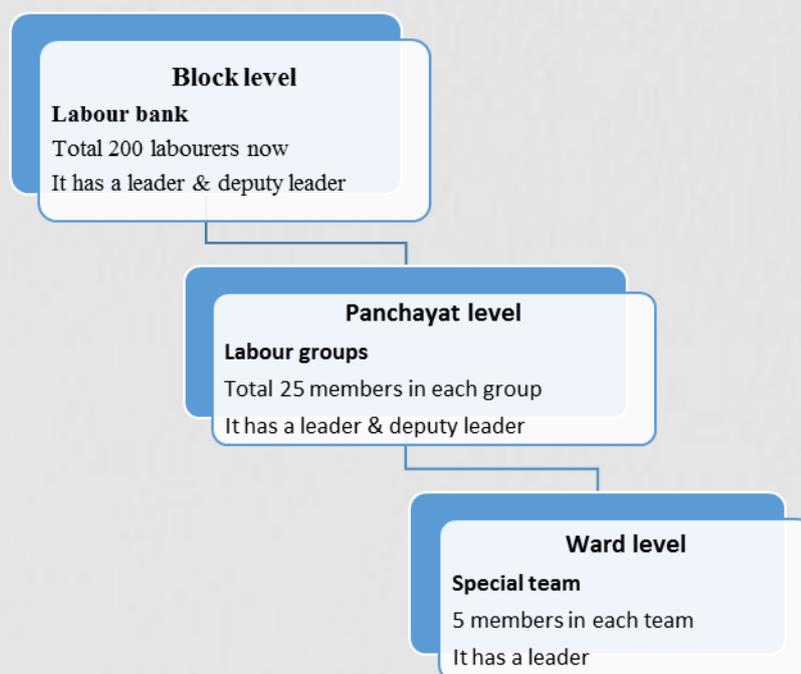
Most of the people had apprehensions about the participation of women and their active engagement in the Green Army. They also were not confident about the capability of women workers to work with and operate various heavy machineries such as transplanter. The people and farmers were slowly attracted towards agriculture through demonstration effect. Initially 4-5 people were selected from one Panchayat for the Green Army. Those who were willing to participate initially got 24 days of training. The status of agricultural labourers improved slowly by increase in the number of labour days and social security measures entitled in the job, after the introduction of labour bank. It helped Green Army to be-

come a successful venture. There are some practical issues that the Green Army face due to members dropping away after taking responsibility and, those who leave Green Army when they find better job opportunities in other sectors and abroad. Another concern is about finding the replacement for members of labour bank in the event of accident, death, and sickness. They are managing such issues with the support of labourers from other States who migrated to Kerala in search of work.

7.4 Structure of Green Army (Labour bank)

The Green Army is organised as a Society Registered under the Charitable Societies Act of 1955. Although it is an independent institution, its organisational and operational matters are designed, executed, controlled and monitored by a body that has representatives of the Local Body Institutions, Government Departments responsible for functions and activities related to agriculture, irrigation management, revenue administration and rural development. The organisational structure of Green Army is given in Appendix-1.

Membership in the Green Army is provided on the basis of payment of membership fee. The member has to pay Rs. 1000 as membership fees and Rs. 120 as an annual fee to the organisation. All the members are organised into a number of groups. One group is constituted by 25 members, which is categorised into five teams of five members each. There is one leader and deputy leader for each group and there is one leader for each team. There is a grading for the members of Green Army based on their quality of work, skills and capacity. Grading standards are revised every six months. The salary given to each person is based on the grade and value of work done during the previous year. In addition, they are entitled to various social security benefits like pension, health insurance and educational aid to children.



Having the labour card in MNREGS is the criteria for getting membership in the labour bank of Green Army. There are three tiers in the structure of Labour Bank. The basic unit or first tier of Green Army is at the ward level and is called a special team. The special team consists of five members at the ward level and one among them is selected as a leader. The leader is responsible for the functioning of the special team. Five such special teams are organised into a Labour group at the Panchayat level, and this forms the second tier of Green Army. A Labour Group will have 25 members consisting of a leader and deputy leader for co-ordination of the group's activities and functions. The Labour Groups at the Panchayat level is organised into the Labour bank at the Block level. This forms the third tier of Green Army. At present there are nearly 200 members in the labour bank, consisting of eight Labour groups and forty special teams. The special teams are

the basic unit of Green Army, and various agricultural work demanded by farmers or *padashekharams* are undertaken under the responsibility of special teams. They form the 'operational unit' of the Green Army. Based on the nature, extent and scale of work, several teams are combined together to perform task assigned to Green Army. If there are agricultural operations like transplanting or harvesting to be carried out in large *padashekaharams* several teams join together and complete the tasks as per the schedule. The preparation of work chart, scheduling of tasks, organisation and assigning responsibilities to teams is co-ordinated by the office of Green Army. The office consists of a retired agricultural officer who has thorough knowledge and familiarity with the agricultural production conditions of the region, an accountant to keep track of the details of work, payments and other administrative tasks required for the day-to-day functioning of the institution, and an office assistant. They work under the guidance of the key functionaries of the Block Panchayat. In nutshell the labour bank is formed at the Block level, labour team at Panchayat level and special team at the field level. There is team leader and deputy leader in each tier. The Green Army has an office functioning with staffs, accountant and office bearers at the Panchayat level for the administration, management and coordination of the entire activities of labour bank.

7.5 Functioning of Green Army

Green Army identified that the major reasons behind the loss in agriculture are the scattered nature of small and marginal holdings and the practice of performing crop operations individually. They could not utilize the economic scale and the resultant profitability from doing group farming for paddy cultivation. They decided to promote group farming approach by rejuvenating *padashekharasamitis*. The entire farm activities were scheduled after reviving and strengthening the defunct *padashekharasamitis*. The Green Army conducted a meeting of the *padashekarasamiti*, the farmers, labourers and the Green Army functionaries before starting any activities for a particular crop season. The meeting collectively decided about the crop operations and activities to be carried out for that season, and the schedule for performing each operation. The group leaders discussed and took decisions on the basis of the available schedule, total area to be cultivated and all activities to be performed. They made a detailed agricultural calendar for the region for preparing the nursery for paddy cultivation in various *padashekharams*, schedule and time line for land preparations and various other agronomic operations. Sometimes, the work couldn't happen as per the specific schedule and agricultural calendar due to various reasons, especially, during the rainy season due to increase in water level in the field which prevented field preparation. Any mismatches in the scheduled activities or loss in the coordination led to the delay of the entire crop calendar. It results in the dependency on migrant labourers from outside to complete the work within the planned schedule. The Green Army office acts as a coordinating centre to decide the schedule of works according to the agriculture calendar and the irrigation facilities available at various *padashekharams*. Normally, scheduled work is allotted to the nearest labourer team or to the team which has the least work to ensure allotment of equal amount of work to all members of the Green Army. The Green Army ensures timely completion of works by proper communication and co-ordination between the office of Green Army and the Group Leaders and Deputy Leaders. This facilitated smooth functioning of the Green Army.

In order to use the support of Green Army for paddy cultivation, the representative of *Padashekarasamiti* has to book the labour services in Green Army by paying an initial advance of Rs. 1500 out of the total amount of Rs. 3950 per acre, which is fixed by the Panchayat to *Padashekarasamiti* and Green Army in corresponding seasons. The remaining instalment will be paid after the transplanting work is completed. Once the advance amount is paid, Green Army will start preparing the nursery for transplanting paddy. The responsible person from the Green Army office will communicate with the group leader every day to assess their works and progress in schedule. They will interact with labourers to find out if there are any issues, and will try to solve any problems related to cultivation. The communication will be managed generally through phone calls and sometimes by conducting meetings of stake holders involved if necessary. Any delays or problems in performing the operations as per the schedule was solved by the co-ordinating office of the Green Army.

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7.6 Progress of Green Army and Paddy cultivation

In 2008, the first phase of the Green Army project was initiated in 12 *padashekharams* which cultivated around 580 hectares of land in the area. This helped to increase the productivity of paddy production in these *padashekharams* from 3.5 tons to 8 tons per hectare. Among various agricultural activities, sixty percent of the works including transplanting, harvesting, threshing and winnowing were done by the machines. It was the beginning of mechanization in the agricultural sector of the area which was earlier following traditional agricultural practices and human labour for all the crop operations. Additionally, 38 new *padashekharams* were added in the second phase of the project, and a total 50 *padashekharams* was cultivated. It resulted in the expansion of cultivation to around 850 hectares of land during this phase. The third phase of the project increased the cultivation to cover 120 *padashekharams* and three *kole* areas with the aim to produce *mundakan* in 3500 hectares, *virippu* in 1000 hectares and *punja* in 250 hectares. At present almost eighty per cent of the paddy transplantation is done by using machines.

Table 4. Total number of working days per year provided by in Green Army during 2014-15 to 2018-19, in number

Year	Total number of working days	Membership of Green Army	Number of labourers who participated in all the three seasons *	Working days per Person
2014-15	10939	168	51	214
2015-16	10226	153	48	213
2016-17	6443	145	32	201
2017-18	4805	121	22	218

Source: Green Army, 2019

*This includes only those members of the Green Army who has participated in all the three seasons of paddy cultivation.

7.7 Improvement in number of working days and income

During the first year of formation of Green Army labourers got 6200 working days for transplanting alone. In later years, the activities of Green Army were extended to other areas of Thrissur district and even to neighbouring districts of Palakkad and Malappuram. The total number of working days provided by Green Army during 2014-15 to 2017-18 is given in Table 4. As a result of this, there was improvement in the number of labour days for members of the Green Army and subsequently their income levels also increased compared to previous situation. Studies show that the average labour days for members of Green Army increased from 203 days per person to 225 days per person after joining the institution. The average family income increased by around 40 per cent and there was an increase in the savings by 137 per cent after joining Green Army (John, 2105). The details of area covered under paddy cultivation through Green Army, income generated through labour contribution and the total income and benefits given by the Green Army to its members is given in Tables 4, 5 and 6. There were a lot of fears and concerns among the various stakeholders of Green Army when the project started. There were proper interventions and coordination by the department authorities and leaders of Green

Army by conducting a number of meeting and discussion with farmers, *padashekarasamiti* representatives, agricultural labourers and the public for the timely performance of agricultural operations and other tasks assigned to them by integration of different departments involved. This helped to overcome various issues faced during the initial periods among the members.

Years	Number of Padashe-karams covered	Area Transplanted (acre)	Income of Green Army per year (Rs)
2010-11	52	2897	66,787,81
2011-12	97	4218	1,06,67,571
2012-13	117	4837	1,11,64,505
2013-14	127	2898	1,11,55,598

Source: Green Army, 2019

Particulars	2010-11	2011-12	2012-13	2013-14
Salary	4345112	7796848	7195449	7971637
Labourers Benefit fund	465424	246242	537209	503780
Accidental Insurance	143600	163200	147275	130780
Medical Expenses	18692	32382	20349	58840
Total	4972828	8238672	7900282	8665037

Source: Green Army, 2019

7.8 Inclusion in Recruitment of members in Green Army

Green Army notifies the advertisement in newspapers for the recruitment to attract willing people from all social categories. It does not restrict anyone from participating in terms of caste, class or religion. It will select nearly 50-70 persons per year from all socio-economic background and they will provide training in various areas of agricultural activities including machineries, coconut tree climbing and allot them work as per the requirement and their willingness to perform it.

7.9 Grading of labourers and salary system in Green Army

There is a grading system among the labourers of Green Army for fixing the wage for each labourer as per their quality of labour services and skills. As of now, members are categorised into four grades based on clearly defined criteria. Grades from 1 to 4 are given salary of Rs. 1200, Rs. 1100, Rs. 1000 and Rs. 850 per day respectively. The major criteria used for grading are a) leadership quality, b) behaviour, c) punctuality, d) efficiency, e) coordination & management skills, and c) the relation with farmers and other members of the Green Army (specifically for Group leader, Deputy leader & Helpers).

Ideally, for each member there should be at least 192 working days in a year to provide salary for all months in a year. But because of the nature of cultivation in the area, the number of working days is almost half of it now. The strategy adopted by Green Army is to achieve 192 working days for each member and provide salary to members throughout the year. The members in mechanical section (who take care of repair and maintenance of machinery) are getting salary for 12 months. Most of the other members are getting salary for six months by using works of three months and wages. Out of the total 30 working days in a month, 16 days wages of the labourers are given as one month salary. The remaining wages of 14 days is kept as reserve by the Green Army and is used to provide salary to cover the rest 3 months, when they don't have any work. In addition to this there is a provision of bus allowance (Rs. 100), food allowance (Rs. 150) other than the basic fair as per the grading. The transition from daily wage to monthly salary made great changes in the socio-economic situation of the agricultural labourers. Earlier they were spending whatever amount they earn in day or week. Now they could save small amounts which helped them to inculcate the habit of saving. The agricultural labourers who were daily wage earners didn't have access to credit facilities. After becoming members of Green Army, they could avail the benefit of monthly salary from the institution. This helped them in gaining access to the formal credit system. The Peringandoor Service Co-operative bank which catered to the credit needs of households in the region provided access to credit facilities for Green Army members. The salary system in Green Army helped the members to reduce their dependency on money lenders for their credit requirements.

7.10 Social security in Green Army

The Green Army provided its members three components of social security. They are,

- a. Pension:
- b. Insurance (life insurance and Health Insurance): Rs. 1050 per person/year.
- c. Educational Aid: It is for the children of the labourers of Green Army in 9 to 12th classes which is an amount of 600 rupees/year.
- d. Welfare fund: There is a welfare fund created by contribution Rs. 45 each by the labourer and Green Army. The contribution of Rs. 45 (Rs. 40 earmarked for pension+ Rs. 5 for welfare) will be collected based on the per day attendance from the labourer and the same amount will be paid by Green Army (total Rs. 90). This fund is used for providing pension and other welfare activities of the labourer.

7.11 Training and Capacity building

Before the intervention of Green Army, farmers were largely practicing traditional methods of cultivation, and the agricultural labourers were largely unskilled. The initial step was taken to form Green Army was to transform the unskilled labourers to skilled labour force by giving them training on scientific methods of cultivation and expertise in handling various types of machinery required for cultivation. The Green Army co-ordinated with the Kerala Agricultural University to assess the system of cultivation, identify areas of improvement and design the strategies to be adopted for sustainable transformation of rice cultivation in the area. The capacity building activities were largely supported by Kerala Agricultural University and Department of Agriculture. The initial training of 24 days to labourers was organised by the Kerala Agricultural University to make them skilled labour force in all agricultural works and capacity building to use various machines like tractor, transplanters and tiller for various agricultural operations.

7.12 Transparency in functioning

The functioning of the Green Army is very transparent through regular meetings of members and leaders at various levels every month. The schedule for meeting changes when they have heavy workload during peak season. Every decision taken regarding the functioning and activities of Green Army is communicated properly and timely among the group leaders, team leaders and members. There will be a meeting twice in a year that discusses all the matters regarding functioning of Green Army, especially planning, finance and budgeting. The Green Army used to take-up the next work only after resolving the all issues of the previous year. Every decision of Green Army was communicated through the group leaders properly on time. Members of the Green Army have the freedom of opinion and participation in the entire process. The final decision will be taken only after considering all the opinions expressed by all the members and in the larger interest of the institution. In Green Army, all members share equal status and opportunity. It ensures participation and contribution of all members and facilitates the smooth functioning of the system.

7.13 Infrastructural facilities in Green Army

The Green Army over years since its inception in 2008 has various assets mainly in the form of machineries used for agricultural operations. Out of the total machineries, 15 transplanters are owned by the Peringandoor Service Cooperative (PSC) bank and the remaining machineries are owned by Block Panchayat and Green Army is working as a custodian of all machineries. None of the machine in Green Army is given for rent as all the machines are fully utilised for their own work. This is an example of convergence between institutions of local governance, particularly the PRIs and organisations like Green Army that have emerged under the support of PRIs to address constraints that affect local development. The Green Army has a garage centre to keep and maintain all its machinery, a training centre and an office for coordinating the activities. There is a special labour group for maintenance and repair of all machinery in the garage centre. The training centre in Green Army includes a seminar hall for more than 100 participants with the facility of an LCD projector.

7.14 Strategies adopted by Green Army to revive paddy cultivation

The functionaries of the Green Army initially analysed in detail various aspects of paddy cultivation in the region and understood that it can be made profitable with certain interventions. The duration of one paddy crop in the region is 4 months (120 days). They estimated that it will cost Rs. 60,000 to cultivate one hectare of paddy. They will get a return of Rs. 1,00,000-1,20,000 from one hectare of paddy and Rs. 25,000-45,000 from the straw after harvesting. It means they are getting an almost double amount of returns to the cost of production. But there were lot of risk factors in agriculture such as natural disasters, incidence of pests and diseases. It was also observed that paddy is the only crop which provides 250 working days, for one hectare of paddy grown, and no other crop provides this much employment. It was also observed that there is a scope for improving the yield by adopting scientific cultivation practices and reduce the labour cost to an extent by introducing mechanisation. With respect to labour used for paddy cultivation, they faced the problem of higher costs because of the higher wage rates as well as availability of sufficient labour during peak periods of intensive crop operations like transplanting and harvesting. The characteristic of the paddy production system and the agro-ecology of the region (which is largely part of the *kole* land ecosystem) demanded that the major crop operations like land preparation, transplanting, irrigating the crop and harvesting should be done collectively. This will help the farmer in addressing majority of the constraints that affect the profitability of paddy cultivation. They realised the importance of adopting scientific methods of crop management, performing the crop operations collectively, mechanisation in control-

ling the cost of labour component and ensuring timely completion of critical crop operations in improving the returns from paddy cultivation. This realisation was the precursor for formation of the Green Army in Wadakkanchery Block.

Before the formation of Green Army, mechanisation was very minimal and farmers were facing the issue of lack of availability of labourers. The farmers also found the wage rates to be very high that led to higher expenses for cultivation and consequent low returns from paddy cultivation. It resulted in the moving out of farmers from the sector by searching other livelihood options and converting productive land for non-agricultural activities or they were keeping the land as fallow without cultivating.

The large-scale mechanisation drive was started by Green Army, initially by pooling the machine from various sources. Later, Wadakkanchery Block Panchayat decided to buy the machineries for *padashekharams*. They created master trainers for machine usage. Initially, 35 members were trained by Kerala Agricultural University at Mundathikode. New machineries like the transplanters and harvesters were brought into the field and it helped to reduce the drudgery of agricultural labourers and reduce the cost of cultivation by reducing the labour cost. The yield increased due to scientific space management and uniform planting by using machinery. So, the profit increased and farmers were attracted towards paddy cultivation. During the initial six months of preparation, Green Army organised a harvesting festival to attract more farmers and create awareness among them. More machinery was brought in for expansion of activities by using various funds including RKVY fund, funds from Department of Agriculture and Block Panchayat for buying more machines. So, mechanisation made a huge difference in paddy cultivation in this area. The most important steps taken by the Green Army in addressing the constraints in agricultural production in the region are,

- a) There was no scientific knowledge about the *padashekharams*, the nature and quality of soil and other agricultural practices among the farmers and labourers. There was a detailed participatory study about the paddy cultivation to understand the problems and prospects of cultivation of paddy during three seasons (*virippu*, *mundakan* and *punja*).
- b) Assessing the requirements for improving the status of paddy cultivation including availability of quality seedlings, methods of planting, irrigation management, and harvesting. Maps and charts were prepared on various aspects of cultivation based on the detailed study.
- c) An agriculture calendar was prepared after a number of meetings and discussion with the members of *padashekharasamiti* and agricultural labourers to plan agriculture activities together in the entire *padashekharams*. The project planned to cultivate one-seed cultivation at a time which eased the entire agriculture activities and crop management.
- d) Ensured the integration and convergence of various stakeholders including Block Panchayat, district Panchayat, Gram Panchayat, *padashekharasamitis*, Agricultural department and Irrigation department at regular intervals to facilitate smooth sailing of the interventions planned.

7.15 Role of PRIs in the formation of Green Army and its capacity building

Panchayati Raj Institutions had a vital role in the formation of Green Army. They took initiation for converging various institutions of local governance at different levels, agriculture and irrigation departments, various agencies dealing with agriculture and rural development, and other stakeholders like political parties, labour unions, local communities, SHGs, farmers and labourers. They played a critical role in bringing all material, financial and physical resources available for the region in one common platform to create a sustainable institution for development of agriculture. They conducted meetings on the project plan, objectives to achieve, and targets to be completed to achieve the objectives. They coordinated with Kudumbashree, *padashekharasamiti* and Panchayat representatives to identify the farmers, labourers and other stakeholders responsible for agriculture development in the region. They were instrumental in the organisation of

all programs like harvesting festival, awareness campaigns and major events related to implementation of agriculture development programmes and policies.

Panchayati Raj Institutions such as Gram Panchayat, Block Panchayat, and District Panchayat, in co-ordination with Agriculture Department played a significant role in the capacity building and skill enhancement of the farmers and labourers. They conducted training for the labourers, for mechanisation, financial accounting and crop wise training for different crops such as paddy, coconut, vegetables. They also facilitated in conducting training on agronomic practices, nutrient management, pest and disease identification and its remedial measures, processing and post harvesting techniques in various crops grown in the region.

7.16 Role of Agriculture Office in Green Army and Agriculture Development

Agriculture office has an important role in the formation of Green Army and development of agriculture sector in Wadakkanchery Block. It functioned as a nodal agency to coordinate all the activities for the development of agricultural sector in the area and converged various programmes of agriculture department for the formation of Green Army. They facilitated in getting the support of Kerala Agriculture University, Thrissur for identifying the problems and introduction of scientific management of agriculture practice in terms of agronomic management, mechanisation, capacity building of farmers and labourers and provided technical assistance and expertise in the all matters of cultivation. This includes seed selection, pest control, proper use of fertilizers, irrigation and the total care of plants from seedlings to harvesting. It also created expert resources from the cultivators itself by capacity building of the farmers. Agriculture office also ensured continuous assistance during the various difficulties faced by the farmers. They made an important contribution in facilitating the convergence of various agriculture development programmes towards formation and sustenance of Green Army.

7.17 Role of Labour Bank in Women Empowerment

7.17.1 Representation

The female members of the Green Army have a well-defined role in the system. They are considered equally with male members in all respects. Green Army has higher number of females than males. There is no gender gap in wages and women have the opportunity of taking responsibility or any position based on their interest, willingness and skills. There is a grading system for members that decide the level of wage in the system and gender is not a criterion in grading. There are women members who operate, maintain and repair heavy machinery like the tractor and other machinery. They also function as leader of a group of four members that takes care of the mechanical garage that maintains and repairs machinery.

7.17.2 Gender equality

Labour bank has a greater role for ensuring gender equality in the work force of Green Army. It helped to break gender norms which exist in society. Both genders got same kind of training and they proved both genders could do same kind of work efficiently, especially dealing with heavy machineries. It was also entry into the so-called men reserved spaces in employment.

7.17.3 Independence

The women who were not willing to travel at least within the district of Thrissur are now travelling across the district of Kerala alone for work and conducting training programmes. It provides income and economic independence. Green Army is providing equal remuneration for the equal work. After joining the Green Army, they had better access to formal sources of credit that ensures improved financial inclusion.

7.17.4 Empowerment

As discussed in earlier section, women have a better representation in the Green Army. They started engaging with various institutions and government departments and are having greater role in Panchayat, Krishibhavan, Kudumbashree and agriculture development forums. This has improved their involvement in various development programmes and they have started taking up leadership roles in such initiatives. This will significantly contribute to improving the gender balance and gender relations in the community.

7.18 Ensuring financial inclusion through Green Army

Bank linkage was one of the major components of formalisation of labour force through Green Army for ensuring financial inclusion of its members. Green Army could intervene to get the provision of allocating loans for *padashekharams*. The Peringandoor Cooperative Bank (PCB) granted Rs. 50,000/- as revolving fund for each *padashekhararam* and ensured interest free loan as the rate of Rs. 7,500 per acre through primary co-operative societies. Transformation from the traditional way of daily wages to monthly salary through bank account helped the members of Green Army for a better banking linkage and basic financial literacy. The salary, Pension and Provident Fund (PF), all are given through bank account of Peringandoor Cooperative Bank. The ensured monthly salary gave them more confidence and creditability in financial transactions with the bank and better access to credit. They will get the loan from the bank through the security letter from Green Army and *padashekarasamiti*. Most of the members of Green Army, especially women were not linked with banks for their financial transactions earlier, or they were not using the bank account regularly. But Green Army helped them to connect with the banks regularly thus improving financial participation and ensuring the financial inclusion.

7.19 Adoption of New Technology and Agricultural practices

The yields from paddy cultivation were very low before the intervention of Green Army. They were following traditional method of cultivation and thus they are getting 2 – 2.5 tonnes per hectare. The introduction of Green Army made them adopt mechanisation and new scientific cultivation practices which helped them to improve production and productivity. The productivity improved from 2.5 tonnes to 8 tonnes per hectare. It led to the elimination of fallow land and they could cultivate more land areas and an additional season of *virippu* during the initial years. Initially, Green Army took the fallow land and they started their own cultivation to convince the farmers about the potential for improved returns from paddy cultivation.

Mechanisation reduced the quantity of seed used for paddy cultivation. Earlier they used around 100 kg of seed for cultivating one hectare, and it reduced to 50-75 kg by adopting machine transplanting. The yield was also higher. With the introduction of machine transplanting there were no delays due to labour scarcity, and they could complete the transplantation of entire *padashekharams* within a short time. Delays in transplantation had earlier caused reduction in yield.

7.19.1 Preparation of agricultural calendar

The development of Agriculture calendar was an important step implemented by the agriculture department by gathering various stakeholders to improve paddy cultivation. Agriculture officers, secretaries of all *padashekharasamitis*, Secretaries of all Panchayats, Agriculture Development Assistant (ADA) and farmers were invited to Wadakkanchery Block office to create an agriculture calendar for the region. They discussed about the seasons of all Panchayat in the Block, total area to be cultivated and the timelines for various agriculture activities and planned accordingly. The crop calendar was made on the basis of the scientific cultivation methods that were introduced. Each work had an action plan and specific team was allotted who will complete the scheduled days. Based on the crop calendar, the *padashekharasamitis* have to book the labour army by giving 20 per cent of the total charge in advance for cultivating their area.

7.19.2 Adoption of High Yielding Variety Seed

The traditional seed which they were using had very low productivity. The Green Army popularised HYV seeds such as Uma, Jyothi, Shreyas, Aishwarya and Annapoorna. The adoption of HYV seeds, policy of sowing one variety of seed by *padashekharms* and following scientific crop management practices resulted in improvement of yield levels from paddy cultivation. There was a compulsion to use the specific variety of seed for facilitating mechanisation. They used the same seed as a part of group farming. This helped in reducing the damages to seedlings, easy replanting, uniformity in crop maturity that facilitated better and effective crop management practices. All these resulted in improved yields. The invention of green Army resolved the issue of labour scarcity. It made possible time bounded agricultural activities in the area. The entire work under *padashekharms* was completed within two weeks by Green Army. The plant matures within 15-18 days. This would not have been possible if Green Army was not there.

7.19.3 Scientific crop management & improved productivity

The mechanisation made enough changes in the spacing in planting which made a huge difference in number of plants per unit area. In manual transplanting the labourers could plant only 30-32 plants in one square meter. But they could plant almost 42 to 45 plants per square meter using machines which increased on an average of 10 plants per one square meter. It will take 25 to 28 days for manual transplantation in all the *padashekharms*. Then the maturity period of the plant was longer than those done by machine. Within 21 days the panicle will grow. The productivity will be higher as the number of panicles will be higher. The tillers will start to come in every four days. Within 21 to 45 days there is a chance of maximum 6-7 panicles per plant. But when it is planted by hand, it will take time for re-growth of the root, and there will be only two panicles per plant by manual transplantation. But the possibility of panicle will be four to five panicle during the time of its germination. It will make a significant difference in productivity between manual transplantation and transplantation by machinery.

7.20 Outcomes of establishment of Green Army

The establishment of Green Army and its functioning over more than a decade since 2008 brought important outcomes for the people in Wadakkancherry Block. It is important to understand these outcomes to assess the contribution of such institutions. It will also help in setting up similar institutions elsewhere to address challenges of similar nature. The major outcomes of a decade of functioning of Green Army are:

7.20.1 Adoption of scientific cultivation and mechanisation for improved productivity and profitability

The Green Army helped the farmers to shift from traditional practices to follow scientific cultivation in paddy. It also helped to spread rice cultivation to almost 4559 hectares in 2010 and to increase the productivity from 3.5 tons to eight tons per hectare. They also introduced mechanisation of agricultural operations and improved the skills of agricultural labourers to handle machineries. Before the formation of Green Army, only a small percentage of farmers who were financially rich were using the machineries including the tractors, tillers and harvesters, largely by hiring. The marginalised farmers could also access the mechanisation after the formation of Green Army. They could finish the work within lesser time. The formation of labour bank helped to supply enough labourers and machines for crop operations with affordable labour cost. This reduced the cost of cultivation and made paddy cultivation a profitable enterprise and helped them to get a higher profit. Green Army started to take all agriculture activities on contract basis to complete in limited time which resulted in an increase in profit.

7.20.2 Improvement in income and employment security of members of Green Army

As the returns from paddy cultivation improved because of interventions from Green Army, most of the *padashekharms* started engaging Green Army for paddy cultivation. The income levels and number of working days of those enrolled in Green Army increased. This provided the agricultural labourers with employment security. The social security support

systems and the practice of providing regular salary even during months where there was no work provided a great sense of economic security and financial inclusion. It attracted other labourers towards participation in the Green Army.

7.20.3 Enhanced dignity, respect and improved bargaining power

Green Army could enhance the dignity and respect of labourers in Wadakkanchery. They provided better social security support to the labourers and minimise the uncertainty in work in terms of wage rate and the number of working days. It resulted in the changing attitude of labourers towards agriculture and attracted them to engage with agriculture work. Before the intervention of Green Army, the farmers were powerful and they used to fix the wages and terms and conditions of work which were not favourable to the workers. So, the purchasing power of the agriculture labourers was not enough to satisfy their basic needs. The daily wage of male labourers was Rs. 400 and for the women labourers were in a range of Rs. 200-250 rupees. With the formation of Green Army, the situation has improved, a daily wage of Rs. 1200 for Grade-A, Rs. 1100 for Grade-B, Rs. 1000 for Grade-C and Rs. 850 for Grade-D workers. With the formation of an institution that focus on protecting and improving the welfare of most vulnerable section of the society with the support of PRIs and other departments, their bargaining power improved.

7.20.4 Increased Awareness levels and positive attitude towards cultivation

They farmers and labourers were less aware about mechanized agriculture and modern methods of cultivation. They didn't have any opportunity or platform for meetings, interactions and exchange of ideas before Green Army. The Green Army provided a platform that facilitated improvement in awareness levels of farmers and labourers. People in Wadakkanchery were slowly turning away from agricultural activities. But the agriculture department with the support of Green Army impressively changed the attitude of the people towards agriculture. The participation of youth improved and they willingly came to work in agriculture.

7.20.5 Protection of irrigation systems reduction in fallow lands

The Green Army brought convergence between MGNREGA work and the paddy cultivation by successfully deploying them for the development of irrigational infrastructure and there by the sustainable agriculture development in Wadakkanchery. This model was created by reconstruction of 46.5 kilometers long Vazhani main canal and the branch canals within 20 days. In 20 days, farmers and Green Army members completed the transplanting works and 2500 workers of MGNREGA program completed the reconstruction of canals. They used the opportunities of employment guarantee program and created awareness about canal protection by the people. The canal, which was used for disposal is now renovated by the people using the employment guarantee scheme. This was an important contribution towards sustainable natural resource management of the region that will sustain the agricultural production in future. The attitude of people toward the cultivation changed because of the positive development with interventions of Green Army. It resulted in bringing more land under paddy cultivation which were lying fallow. This was an important contribution of Green Army towards sustainable agriculture production and food security of the region.

Creation of an inclusive and sustainable institution

The most important outcome of the formation of Green Army is the creation of an institution weaving together the strengths of decentralised institutions of local governance, scientific knowledge and technology from research and extension agencies like the Kerala Agricultural University and Department of Agriculture, channelizing the collectiveness of *padashekahrams*, bringing together the strength of people's movements and organisations. This has resulted in the formation of an inclusive and sustainable institution that can address the core development problems of the region. It has made a significant contribution in addressing the agrarian constraints through the formation of Green Army. This has made a remarkable contribution in finding a solution to the labour market imperfections that constrained paddy cultivation in the region. In the process, they have improved the lives of agricultural labourers by preserving the dignity of labour, protecting their rights and providing them with better social security support, better financial inclusion and decent forms of employment. These were achieved without compromising the interests of farmers and other actors who are de-

pendent on cultivation for livelihood. The Green Army acted as a platform that brought convergence between various farmers, agricultural labourers and the institutions relevant for agriculture and rural development and local governance. This makes the relevance of an institution like Green Army, a priceless one.

8 ANALYSIS OF GREEN ARMY: AN INSTITUTIONAL ANALYSIS DEVELOPMENT (IAD) FRAMEWORK APPROACH

This section focuses on analysis of Green Army as an innovative institution that has emerged to address one of the major agrarian constraints in Kerala, i.e., issues with respect to availability of labour use for agriculture and sustainability of agricultural production systems. In this analysis we are using the Institutional Analysis Development (IAD) framework approach, which is used by several scholarly studies to understand and analyse the process of emergence of such institutions, various actors, processes and interactions among them, various rules in use for the functioning of the institution, the outcomes from such institutions and evaluative criteria to assess such institutions. This approach was developed by Elinor Ostrom during 1983 and there are several scholarly studies that has used this approach in analysing different institutions on diverse geographies and ecologies. The basic analytical framework of the IAD framework is given in Figure 1.

The following sections discuss in detail the analysis of Green Army based on various parameters of the IAD framework.

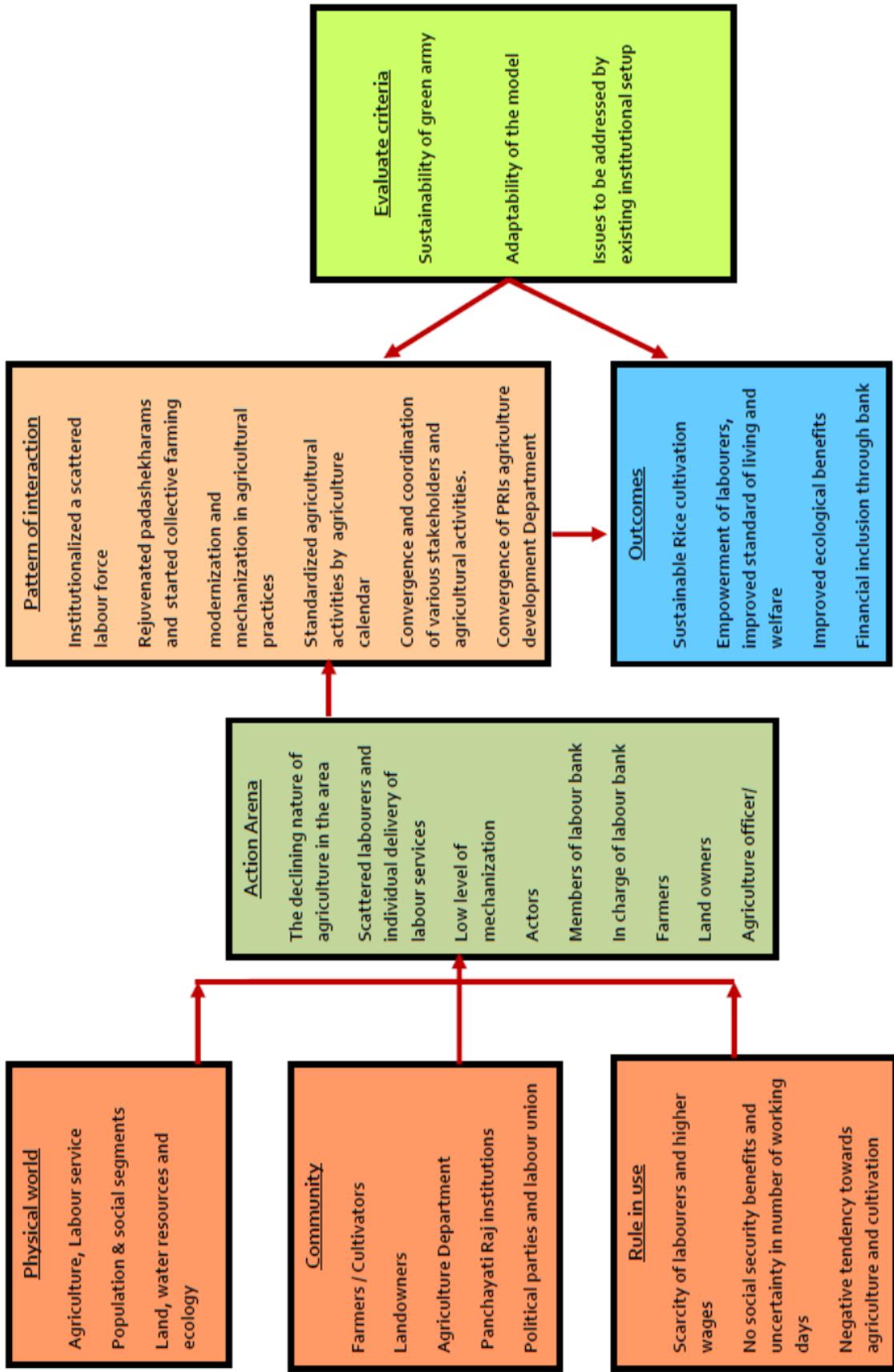
8.1 Physical world

Thrissur is one of the important districts of Kerala is situated in the central part of that state. Spanning an area of about 3,032 km², Thrissur district is regarded as the cultural capital of the State and is home to over 10% of Kerala's population. Out of the total 16 Block Panchayats in the district, Wadakkanchery is one of the important Block Panchayat with a population of 15671 (2011 census) with an area of 15.0 sq.km. The Wadakkanchery Block Panchayat is constituted by people from different segment of the people which help the harmonious functioning of the institution. There are people from various category including SC, OBC and General category.

Wadakkanchery Block Panchayat was one among the paddy cultivated areas in Thrissur district which was located in the two sides of 'Machad' mountain ranges. The Block Panchayat consisted of nine Gram Panchayats of Velore, Varavur, Thekumkara, Mundathicode, Mulurkara, Kadangod, Erumpetty, Deshamangalam and Wadakkanchery. The major source of livelihood of the population were dependent on cultivation of paddy, vegetable and cattle rearing. There were no major industrial activities or non-agricultural enterprise in the area. Most of them were doing individual farming and a small portion of them were doing group farming activities.

The regions are blessed with natural resources constituted by fertile land or fields, sufficient water provided by stream of rivers and canals. The presence of Vazhani Dam and its canal network in the area contributed necessary irrigation facilities. There were several check dams created for irrigation purpose. The areas not covered by the canal irrigation were doing rainfed cultivation. There is no lift irrigation facility in the areas which it is not covered by canal. The region also has rich diversity of flora and fauna is interspersed with natural forests.

Figure 1. IAD Framework for Green Army, Thrissur District, Kerala



8.2 Rule in use

- There was a significant shortage of agricultural labourers accompanied with a higher wage rate that prevailed in the economy. The existing labourers were scattered and were unorganized in their activities without having any social security benefits.
- The cultivators in the area were following individual farming without having any collective farming arrangements and they had to do all agricultural activities individually. This along with rising wage costs and scarcity of labour force made paddy cultivation unremunerative for farmers.
- Majority of the workforce were not willing to do agriculture work due to lower dignity and respect from society. Educated people, youth were keeping away from informal/agricultural jobs due to various issues attached with that job such as uncertainty in the number of working days, wage rate and lesser dignity among the society.
- There were many problems during the organization of labour bank. There were so many doubts on the Green Army during its organization about the possibility and success of such institution which is new for them. Most of them did not believe in the participation of women and their active engagement in the Green Army. They also doubted about the capabilities of women workers to handle heavy machineries such as transplanter.
- There were gender norms attached with various works particularly with operating heavy machinery and its maintenance. During the course of establishment of Green Army, it proved that the women can easily handle such machine works. The women labourers did not believe in their capability and success of the institution and its functioning. The training for climbing coconut tree helped them to get more confidence and break the gender norms of limiting certain jobs. Now the women are climbing coconut tree and, operating and repairing all machinery.

8.3 Action Arena

8.3.1 Stagnation and decline in agriculture sector

Agriculture, the major livelihood option in this area, especially paddy cultivation was facing a decline in production and productivity due to various reasons. The extent of fallow lands was increasing because people were increasingly moving away from paddy cultivation which was becoming unremunerative. There were constraints in availability of agricultural labour, high wage rate and absence of mechanisation in the field which led to the higher cost of production making paddy cultivation a loss-making enterprise.

Agricultural work was also seasonal job with low level of wage and lesser number of working days. The unskilled labourers were following traditional practices did not have any social security support mechanisms. The labourers and farmers were moving out from the sector due to declining profits and loss of confidence in agriculture sector as a viable livelihood option. It resulted in the farmers shifting from the sector by searching other livelihood options and converting productive land for non-agricultural activities, or they were keeping the land as fallow without doing any cultivation. It was a decision by Wadakkanchery Block Panchayat to initiate a project in 2008 in the objective of bringing the agriculture sector as a major livelihood option and ensure food security in the state by enhancing agriculture production and productivity. After continuous meetings and discussion under the leadership of Block Panchayat this idea for creating a labour bank was formulated. Local government had conducted various programmes, seminars for building awareness among the public, meeting for the project plan, objectives and target. They used to inform Kudumbashree, *padashekarasamiti* and Panchayat representative to inform the farmers and labourers about the programme. Awareness camps were conducted through the representatives of local self-government. The people in the region and farmers came slowly towards agriculture through a demonstration effect.

Maithri, an NGO from Palakkad district gave technical assistance to the cultivation under Green Army. It made various maps of the total land, cropping pattern and complete details about the total area cultivated and the area which remained fallow.

8.3.2 Green Army: Institutionalising the labour force

They institutionalised the scattered labour force under the umbrella of Green Army. The membership in Green Army is provided on the basis of bond or membership. All the members are made into different teams headed by leaders. Green Army provided a better uniform which gave the labourers more respect. There is a grading system among the labourers of Green Army which is fixing the wage for labourers as per their quality of labour services and skills. The leadership quality, behaviour, punctuality, efficiency, coordination & management skills, and the relation with farmers and other members of the Green Army (Group leader, deputy leader & Helpers) were the major criteria for the grading. Grading standards are revised in every six months. The salary is given to each person according to the Grade and value of work done during previous year. In addition, they are entitled to various social security benefits like Pension, Health Insurance, and educational aid to children, bonus, gratuity, and special allowance during festival. A coupon system has been introduced with the help of 'Neethi stores' to reduce the financial stress of labourers during the months, when there are fewer working days. Based on the coupon, each farmer can get food commodity and medicine for specific amount in those months and the amount is deducted from bonus of working months. The entire activities in the labour bank are integrated with employment guarantee scheme.

The initial step taken to form Green Army was to transform the unskilled labourers to skilled labour force build capacity to use various machines for the agricultural activities including tractor, transplanter and tiller. The Green Army office will decide the works according to the agriculture calendar. Work is assigned to the nearest labourer team or to the team which has the least work to ensure the equal allotment of works to all members in the Green Army. The Green Army makes sure the work is done on time by the proper communication between the office of Green Army and the Group Leaders and Deputy Leaders. It helps for smooth function of Green Army. There was a proper intervention and coordination by the department authorities and leaders of Green Army which conducted a number of meeting and discussion with farmers, *padashekarasamiti* representatives, Agricultural labourers and the public for the timely integration of different departments. It helped to overcome various issues faced during the initial period among the members. The key factor to the success of Green Army was the convergence of local self-government, Agricultural department, Irrigation department, Co-operative bank, farmers under *padashekarasamiti* and Agricultural labourers. The process could bring all of these stakeholders along with youth students and the public in one common platform led to the larger arena of success which resulted in the Wadakkanchery model.

8.4 Actors

The major actors engaged with building up of Green Army are the following:

8.4.1 Labourers

Labourers are engaged in agricultural activities by physical works, support for the cultivation and contributed for production.

8.4.2 Farmers

Farmers are pooling various inputs including labour, seed, fertiliser, pesticide, water and machineries for the cultivation and engaging in agricultural production activities in the field or land. They are mostly organised into *padashekharams* for agricultural production.

8.4.3 Land owners

There were land owners who are not cultivating themselves, but were contributing for cultivation by leasing out their land.

8.4.4 Green Army

Green Army helped in the formalisation of labour forces into an institutional setup

8.4.5 Agriculture office

Agriculture offices in various Panchayats in Wadakancherry Block helped to converge activities of various agriculture department and agencies. It led various training and capacity building programmes for mechanisation and new agricultural practices by mobilising the labourers and cultivators' programmes for the sustainable agriculture development.

8.4.6 Block Panchayat and Gram members

Block Panchayat initiated this project for sustainable agricultural development of the region and they brought various departments stakeholders together for this. As a part of this, other Panchayati Raj Institutions such as Gram Panchayats and wards were also engaged in this process.

8.4.7 SHG members

SHG members played a major role in bringing scattered labourers, cultivators and engaged them in creating awareness about the need for agriculture development.

8.4.8 Kerala Agricultural University

Agriculture University helped in providing agricultural expertise, promoting scientific agricultural practices and providing support training and capacity building.

8.4.9 Maithri

Maithri is a non-governmental organisation which provided all necessary technical assistance for the formation of Green Army such as providing support in the preparation of planning process of the total project and generating various resource maps for optimal use of land and other natural resources.

8.5 Pattern of interactions

The process of organisation of Green Army has been a tremendous task. They gathered farmers and agricultural labourers and conducted a number of seminars and meeting regarding the importance of agriculture and created awareness to restart the agrarian culture in the area in a scientific manner. They faced so many issues during the process of organisation of labour bank. The Panchayat representatives supported the institutionalisation of Green Army by observing its success, even though they were sceptical about the idea during the initial phase. Later, it got significant support from the representatives of Panchayati Raj Institutions from ward level to district level in the process of organisation. Technical support for the formation of Green Army was given by an NGO named Maithri and Kerala Agricultural University in various ways such as training, expertise and advice for formalisation as an institution. The important support and contribution was given by the all farmers here who strengthened the *padashekarasamitis* and the labourers who joined in Green Army. Green Army started its cultivation in 2008, the first phase of the Green Army project was started in 12 *padashekharams* which cultivated around 580 acre of land in the area. This helped in doubling the productivity from 3.5 tons to nearly eight tons per hectare. They increased the area of cultivation successively.

8.5.1 Functioning of Green Army

The Green Army functioned very transparently in carrying out its activities for paddy cultivation. There will be one meeting in Green Army before they start any assigned activity. The entire decision regarding nature of work, schedule of work, groups or teams responsible for work etc., is taken in that meeting. The group leaders discuss about their decision on the basis of agriculture calendar, total area to be cultivated and the activities to be done. The nursery required for transplanting and land for planting will be prepared as per their decision. If there is any delay or issue in executing the work, Green Army has to take assistance from other groups to complete the work. The responsible person from Green Army office will communicate with the group leader every day about their works and schedule. They will interact with labourers to find

out if there are any issues, which will be addressed within the institutional setup. If they cannot conduct meetings, they communicate with each other through telephone calls. These are the initiatives taken to ensure the smooth functioning of the Green Army. Every decision in Green Army is communicated properly and timely among the group leaders, team leaders and members. A larger meeting will be organised twice a year in which they take decisions regarding the entire matters of Green Army, especially planning, finance and budgeting.

8.5.2 Various steps were taken to make a sustainable paddy production

a) They institutionalised the existing labourers, for delivering professional labour services, which was scattered and unorganised. The institutionalisation process helped to improve the bargaining power regarding fixation of the wage rates and provision of social security measures. Seasonal availability of agricultural work has created lot of uncertainty in wage rates and the number of working days.

b) They selected 4-5 people from each Panchayat for a capacity building programme that includes 24 days of training by Kerala Agriculture University. The people who got training were skilled with practices of modern agricultural operations, including training in pest management, operation of agriculture machineries.

c) The Green Army identified that scattered small holdings and practice of individual farming is the major reason behind the losses in agriculture. It leads to the promotion of group farming by rejuvenating *padashekharasamitis*. It helped them to take advantage of economies of scale by using machineries and reducing the cost of cultivation. The entire farm activities were scheduled after the strengthening of *padashekharasamitis*.

d) There was no scientific knowledge about the *padashekham*, the nature and quality of soil and other agricultural practices among the farmers and labourers. They conducted detailed participatory study about the field to understand and make inferences about the field for cultivation of various paddy varieties. It assessed the requirements for improving the status of cultivation including seedlings, planting irrigation and harvesting. Maps and charts were prepared based on the detailed study.

e) An agriculture calendar was prepared after a series of meetings and discussions with the members of *padashekharasamiti* and agricultural labourers to make proper planning. There was a compulsion to use the specific high yielding varieties of seed such as Uma and Jyothi.

f) Green Army introduced mechanisation of all activities including ploughing, transplanting, harvesting winnowing, etc., on a priority basis to address the issue of labour scarcity in the area. Introduction of mechanisation was the step to reduce the cost of production and improve the efficiency of work which resulted in an unexpected level of production and productivity. Scientific space management through transplanter also contributed to improve the yield.

g) The Green Army ensured the integration and convergence of various stakeholders including Block Panchayat, district Panchayat, Gram Panchayat and Agricultural department at regular intervals for smooth functioning of its activities.

8.6 Outcomes

8.6.1 Sustainable agriculture production

Green Army could create a sustainable agriculture production system in the area which was not profitable and going through a stagnant phase. Higher cost of cultivation due to lack of mechanisation and scattered delivery of labour services were major constraints. Green Army contributed to the livelihood option of the people by transforming agriculture sector to a profitable one. It also provided employment facilities for more people, provided banking support, and supported its members through social security schemes and ensured fixed working days and monthly salary. It also facilitates various benefits for the labourers and farmers. Green Army intervened in the situation to bring a sustainable agriculture production.

8.6.2 Reduction in cost of cultivation and time bounded agriculture activities

The formation of Green Army resolved the issue of labour scarcity by supplying enough labourers for the field with affordable wage rates. They started capacity building among labourers and introduction of various machineries into the field. It helped to complete the agriculture activities with limited time period and more efficiently. It made possible time bounded agricultural activities in the area. The entire work of *padashekharas* could be completed within two weeks by Green Army.

8.6.3 Reduction in fallow land through group farming and Improvement in production and productivity.

The farmers had a negative attitude towards the cultivation due to less profitability and higher chances of loss and they were shifting out of paddy cultivation. The purposive intervention of Green Army and agriculture department for creation of awareness among the stakeholders of cultivation, and the institutionalisation and formalisation of the agricultural activities and labourers changed the situation. This attracted more people towards cultivation. They turned into group farming by strengthening the *padashekharasamitis*. It helped to get more profitability from paddy cultivation by taking the advantages of economies of scale through mechanisation in group farming. This resulted in decrease in the area of fallow land thus increasing area of cultivation by cooperative farming. Mechanisation and new scientific cultivation practices brought by Green Army helped them to improve production and productivity, which increased from 3.5 tonnes per hectare to eight tonnes per hectare.

8.6.4 Empowerment of labourers through welfare provision

Empowerment of the labourers is one of the major outcomes created by the Green Army which contributed significantly for the sustainable development of agriculture sector in Wadakkanchery. It attracted the labourers to the agricultural labour force and made them continue in the field. Unionisation and mechanisation helped to reduce the drudgery in the field, and they could take advantage of group work by sharing the work and risk. Green Army intervened by various actions to improve the status of labourers in the following ways:

8.6.4.1 Change in the attitude of labourers towards the agriculture work

The labourers were not interested to work in agriculture due to various reasons such as uncertainty in the number of working days and fixed wage rate, and lack social security and the seasonality of the agriculture work. There was no social and economic security with the sector and lesser acceptance from the civil society made them move out from agriculture. They transformed the daily wage into monthly salary and added more social security measures such as life insurance, medical insurance, pension, welfare fund, and educational assistance to children. This attracted the labourers to join in labour banks and thereby improve their income and purchasing capacity.

8.6.4.2 Fixed working days & increased wage rate

Green Army ensured fixed working days for the labourers by organising the scattered labourers into a formal system and providing capacity building and skill up gradation into an efficient labour force. It also standardised the wage rate for the labourers on a monthly salary basis. This salary system helped the labourers from the seasonal uncertainty of works and fluctuation in the wage rate. The salary system could help them to save little amounts which cultivated saving habit. Earlier they were spending whatever amount they earned. The banks were providing loan only for the individual who has monthly salary. Daily wage labourers could not access the loan. The salary system to labourers also helped to eliminate money lenders, especially the Tamil migrants and free them from high interest rate.

Improved social dignity and respect and enhancing bargaining power

The institutional formation of labour force into a collective labour bank helped to improve the dignity and respect of the labourers in the society. They got more creditability and social and financial independency by getting new uniform,

monthly salary and various social measures such as pension, health insurance, educational support to the children of labourers and other welfare measures. Also, capacity building towards formation of a trained labour force to improve bargaining power among labourers changed the situation for empowering the labourers. The members of the Green Army became the experts in agricultural operations due to the years of experiences in scientific agricultural practices.

8.6.4.4 Institutional formation for delivering labour services

The formation of Green Army by institutionalising the scattered labour force helped to provide agricultural services timely as per contract. The services include, land preparation, nursery and seedling, transplanting, harvesting and post-harvest handling. It helped to create a system which provides the labour services without any difficulty. The farmers were approaching the labour bank instead of searching the labourers individually. The members of labour bank got better field experience, and earned confidence and self-esteem.

8.6.5 Improved the ecological benefit

The activities of Green Army and formalisation of agricultural labour force could contribute to sustainable agricultural production in the region. Activation of *padashekharams* and total farming in field helped to conserve the flora and fauna in the fields and neighbouring areas due to better availability of water and other resources. Renovation of irrigation infrastructure such as canals and other water resources helped to provide proper supply of water to the agriculture fields from the rivers, which also resulted in the recharging of ground water levels in the region. Conversion of fallow land into cultivating paddy field also and contributed for the conservation of water in the area.

8.6.6 Financial inclusion through banking linkage

Formalisation of labour force through Green Army helped to change from the traditional way of daily wages to monthly salary through bank account, which helped the members of Green Army for a better banking linkage and financial inclusion. Most of the members of Green Army especially women were not linked with banks for their financial transaction earlier. All their social security support were implemented through their bank accounts with the Primary Co-operative Bank. Thus, Green Army helped them to get connected with the banking system and enhance their financial inclusion.

8.6.7 Promotion of Gender Equality and Women Empowerment

Women members constituted majority of the labour force of Green Army and the functioning of the institution focused on promoting gender equality and empowerment of its women work force. The most important step in ensuring gender equality was in the provision of wages for members belonging to same grade irrespective of their gender. Women and men received the same wages and they were given equal opportunities for skill development and capacity building.

The women members of Green Army got economic and social independence after joining the labour force. They started to engage with various institutions and government departments. This helped them to develop their network of relations with government officials and other functionaries. It helped to create a better social capital which helps them in various ways. The experience from Green Army made them to take the charge of key positions and role in various forums in Panchayat samiti, Krishibhavan, Kudumbashree and agriculture development agencies. They also started contesting in local body elections.

8.7 Evaluate criteria

The IAD framework uses the concepts of economic efficiency, equity, adaptability, resilience, and robustness, accountability and conformance to general morality as the major evaluative criteria for analysing institutions (Ostrom, 2005). In this analysis we evaluate the institution of Green Army on account of its sustainability, adaptability, equity and accountability.

a) The sustainability of the Green Army: Institutionalisation of labour force into Green Army helped in creation of a sustainable agriculture production system. It can create a permanent skilled labour force, which are also adapted with use of mechanisations. It can reduce the cost of cultivation and reduce the risk of the cultivators now the Green Army is taking all activities in a contract basis. The model can bring significant improvement in the production and in the productivity. It improved the productivity from 3.5 tons per hectare to eight tons per hectare paddy cultivation in Wadakkanchery Block. All those activities helped to form a sustainable institution in addressing the challenges for agriculture development.

b) The Wadakkanchery model has performed well but the adaptability of this model will depend on how we are implementing to tackle the issues in other areas. The issues emerged were handled by the institutionalisation of labour force and agricultural development activities. We hope that they can tackle similar issues with the help of institutional set up created by the convergence of PRIs and their functionaries, agricultural department and members of the community.

c) The wage rates have increased significantly and wages were also given as salary on a monthly basis. But the number of working days has to be increased to 192 days to provide salary throughout the year, which is comparatively less now. It has to be addressed by using the institutional arrangements of Green Army and extending its activities. A major concern now is that they experience a decline in the membership due to lesser number of working days available for them.

d) The institutionalisation of Green Army could address the major input constraints of agriculture, which is labour. It provided more dignity and respect to the labour now by adding various social security measures such as pension, insurance and educational support to the children, which attracted them to engage in agricultural activities. The interventions have improved the profit levels and the status of farmers by reducing the risk during the agricultural production. The agriculture in the Wadakkanchery Block after the formation of Green Army became more sustainable one by increasing the profit by reducing the cost and risk of cultivation.

E) The role of Green Army is in institutionalising all agriculture activities in a single platform by the convergence of all respective departments and agencies. The institution has succeeded in bringing all resources to one platform and collective action of all stakeholders including Agriculture Department, Panchayati Raj Institutions such as Block Panchayat and Gram Panchayat farmers, labourers and civil society. It improved the status of labourers by providing more security for the labourers in terms of wage, number of working days and social dignity. It also provides security to the cultivators in terms of profit and reducing uncertainty and risk in paddy cultivation. Both these elements significantly contributed in making a sustainable agriculture in the area, which attracted more labourers in agriculture sector and supported more farmers to engage in paddy cultivation.

9. Major Learnings from Green Army

Formation of Green Army is a significant intervention to create an institution to address the challenges in agriculture development. It was formed in the Wadakkanchery Block Panchayat of Thrissur district, when the area was facing a decline in agriculture production and reduction in the area of cultivation. It resulted in the keeping away of farmers from cultivation. They identified that increased cost of cultivation is the major reason for loss in cultivation which is majorly driven by the higher cost of labour service. Following traditional way of agriculture practices and lack of adoption of modern machineries and technologies are the other reason for raising the cost of cultivation. The labourers were also facing lot of problems including the uncertainty of fixed working days and lack of social security and other benefits. The stakeholders of the agriculture sector intervened in this issue by formalising and institutionalisation of the labour sector. The output was the formation of Green Army.

Green Army transformed the entire status of labourers and thereby agriculture sector in the Wadakkanchery Block Panchayat. They organised the scattered labourers and gave them training in skill enhancement and capacity building to

make a skilled labour force. They also entitled various social security measurements, fixed working days and fixed salary which empowered the labourers. It also brought mechanisation in the fields of Wadakkanchery which was following traditional agricultural practices. This resulted in the reduction in cost of production and organised farming system in the area which attracted the farmers towards the Green Army and cultivation of paddy. Green Army grew into a system which is providing all agriculture activities on contract basis at a specified charge for each work. It reduced the risk of farmers engaged in paddy cultivation. Green Army helped to strengthen the *padashekharasamiti* and also provide banking support to get various loan and financial facilities and thus contributed to creation of sustainable livelihood options in agriculture sector.

10. TOTAL FARMING PROGRAMME AND FORMATION OF MAYYIL RICE PRODUCING COMPANY (MRPC), KANNUR

This section discusses the background, process of formation, functioning and various interventions made through the formation of Mayyil Rice Producing Company, which has transformed the agricultural production in Mayyil Gram Panchayat of Kannur District. They have achieved this by addressing a major output constraint that has affected the returns from paddy cultivation, and farmers were slowly withdrawing from cultivation.

10.1 Background of Kannur district and its agriculture

Kannur district is located in the northern parts of Kerala which covers an area of 2966 sq km bounded by the North latitudes 11° 40' and 12° 48' and East longitudes 74° 52' and 75° 56'. It is bounded by Kozhikode district in the south, Kasaragod district in the north, Wayanad district and Coorg district of Karnataka in the east and the Arabian Sea in the west. As per the census data 2011, the district has total population of 2525637 persons with 1184012 males and 1341625 female's population with a literacy rate of 95.41 per cent. For administrative convenience, Kannur district is divided into 3 taluks (Taliparambu, Kannur and Thalassery), 5 Municipalities (Payyanur, Taliparambu, Kannur, Mattannur, Thalassery and Koothuparambu), 9 Block Panchayats (Payyanur, Kannur, Thalassery, Taliparambu, Edakkad, Irikkur, Iritty, Peravur and Koothuparambu), 81 Gram Panchayats and 129 villages.

The major source of irrigation in Kannur district is the Valapattanam and Anjarakandy rivers. The other rivers are Kupam, Mahe, Thalassery, etc. A total of 23312 ha area is irrigated in Kannur, which accounts about 8.01 per cent of the gross irrigated area of the state. The district receives a total annual rainfall of around 3438 mm, in which it experiences heavy rainfall during the South West monsoon season during June to September contributes 70 per cent of the total rainfall of the year followed by North East monsoon during October to December which contributes 30 per cent.

The stagnancy of agriculture sector in Kerala was also reflected in the district of Kannur and in the Mayyil Panchayat. The increased cost of cultivation, traditional practices of production, marketing, and scattered cultivation due to inactive *padashekharasamiti* were adversely affecting profitability of Mayyil's paddy cultivation. Strengthening *padashekharasamiti* was the first initiative taken to address these issues, which later led to the formation of Farmers Producing Organisation (FPO) named Mayyil Rice Producing Company at Mayyil, Kannur District of Kerala.

10.2 Land Utilisation of Kannur District in 2016-17

The land utilisation pattern of Kerala and Kannur district is given in Table 2.Y1. The gross cropped area in Kerala is 2584007 hectares and 221366 hectares in Kannur district which is 8.6 per cent to the Kerala. The cropping intensity in Kannur is 118 which is less than that of Kerala (128). Kannur is sharing 8.48 per cent of the land which is used for "Non agriculture uses" to the Kerala. There is 55530 ha of "Other fallow land" which is being continuing as a fallow for 1 to 5 years in Kerala. Kannur has a share of 7.05 per cent of the 'Other fallow land' to the Kerala. Kerala also has 72008ha of

'Current fallow land (up to 1 year)'. Kannur has an account of 5.65 per cent of the current fallow land to the total share of Kerala.

10.3 Cropping pattern of Kerala and Kannur

Kerala is producing 436483 million tonnes of paddy by the cultivating 171398 ha of land. Paddy is cultivated in 7.56 per cent of gross cropped area in Kerala. Kannur district is cultivating paddy in 4761 ha of land, which is 2.72 per cent share of the total area of paddy cultivation in Kerala. Kannur district is also producing 10623 million ha of paddy which is 2.43 per cent share of the total production of Kerala.

Table 7 Land Utilization of Kerala in 2016-17

Category	Kerala Area (in Hectares)	Kannur Area (in Hectares)	Thrissur Area (in Hectares)
Gross cropped area	2584007	221366 (8.6%to Kerala)	170978 (6.6% to Kerala)
Net cropped area	2015482	187932	128469
Cropping intensity	128	118	133
Land put to non -agricultural uses	441934	37512	39026
Current Fallow (up to 1 yr)	72008	4069	9813
Other fallow land (1 to 5 yrs)	55530	3915	6031
Cultivable waste	101379	8405	10170

Source: Department of Economic and Statistics, Government of Kerala

Table 8. Area and Production of Major crops in 2016-17 in Kerala & Kannur

Sl. No	Crop	Kerala			Kannur		
		Area (in Hectare)	Share of crop in %	Production (in MT)	Area (in Hectare)	Share of crop in %	Production (in MT)
2	Paddy	171398	7.56	436483	4671	2.33	10623
3	Coconut	781496	34.5	5384	88217	44.2	527
4	Areca nut	97696	4.31	116839	9543	4.8	12684
5	Tapioca	68664	3.03	2529729	1661	0.83	67051
6	Banana	57158	2.52	489322	2022	1.01	18342
7	Plantain	57140	2.52	395806	3150	1.57	13669
8	Jack	91982	4.06	281	8504	4.25	24
9	Mango	79496	3.51	420048	7829	3.9	48685
10	Pappaya	19694	0.86	116262	2031	1.01	13189
11	Cashew	41661	1.83	27944	19411	9.72	19148

12	Pepper	85207	3.77	34065	4394	2.2	2447
13	Ginger (cured)	5151	0.22	20478	53	0.03	184
14	Turmeric (cured)	2632	0.11	6506	144	0.07	483
15	Tea	30205	1.33	61505	0	0	0
16	Coffee	84976	3.75	63476	0	0	0
17	Cardamom	39080	1.72	17147	0	0	0
18	Rubber	551050	24.33	540400	48070	24.07	49000
	Total	2264686	99.93		199700	99.99	

10.4 Agricultural Production in Mayyil Panchayat

Mayyil Panchayat is in the lateritic zone in north Kerala, specifically in Kannur district, spread over 33.08 sq. km. Mayyil is located about 20 km North-east of Kannur Municipal area. It is situated in the Irikkur Block division which falls under Thaliparamabu constituency. The Panchayat has 17 Gram Panchayat ward divisions. The Panchayat consist of two villages Mayyil and Kayaralam, with a population of 34998. It is a strategical place which has easy access to different places of Kannur district such as Thaliparamba, Parassinikadavu, Chalode, Thalassery, Mattannur, Kuthuparamba, Iritty, Sreekandapuram, etc.

The situation of Mayyil was entirely different three years ago. Cultivating paddy was not remunerative due to individual cultivation by using traditional agricultural practice and lack of mechanisation. So, farmers were searching other livelihood options. Around 6000 families live here and one-third of them cultivate paddy on marginal holdings of 0.1 acre to three acres, owned by themselves or lease. Due to high production cost and low returns on rice, Paddy cultivation was declining. The workers have to stand long hours in slush for transplanting paddy, which was mostly done by women over 60-years old. They would harvest 20 to 21 kg of paddy per day and given 15 kg paddy per day for their labour charge.

10.5 Low prices and lack of marketing opportunities

After the paddy was harvested, paddy farmers had only one option, i.e., to sell their product to Supply co, a state government agency, which would procure at a fixed rate of Rs. 23.30 per kg. The farmer had to go through complicated formalities to sell to the government agency and both procurement and payment were always inordinately delayed. Because of this, most farmers were compelled to sell their output to rice mills at a lower price, before it got spoiled. They did not have sufficient storage facilities. They used to sell their paddy to private mills, for making rice flakes or *poha* at a low price of 17 rupees per kg. The paddy procured by the government was sent to big rice mills which were then sold to the buyers in other States. These mills then buy low quality rice at lower prices, and supply it to the state agencies. Sometimes there were complaints about low quality adulterated rice being supplied to domestic market for consumers. This low-quality rice would be sold through ration shops, Maveli stores and Neethi stores and stores run by rural credit societies. The irony of the situation was that the paddy farmer sold his superior rice to the government or rice mills for a low price and then bought adulterated rice at a higher rate.

11.COMPREHENSIVE PADDY CULTIVATION: THE BEGINNING

The Mayyil Gram Panchayat decided to address the constraints faced by paddy cultivators in the region and launched the 'Total Paddy cultivation campaign' (*Sampoornna NelluKrishi*) on August 2016 to revive the paddy farming in the area. All stakeholders including farmers, agriculture scientists, government agencies, political parties, youth and women united for

the movement which has snowballed through small and local efforts, to make the programme a great success. The campaign resulted in doubling of total area under paddy cultivation from 300 hectare to 600 hectare. Indeed, it led to the improvement of production of paddy by 4.5 times. Mayyil harvested 3000 ton in 2017-18 which was only 645 tones, in 2016-17.

11.1 Improvements in Production and Productivity:

When the Comprehensive Paddy Cultivation programme started, the Panchayat had 300 hectares of area under paddy in which two crops of were cultivated. The average production was 2150 Kg per hectare. There was another 300 hectares of land which remained fallow for more than decade, which was also brought under paddy cultivation. The crop yield was doubled to 4320 Kg in the first crop and, it tripled to 6346 kg during the second crop by the adaptation of new farming techniques.

It also led to a fourfold increase in paddy production from 645 tonnes before starting total farming campaign to 3000 tonnes after the interventions. They estimated that the 6000 families of Mayyil Panchayat would require nearly 1000 tonnes of rice or 1500 tonnes of paddy for their own consumption in a year. They have achieved almost double the production of what they need for own consumption. It helped them to achieve self-sufficiency in food production and an equal amount of surplus paddy was available as marketable surplus. They made this possible by following the advice given by the Scientists from Krishi Vigyan Kendra and State Agriculture Department. Their dedication and hard work ensured increase in production and productivity.

The improvement in productivity helped them to achieve self-sufficiency in paddy production. Earlier, the farmers used to get 60 to 62 per cent of rice and 30 per cent chaff. This improved to 70 to 75 percent of rice by reducing the dosage of nitrogen, which helped in minimising the chaff to three to four per cent of rice. The food security army which arrived from Thrissur also played a crucial role. Being a trained work force, they completed the agricultural operations in an organised and scientific manner without any hesitation and carried out cultivation.

The Mayyil total paddy cultivation campaign thereafter grew into its own Farmer Producer Organisation (FPO) called the Mayyil Rice Producing Company (MRPC) in June 2017, which is marketing its own brand named 'Mayyil Samridhi Rice' .

11.2 Production to Post-harvest handling: Introduction of Mini Rice Mills

Higher productivity and an active Farmer producer company could not ensure farmers a higher income, even though they could raise the level of production and productivity. The exploitation of middle men and big private mills led to the search for local milling options. After sufficient discussions, consultations and exploration, they decided to establish a mini rice mill. This was a small-scale mill powered with a 3 Hp motor, that can convert 120 Kg paddy into rice in one hour. The mini rice mill converts small quantities of paddy into rice and also liberated them from the clutches of big private mills. It helped the farmers to sell their rice locally and make it available for self-consumption. The mini rice mill, which could be easily transported, was manufactured by a Company named Maruthi Engineering works in Davangere district of Karnataka². The first mini rice mill reached the agriculture office of Mayyil, on 16th June, 2017 and they operated there and convinced the Panchayat representatives of the *padashekarasamiti* members.

This mini rice mills became the most vital technological intervention in the programme. A total of 450 mini rice mills were distributed in Kerala during 2017 to 2018. This also helped the FPO to get the dealership of mini rice mill and they became the distributors across the state of Kerala. A mini rice mill changed the total profile of rice marketing in Mayyil. Thirteen mini rice mills, including one running mobile milling unit attached with an ace auto, are now operational in

Decentralized milling had a crucial role in the success of MRPC. MRPC introduced the mini rice mills and other mini mills produced by Maruthi Engineering works to address the issue of local milling in the area. They provided dealership to MRPC for distributing mini rice mills across Kerala which helped to pool working capital for MRPC and sustain it without having any other fund.

Mayyil Panchayat churning out various grades of rice. The success of mini rice mill brought a turnaround in the fortunes of paddy cultivation in the region. The success of Mini Rice Mill resulted in the closure of two big private rice mills in the region.

There was support from the State Agriculture Department for this turnaround in paddy cultivation and rice production. With the intervention of State Agriculture Minister, farmers group got subsidy for mini rice mills, which was priced at Rs. 39500. They only had to pay the tax (GST) of Rs. 2000. Across the state MRPC has sold 645 mini mills in the past 9 months. Thirteen mini mills are operating the Mayyil Panchayat area. Two mills are run by women entrepreneurs under women empowerment programme.

11.3 Mini Rice Mill and Decentralized Milling System

Once the mini rice mills were tested and after necessary trials, they started to develop a business idea of setting up a decentralised system of local milling and processing. The MRPC has set up a three tiered network of 50 mini rice mills. It is distributed in a way that 25 mini rice mills to *padashekharams* for own use. They can sell their surplus rice on their own or they can hand it over to the MRPC for sale. Another 15 mini rice mills were given to individual farmer entrepreneurs. They could mill their own rice and sell to other farmers as well. The farmers can sell rice on their own or to the MRPC. The remaining ten mills are retained by the MRPC to process the paddy, they procure and market it. This network of mills provided households the access to a rice mill where they can buy rice within a kilometre.

The MRPC is also running a mobile rice milling unit attached to a Tata Ace vehicle owned by Jignesh Chappadi, a graduate who operates the mill five days a week. The vehicle will be parked in a central location, and the costumers have to bring paddy to his vehicle for milling and convert into rice. He is milling almost 300 to 450 kg a day. He also delivers rice to MRPC customers twice a week. His mini truck is named as "Arivandi" or rice vehicle. They are providing quality rice which is superior and free of any type of adulteration. They are buying paddy at the rate of Rs. 23 kilogram after calculating production cost with a decent margin for farmers, and the Mayyil Rice Producing Company pays the farmer Rs. 30 for a kg of paddy.

11.4 Decentralised marketing

The paddy cultivation in Mayyil was transformed from a mere production process and disposal of the produce to traders, rice mills or procurement agencies to that of an organised enterprises and the farmers becoming entrepreneurs³. The farmers can now store the surplus paddy and then convert them into rice by using the mini rice mill. They can also sell them to MRPC or in local market, or to other farmers which helps to earn extra income. The mini rice mill converted the farmer into an agriculture entrepreneur. It also ensured food & nutrition security of households in Mayyil Panchayat by increased production, productivity and increased returns from paddy cultivation.

MRPC collected paddy and processed it and marketed, which solved the exploitation of the big private mills which charge higher rates for milling. They took dealership of mini rice mill, which also helps to earn the working capital for the company. This dealership helped the company to tackle the situation even though they did not get any major financial gains from it. Those portable machines are labour friendly and easy to handle. This has helped several women to become entrepreneurs by producing rice and sell them in neighbourhood and nearby markets. It helped them earn income by working in the rice mill at home.

MRPC has been selling rice since December 2017 from their Mayyil office and two retail outlets around the city⁴. They are selling on an average of about six tonnes per month through three local outlets. The MRPC is also delivering the rice to

3. Mr.Radhakrishnan, the agriculture officer of Mayyil Panchyat has played a significant role in developing this 'Mayyil model', which offered a simple solution for a complex issue It was a big challenge for farmers to carry the paddy into big rice mill, which will take more effort and expenses for transportation. So they sold the paddy at lower price to private agencies.

the far-off customers by taking part in exhibitions and agricultural fairs. The company is branding their rice as Mayyil Samridhi rice. It helped MRPC to earn a turnover of almost Rs. 3 crore in the year 2017-18. A few farmers from various *padashekharams* sell unpacked rice for Rs. 50 per kg directly to buyers from their homes. MRPC is now planning to sell packed rice in cotton bags of 1, 5, 10 and 20 kg. Depending on the variety, the price of Mayyil rice is fixed between 60 to 70 rupees per kg (currently selling at Rs65/kg). There is consistent demand from customers for rice. Most buyers are from middle class and from areas outside the Mayyil Panchayat.

The company now plans to open ten KIOSKs in different parts of Kannur district in the next few months. The KIOSKs are nearing completion. Shortage of space for post harvesting activities is the major problem faced by farmers. MRPC utilised the two existing two poly-houses and a government building owned by the Zilla Panchayat. They have set up MRPC's milling unit, storage space for new milling machines and a godown for storing paddy in that building.

11.5 New agriculture practices for higher productivity

At first, the farmers were practicing traditional method of paddy cultivation. The Krishi Vigyan Kendra in Kannur district made significant interventions in transforming the farmers from traditional production methods to scientific modern methods of paddy cultivation. Eventually when they introduced mechanisation and improved farming practices productivity improved significantly. Their farm trials shows that with these modern technologies, 4556 sq.ft can produce 300 kg of paddy or a hectare can produce 7.5 tonnes of paddy. They applied five customised improvisations that brought about change in the traditional paddy cultivation practices. First, they used dolomite to neutralise soil acidity instead of lime, which has a more lasting effect than lime. So, it helped improve the uptake of nutrients for a longer period. Secondly, they replaced tillers with tractors, which resulted in deeper ploughing and more aeration in the soil. Third intervention was improving the quality of seed. Earlier they used seven paddy seed varieties for the first crop, which reduced to two varieties for the second crop. The concept of using one variety of seed for one *padashekharam* facilitated simultaneous agricultural operation and kept the field free from the pest and diseases. More spacing between plants and shallow planting through transplantation was the fourth improvisation method. This resulted in the increase in number of tillers or grain bearing branches. There was a phenomenal increase in tillers in the paddy plants in about eight to ten paddy belts⁵. The fifth improvement was preparing the soil with nutrients and growth promoters, such as *harithakashayam* from the Vrikshayurvedha, without spraying any chemical insecticide to make poison free rice. They followed the principle of healthy soil, healthy plant and thereby healthy food. It gave an encouraging yield in the first crop, which was not the case for second crop, which seemed difficult due to not getting enough time for preparing field and extra work of all activities due to special effort for first crop⁶. It led to the thought of introducing mechanisation to reduce human labour for timely completion of operation. But farmers were too cautious on bringing machine on their field. They all were concerned about the functioning of new machineries which they were not used to. They were sceptical that transplanter and combined harvester would not be able to get down to their fields, and production would be seriously affected. The area was too vast; the machinery might be limited which would not cover the vast area of cultivating land. The Food Security Army from Thrissur District was bought in to complete the work within 10 days⁷. They organised 15 transplanters from Tamil Nadu, but faced the challenge at the last minute because of the withdrawal of the agreement by the transplanting machine own-

4. Till now, the MRPC has procured a quantity of 48 tonnes of paddy and it has sold 24 ton of rice processed by a mini rice mills.

5. Even though the effective tillers was an average of 52, one farmer named U Kumar could produce 86 tillers in his plant which was displayed by the V.S Sunil Kumar, the Agriculture minister of Kerala as a token of high yield.

6. MRPC is cultivating two crops now, they are cultivating almost 784 acres of first crop during the months of May- September and they are using the varieties of seed including Vellariyan, Shreyas, Uma and Prathyasha. They are cultivating 688 acres of second crop during October-February

7. Dr. A Latha, head of the agriculture research station of Kerala agriculture University (KAU), Thrissur, who was an experienced scientist, supported MRPC in getting the services of Food Security Army for timely completion of harvesting and other post-harvest operations.

ers from Tamil Nadu. They made alternative arrangement for machines and it took 25 days to complete the whole task.

They could effectively change the situation by a centralised production system and decentralised marketing system to establish such a sustainable system. But there are still issues to be addressed, such as of lack of space to dry their paddy close to their household milling units. The Agriculture Office is doing consistent follow up by providing good seeds, machinery support and technical advice to *padashekharasamitis*. The seed to market strategy improves the quality of produce and changes the lives of its members and the people related to it.

11.6 Organisation process of total farming programme

After the Total Paddy Cultivation programme was launched, six months were spent on creating awareness through meetings, trainings, discussion and other programmes. The paddy farmers were organised into 25 paddy farming groups or *padashekharams* at the grassroots level. Each *padashekharam* controls 25 to 175 acres and it made effort to improve productivity with the help of agriculture office, and Panchayat.

U Ravindran, the secretary of Keezhalam *padashekarasamithi* with 150 acres says that, three years ago, they were cultivating 50 acres in the first crop and 28 acres in the second crop, and about 100 acres were left fallow. In 2016-17 they got Rs. 1.5 lakhs as an incentive for extending paddy cultivation. This was disbursed to farmer members, for cultivating paddy in the fallow land. This resulted in an increase in cultivation from 78 acres during 2015-16 to 290 acres in 2016-17. All farmers supported this decision and the committee went door-to-door meeting the land owners of the *padashekharam*. This was a success. Subsequently the committee members decided to use the profit from the first crop to support the second crop. The committee bought a small building with four rooms for Rs. 6.2 lakh by the next round of incentives amount. This was used as the machinery store room, mini rice mills, and meeting hall. Inspired by the success, many people voluntarily joined the mission in subsequent seasons⁸.

11.7 Process of formation of MRPC

The first meeting towards the formation of Mayyil Rice Producer Company was held under the leadership of Agriculture officer and *padashekharasamiti*. They formed a temporary committee on June 2017, and registered with 10 people as members and with an initial capital of 1 lakh by contributing Rs. 10,000 each. The shareholders consist of five executive directors and five members which changed into 10 executive directors now. The initial capital of the company was Rs. 1 lakh, which has 56 shareholders now, and the directors can share the profit. The company earned a profit of Rs. 14.25 lakh in the year 2017-18 and it paid an income tax of Rs. 4,10,000. At present they are not sharing the profit and the shareholders are using that amount to procure paddy. Mechanisation was introduced by MRPC without owning any machine, but pooled the machines from various agencies by rent. The key objective of the MRPC is focusing on the principle "from seed to market". The major activities include procurement of paddy at a fair price, its conversion into rice and marketing of the branded rice in local market. In October 2017, MRPC began procuring paddy at Rs. 23 per kg and paid farmers on the spot.

MRPC didn't try for other financial sources due to the pooling of working capital by the dealership of mini rice mill in Kerala. They are getting finance through the sales of these machineries. MRPC had a direct agreement with the company from Bangalore. They already sold 450 machines in Kerala and they also have an order of 100 machines. There is an issue

Chandrashekar, secretary of Mullakkodi *padashekharam* says that they have 100 members and supervises 175 acres of land for cultivation which has increased from 100 acres of land within two or three year. They grow a local variety of rice called "Vellarian". Their crop yield increased from 600 – 700 kg per acre to about 1200 kg per acre, after they applied a traditional growth promoter prescribed in the "Vrukshayurvedha". It helped to attract more people on farming in fallow land now more people are coming forward to cultivate fallow fields.

of permanent setup for distributing the product, but they are getting orders through Agriculture office and selling through it. They introduced their brand in 2017 and launched the product by making a stall in Vaiga, an annual agricultural fair conducted at Thrissur. They are also planning to make alliance with other FPOs by exchange of different products such as moong dal, green peas and other pulses from one FPO based in Karnataka. They have already made a business agreement with the eco-shop from Thalipparamba to distribute their products through them. MRPC started with sale of rice which is extending now to formation of eco-shop. They are making linkages and agreements with various parallel institutions like Kerala Dinesh Product. The initiative is not to make huge profits, but to protect various local enterprises survive by selling their products, which are not very popular among communities. They also have the dealership of coconut oil processing machine. But they are not interested to enter into market.

11.8 Mini rice mills and household enterprise

The company introduced mini-rice mill which helped the farmers to start an entrepreneurship which was a proud achievement for the company. Kerala was producing paddy, but it lacked the facility for processing and storage at farm gate. The coordination of the company helped to process the product by the farmer himself. When the machine is brought into one household, farmers are giving the paddy for processing; they can charge Rs.2 to 3 for processing of 1 Kg of paddy to make rice. The mini rice mill is consuming lesser electricity. Thus the cost of operation was also less. They can also earn Rs. 35 or more as profit than getting for paddy at Rs. 23. The introduction of mini rice mill led to closing down of the private mill, which was charging a higher rate for milling. Some mill owners are also demanding for the mini rice mill. The earlier milling process was heavy and time taking (Three step process). The mini rice mills are very simple to operate. They have now given contract for the commercial production of mini rice mill with slight modifications. Now MRPC owes the dealership of mini rice machine in the entire state which is helping to organise the capital for the FPO. MRPC is also planning to produce a boiling unit made by steel which is priced Rs. 15000 + GST to support the farmers to minimise their risk during the boiling.

11.9 Involvement of MRPC

11.9.1 Ensuring decent price for paddy

The paddy cultivation of the area was declining due to non-remunerative price for the product. The MRPC was formed to address the low-price issue for the paddy they had grown. They formalised and institutionalised the system which helped to ensure a fixed rate for the paddy which was a greater achievement and support for the farmers. So, all the farmers are working as per the guidance of MRPC and they are supplying the rice after processing when the company demands.

11.9.2 Pooling machinery

At present, there is no difficulty to pool the machinery for various agricultural operations. The machine delivery agency, from other states is also calling to inform them about the requirement before the season. It is a huge success. Now they have better bargaining power. The intervention of FPO in the machinery pooling helped to eliminate the exploitation from private agencies. There was no uniformity in the machine charges earlier, which is not the case now. They will discuss about total area to be cultivated there with the *padashekkharasamithi* secretary, MRPC, Panchayat President and agriculture officer. *Padashekkharasamithi* secretary will coordinate and supervise the cultivation activities in the field. The

8. Chandrashekar, secretary of Mullakkodi *padashekkharam* says that they have 100 members and supervises 175 acres of land for cultivation which has increased from 100 acres of land within two or three year. They grow a local variety of rice called "Vellarian". Their crop yield increased from 600 – 700 kg per acre to about 1200 kg per acre, after they applied a traditional growth promoter prescribed in the "Vrukshayurvedha". It helped to attract more people on farming in fallow land now more people are coming forward to cultivate fallow fields.

9. It will take 1.7 Kg paddy to process into 1 kg rice. The farmers can get Rs.50/Kg from MRPC. The farmers can earn Rs.60 or more than that by doing value addition in the rice like steam cake powder or any other product.

most important change in the method of paddy cultivation was the shift from manual harvesting to mechanical harvesting. It resulted in surplus level of paddy production in Mayyil. The company could sell almost 200 tonnes of paddy in the last one and half-year after its formation.

11.9.3 Value addition for higher returns

When there was surplus production, the company bought paddy from farmers at rate of Rs. 23 per kg. If the farmer is doing some value addition in the product such as boiling and processing, he can sell the rice to MRPC and get Rs. 50. Earlier, the value addition was done by the private mill which converted paddy into flakes or poha. Now there is one Kudumbashree unit (unit of State Rural Livelihood Mission) is doing the value addition activity to make several products from rice including steam cake powder (*puttupodi*).

11.9.4 Extension through Video conferencing

The formation of MRPC facilitated a better and efficient transfer of technology mechanism. They made a historical intervention in extension system by using video conferencing between agriculture experts and the farmers. It was conducted in 24 local libraries (or cultural centers) in the Panchayat. They effectively utilised the computer and internet facilities in those cultural centres. This idea was proposed and supported by the Member of the Legislative Assembly (MLA) representing the region. They informed all the farmers to be gathered at any one of the centres to attend sessions through video conferencing. They could interact directly with experts like scientist from Kerala Agricultural University, experts from KVK, MLA, agriculture officers and representatives of Panchayati Raj Institutions. Ward members of the Panchayat were also actively involved to bring the farmers in the centres. Direct interaction with agriculture experts and resolving all issues related with farming was the major objective of the programme. It was a great success in implementing decentralised extension system for agriculture development.

In addition to this the media, especially, Akashvani Kannur (regional broadcasting of All India Radio), and other local newspapers had a significant role in the movement by spreading news of Mayyil rice. They were continuously giving news about the programmes and made series of programmes providing media coverage to the activities. It encouraged more farmers to get back to the field. This resulted in the landowners cultivating their fields themselves without giving their land for rent.

11.9.5 Addressing the delays in payment

The farmers who are financially stable used to sell their product to Supplyco. The delays in payment would not make any issue to the rich farmer. But for those farmers who are financially weak were forced to sell their product to private agencies at a lower rate of Rs. 16-17 per kg for getting immediate payment. They have to get the money immediately for repayment of their loans and to start their next year cultivation. The FPO made a system that gives money to farmer immediately after they sell their paddy. This was not the case when they are selling to Supplyco, which was the agency under the government responsible for procuring paddy. The major issue with Supplyco was, delay in payment for the product to the farmer which used take several months. The only option other than Supplyco were private agencies and individual traders who were paying a lower rate of Rs. 16-17 per kg of paddy. Now the farmers from different part of the Kannur district are calling the MRPC for selling their paddy. At present, farmers are getting Rs. 23 per kg for raw paddy without any processing¹⁰.

The formation of MRPC and its interventions in agriculture sector in the region is a model for locally adapted agro based sustainable development. It extended to other areas and other crops. Along with mini rice mill, they also introduced mini oil extraction machines for making pure coconut oil from dried coconut (*copra*). The machine can be used for processing any oil seed to make oil. MRPC has also introduced on a pilot basis multipurpose mini flour mill for all grains and pulses

10. Getting a lower price for the paddy was a major issue which brings back the farmer from cultivation. Private agencies who are making flakes usually buy their product. The present government introduced a new loan system in which the farmers get the loan by giving the slip, which was provided by Supplyco, when the farmer sells their product. The slip has a value equal to the total price of the product sold by farmer. The interest will be paid by the government.

to make masalas in a smaller scale. All these interventions have brought back the interest of farmers in cultivation and contributed to the reduction in fallow lands in the region.

11. 10 Convergence of Institutions for Agriculture Development

During 2017-18, Mayyil Gram Panchayat could achieve significant results in paddy cultivation within 18 months of their effort, by experimenting in few *padashekharams* and assessing the outcomes. They focused on soil improvement techniques through scientific soil management practices and could achieve improve production and productivity. The MRPC also created 10 experts by proper capacity building of its own farmers to ensure that all farmers got access to such information. Convergence of various agencies had a significant role in the success of Mayyil model. The following section discusses the convergence among various institutions engaged with agricultural development in the region.

11.10.1 Agriculture office (Krishi Bhavan)

The agriculture office in Mayyil took the lead role in the entire process of total farming programme and formation of MRPC in Mayyil. It coordinated all agricultural activities such as management of natural resources, timely completion of agriculture operations, proper water supply to the fields and bringing all *padashekharams* together. It had a major role in scheduling all agricultural activities, including availing seedling for transplantation, nursery preparation, land preparations on time, machinery pooling and preparation of agricultural calendar after the detailed study of all aspects of agriculture. They provided the farmers timely advice on various aspects of paddy cultivation and co-ordinated the implementation of various agricultural development programmes of the State along with the Gram Panchayat.

11.10.2 Gram Panchayat

As the basic unit of decentralisation and local governance, Gram Panchayat took initiation to the total farming movement by bringing all actors such as elected representatives of local bodies, agriculture officers, political parties, local communities, cultivators and land owners for the total agricultural development. It created awareness among the farmers and made an agreement among the land owners and farmers together to cultivate paddy. They co-ordinated various agencies and mobilised financial resources through convergence of various agricultural development programmes to support the revival of agriculture in the region. It gave priority to agriculture sector by allocating 56 per cent of Panchayat funds for agriculture, probably the highest in the state, when all the other Panchayat give preferences to infrastructure development such as road construction and other activities. The Mayyil Gram Panchayat and its functionaries played a pivotal role in developing agriculture sector in the area.

11.10.3 Krishi Vigyan Kendra (KVK):

It is an institution under the Indian Council of Agricultural Research, working in association with Kerala Agricultural University for conducting research, training and technology transfer. KVK in Kannur played an important role in coordinating various agricultural development programmes and awareness campaign in the district. They undertook a detailed study after field visits and interaction with farmers in Mayyil Panchayat and identified all drawbacks in farming practices and the technology followed by farmers. Following that they introduced efficient input utilisation strategy by applying proper nutrient management through fertilisers, pest management, and use of one-seed (HYV) cultivation instead of seven traditional varieties. It resulted in the improvement of soil health and supply of necessary nutrients to the plant. The support of KVK in improving soil health and fertility through scientific nutrient management was critical for increase in productivity paddy cultivation, within a short period. The productivity of paddy cultivation improved from 2.1 tonnes per hectare 4.3 tonnes in the first year and to 6.3 tonnes during the second year.

11.10.4 Department of agriculture

The department of agriculture and the agriculture minister gave the all support for the total farming movement and for getting a lower price for the paddy was a major issue which brings back the farmer from cultivation. Private agencies who are making flakes usually buy their product. The present government introduced a new loan system in which the farmers get the loan by giving the slip, which was provided by Supplyco, when the farmer sells their product. The slip has a value equal to the total price of the product sold by farmer. The interest will be paid by the government.

mation of MRPC. The department also gave subsidy for mini rice mill and provided a financial support of Rs 1.20 crore from the agriculture department and its agencies. There was an active presence of the agriculture minister in various program like agriculture campaign and harvesting festival giving guidance and monitoring the progress, thus making the programme a successful one. The officials of Agriculture Department at various levels supported the initiative through convergence of various agriculture development programmes.

11.10.5 District Panchayat and Block Panchayat

The institutions of local governance at various levels, particularly the District Panchayat and Block Panchayat provided support to the project in various ways like allotting funds for project for mini rice mill distribution. Agriculture officer and Assistant Director of Block Panchayat announced the fund from Block Panchayat. All components of Panchayati raj institutions had a significant role in the Mayyil model. All information was presented and passed through Gram Sabha and ward member regularly informed the farmers and people to ensure participation in various programmes. The Member of Legislative Assembly, who is the elected representative of the constituency to which Mayyil is located took special care and gave support for bringing convergence between various institutions.

11.10.6 Contribution of MGNREGA Workers

There was a significant role of MGNREGA workers in the Mayyil model. They provided labour services mainly for the development of irrigational infrastructure and also for preparation of land before cultivation. About Rs. 26.6 lakh of MGNREGA funds were used for building infrastructural activities such as formation of bunds and canal, rejuvenation of ponds, canal and other water resources for the smooth irrigation connected to paddy farm. This has made significant contribution towards sustainable use of natural resources to support paddy cultivation in the region.

11.11 Challenges during the formation of total farming programme

The initiative faced countless difficulties while organising the farmers for the total farming programme. Initially, they took six months for conceptualising the idea and make appropriate plan of action after necessary assessments and discussions with various stakeholders. The major issue was the existence of small and marginal holdings with farmers cultivating individually following diverse farming practices, instead of group farming. This resulted in very low yield levels and farmers were suffering losses from paddy cultivation. They identified that collectivisation of farmers on the basis of *padashekarasamithis* was the first and biggest task to be undertaken for the total farming programme.

11.11.1 Convincing various institutions of local governance and agricultural development

They held series of consultations and discussions with the major political parties in Mayyil and made a deal with them about the programme strategy to organise cultivation on the basis of *padashekharams* and use uncultivated lands. They purposively introduced these issues in tea shops discussions to mobilise public opinion on this. There are members from political parties in the development samitis of agriculture. They conveyed all the issues related to Mayyil's agriculture programme to be implemented and its agendas, to the authorities of Panchayat, *padashekarasamiti*, development *samitis* of Agriculture office, agriculture department and political parties. This convinced these institutions about the strategies planned to address the agrarian constraints and won their approval and support to make necessary interventions.

11.11.2 Bringing farmers together and collectivisation of padashekharams

The next step was to create awareness about the programme, its objectives and strategies among farmers belonging to various *padashekharams* and convince them about the importance of collectivisation of individual field on the basis of *padashekharams*. When the total farming programme started, there was only 18 active *padashekharams* out of the total 25. Most of the *padashekharasamitis* were inactive due to various socio-economic reasons. The *padashekharasamiti* was not functioning due to the existence of tension between different communities, internal issues of the members and with *padashekharas* secretaries, and inactiveness of secretary and its members to engage in cultivation activities. Initially, the

agriculture office took these 18 *padashekharas* and its farmers as major players of project, they conducted a meeting and conveyed the objective of elimination of fallow land completely, improving productivity and thereby improving agriculture in the area by earning more profit through new agricultural practices. The agriculture office and its officers build a great rapport among the farmers. There are other social constraints which forced the farmers to quit the agriculture for the declining of paddy cultivation such as involvement of real estate mafia by buying the massive land, migration of farmers to find other places, farmers are utilising for non-agriculture purpose such as building house, not getting proper price for the cultivated product. Several general bodies were conducted for all *padashekharas*, and farmers for creating awareness. After creating awareness among farmers through general body meetings of *padashekharas*, they moved to get public consent instead of individual consent as part of a social engineering strategy.

They conducted a meeting of all farmers before starting their cultivation. The meeting discussed total areas to be cultivated, total machinery needed and made timetable as per that. It helped them to complete their farm activities one by one. It also created core team of selected 10 members to reach all fields and give explanation. Same content will be provided to the farmers to avoid any communication gaps. They prepared detailed notes about each activity taken up under the programme to avoid misunderstandings among the people, which is also an important aspect of social engineering. A detailed study was conducted on all issues related with agriculture including infrastructure issues. They listed all issues identified from the study which were helpful to *padashekharas* and created a shelf of projects to be submitted for financial support from various departments.

11.11.3 Convergence with MGNREGA

They did not get funds for those projects due to various reasons. The only fund available was from the agriculture department and support from MGNREGA for infrastructure. The members of MGNREGA made a significant contribution in this programme by making bunds channel preparation with a project cost of Rs. 26.5 lakh. It resulted in the increase in water availability which leads for intensive growing of paddy cultivation¹¹. Presence of rivers and canals with abundant water helped to irrigate about 1500 acres for six months which helped to resumption of paddy farming and grow paddy on a large area. Though there were resistance from the part of authorities and agencies implementing MGNREGA, the organisers could convince superior officers about the importance of this convergence in making the programme a success. After an initial lag, they could ensure convergence with MGNREGA which made significant contribution in improving the irrigation infrastructure for the *padashekharas*.

11.12 Important lessons from Mayyil Experience

Mayyil model of total cultivation movement and formation of Mayyil rice producing company was the best example for creating a sustainable agriculture development model by innovating a new institutional establishment. It could identify the agriculture constraints and transform the entire agrarian system by proper intervention. The key idea of Mayyil model was institutionalising a centralised production system and decentralised marketing and post-harvest handling. It could actively involve all stakeholders of agriculture by converging various department and agencies of agriculture and Panchayati Raj Institution. The main beneficiaries of the programme were the most marginalised rural poor, who are depending on agriculture as a livelihood. Mayyil model could realise the food security by the optimal utilisation of local resources and to transform the agriculture sector to enterprises which contributed more income to the household. Mayyil model also contributed for inclusive development, women empowerment and financial inclusion through banking link-

11. The agriculture office in Mayyil and its officers during this period, especially Sri Radhakrishnan assured all the support for the programme and promised their presence in the field by providing all agriculture assistance, and new technology. He was optimistic about the programme and had a strong belief in farmers. There was one *padashekharas* which remained fallow due to the issue of water which was caused by the damaged bund. Sri Radhakrishnan invested Rs.10,000 from his own savings to renovate the bund by replacing wooden plates in the bund. He resolved that issue which helped to cultivate 20 acres of land. They also made 80 mud bunds which resulted increase in the water level in fields.

age. Mayyil model is one of the ideal models which can transform the agriculture sector in India by institutionalising the participation of stakeholders, concerned department and Panchayati Raj Institution.

12. AGRARIAN TRANSFORMATION IN MAYYIL: AN INSTITUTIONAL ANALYSIS DEVELOPMENT FRAMEWORK APPROACH

In the earlier sections we have seen how the initiatives for agricultural development in Mayyil Gram Panchayat, though the convergence of various institutions for agriculture development and local governance has resulted in a successful model for agrarian transformation in that region. The key for success lies with the formation of credible institution to coordinate the convergence actions and mobilisation of farmers for sustainable agriculture development. This section analyses in detail this transformation by adopting the IAD framework approach.

The schematic diagram of the IAD framework with its components is given in Fig.2.

12.1 Physical world

Mayyil Panchayat is located in the lateritic zone of north Kerala, specifically in Kannur district, spread over 33.08 sq. km. The Panchayat consist of two villages Mayyil and Kayaralam, with a population of 34998. Agriculture is the major livelihood option of the area in which 33 per cent of the total population in Mayyil Panchayat are depending on the agriculture and related activities. The population composition of Mayyil is shared from various social categories including SC, OBC and general.

The availability of natural resources is the main reason for continuing in agriculture in Mayyil. The natural resources constituted soil (land) or fields, water resources and ecology. The area is enriched with wide area of fields with soil and cultivating land which was widely irrigated by water resources from 'Valappattanam river'. The presence of Valappattanam river and its canal networks such as Mayyil Valiya-thod, Kaivayal-thod, Alinkadav-thod, Vadakkanoodi-thod, Manati-thod, Kandathikaithod, Poyyur-Neerchal in the area and the number of check dams in the canal network are contributing for the necessary irrigation facilities. There was remarkable vegetation in the area which maintains the ecological balance in Mayyil. Availability of paddy fields and land for cultivation was the major feature of Mayyil Panchayat. There were more farmers and they had a farming culture in the area. Various ecological conditions such as availability of water resources and favoured atmosphere were one of the major physical conditions of Mayyil.

12.2 Community

12.2.1 People

Those belonging to households in Mayyil Panchayat is the major community involved in the total farming movement and the formation of MRPC. The entire movement involved creating awareness and drawing the attention of the people, regarding the sustainable development of agriculture sector, and improving the standard of living of the community.

12.2.2 Political parties:

Political parties had an important role in the movement. Representatives of various political parties were key functionaries of Panchayati Raj Institutions responsible for planning, designing and executing various programmes and policies for local development. Their programmes and policies are influential in deciding the development strategy to be adopted for the region as well as ensuring participation of members of the community and relevant institutions who are stakeholders for the programme.

12.2.3 Farmers / Cultivators/ Padashekarasamiti

Farmers are the principle stakeholders of the entire activities in setting up this institution for comprehensive agricultural development in the region. They were cultivating individually in small and marginal holdings, which was the major reason for loss in agriculture sector. Strengthening farmers and *padashekarasamiti* was the foundational activity did by this

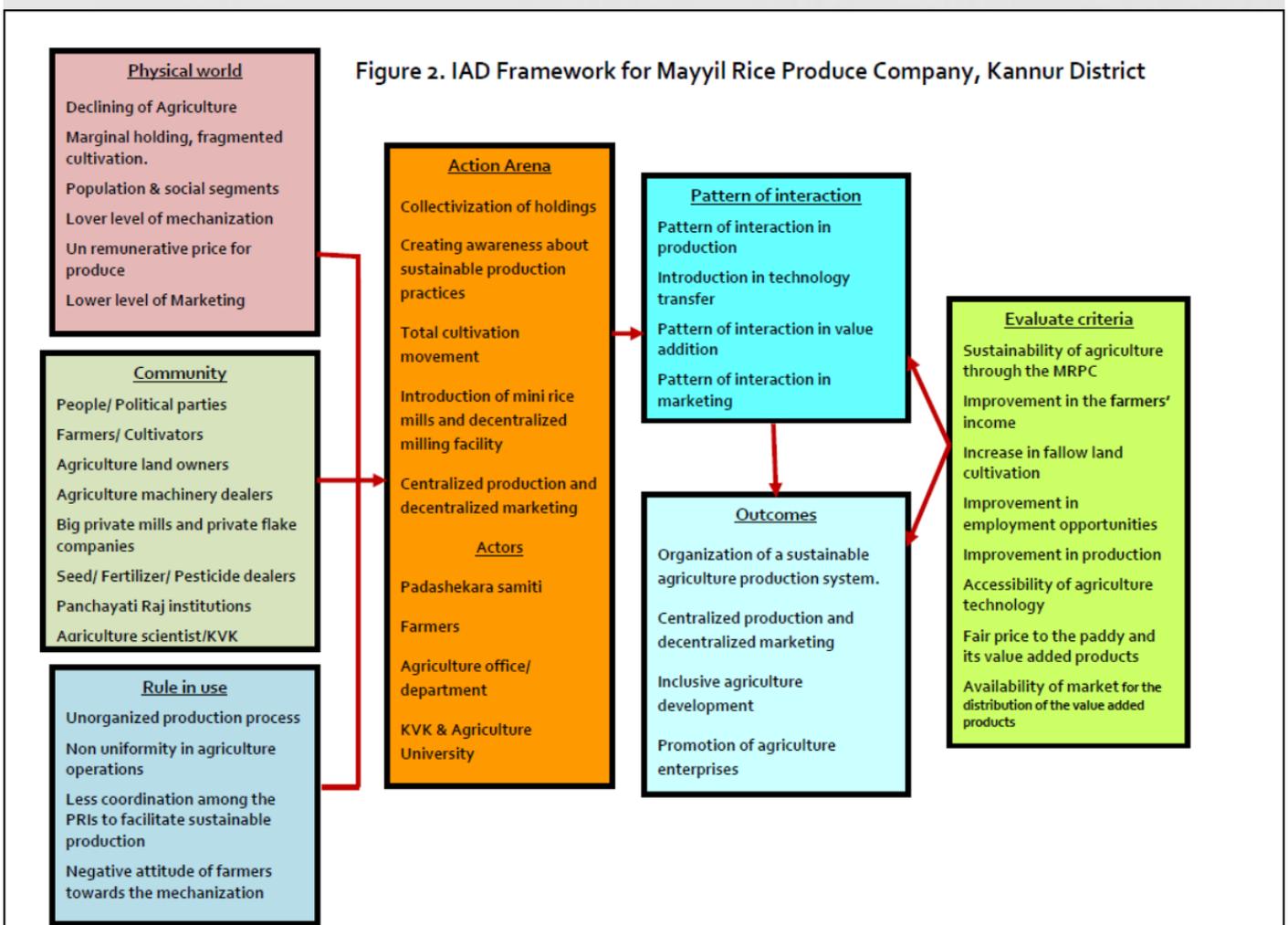
movement.

12.2.4 Landowners

The landowners who were not directly cultivating their land left their land as fallow or used for non-agricultural purpose. They also realised the potential of the programme and participated in the movement to rejuvenate the agriculture sector in Mayyil.

12.2.5 Gram Panchayat

Gram Panchayat is the key institution for local self-governance. The Mayyil Gram Panchayat has been significantly involving in all the activities of organising the farmers to rejuvenating cultivation in Mayyil. It prioritises the agriculture sector as a major area to be considered and allocated major share of its income to the sector and also initiated to bring all stakeholders for the cultivation culture.



12.2.6. Agriculture officer/Agriculture department:

Agriculture officer of the Mayyil Panchayat took the initiatives in the total farming activities and the agriculture department supported in various ways. The Agricultural Officer with the technical support of scientists from KVK spearheaded the transformation starting with convincing farmers about the need to adopt scientific methods of cultivation focusing on improving soil health, advantage in growing a common variety of paddy, following the package of practices recommended by KVK and adopting mechanisation in cultivation and post-harvest operations.

12.2.7 Big Rice mills and Private flakes companies, other local market

Before the interventions that resulted in the formation of MRPC, big mills and private flake companies were the main players in the paddy market and were engaged in the value addition activities. They were the major consumers of the paddy from the producers in Mayyil. Even though they were paying comparatively less price to the farmer, the delay in payments by Supplyco forced the farmers to sell their produce to private players like big rice mills and flake companies.

12.3 Rule in use

The farmers in the Mayyil were doing traditional activities and were facing huge loss from paddy cultivation. Due to high production cost and low returns, paddy cultivation was declining and the farmers were quitting from agriculture by keeping the land fallow and were searching other livelihood options.

The farmers were following conventional method of agricultural practices without using any technological intervention and machineries. The farmers have to take all risk for bringing machines for pooling the machineries and labourers from various sources. They also believed that machineries are not appropriate in Mayyil field and it is impossible to handle the operation by machineries. It caused the loss in the cultivation among the farmers due to higher cost if input including labour cost and others. The price from the market was also not satisfactory due to the exploitation of private agencies by giving low price for the paddy. There was no bargaining power among the farmers. It led the farmers and labourers moving away from agriculture.

There was no storage facility earlier in the Mayyil Panchayat. At every stage after the paddy was harvested, rice farmers had only one option to sell their product to Supplyco, a state government agency. But the farmer had to go through complicated formalities to sell the government and both procurement and payment were always inordinately delayed. Most farmers were compelled to sell their output to rice mills at a lower price, before it got spoiled. They used to sell their paddy to private mills, for making rice flakes or *poha* with a lower payment of only Rs. 17 per kg.

The paddy procured by the government was sent to big mills which were sold to the buyers in other state after processing to. This mill then buys inferior rice, adulterate it with colour to make it look like red rice, and supply it to the state agencies, which were finally supplied to public. The irony of the situation was that the paddy farmer sold his superior rice to the government or rice mills for a low price and then bought adulterated rice at a higher rate.

There were no centralised production and decentralised milling facilities, instead they were cultivating individually and depending big milling units which have higher charges for milling. The producer has to take care of all transportation expenses to milling units and related risk on that. The farmers in the Mayyil weren't doing any value addition to the product, other than selling it as a raw paddy. There were no proper marketing facilities for paddy or rice in Mayyil, instead of that people used to sell out their product with a minimum price.

12.4 Action Arena

12.4.1 Collectivization of holdings

Most of the farmers in the Mayyil owned or operated marginal and small land holdings which were scattered and cultivated individually. When the MRPC started organising paddy cultivation in Mayyil, it started to collectivise the small holdings through the *padashekhara samitis* and they started to cultivate together.

12.4.2 Sustainable production practices

The agriculture sector in the Mayyil was not sustainable due to various reasons. It was going through the stagnancy due to the absence of organised cultivation system in the Mayyil. It resulted in the loss in paddy cultivation and farmers quitting from agriculture in search for other ways of livelihood. This led to the beginning of a movement in Mayyil by bringing all stakeholders into a platform and creating awareness about the necessity to rejuvenate paddy cultivation in the area. And it institutionalised all farming activities in an organised way by the participation of all stakeholders.

12.4.3 Centralised production and decentralised marketing

The paddy cultivation in Mayyil was scattered and unorganised which also led to loss to the farmer. Each farmer has to

find the labourers and bring machineries for the cultivation. Centralisation of agriculture production was the major step taken in Mayyil to avail the benefit of economies of scale, thus reducing the cost of production and minimising the risk. There was no coordination or organised system of marketing in Mayyil and the farmers could not bargain for a better price in the market. This situation led to the establishment of a decentralised marketing system among the farmers. Introduction of mini rice mill played a crucial role to start a decentralised value addition and marketing in this situation.

12.4.4 Transition from traditional agriculture operation to Mechanisation

Lack of organised method of agriculture production, processing and marketing was the key feature of Mayyil Panchayat. The *padashekharams* were not actively engaged in cultivation. There was no mechanisation in Mayyil earlier, and machineries were not there except a tractor and a tiller. Most of the farmers were producing in their own land or leased land individually. Scattered labour services and machinery services were used for paddy cultivation, which increased the cost of cultivation. Most of the farmers were lesser familiar with use of advanced machinery and technology. When the MRPC formed, they started to pool the machineries from various places from within district and outside.

The agents who hired out machinery to farmers in Mayyil, many of them from other states also started to call MRPC to rent out their machinery in Mayyil before the season. The intervention of FPO in the machinery pooling helped to eliminate the exploitation from private agencies and reduce cost. There was no uniformity in the machine charges earlier, which is not the case now. The total area to be cultivated will be discussed by *padashekharasamiti* secretary, MRPC, Panchayat President and agriculture officer. *Padashekharasamiti* secretary will coordinate and unite the cultivation activities in the field. They shifted from manual operations of agriculture activities such as transplantation, harvesting, etc., to mechanical operations. When there was large amount of marketable surplus, MRPC arranged a system by directly giving the payment to farmer when they were selling their paddy.

Procuring and Value addition

At present, the MRPC is procuring the paddy for Rs. 23 per Kg without any processing. If the farmers are doing some value addition in the product such as boiling and processing, there is an opportunity to get Rs. 50 from the MRPC which again helped to increase the income. Earlier, the value addition was done by the private mill which was converting paddy into flakes or *poha*. Now there is one Kudumbashree unit processing steam cake powder (*Puttupodi*).

Introduction of mini rice mill and avoiding the exploitation of big mill rice mills

Higher productivity and an active Farmer producer company could not ensure farmers a higher income, even though they could raise the level of production and productivity. The exploitation of middle men and difficulties with big private mill led to search of various possibilities of post-harvest handling. They came across a mini rice mill, which converts small quantities of paddy into rice and also liberated them from the clutches of big private mills. It helped the farmers to sell their rice locally and consume the product that they grow. These mini rice mills, which can be easily transported, became the most vital technological intervention in post-harvest handling of the produce in the programme.

Campaign and Technology Transfer through Media

The campaign to transform agriculture in Mayyil became successful with the support of different media. They supported by giving news about the programmes and broadcasting series of programmes providing media coverage. This convinced the cultivators to join the transformation and the process of collectivisation of fields, adoption of modern methods of cultivation and experimenting with decentralised post-harvest handling using mini rice mills.

12.5 Actors

The important actors who were instrumental in making the transformation of paddy cultivation in Mayyil happen are the following:

12.5.1 Farmers and *padashekharasamiti*

Farmers are pooling various input resources including labour, seed, fertilizer pesticide, water and machineries for the cultivation and engaging in agricultural production activities. *Padashekharasamiti* was a collectivised form of farmers and

their small holding to make all agriculture operation together to reap the benefits of economies of scale.

12.5.2 Agriculture office and Agriculture department

Agriculture officer of Mayyil helped to converge various programmes of agriculture department and agencies. It led to various training and capacity building programmes for mechanisation and new agricultural practices by mobilising the cultivators and labourers for the sustainable agriculture development. They are also responsible for implementation of all agricultural development programmes by the State and support the farmers with technical and administrative guidance for development of agriculture sector.

12.5.3 Gram Panchayat and Gram-sabha

Gram Panchayat had a greater role in the total cultivation movement in Mayyil and they brought various departments together and stakeholders of agriculture for the total agriculture development. As a part of this Gram Panchayat, Gram-Sabha and ward members also were engaged in the process of creating awareness among the people about the agriculture and the need for rejuvenating agriculture in the area. Gram Panchayat allocated significant amount for the agriculture sector from its income. Other Panchayati Raj Institutions such as district Panchayat and Block Panchayat also supported by providing various funds to this movement.

12.5.4 Mayyil Rice Producing Company (MRPC)

Mayyil rice Producing Company became the key institution as a FPO which rejuvenates the farming culture in Mayyil by bringing farmers and all other stakeholders into the field. They formalised the farming and its production process in a centralised manner and they decentralised the milling and marketing.

12.5.5 Krishi Vigyan Kendra (KVK)

KVK provided technical assistance for the cultivation and starting new agricultural practices such as testing the soil, efficient nutrient management by providing proper irrigation, fertilising plants and proper spacing between the plants. It enhanced the production and productivity in the field which attracted more farmers towards the cultivation.

12.5.6 Kerala Agriculture University

The Kerala Agriculture University functioned as a key institution to deliver expertise and training for mechanisation and modern agricultural practices in Mayyil. It helped to start scientific cultivation and getting more efficient output from the field.

12.5.7 Media

Media had a significant role in Mayyil by spreading news among the people and making awareness about the paddy cultivation. Intensive media coverage in local newspapers, Akashvani and news channels helped to extend cultivation and start fallow cultivation in Mayyil.

12.5.8 Elected representatives

Elected representative including Agriculture Minister and MLA contributed for rejuvenation of cultivation in Mayyil. The MLA established a video conferencing system to facilitate interactions with agricultural experts with the farmers by using public libraries. He supported in terms of pooling various funds for agriculture, promote the activities through the agriculture department. MLA also arranged to extend agricultural market to various places by linking the MRPC and various Eco-shops opening new outlets in different places.

MGNREGA: lack of irrigation infrastructure was one of the major issues faced by paddy cultivation in Mayyil. It was overcome by using the workers of MGNREGA for infrastructural development such as renovating canals and preparing bunds for the irrigation in Mayyil.

12.5.9 Maruthi Engineering Works

The Bangalore based company provided mini version of machineries to the MRPC which ensured decentralised milling facility to the farmers. It also provided the dealership of mini rice mill to MRPC which helped to get the working capital through distribution of machineries across the state.

12.5.10 SHG members

SHGs had a proper involvement in the paddy cultivation movement of Mayyil. Initially it took part of the awareness making among the various stakeholders including farmers, women and youth. Later it engaged in the marketing of the paddy and its value-added products.

12.6 Pattern of interaction

The Mayyil Gram Panchayat initiated the 'Total rice cultivation campaign' (*Sampoornna Nellu Krishi*) on August 2016 to revive the paddy farming in the area. All stakeholders including farmers, agriculture scientist, government agencies, political parties, youth and women united for the movement which has snowballed through small and local efforts, which made the total rice farming programme a great success. The campaign resulted in substantial increase in area under paddy cultivation in the region and improvement of productivity of paddy.

After the total rice farming programme was launched, six months were spent in creating awareness by organising meetings, discussions and other talks. Political parties also were actively involved improving public consciousness for the cultivation and about the programme. General body was conducted for all *padashekharams* and farmers for creating awareness and for public consent. These meetings helped to make an effective pre-planning for the cultivation including total areas to be cultivated, total machinery needed and made timetable as per that. It helped them to complete their farm activities one-by-one. All activities for total farming programme were supported by campaign and big events such as land preparation, plantation festival and harvesting festivals which gave more reach for the programme were among the farmers and people. There was regular participation of Kerala Agriculture minister in all agriculture development programmes such as transplantation programme, harvesting festival, inauguration of FPO and introduction of mini mills.

The movement faced several difficulties while organising the farmers into groups for the total farming programme. It identified that collectivisation of farmers into *padashekarasamiti* was the first and biggest task to the total farming programme. They organised and strengthened the *padashekarasamiti* in the grassroots level which was inactive due to various reasons. A team of ten members were identified and trained to give technical support to farmers during rice cultivation. They also utilised the MGNREGA workers for improving the irrigation facilities.

A special media camp was arranged for media professionals in which, they were brought into field to understand about higher levels of productivity of paddy and pesticide free cultivation. This news helped to spread the Mayyil experiment at various levels including major political platforms and agriculture departments.

They made interventions in technology transfer through information technology by using video conferencing between agriculture experts and the farmers. This was conducted in 24 local libraries (or cultural centers) by effective utilisation of the existing infrastructure such as cultural centres and its computer and internet facilities. All the farmers gathered at any center of video conference and interacted directly with experts like scientist from Agriculture University, experts from KVK, MLA, Agriculture Officer and representatives of Panchayati Raj Institution. Direct interaction with agriculture experts helped in resolving all issues related with farming and infused confidence among the farmers.

In addition to these, they conducted Technology camp for increasing productivity by improving local specification with 'Production Protocol' campaign. The camp was conducted in different *padashekharams* under the guidance of professors from Agriculture University. These interactions improved their knowledge level and gave them confidence to address the problems they were facing during cultivation. It also helped them to develop expertise in guiding other farmers who faced similar issues.

They also intervened in the marketing system by a decentralised milling and marketing structure. Introduction of Mini mill played a key role in it. They distributed a number of mini mills to the *padashekarasamiti* and farmers which helped to the milling and value addition effectively in a decentralised manner. Since the milling of paddy into rice was made in households who had bought mini rice mills, other households in their neighbourhood were assured about the quality of the product and the households within Mayyil Panchayat started demanding the product. This system enabled the farmers to sell their product after milling and value addition themselves. In the process the consumers as well as producers were benefitted. The producers got sufficient demand for their produce at reasonably good prices after processing, and consumers got good quality rice at prices lower than what they pay in the market.

12.7 Outcomes

12.7.1 Organisation of sustainable agriculture production through MRPC

The agriculture in Mayyil has been transformed into a sustainable model of cultivation by better coordination, and organisation and later the institutionalization of MRPC, which is also adaptable to other farmers in various places. The participation of more farmers and other stakeholders helped to ensure accountability in its programmes. It distributed its output equally among the stakeholders and distributed the profit of the company among the farmers who are shareholders.

The yield increased after the transition from traditional agricultural practices and higher dependency of human labour to mechanisation and imported farming practices. They established an institutional setup which pool the machineries into the field and complete all agricultural operation. They mechanised land preparation, transplantation, inter cultivation operations, harvesting and post-harvest handling, etc. They could improve the paddy cultivation by mechanisation without owning any machinery and optimising the resources.

It helped to improve the production and productivity of paddy when the total rice framing programme started, there is a cultivation of 300 hectares on which two crops of paddy were cultivated. The average production was 2150 Kg per hectare. They brought the 300 hectares of fallow land under cultivation which remained uncultivated for more than decade. The crop yield doubled to 4320 Kg in the first crop and, it tripled to 6346 kg during the second crop by the help of new farming techniques. It also led to four-fold of production into 3000 tonnes from the estimate of 645 tonnes, before starting total farming campaign. They could introduce healthy and quality rice and its value-added product in the market. This also ensured food security and nutrition security of Mayyil by increased production, productivity.

The paddy cultivation of the area was declining due to not getting appropriate price for the product. The MRPC was formed to address the price issue for the paddy. They formalised and institutionalised the system which helps to ensure a fixed rate for the paddy which was a greater achievement in the sector and support for the farmers. So, all the farmers are working as per the guidance of MRPC and they are supplying the rice after processing when the company demands.

12.7.2 Centralised production and decentralised marketing:

The major output of MRPC is the institutionalisation of agriculture activities to start a centralised production and decentralised value addition and marketing. Introduction of mini rice mill helped to develop an institution model which conducts organised production activities together. Collectivisation of all small land holdings into *padashekhara* and pooling machineries and labourers helped to reduce the cost of cultivation and enjoy better profit from the cultivation. It utilised all stakeholders including Agriculture office, Agriculture University, KVK and other stakeholders to follow a scientific cultivation in Mayyil.

It also established a decentralised processing system and local market by setting up a three tiered network of 50 mini rice mills. It is distributed in a way that 25 mini rice mills for each *padashekhara* for own use, they can sell their surplus rice on their own or they can hand it over to the MRPC. Another 15 mini rice mills were provided to farmer entrepreneurs.

They could mill their own rice and for other farmers as well. Here too farmers can sell rice on their own or to the MRPC. The remaining ten mills are retained by the MRPC to process the paddy they procure and market it. This network of mills helped all home to access a mill within a kilometre. The processed product is sold through various eco-shops, outlets, MRPC and directly to consumers from the farmers.

12.7.3 Transform farmers from producers to agriculture entrepreneurs

Transformation due to cultivation in Mayyil yielded revolutionary outcomes, it led unorganised cultivators into organized farmers cum entrepreneurs. The farmers can store the surplus and convert the paddy into rice by using that mill. The mini rice mill changed the total profile of rice marketing in Mayyil, which can convert 120 Kg paddy into rice in one hour. The farmers can sell to company or in local market, they can also mill the paddy for other farmer which helps to earn extra income. The mini rice mill converted a farmer into agriculture entrepreneur; they started household enterprises, especially women could generate their own income by value addition from home along with managing household activities and other responsibilities. It is a landmark achievement of MRPC and such model can transform the agriculture sector.

12.8 Evaluation criteria

- a) The institutionalisation of paddy cultivation in Mayyil by MRPC helped to create sustainable paddy cultivation by a centralised production and decentralised marketing in the area. MRPC ensured a fair price for the farmers and extra income through value addition which promoted more farmers towards cultivation and make it as a persistent livelihood option. It also could transform agriculture sector from a mere livelihood into a successful enterprise.
- b) The formation of MRPC improved the status of farmers by generating better income and profit from paddy cultivation. Increase in fallow land cultivation and higher profit from agriculture helped to increase the employment opportunities to the farmers. The existing price for paddy in MRPC is Rs.23 and Rs. 50 for one kilogram of rice. The farmers could increase income by value addition contributing to sustainability of paddy cultivation.
- c) Improvement in paddy cultivation and returning of farmers towards cultivation due to better income helped to increase the production in Mayyil. Thus, MRPC could contribute for ensuring food security and nutritional security among the people and the state. The Panchayat became self-sufficient in the production and it also could sell significant amount of rice in the market.
- d) Transformation of loss-making agrarian sector to profitable enterprises in Kerala is the key contribution of MRPC. Introduction of mini rice mills to the household encouraged this movement. It also emphasised the role of mini mills in India, where majority farmers have small or marginal holdings.
- e) The success of MRPC was also a success of convergence of different PRIs, agriculture departments and other stakeholders for the agriculture development of Mayyil. It is a model for extension of agriculture activities and maximising the potential by bringing that institution into one platform.
- f) MRPC has a significant role in the empowerment of farmers, women, children, old age and other marginalised groups in the area by total farming movement. It strengthened the agriculture sector as a major livelihood option with more profit to the farmers. MRPC also reduced the risk of farming by mechanisation. Introduction of mini rice mills and local milling empowered the women to earn income within household along with all other activities. Women can take care of the children, person with disabilities and old age people in the household along with milling.
- g) The agrarian technologies were not accessible to the small and marginal farmer who were cultivating individually. MRPC intervened here by the convergence of various PRIs and agriculture department helped to access new agriculture technologies and machineries including mini rice mill in to the Mayyil with an affordable rate. Various agency including

KVK and Agriculture University brought the new technologies to the Mayyil's field. It made a positive impact on the agriculture sector in Mayyil. It has also pooled the machineries from various sources which was expensive for farmers to pool individually.

h) Mini mills have an important role in the success of Mayyil model to make a decentralised value addition and marketing network. This is effective for the farmers in Kerala where most of the farmers have small and marginal land holdings as an output of land reforms in Kerala. This situation is almost same in India which has a greater number of small and marginal farmers. It has a greatest scope to machineries for pre and post agriculture activities by introducing such machineries as mini rice mill, mini oil mill and mini flour mill.

i) There is only one MRPC and few eco-shops in Mayyil which are inadequate to meet the supply of produce to the final consumers. It has to create a network of shops of KISOK or any other market outlet to increase the supply of product which can address the existing agrarian market imperfection in the area. It can also stimulate the production due to increase in demand for paddy. Improving decentralised market will strengthen the agriculture sector in the area by better competition. Making more agreement with existing shops to sell the product and starting new outlets and KIOSK are the only potential way to overcome this issue.

j) Agriculture sector has greater potential in various ways. It could generate more employment, income and profit, ensure food security, nutrition security and sustain the ecological balance in the area. MRPC can achieve more targets by making its activities in more professional ways and extending its operations with more centralised production and decentralised marketing with effective participation of farmers and other stakeholders.

13. CONCLUSIONS

Agriculture sector supports livelihoods of a significant share of rural population in India, and any constraints in the sector will adversely affect their welfare. The current study focuses on two specific cases of institutional innovations that was formed to address agrarian market (input and output market constraints) constraints in the State of Kerala. The Green Army formed in Thrissur District of Kerala addresses the issue of shortage of agricultural labour and the living conditions of agricultural labourers that has affected paddy cultivation in one of the major paddy growing areas of the State. This institution tries to address this major input market constraint in agriculture sector of the State and contributes to sustenance of paddy cultivation and improvement in living conditions of agricultural labourers. The Mayyil Rice Producing Company in Kannur District of Kerala is a farmer's collective, which is slowly emerging as a Farmer Producer Organisation. This institution emerged to address the output market constraint of finding remunerative market options for paddy produced by the farmers. Mayyil Rice Producing Company (MRPC) has addressed this constraint through creation of a centralised system of paddy production and an innovative decentralised system of marketing the produce with the support of small scale mechanised post-harvest operations. Both the institutions have sailed through the turbulence of the process of establishment and is slowly advancing towards stabilisation and scaling up of activities.

These two institutional innovations have tried to address the major agrarian market constraints that pulls back the performance of the sector and has contributed to the lives and livelihoods of population dependent on them. The most important factor that has contributed to the emergence of these institutions is the leadership and intervention of the Panchayati Raj Institutions (PRIs), which are the institutions for Local Self Governance. The PRIs of the respective region facilitated and supported the formation of these two institutions and ensured a smooth sail towards their establishment to address the agrarian constraints. They played a major role in creating a platform that ensured collaboration of various research institutions, agricultural development agencies, communities engaged, and financial institutions in the region to work towards finding a solution to the problem. A detailed social and economic assessment was carried out about the possible ways of addressing these constraints and they came up with a strategy that is suitable for the region as well as

ensured support and participation from the community. This facilitated the convergence of institutions engaged in research, technology transfer, natural resource management, agriculture and rural development programmes, financial inclusion and local governance towards establishment of a sustainable agricultural production system.

The formation of the two institutions studied has made significant contribution towards

- a. bringing convergence of institutions of local self-governance, agriculture research, technology transfer, financial access and inclusion, natural resource management and rural development.
- b. Improving the skill levels and performance of agricultural labourers, provision of dignity of labour, financial inclusion and social security support that has significantly improved their standard of living.
- c. adopting measures that are gender sensitive and resulted in gender empowerment.
- d. ecologically sustainable strategies for natural resource management through convergence of various agriculture and rural development institutions.
- e. inclusive and sustainable development of farming community through locally adaptable interventions.

The study of two institutional innovations that has tried to address the agrarian market constraints has shown the importance of decentralised planning and role of institutions of local governance (PRIs) in finding solutions to micro level issues that constraints sustainable development, thus contributing to macro level benefits. These are small steps towards finding local solutions to global problems that constrain sustainable development.

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