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MAJOR DIMENSIONS OF CONTEMPORARY SMALLHOLDER AGRICULTURE SECTOR IN SRI LANKA

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ISBN 978-955-612-132-2



Rs. 230/-

HARTI



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Research Report No: 146

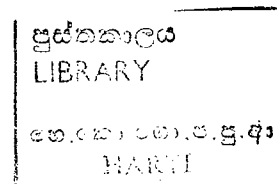


March 2012

Hector Kobbekaduwa Agrarian Research and Training Institute
114, Wijerama Mawatha
Colombo 7
Sri Lanka

239/8

1 23918



First Published: 2012

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Page lay-out: Dilanthi Hewavitharana

Cover Page Design: Udeni Karunaratne

ISBN: 978-955-612-132-2

FOREWORD

Liberalization of Sri Lanka's economy in the late 1970s has marked relatively high economic growth rates in spite of the thirty-year old internal conflict in the eastern and northern provinces. However, the growth has resulted in widespread disparities in household income and regional economic growth between the more urbanized and industrialized Western Province and the rest of the provinces which are predominantly rural and agricultural. It has been reported that by 2002 about twenty five percent of the country's population was poor, eighty percent of them living in rural areas. Similarly, it also has been noted that about 40 percent of those engaged in agriculture fell below the poverty line by 2002. This shows that even with the more saluting effects of the liberalization policy on the economy, rural areas and some sectors of the smallholder farmer community and certain crop sectors in Sri Lanka have made little progress or even fell behind in adjusting to the challenges posed by the demands of the changing social and economic environment that came together with economic liberalization.

Taking into consideration the existing income inequality and disparities between the relatively more urban and industrialized Western Province and the rest of the provinces, the new Government that came into power in 2005 started to focus on policies and programmes to benefit rural areas and agrarian population. Accordingly an array of programmes and projects to improve the rural social and physical infrastructure including roads, electricity, irrigation and drinking water supplies, agricultural markets are being implemented. A significant portion of the annual budget is also allocated for subsidizing fertilizer for smallholder farmers.

This study record and analyse the demographic, social and economic conditions of the smallholder farmers growing selected crops in different ecological and irrigation regimes and in different seasons. Therefore, the study helps to understand the emerging situation in the agrarian population or smallholder farming sector in Sri Lanka as a result of the factors associated after three decades of economic liberalization. Information and analysis provided in this report is also useful for fine-tuning of the future agrarian policy and addressing issues related to further agrarian transformation as it deals with such subjects as land tenure, innovation and technology adoption, crop management and marketing. It also can be used as a basis for future evaluation of the performance of the agrarian sector in the years to come.

As the authors note, smallholder farmer access to agricultural land and irrigation differ across districts and regions influencing the crops selected for cultivation and management practices. These conditions appear to entail the observed differences in farm household income and living conditions. Therefore, a comprehensive strategy towards the development of the smallholder farming sector with rural development focus is needed to be designed and implemented. Such a strategy should pay attention to aspects like the small plots that the farmers are compelled to operate, need for assured irrigation water, further crop diversification so that differences of income due to selection of low value crops are reduced and cultivation of crops to supply the lean season.

I am thankful to Dr. Dhanawardana Gamage, former Deputy Director of Research and Research Fellow for initiating and designing this study and completing the first draft report with Miss M.K Nadeeka Damayanthi, Research Officer. I am especially thankful to Miss Damayanthi who functioned as the co-researcher who assisted HARTI in many ways in getting this report out after Dr. Gamage retired.

Lalith Kantha Jayasekara

Director

Hector Kobbekaduwa Agrarian Research and Training Institute

ACKNOWLEDGEMENTS

This report sees the light of the day under some exceptional circumstances and two persons have helped wholeheartedly to undertake the study and publish it. Mr. V.K. Nanayakkara, the former Director of HARTI, in 2007 encouraged us to study comprehensively aspects of agricultural and agrarian transformation in Sri Lanka so that the Government and the policy makers could be assisted to plan policies and programmes more effectively for the agrarian sector on the basis of empirical information. Mr. Nanayakkara not only took steps to obtain the approval of the HARTI Board of Governors for funding the study but also arranged a seminar on the research proposal with Research and Training Committee members of HARTI and others so that ideas and perspectives on the subject studied are exchanged. He also gave valuable ideas for the study from time to time.

After completing the draft document, the principal author of this report (Dr. Dhanawardana Gamage) left HARTI and subsequent to that the second author went abroad for two years to read for a masters study programme. During the period of the successor to Mr. V.K. Nanayakkara, the draft report had been shelved. When the second author came back to the island after completing the studies, the copy of the draft report was missing.

However, before long Mr. Lalith Kantha Jayasekara assumed duties as the Director of HARTI and he has taken many uphill struggles to unearth two missing reports by us and one of those has been already published due to his continued interest. Given this backdrop and peculiar conditions under which this study was completed and published, we are greatly indebted and thankful to Mr. Lalith Kantha Jayasekara for his efforts to publish this report and to Mr. V.K. Nanayakkara for making the study for this possible and encouragement given.

Our thanks also go to Dr. L.P. Rupasena, Deputy Director and Mr. J.K.M.D. Chandrasiri, Head, APPE Division of HARTI for reviewing the preliminary draft and providing comments in 2009. Our sincere thanks go to Prof. Tudor Silva for reviewing the report and for his valuable comments. Acknowledged with much gratitude is Mr. N.N.A. de Silva, former Senior Statistical Officer of HARTI for coordinating field data collection, data processing and tabulation. We also acknowledge the services rendered by Mr. I.M.B.A. Bandara, Mr. H.A.C.R. Vitharana, Mr. G.M.C.K. Gallaba, Mr. D.Y. Jayasundara, Mr. U.I.P. Vithanage, Mr. K.G.S. Bandara and Ms. W.M.T.P. Weerasinghe who functioned as the enumerators of the questionnaire survey. Also our heartfelt appreciation goes to farmers who provided valuable information for the study and Agricultural Research and Production Assistants in the sampled locations for their support.

Our thanks also go to Mr. N.S.J.K. Nissanka, Statistical Officer of HARTI for field data collection, Mr. J.C.K.B. Lionel, Statistical Assistant of HARTI and Mr. Manjula Rathnayake, Casual Investigator of HARTI for field arrangement in Matale and Ampara districts. We are also thankful to Professor W.I. Siriweera for final editing, Mrs. Dilanthi Hewavitharana for page settings of the report and Mr. Pujitha De Mel, Head, Publication Unit and Printing staff, the making necessary arrangements for publishing the report speedily.

Dhanawardana Gamage
M.K. Nadeeka Damayanthi

EXECUTIVE SUMMARY

Changes in government policies, specially abandoning of the inward-looking economic policies and adopting liberal policies in the late 1970s have had salutary effects on gross domestic product, transformation of the structure of the economy, sectoral composition of employment and regional distribution of growth. Such changes also have had discernible impacts, largely positive, on the country's Smallholder Farming Sector (SFS). In spite of the fact that the liberal economic policies did provide a favorable environment for transformation and growth of SFS, it is deemed to have suffered from few shortcomings affecting its fuller transformation into a modern agricultural sector. Major drawbacks in transformation include lack of innovation and insufficient technology adoption, lack of crop diversification and market orientation by a sizable portion of the smallholder farming population. Above in turn affect the agricultural productivity and income at the farm household level. Burgeoning population placing significant pressure on existing agricultural land resulting in increasing land fragmentation and compelling the land users to adopt complex tenure arrangements to access to land, lack of access to assured irrigation, poor transportation and marketing facilities are often blamed for the lack of fuller transformation of SFS.

There is a vacuum in the existing knowledge as to both the prevailing and emerging situation in the SFS and factors affecting its fuller transformation into a modern sector. The present study was undertaken to examine the paths that SFS has traversed after the liberalization of the economy, its achievements and constraints it faces in relation to the existing conditions. For this purpose, a comprehensive field survey was carried out on which this report is based.

The field survey was carried out in 17 locations in nine districts (Polonnaruwa, Matale, Anuradhapura, Ampara, Galle, Matara, Puttalam, Hambantota and Kurunegala) covering almost all major agricultural zones and thirteen crops cultivated by the smallholder farmers. The total sample size was 914 smallholder farming households. The sampling was purposive in order to cover most important crops cultivated in SFS so that it reflects different dimensions of the sector. The relative sample size was not necessarily proportioned either for crops or the agro-ecological zones. In the collection of primary data number of methods were employed viz questionnaire survey, focus group discussions and key informant interviews by authors.

The Sri Lankan population is in transition with implications for ageing of the agrarian population. The study found that aged in agrarian households are in a vulnerable situation as they do not have regular or assured incomes and tend to suffer from transitory diseases that need them to access regular and expensive health care. They are depending on their siblings or extended family support and often are expected to provide labour support to persons they depend on. Other studies by HARTI like those conducted by Rambukwella *et al* (2008; 100) have revealed that farmers are interested in pensions and social security benefit schemes. Therefore, in the long run the exiting farmer pension scheme should be strengthened and other planned programmes should be implemented to take care of the elderly in agrarian households.

Those over 15 years of age in the sample, 53.6 percent were employed of which about 46.4 percent were engaged in farming and 18 percent engaged in non-agricultural employment. In addition to main occupation, 12 percent of farm household members had secondary occupations. However, only 41.4 percent of the females were employed against 65.7 percent of the males in sample farm family households. Of those in the workforce, 6.24 percent were unemployed. Unemployment rate differed by location, source of irrigation water as well as crops. Of those reported as unemployed, the highest portion (35.2 percent) was reported from paddy farming households while the lowest portion (0.2) was reported by chili cultivating households.

The study findings show that archaic land tenure systems in SFS are fast disappearing while there is slight tendency towards leasing or mortgaging of land for cultivation. Furthermore, the data show that there is a need for solving continued fragmentation of agricultural land holdings resulting in uneconomic holdings preventing transformation of SFS into a viable farming sector. Only 8 households (0.87 percent of the total households) reported 9 *chena* plots (0.33 percent of the total plots) being State land encroached for crop cultivation. On the other hand, farmers were using such type of land for highland farming with agro-wells or using water pumps. This was found to be a new trend in transformation of land use pattern in SFS.

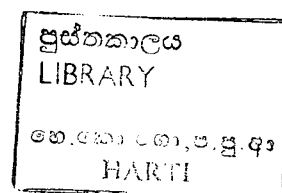
Study findings reveal that labour requirement for paddy farming in rain-fed areas (52 person days) is almost double in comparison with the major irrigation areas (22 person days). Of the labour used for paddy cultivation, male labour accounts from 63 percent to 89 percent. The female labour used in paddy cultivation differed from 10 percent in major irrigation schemes to 36 percent in minor irrigation schemes. It was found that the use of child labour was negligible (around 1 percent). Though machinery has a replacing effect on labour and has become the major item in cost of production when the input value of family labour is excluded.

On the whole, 81 percent of the total sample households' income was derived from agriculture whilst the remainder came from nonfarm employment. There are significant differences in annual average household income by type of irrigation. The average gross income was reported as Rs.579,923, Rs. 348,486 and Rs. 310,482 in major, minor and rain fed areas respectively. While the total sample of the paddy farmers' average annual income was Rs. 360,600, this crop provided only 12.7 percent of the total farm household income. This is in spite of the fact that paddy is treated as the major stay of SFS and therefore huge subsidies in terms of irrigation and fertilizer are provided to paddy farmers.

By examining the existing state of SFS, a number of major recommendations is provided. These include the strengthening the farmer pension and social security benefit schemes, further assistance towards crop diversification and broadening the assistance for well irrigated production system with a package of assistance for infrastructure development in such areas. There is also a need for an intensive study to understand the situation of female in farming households, to examine how ongoing process of farm mechanization affects them.

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ABBREVIATIONS

Ac	-	Acre
ADC	-	Agrarian Development Centre
DDEC	-	Dambulla Dedicated Economic Centre
DZILS	-	Dry Zone Irrigated Land Settlement Schemes
GDP	-	Gross Domestic Products
GOSL	-	Government of Sri Lanka
HYV	-	High Yielding Varieties
IPM	-	Integrated Pest Management
kg	-	Kilogram
NGOs	-	Non Governmental Organizations
NPCS	-	Non Plantation Crop Sector
NPSAR-		Non Plantation Sector Policy Alternative Report
OFCs	-	Other Food Crops
SFS	-	Smallholder Farming sector
SPSS	-	Statistical Package for the Social Science

CHAPTER ONE

Introduction

1.1 Background

Abandoning the import-substitution and inward-looking economic policies and adopting liberal policies encompassing export-led development strategy that encouraged foreign and local investment in the export sector in 1977 was a major policy orientation which had implications for growth in domestic agriculture sector in Sri Lanka. Some in their analysis of the non plantation crops sector (NPCS) or the smallholder farming sector (SFS) imply that if not for certain structural encumbrances the policy could have had much beneficial impacts on the sector (World Bank, 1996). In spite of the dominance of uneconomic land holdings operated, policies pursued were largely centered on reducing subsidies and removing existing food rationing.

New policy also meant certain other changes in strategy for development of SFS. There had been a reduction of services provided by the state for agricultural marketing, extension, credit and distribution of quality seeds. Import restrictions on domestically produced crops were relaxed from time to time though the government maintained a control on rice, onion and potato imports fearing that complete trade liberalisation would have adverse impacts on local farmers. However paddy procurement, milling and distribution were mainly entrusted to the private sector. While some view that the paddy (rice) marketing system is competitive; many consider that it is dominated by a group of oligopolistic traders -which affect the farm gate price.

Following the economic policy reforms, gross domestic product (GDP) grew at around 5 percent annually, about 1.5 percent higher over the previous policy regime. This was in spite of the protracted conflict in the north and east. However, economic growth has been largely concentrated in urban areas, in particular in the Western Province and disparities in income and consumption levels have increased. Similarly, the growth rates in agriculture sector have declined over the years in comparison to growth impact of policy and service sector.

The government has continued to invest in SFS for attaining such strategic objectives like reducing food deficit, increasing rural employment opportunities and inducing rural development. The government patronage to SFS has had a number of beneficial impacts. Employment, both direct and indirect, on farm and off farm has been substantial on irrigated land settlement schemes. Such schemes might have contributed to maintain rural quiescence, political stability, curtail rural unrest and unplanned migration from rural to urban areas in search of employment. Continuing government patronage and implementation of large-scale irrigated settlements like the Accelerated Mahaweli Development Programme (AMDP) contributed to substantial increases in paddy productivity and production. For instance, both the area under paddy cultivation and the yields increased steadily between 1980 and 1985 and annual output reached 2.7 million tons, compared to an annual output of around 1.4 million tons in the early 1970s. The government support schemes have contributed to the achievement of near self-sufficiency in rice and increasing production of other food crops (OFCs) such as big onion, potato and chilli. As a result, SFS has grown faster than the plantation sector during early years of economic liberalisation.

The performance of the entire agricultural sector has been short of expectations in comparison to industrial and service sectors at all times. SFS has started to experience problems by the mid 1980s, a factor largely attributed to slowing down productivity rates of major crops cultivated and reduction in incomes from farming. Higher incidence of poverty in SFS has been observed (ADB,

2002). This situation is in spite of the observed pockets of diversification and growth in the sector (Silva *et al*, 1999).

To understand the existing situation and emerging trends in SFS, one needs to assess the factors influencing the agricultural productivity and income at the farm household level. As such, there is a need for assessing the influence of farmer behaviour in terms of crop choices, land tenure, access to production infrastructure and inputs and markets; influence of specific agro-ecological niches the farmers are operating; adoption of productivity improving technologies etc in determining productivity and income at the farm household level. The following sections in this chapter deal with key findings of the existing studies and explain why and how the present study was undertaken.

1.2 Rationale of the Study

There is a vacuum in the existing knowledge as to both the prevailing and emerging situation in SFS which this study attempts to fill. As far as the study of productivity within SFS is concerned, areas needing assessment include cropping pattern, cropping intensity, technology adoption, orientation of farming for consumption or sale and farmer income from land under different farming and resource management systems.

Particular issue affecting SFS deemed to be the burgeoning population placing significant pressure on existing agricultural land resulting in increasing land fragmentation and compelling the land users to adopt complex tenure arrangements to access land. Liberalisation of trade, increased involvement of the private sector in input and technology supplies, agro processing and marketing could be expected to have had a considerable influence on SFS by affecting early production and exchange relations. Therefore, there is a need for identifying and assessing the impacts of these on productivity, farm household income and income distribution within the sector.

In spite of many factors affecting the agricultural productivity and income at the farm household level, the farmers are blamed for insufficient technology adoption, lack of innovation, non adherence to crop diversification and inadequate market orientation. By implication, such analysis pass on the responsibility of evolving agrarian situation on smallholder land operators themselves. This amounts to blaming the victims. On the other hand, the farmers blame the ineptitude of the government in addressing the situation and its wrong policies. This is in spite of the fact that the government continues to assist the SFS with input subsidies, free irrigation water, extension and purchasing of paddy by allocating scarce resources. Possibly, there are tradeoffs between allocation of resources for farmer support services and resources allocated for improving necessary production and rural infrastructures. Development of the rural infrastructure has the potential for inducing growth in productivity and market orientation in the sector while at the same time attracting industries and services into rural areas so that the farming households can reduce their heavy dependency on agriculture.

Another issue that the present study attempted to shed light is the contradictions in the existing literature focusing SFS. Different analysis paints different scenarios of the evolving situation in the sector suggesting divergent policy paths. While the discrepancies or divergence of suggested policy paths result from the ideological underpinning influencing the studies, focus, coverage and methods adopted. These at best can have a confusing effect on the practical policy maker. Some of the issues with salient policy paths recommended in the literature are as follows:

- A) The World Bank Report (March 1996) entails the need for shift from low valued domestic food crop production to "high valued crop production" in the NPCPS. However, recommendations contained in the report have been used little for policy as it

necessitates drastic changes in the existing policy and political ideologies. The mainstay of SFS is paddy farming and paddy occupies the greatest land area under agriculture contributing to a sizeable portion of the agricultural sector GDP and engaging a significant proportion of rural workforce. In the post-colonial period, the political ideology influencing the government policy aimed at sustaining a paddy producing peasantry is well established (Moore, 1985). The policy action taken to promote rice production and achieve self-sufficiency include large-scale investment in infrastructure of the hitherto thinly-populated and underdeveloped dry zone, support services including research and extension, input subsidies and guaranteed prices¹. Though the government support was extended to non paddy crops, especially to import substitution food crops such as potato, onion and chilli from early 1970s in a bid to save foreign exchange, increase agricultural employment and income through introduction of high yielding varieties, extension, input subsidies and marketing facilities, continuing government patronage to paddy sub-sector for political, social and cultural reasons remains unchanged. Therefore, extensive diversification of the paddy sector to produce high value crops has far reaching implication for the government objective of maintaining rice self-sufficiency and sustaining a paddy producing smallholder farming sector. On the other hand, impulsive paddy orientation, on the farmer and the State, might be related to high incidence of poverty or just subsistence maintenance amongst some segments of the smallholder farming community. Therefore, there is a need for understanding the reality on the basis of empirical facts which the present study attempted to achieve.

- B) The World Bank's analysis of productivity performance of the paddy sector is oversimplified, if not over generalized. For instance, Ranaweera (1988:8) suggests that Sri Lanka matches well in terms of productivity of paddy per hectare in comparison with most countries in the South and East Asia. Furthermore, the performance of the high yielding varieties (HYVs) in relatively favourable environments as in the dry zone, in particular under irrigated conditions, has been noteworthy. Paddy farming, therefore, contributes more to the farm income in the dry zone than in the intermediate and wet zones. Low cropping intensity in irrigated areas could be due to inefficient water management than insufficient availability of water. Rain-fed paddy lands are out of production or suffer crop damage due to drastic changes in rainfall pattern. The relatively high productivity and cropping intensity of irrigated paddy lands highlights the importance of assured water supplies for increasing productivity and production than changes in land tenure.
- C) The World Bank study (2000) emphasises that the most important impediments to the development of SFS are overly restrictive land policy regimes associated with State ownership or custody of some 80 percent of the lands, restrictions on technology imports and land usage in the country. The study attributes the problems observed in SFS mainly to problems in land tenure and recommends the solution of tenure issues through consolidation of smallholdings to result in viable units through the operation of free land markets. The report links the lack of emergence of "free land market" to lack of clear, regularised "freehold titles" resulting from existence of a large land area granted by the government where "free marketing of land" is legally prevented and rural land that was jointly owned by the families. The report stresses the need for creation of a "free land market" as an essential immediate measure to achieve fast growth in the sector.

¹ The first Land Commission of 1927 recommended the preservation of peasantry as a small-land owning class by distributing public land. Recommendation by the Land Commission led to the enactment of Land Development Ordinance (LDO) of 1935 and the Land Commissioner's Department. Under the LDO of 1935, large tracts of lands have been allocated for the landless for cultivation on smallholder basis.

The recommendations contained in the World Bank Report of 1996 NPCS regarding the free land market have been met with disparagements from few fronts. Those opposing hold the view that removal of restraints will result in land grabs and creation of a large landless population or "landless destitute". On the other hand, implication of land tenure on productivity has not been so far conclusive though higher incomes obtained from paddy cultivation in the dry and intermediate zones are partly attributable to relatively large land holdings operated in the regions and higher productivity. For this reason and others, the government has maintained silence on tenure issues in SFS. Thus, it appears that the existing analyses do not agree with the prevailing situation and possible causes as well as the policy paths prescribed by them. There was the need for making sense out of divergent policy paths recommended in the existing analyses for SFS by undertaking a study afresh, and this study attempted to do so.

1.3 Objectives of the Study

The study has three major objectives:

1. To profile major social and economic dimensions of emerging conditions in SFS in Sri Lanka and factors associated with those. In this regard, following factors were examined.
 - a. Social conditions in the sector.
 - b. Land tenure situation.
 - c. Employment and profitability of selected non-paddy crops in relation to paddy.
 - d. Influence of physical infrastructure like irrigation in crop productivity and farm household income.
 - e. Assessment of extent to which active farming households depend on various forms of income transfers.
 - f. Emerging issues in the sector like ageing of farm population.
2. To analyse the implications of emerging situation for the development of SFS.
3. To update policy makers on major issues to be addressed in future strategy and planning for development of SFS.

Research Questions and Selected Variables for Testing

Research questions	Variable tested
What are the major demographic and socio-economic characteristics of the farming households?	Age, sex, educational level of household members, employment and income
What are the existing land tenure systems?	Distribution of all types of holdings by size and rental arrangement, if any, to access land
What are the crop productivity levels under different cropping and land management systems?	Productivity of crops by type, irrigation
How profitable are different crops?	Profitability of crops in terms of investment.
How important is agricultural incomes for farming households?	Household incomes and the proportion of household incomes contributed by agriculture.
How do the farmers perceive agriculture?	Attitudes and preference for agriculture in terms of alternative employment
What constraints affect the farmers in increasing agricultural productivity and incomes?	Attitudes and perception of farmers as to the constraints.
What is the situation with regard to unemployment and under-employment?	Levels of unemployment and under-employment in the sample households.

1.4 Methodology

1.4.1 Data Collection Methods

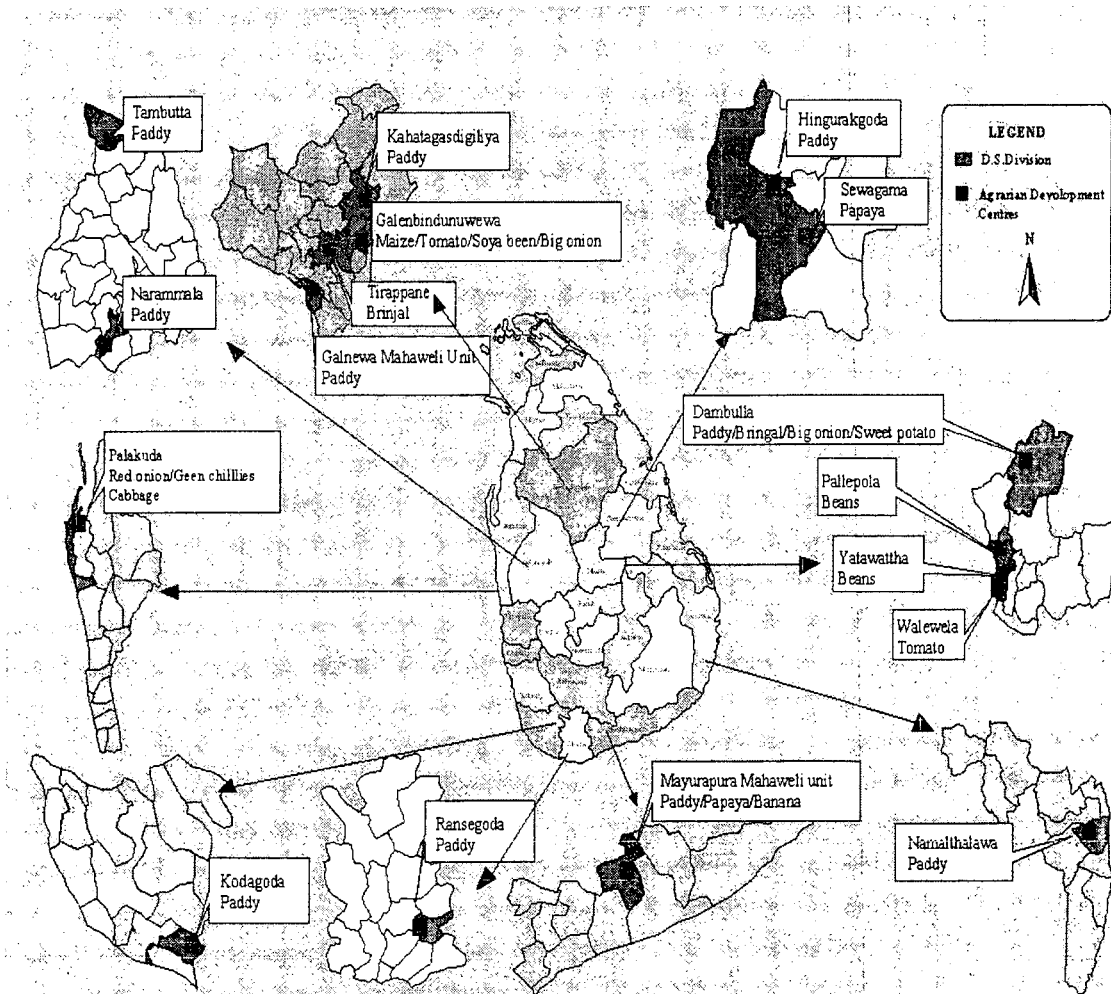
Both primary and secondary data are used in the study. Primary data were collected through methods such as questionnaire survey, key informant interviews and focus group interviews. The interviewers comprised public officials linked to agriculture, traders and collectors in Dambulla Dedicated Economic Centre and Sooriyawewa trade fair and paddy millers in the Polonnaruwa, Anuradhapura and Hambantota districts.

The design of any socio-economic study is a function of the objectives it intends to achieve. The present study attempts to describe and analyse the productivity of different segments of SFS in terms of crops cultivated and income obtained by taking into consideration the physical resources and agro-ecological conditions in different areas. Therefore, a sample survey of agricultural households using a pre-formatted questionnaire was conducted to obtain the information listed in the section 1.3. The questionnaire was designed to capture the quantitative and qualitative information on opinions, attitudes, values, perceptions as well as possible responses to certain hypothetical conditions (for example: "if you find a relatively a more profitable crop, would you reduce the area cultivated under paddy?").

1.4.2 Study Area

It was assumed that differences in geo-climatic and physical infrastructure would explain to a significant extent the cropping pattern, productivity and income at the farm household level. Therefore, a major factor guiding the sampling was the major agro-ecological zones, namely the wet and dry zones. The intermediate zone being a transitional zone was also given due attention. Within the zones, the sample was taken to reflect the influence of physical infrastructure facilities like the irrigation, roads and markets. One other major factor determining the sampling for the study was cropping pattern. The sample was selected to represent paddy in *maha* and *yala*, paddy in *maha* and other crops in *yala* with due attention paid to select those growing high value crops like onion, potato, chilli and low value crops like grains and yams. Farm land used for papaya and banana cultivation and vegetable farming systems was also included in the sample. The sampling was purposive to select many crops to capture different dimensions in the SFS and the relative sample size was not necessarily proportional either for crops or the agro-ecological zones. The sample study was carried out in 17 locations of the nine districts for thirteen crops (Map 1.1).

Map 1.1: Study Locations by District, Agrarian Development Centres and Crops



Source: Socio-economic survey data, 2007/08, HARTI

Table 1.1: Distribution of Sample by Districts, Agrarian Development Centres and Crops

District	Agrarian development centre area/Mahaweli unit	Grama Niladhari Division	Crop
Polonnaruwa	Hingurakgoda	Hatamuna	Paddy
	Sewagama	Laksha Uyana	Papaw
Matale	Pallepola	Moragaspitiya, Madalanda, Akuramboda	Bean
	Yatawatta	Selagama East, Selagama West, Nagolla	Bean
	Dambulla	Lenadora North, Pahala Erawwala	Paddy, Sweet Potato, Brinjal, Big Onion
	Walewela	Dullewa, Unweruwa, Pamunuwa	Tomato
	Kibissa	Wewala	Big Onion
Anuradhapura	Galenbidunuwewa	Kokawewa, Hurulunikawewa, Ulpathgama, Mailagaswewa	Tomatoes, Big Onion, Soya Bean, Maize
	Kahatagasdigiliya	Bethkewewa	Paddy
	Galnewa Mahaweli Unit	Mulannatuwa	Paddy
	Thirappane	Sembukulama	Brinjal
Ampara	Namalthalawa	Track 04	Paddy
Galle	Kodagoda	Horadugoda	Paddy
Matara	Ransegoda	Horapawita	Paddy
Puttalam	Palakuda	Panaiadiya, Norochchola, Mampurei, Pulachchiya, Ilanthidiya, Kirinthidiya, Nawakkaduwa, Tharakkalliya	Red Onion, Green Chilli, Cabbage
Hambantota	Mayurapura Mahaweli Unit	Andarawewa, Nambadagaswewa, Bandiwewa	Paddy, Papaw, Banana
Kurunegala	Tambutta	Potanegama, Pahala Giribawa	Paddy
	Narammala	Kiwulgalla	Paddy

Source: Socio-economic survey data, 2007/08, HARTI

734 out of 914 households included in the sample are from the dry zone. This is mainly due to the dominance of smallholder agriculture in the dry-zone areas. These are also the areas where irrigated agriculture is practised. Dry-zone agriculture is also practised under rain-fed and well

irrigated conditions. A recent trend has been to plant other high-valued crops like maize, papaya, banana by using water from irrigation tanks.

Table 1.2: Distribution of Sample Households by Source of Water and Agro-ecological Zone

Source of water	Agro-ecological zone			
	Dry zone	Intermediate zone	Wet zone	Total
Major irrigation	285	0	0	285
Minor irrigation	149	0	0	149
Rain-fed	60	120	60	240
Agro-wells	240	0	0	240
Total	734	120	60	914

Source: Socio-economic survey data, 2007/08, HARTI

Selection of Agricultural Households

In sampling, households engaged in growing of one crop defined as the crop focus of the study were interviewed. Though many sample households grew different crops, main focus of the questionnaire was the specific crop. In terms of crops cultivated, sample distribution is given in Table 1.3.

Table 1.3: Distribution of Sample by Crops Cultivated

Type of crops	Number
Paddy	299
Papaya	45
Beans	60
Tomato	60
Brinjals	60
Sweet Potato	60
Big Onion	60
Maize	60
Soya	60
Red Onion	30
Chilli	30
Cabbage	30
Banana	60
Total	914

Source: Socio-economic survey data, 2007/08, HARTI

1.4.3 Study Period

In considering the study period, attention was paid to the need for capturing of cost of production and income from various crops for successive two or more seasons over one year. Consideration of this fact together with sites and crops studied, affected dragging of field work over an extensive period. Field data were collected from July 2007 to December 2007 covering two major farming seasons.

1.4.4 Data Analysis

The questionnaire was structured to facilitate computer analysis by pre-coding and statistical packages to analyse the data. Simple statistical methods such as graphs, tables and charts were applied for presenting the analysed data.

1.5 Structure of the Report

The report comprises of six chapters. First chapter focuses on background of the study, rationale, objectives, research questions and tested variables and methodology of the study. Chapter two presents major highlights of findings from a literature survey on past and present situation of SFS. This chapter briefly describes existing knowledge on production and productivity, employment and unemployment and income.

Chapter three discusses the socio- economic conditions of sample households such as the level of education, housing conditions, employment and unemployment, ageing and income. Chapter four presents the major findings of the survey on such factors as land tenure situation, crop diversification. Focal points of the chapter five are production, productivity and income. Chapter six presents a brief summary, conclusion and policy implications relevant to the study.

CHAPTER TWO

Major Findings of Previous Studies

2.1 Introduction

This chapter briefly reviews the existing literature with a focus on the subject matter dealt in the report. There have been a few studies focusing on SFS directly or indirectly by the turn of the century and many of these were reviewed before the commencement of survey to identify the matters relevant for examination. Literature reviewed included empirical analysis of the past trajectories of the agriculture and smallholder farming sector in general. In particular, literature reviewed included research reports, official documents and reports by such agencies like the World Bank, Asian Development Bank and Annual Reports and Socio- Economic Data published by the Central Bank, Statistical Abstracts, Household Income and Expenditure Survey reports published by Department of Census and Statistics and various reports and documents that are available in the internet.

2.2 Problematic Dimensions of SFS Revealed in the Literature

Some reviewed literature suggested pockets of modernization, diversification and greater market orientation while many studies cited a few problematic dimensions of the sector. One of the major arguments of the selected studies is poor growth performance of the sector. For instance, the Non Plantation Sector Policy Alternatives Report (NPSAR) by the World Bank (March 1996) claims a little "growth" in the NPCS or SFS as referred to the sector in this study.

Some studies have identified low productivity as another problem of the sector. It has been pointed out that the growth in the agriculture sector as a whole has been below that of the overall economy. The sector employed about 30 percent of the labour force and contributed to about 12 percent to GDP in 2008, showing disparity between resource use and productivity.

The declining contribution to GDP and employment identified as another major dimension of the sector. Though agriculture has played a significant role in Sri Lanka's economy, employment and income in the past, its contribution has been declining gradually during the course of time. For instance, agriculture accounted for 38 percent of GDP in 1950, 32 percent in 1977, 20.1 percent in 2002 and about 12 percent by 2008. Many factors such as the diversification of the economy and the consequent rise in manufacturing and services, lower productivity and unfavourable terms of trade for agricultural products have played a part in declining contribution of agriculture. However, some attribute this factor to the neglect of the sector and loss of its dynamism.

Farm incomes in real terms have been declining, bringing pressure on farmers to leave agriculture or find alternative income sources. Furthermore, youth, especially educated youth were disinclined to take up agriculture for employment. This is in spite of the prevalent high rate of unemployment amongst the relatively young and the more educated members of the rural labour force both on plantation estates and SFS.

The State had used a large extent of land and financial resources for implementation of land settlement schemes. It has been instrumental in bringing large tracks of land in the dry zone under agricultural production. But keeping pace with increasing population pressure on land, excessive number of farmers are operating uneconomic holdings. However, few of them have enough flexibility for intensification and diversification of production. Gravity of the land fragmentation problem could be understood by comparing data of Census of Agriculture 1982 and 2002.

The Census 2002 reported that there were 3.3 million agricultural holdings in SFS. The corresponding number reported in the 1982 Agricultural Census was 1.8 million holdings. Of the holdings devoted for agricultural crops and livestock in 2002, about 45 percent were less than 40 perches (or quarter acre). Increasing land fragmentation is attributed to the division of land amongst family members as well as higher demand for land in the land market for other competing purposes. Emerging land tenure situation might explain to a significant extent the observed conditions in the sector and the impasse it faces.

There has been a reduction in the area cultivated with paddy and other crops (OFCs) due to the abandonment of agricultural land.² For example the grain crops of which the area under cultivation has been reduced are Kurakkan (75 percent), sesame (29 percent), groundnut (18 percent), sorghum (73 percent), meneri (93 percent), soya beans (33 percent) and black gram (32 percent) during the periods of 1970/73 to 2004/06. Furthermore, during the under review period cultivated extents of red onion (28 percent), manioc (69 percent), sweet potato (64 percent), chillies (49 percent) turmeric (64 percent) and mustard (87 percent) have decreased (Damayanthi and Gamage, 2011; 8-9).

In spite of the continuing support to the SFS, poverty levels in population involving farming of smallholdings have remained high. Existing estimates suggest that about two fifth of the principal income earners in poor households are employed in agriculture (Asian Development Bank, 2001).

With structural transformation of population, increasing numbers of those engaged in agriculture or related pursuits are ageing rapidly having implications for economic and social security of the ageing population, labour supplies, and technological innovations. Furthermore, a sizeable proportion of rural women work abroad or are employed in service and manufacturing industries, mostly in urban fringes identified as a dimension of SFS.

Under a privatization programme that commenced in 1995, the private sector has started to play a major role in the plantation sector which consists of tea, rubber and coconut. However, private sector involvement in the smallholder sector is largely limited to transport, processing and marketing. This shows the need for understanding the lack of involvement of private sector in the field of agriculture.

² Other Food Crops (OFCs) consisting of a heterogeneous group varying from high value cash crops such as chili, onions and potatoes, to low value cereals such as maize and kurakkan (finger millet) are grown by smallholder farmers. Most high value crops are grown very intensively, at times under irrigated conditions, while low value crops are often grown in an ad-hoc manner in home gardens or in *chena* (swidden) lands under rain-fed conditions.

CHAPTER THREE

Pertinent Characteristics of Sample Population

3.1 Introduction

This chapter examines the existing conditions of the sample population with special focus on demographic pattern, issues of ageing, housing conditions and amenities, infrastructure, employment, unemployment and income of the sample households.

3.2 Population

3.2.1 Demographic Pattern

The survey indicates that average family size is 4.5 members. However, it varies from 3.7 members in the Narammala Agrarian Development Centre area to 5.2 members in the Namalthalawa Agrarian Development Centre.

91 percent of the heads of households were between 19-64 years of age. Of the sample of 914 households, 867 (94.8 percent) were headed by males and the rest of 47 (5.2 percent) of the households were headed by females.³ Of the male heads, 92 percent were between 19-64 years of age (Table 3.1). Of the female heads, 72.3 percent were in the age group between 19-64 years. The most important fact was that 27.7 percent of the female heads were over 64 years of age. The share of the head of households over 64 years and still engaged in agriculture was relatively higher amongst those farming crops like paddy (16 percent), sweet potato (13.3 percent) and bean (10 percent)⁴.

³ In contrast to about 20 percent of the female headed household in Sri Lanka, the smaller percentage headed by females in the sample could have been due to the fact that in Sri Lanka, family assets especially, land are distributed among males and females like widows do not own these type of assets needed for farming. Therefore, female headed households in the sample are smaller than the national ratio.

⁴ Head of a household is the person who usually resides in the household and is acknowledged by the other members of the household as the head.

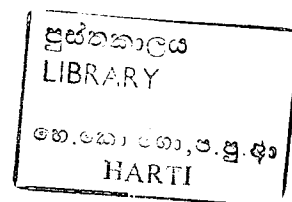


Table 3.1: Distribution of Heads of the Households by Sex, Age Groups and Type of Crops Grown by Them

Type of Crop	Age groups					
	Female (N=47)		Male (N=867)		Total (N=914)	
	19-64 (%)	Over 64 (%)	19-64 (%)	Over 64 (%)	19-64 (%)	Over 64 (%)
Paddy	77.8	22.2	84.3	15.7	83.9	16.1
Papaya	33.3	66.7	100.0	0.0	95.6	4.4
Bean	80.0	20.0	90.9	9.1	90.0	10.0
Tomatoes	0.0	0.0	93.3	6.7	93.3	6.7
Brinjal	100.0	0.0	96.6	3.4	96.7	3.3
Sweet potato	60.0	40.0	89.1	10.9	86.7	13.3
Big onion	66.7	33.3	96.5	3.5	95.0	5.0
Maize	50.0	50.0	98.3	1.7	96.7	3.3
Soya bean	80.0	20.0	92.7	7.3	91.7	8.3
Red onion	100.0	0.0	100.0	0.0	100.0	0.0
Chilli	100.0	0.0	100.0	0.0	100.0	0.0
Cabbage	0.0	0.0	96.7	3.3	96.7	3.3
Banana	66.7	33.3	100.0	0.0	98.3	1.7
Total	72.3	27.7	92.0	8.0	91.0	9.0

Source: Socio-economic survey data, 2007/08, HARTI

The sample population had 4,099 people of whom 2,027 (49.5) were females. 21 percent of the sample household members belonged to 1-14 years of age group while another 171 (5.1 percent) were over 64 years of age. This fact reveals that the dependency ratio in the sample is higher than national figure (9.81 percent) reported by Census and Statistics of 2001.

3.2.2 Age Distribution

Average age of the head of the household was 47.6 years. However, age distribution differed among farmers who cultivated different crops. Considerable proportion of the sample paddy farmers (16 percent) were over 64 years while small proportion or none of elderly farmers were engaged in Cash crops such as papaya (4.4 percent), brinjal (3.3 percent), big onion (5 percent), maize (3.3 percent), red onion (0 percent), green chilli (0 percent), cabbage (3.3 percent) and banana (1.7 percent). The average age of paddy farmers was 52 years whilst the average age of red onion farmers was 39.5 years. This implies that relatively younger farmers tend to grow crops other than paddy. Of the total of 4,099 persons lived in the sample households, 171 (4.1) were aged 65 years or more.

3.2.3 Migration

Of the total population recorded during the survey, 207 persons (5 percent) had migrated out of the household, while 346 (8 percent) had migrated into the household. This would indicate that the sample households are still growing. The basic cause for in-migration as well as out migration was marriage. Few persons had moved out of their original homes for employment and seeking out land for agriculture and housing.

There were 104 sample household members who were residing outside the household. Of this, 58.7 percent (61 persons) had transfers made to the household. The most had left home to take up employment. Twenty six percent (27 persons) were residing outside the household and

migrated abroad, thirty four percent (35 persons) is employed in the private sector and another twenty three percent (24 persons) is working for public sector.

3.2.4 Mortality

132 cases of death were reported from sample households during the last five years (2002-2007). Of those, 71.2 percent and 3 percent reported were over 64 years and between 0-14 years respectively. The causes for deaths were long-term illness (50.7 percent), while causes of natural deaths were worm infection (6.8 percent), accidents (6.1 percent), poisoning (2.3 percent) and snake bites (0.7 percent).

3.3 Ageing

One major characteristic of the population in transition of Sri Lanka is the trend towards ageing of the population⁵. Official retirement age, which is either 55 or 60 years in the public sector, is not applied in the informal sector like in SFS. Sri Lanka had 9.81 percent (1,865,000) of the population over 65 years in 2001 (Department of Census and Statistics, 2002). The corresponding ratio in the sample population was 4.1 percent. This raises the issue whether longevity is low among agrarian household members and has to be checked in large sample studies. Those able and healthy persons over 60 years of age in the informal sector are engaged in different activities that are economically productive or income generating⁶. In the agricultural sector, population between 10 or 15 years of age and 65 years are considered in the labour force whether they are economically active or not. Therefore, for the purpose of the present study, those over 65 years in the sample population (both male and female) were considered as aged or ageing population. Sri Lanka's gender ratio was recorded as 97.9 in 2001. In conformity with the gender composition of the population of Sri Lanka revealed in 2001 population census, 52.6 percent of the aged population in the sample was female and the rest was male.

As expected, a large sector of the population over 65 years in the sample was active whilst a sizeable proportion of them was engaged in income generating activities or livelihood related pursuits. Of the total population over 65 years in the sample, sixty persons (or 35 percent) were still engaged in some kind of activities that were considered economic or income generating. However, there is a disparity between males and females in terms of engagement in income generating or livelihood pursuits. For instance, only 10 percent of females and 63 percent of males were engaged in such activities. Of the total population those aged over 65 years 21 persons (12 percent) had regular incomes such as pensions⁷. This would indicate that few amongst those ageing in farming households have regular and secure incomes. On the other hand, inflation that was estimated over 20 percent during the study period might have reduced

⁵ The share of the population aged 60 years and more will increase from 11% currently to 16% in 2020 and 29% by 2050, before peaking at 34% in 2080. At the same time, there will be a process of ageing of the old people, as the oldest old people aged more than 80 years, who are the ones most likely to be frail and dependent, will increase from one tenth of the old people population to almost one third. By 2050, the 80 + year age group will account for more than 5% of the overall national population (World Bank, 2008).

⁶ Workers in the formal sector withdraw from the labour market early because of mandatory retirement ages (and because they have access to pensions), while workers in the informal sector work longer and withdraw mostly because of ill health. The prevalence of non-communicable disease among the elderly is high, a result of risk factors (obesity, diet, etc) and a legacy of malnutrition; and disability rates appear to have increased in the country (World Bank, 2008).

⁷ In Sri Lanka, pensions are received by less than one-fifth of the old people and only one-third of the labour force participates in pension scheme, with the vast majority of informal sector workers lacking coverage and considerable evasion among those in the formal sector (World Bank, 2008).

the purchasing power of the aged with income from pensions or similar sources like the grants under various safety net programmes. Of those with fixed income sources like pensions, six (6.7 percent) were females. In particular, few aging women had no source of income (Table 3.2).

Table 3.2: Distribution of Aged Population (aged >65 years) by Activity

Type of Activity	Percentage of female (N=90)	Percentage of male (N=81)	Percentage of total (N=171)
Employed	10.0	63.0	35.1
Pensioners	6.7	18.5	12.3
House wife	81.9	0.0	47.9
Weak, too old	1.4	18.5	4.7
Total	100.0	100.0	100.0

Source: Socio-economic survey data, 2007/08, HARTI

Differences in engagement of elderly in economic activities were noted in terms of the area and crops cultivated by the sample households. A distinct difference exists in terms of the availability of irrigation water. For instance, compared to those households located in the major and minor irrigation schemes, twice the elderly from the rain-fed areas (40.9) were still engaged in income generating pursuits as demonstrated by Table 3.3.

Table 3.3: Distribution of Elderly Population by Source of Irrigation Water

Source of irrigation water	Type of Activity				Percentage of total (N=171)
	Percentage of employed persons (N=60)	Percentage of pensioners (N=21)	Percentage of too old, weak (N=82)	Percentage of house wives (N=8)	
Major	20.0	9.5	26.2	37.5	25.1
Minor	21.7	28.6	25.2	50.0	25.1
Rain-fed	45.0	47.6	40.8	12.5	40.9
Agro-wells	11.7	14.3	7.8	0.0	8.8
Total	100.0	100.0	100.0	100.0	100.0

Source: Socio-economic survey data, 2007/08, HARTI

It is also likely that many elderly with incomes from pensions (47.6 percent) come from rain-fed areas. Reasons for this pattern of distribution are not very clear. However, there are two major factors that might explain this pattern. Firstly, the income from rain-fed farming is relatively low so that the elderly from such areas are engaged in non-farm employment. Secondly, some sample households are from the wet zone, where non-farm income predominates households' income due to such reasons as low productivity of land, crop damages through heavy rains as well as smallness of land plots.

Another major dimension of agricultural households revealed by the survey data is that of 84 households with elderly persons living in them and undertook paddy cultivation, 31 elderly (36.9 percent) were still engaged in farming. This is likely to be associated with different factors. Firstly, paddy farming is becoming less attractive to younger generation, especially for educated youth in the farming families. A major factor that is likely to push the youth from paddy farming is relatively low income associated with paddy cultivation. Until price of rice was increased in 2007 and 2008, paddy farming except under favourable circumstances in major irrigation schemes with assured water for two cultivation seasons a year has been less profitable. It has

been found that when paddy is cultivated two seasons a year with the cost of family labour inputs paddy farming incurred losses on the farming family.

Secondly, elderly engaged in paddy farming for long periods are likely to continue with it. In other words, at a later stage in their life, they are unlikely to be ready to dwell on other types of farming like growing other food crops due to lack of knowledge, skills, attitudes, values, necessary social and marketing networks etc as well as the lack of capital and suitable land properties. Thirdly, new technologies such as machineries, land preparation and harvesting have made cultivation easier so that the need for direct engagement of the farmer in drudgeries involved in such activities has been greatly reduced.⁸ Fourthly, paddy farmers are generally poor so that they have to work longer years than others. This possibility needs to be further elucidated with social surveys focussing on ageing issue in SFS.

Besides engagement in economic pursuits, elderly are also active in many other indoor and outdoor activities. About 44 percent of them spend their leisure time in watching TV, listening to radio and reading news papers. More men (52 percent) than women (37 percent) are engaged in such leisure activities. About one-third of the elderly men and women are engaged in child-caring at home. About 56 percent of the women are also engaged in cooking. Religious activities being the most predominant out-door activities, over three-fourth of the elderly men and women are engaged in such activities. However, it was found that more women (84 percent) are engaged in religious activities than men (67 percent). The elderly also spend time on maintaining social contacts and participation in activities of local social organisations. More men (52 percent) than women (8 percent) are engaged in social organizations.

Engagement in certain activities by the elderly in the sample population also shows the remnants of social customs and values. One is that elderly still remain with their sons and daughters; probably in houses they have constructed themselves. This shows that the extended family system among agricultural households still prevails to a large degree. Then there are also the sharp division of labour between men and women. Men are more likely to engage in activities outside the home, while women's tasks are confined mainly to household chores and taking care of grand children. This pattern is likely to change among the next generation.

Younger female generations in the sample population were found to be more physically mobile than their predecessors. Most young females attend the school and increase the intensity of mobility when they grow up. Women's activities outside the home and field also have increased due to increased enlistment of women in the workforce, religious and social activities. Action programmes at the grass-roots level by both government and non-government organisations have increased women's participation in activities outside the household. This has been followed by removal of social and attitudinal constraints on the participation of women in activities outside household and field due to progress in education as well as the influence of the media, activities of NGOs etc. In this respect, direct observation of the authors are that Sri Lanka's rural women are more mobile and exposed to outside world in comparison with the rural women in neighbouring countries of South Asia. The overall situation regarding elderly women suggests that they live longer, have fewer income sources and more engagements at home than men.

The elderly engaged in helping childcare are more in major irrigation schemes (60 percent) than in other systems. Possibly, the observed situation is explained by a number of factors. A major

⁸ It is important to note that in developed countries like Japan, Korea and Taiwan, paddy farming has been mechanized to such an extent the drudgery involved in it has been greatly reduced. In such countries too, it is more likely that the elderly prefers land based livelihoods, while the others have been absorbed into industrial and service sectors as direct or indirect workers.

one is that the land properties of the elderly persons are likely to be shared and cultivated by their siblings in an extended family arrangement. Land in major irrigation systems have been granted to selected beneficiaries by the state under the dry zone irrigated land settlement scheme (DZILS). Such beneficiaries have been granted one plot of land for paddy cultivation and another small plot for housing and home gardening. More often than not, land grantees have access only to those plots and they tend to share those with children. Another factor is the dominance of paddy in major irrigation schemes. As was noted elsewhere, elderly are more likely to stick to paddy cultivation for different reasons. In other systems, siblings have to go into other areas in search of land for agriculture or alternative employment.

In spite of the work engagements, only 30 percent of the elderly had a source of own income including pensions. In terms of the sources of such incomes, 23 percent had income from property which is largely land and 12.3 percent had pensions. In contrast, a great majority (69 percent) was dependent on income transfers by the children (69 percent) and government/NGOs (5.4 percent). A major concern is that none had income from savings. The income that 28 percent of the elderly had from income transfers was less than Rs.1000/= per month (table 3.4).

Table 3.4: Elder Population (aged >65 years) Who Received Income from Sources other than Their Employment (by Sex and Monthly Income Classes)

Monthly income classes	Percentage of female (N=35)	Percentage of male (N=41)	Total (N=76)	
			Number	Percent
<=1,000	42.9	14.6	21	27.6
1,001<=2,000	8.6	14.6	9	11.8
2,001<=5,000	31.4	31.7	24	31.6
5,001<=10,000	17.1	19.5	14	18.4
>10,001	0.0	19.5	8	10.5
Total	100.0	100.0	76	100.0

Source: Socio-Economic survey data, 2007/08, HARTI

The survey data revealed that elderly in agrarian households suffer from long-term illnesses (49 percent) and other natural causes (44 percent). Data also reveal that the elderly suffer from transitory diseases like hyper tension, paralysis, rheumatic ailments and diseases of respiratory system as shown in Table 3.5.

Table 3.5: Type of Long Term Illnesses and Disabilities Reported by the Elder Population

Type of illness or disability	Number of households reported	Percentage
Ailment of fractures	2	3.0
Cancer	4	6.1
Diabetes	4	6.1
Catarrh	2	3.0
Blinding	3	4.5
Kidney diseases	2	3.0
Blood pressure	16	24.2
Nerve weakness	2	3.0
Paralysis	8	12.1
Rheumatic	7	10.6
Leg injury	6	9.1
Mental weakness	1	1.5
Piles	3	4.5
Ailment of respiration system	3	4.5
Heart diseases	4	6.1
Phlegm	2	3.0
Gout	1	1.5
Arthritis	2	3.0
Asthma	1	1.5
Total	66	100.0

Source: Socio-economic survey data, 2007/08, HARTI

Diseases reported by elderly in the survey poses few problems regarding the health of ageing agrarian population as revealed by national studies (World Bank, 2008). It shows that coverage of Sri Lanka's health system is extensive and the country has a strategy to address non-communicable diseases-based on prevention through the promotion of healthy lifestyles. However, the treatment of non-communicable diseases is outdated and relies on less-expensive methods resulting under-treatment. The country has not taken advantage of less costly medication systems and do not provide continuous or integrated care for the elderly that allow systematic screening for illness or disability. Thus, many elderly patients who require secondary prevention do not receive sufficient care. Possibility is that the elderly in farm households in remote and poorer provinces are more vulnerable to emerging disease patterns.

3.4 Level of Education

Data in Table 3.6 show the differences of level of education by gender. Thus higher proportion (45.7 percent) of the heads of the households are educated to year 6-11 while lowest (0.4 percent) are represented on graduate and no schooling categories. In contrast highest proportion (42.6 percent) of female headed households is representing the category of year 6-11 years of schooling.

Table 3.6: Distribution of Head of the Households by Level of Education

Level of education	Percentage of female (N=47)	Percentage of male (N=867)	Percentage of total (N=914)
Year 1-5	42.6	28.8	29.5
Year 6-11	21.3	47.1	45.7
Passed GCE (O/L)	8.5	16.7	16.3
Passed GCE (A/L)	12.8	5.9	6.2
Graduate	4.3	0.2	0.4
No schooling (Can read and write)	0.5	0.0	0.4
No schooling (Can't read and write)	0.8	1.3	1.3
Total	100.0	100.0	100.0

Source: Socio-economic survey data, 2007/08, HARTI

Some differences of the level of education by type of irrigation could be identified. Firstly, the highest percent (35.9 percent) of the category of year 1-5 educated is representing major irrigation schemes but no graduate is represented in this category. The highest proportion in the no schooling category of the heads of the households is in major irrigation schemes (Table 3.7). On the other hand, the least percentage of no schooling category is reported in the rain-fed areas. Facilities for schooling are better in the rain-fed areas, particularly in Galle and Matara districts in comparison with major irrigation areas over the last five decades.

Table 3.7: Distribution of Heads of the Households by Level of Education and Type of Irrigation

Level of education	Type of irrigation				Total (%)
	Major (%)	Minor (%)	Rain-fed (%)	Agro-wells (%)	
Year 1-5 (N=270)	35.9	17.4	24.1	22.6	100.0
Year 6-11 (N=418)	29.2	14.8	26.2	29.4	100.0
Passed GCE (O/L) (N=149)	28.9	21.5	32.2	17.4	100.0
Passed GCE (A/L) (N=57)	21.1	24.6	24.6	29.8	100.0
Graduate (N=4)	0.0	75.0	25.0	0.0	100.0
No schooling (Can read and write) (N=4)	75.0	25.0	0.0	0.0	100.0
No schooling (Can't read and write) (N=12)	66.7	16.7	8.3	8.3	100.0

Source: Socio-economic survey data, 2007/08, HARTI

A similar pattern can be identified on the level of education of the household members by type of irrigation. The highest percent of those who have had primary education is in major irrigation schemes. For example a total of 33 percent of year 1-5 and year 6-11 are in major irrigation schemes. In addition, 56 percent and 45 percent of household members in no-schooling categories are in major irrigation schemes (Table 3.8). In contrast, 38.5 percent and 37.4 percent are among graduates who have passed the G.C.E. (A/L) respectively in rain-fed areas.

With regard to level of education in major irrigation schemes, the study findings show that there are significant differences between heads of the households and family members. Though there is no one representing in tertiary education in group of heads of the households, highest percent (35 percent) of the undergraduates are represented from family members of the major irrigation schemes.

Table 3.8: Distribution of Household Members by Level of Education and Type of Irrigation (aged >5 years)

Level of education	Type of irrigation				Total (%)
	Major (%)	Minor (%)	Rain-fed (%)	Agro-wells (%)	
Year 1-5 (N=925)	32.8	16.9	24.8	25.6	100.0
Year 6-11 (N=1,711)	32.7	14.8	37.5	26.9	100.0
Passed GCE (O/L) (N=736)	34.4	21.9	24.9	18.9	100.0
Passed GCE (A/L) (N=334)	26.0	15.0	37.4	21.6	100.0
Undergraduate	35.0	20.0	30.0	15.0	100.0
Graduate (N=20)	19.2	30.8	38.5	11.5	100.0
No schooling (Can read and write) (N=23)	56.5	17.4	21.7	4.3	100.0
No schooling (Can't read and write) (N=44)	45.5	22.7	11.4	20.5	100.0

Source: Socio-economic survey data, 2007/08, HARTI

3.5 Computer Literacy

Only 31 percent of the members of the sample, who were between the ages of 10-65 years, had computer literacy with an average of 1.4 persons per family. There is no significant difference about number of family members who are computer literate in term of the type of irrigation (Table 3.9). However considerable differences were reported from households using agro-wells. Furthermore, significant differences in computer literacy between sample districts were identified.

Table 3.9: Computer Literacy among Family Members (aged >10 years and <65 years) by Type of Irrigation

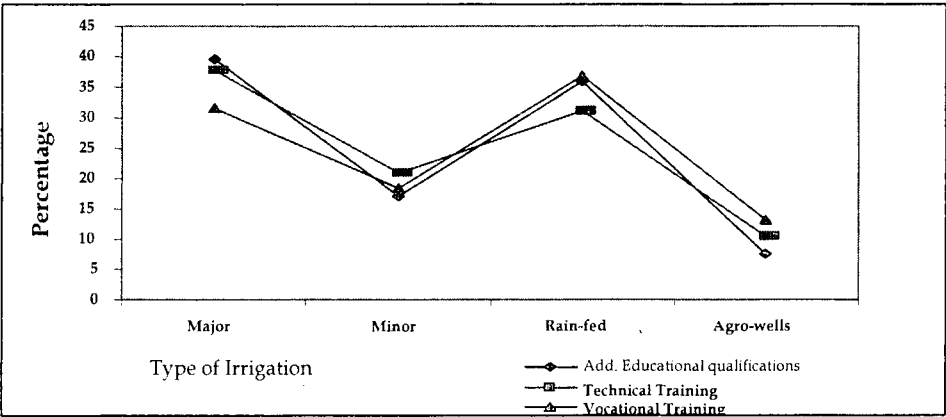
Type of Irrigation	Total number of households	Number of households reporting their family members having computer literacy		Number of family members literate per reporting
		Number	Percentage	
Major irrigation	279	96	34.4	1.5
Minor irrigation	149	57	38.3	1.3
Rain-fed areas	239	76	31.8	1.6
Agro-wells	247	55	22.3	1.4
Total	914	284	31.1	1.4

Source: Socio- economic survey data, 2007/08, HARTI

3.6 Vocational Training

Of the sample household members between 17-35 years of age, 4 percent (168 persons) had additional educational qualifications (53 persons), vocational training (77 persons), and technical training (38 persons). Sixty six percent of those who had such additional qualifications were males. Some differences by type of irrigation as well as gender could also be identified (see figures 3.1 and 3.2).

Figure 3.1: Vocational Training by Type of Irrigation

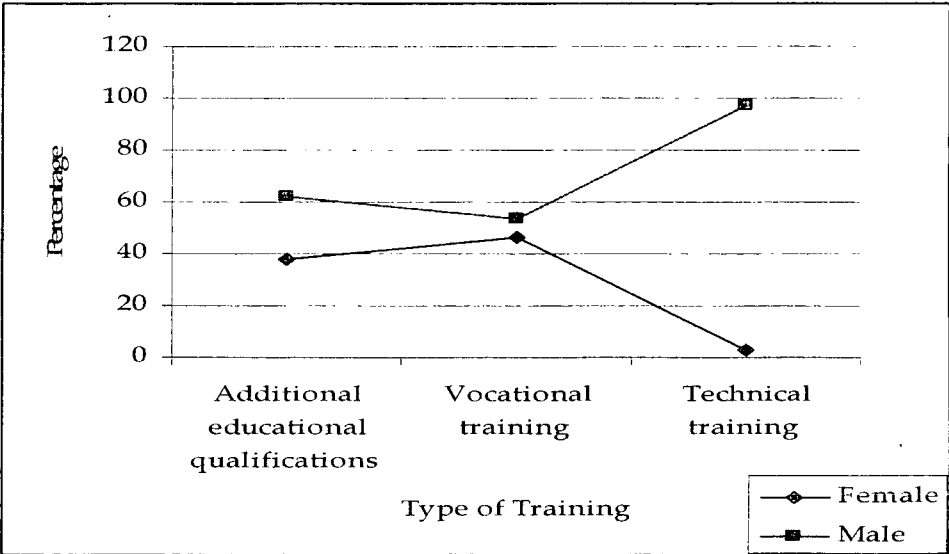


Source: Socio-economic survey data, 2007/08, HARTI

Highest percentage of all trainings and additional educational qualifications were reported in major irrigation schemes. In contrast, lowest numbers were reported from areas cultivated under agro-wells. This might be due to the promotion of vocational and technical training for second and third generation of dry zone settlers by government and non-governmental organisations through various projects and programmes over the last few decades. On the other hand, attention of related agencies should be given to emerging sector of farmers that depend on agro wells for agriculture.

In addition to above, gender differences in training was observed. Of those obtained additional educational qualifications and vocational trainings only 1/3 are females (see figure 3.2). However, only 2.6 percent of females have had any technical training. This means, even today females of the agrarian communities have marginal representation in technical education.

Figure 3.2: Gender Differences in Obtaining Vocational Training



Source: Socio-economic survey data, 2007/08, HARTI

3.7 Housing Conditions

3.7.1 Type of Houses

As revealed by the survey, 81 percent (740 houses) used tiles and 10.7 percent (98 houses) used corrugated metal sheets for roofing while 3.8 percent (35 houses) used cadjan. With regard to type of material used for walls, 90.2 percent (824 houses) used bricks and another 1.2 percent (11 houses) used cement blocks. The rest used clay (5.6 percent or 51 households), cadjan 1.8 percent (16 houses) and wooden flanks 1.3 percent (12 houses) for walls. Similarly, 86.9 percent (794) of the houses had cement floors while 5.1 percent (47) and 8.0 percent (73) had floor tiles and clay respectively. In accordance with material used for housing construction, sample households were divided into two categories as permanent and semi-permanent. Permanent houses were defined to include use of durable materials like bricks or cement blocks for walls, tile or cement for floors and tiles or asbestos sheets for roofs.

According to above classification, about 97 percent of the dwelling units occupied by the sample population were owned by the household members dwelling in them.⁹ This means that just a few houses were leased-in or rented-in type. In comparison to 69.8 percent of households reported as permanent in 2001 census of housing and population, 89 percent of the houses occupied by the sample population were permanent structures. Conditions of dwelling units occupied by the sample population differed by type of irrigation. For instance, 94.6 percent in major irrigation, 89.3 percent in minor irrigation 93.8 percent in rain-fed areas and 78.9 percent in area cultivated under agro-wells were permanent. Nevertheless, the ratio differed within the survey locations. For instance, in the study sites where wells were used for irrigation, 13 percent of the households were of semi permanent type and another 8 percent were temporary or makeshift houses. The households using well-irrigated water had farms that have been established newly.

In spite of favourable housing conditions in general, 8.0 percent (73) of the sample population had semi-permanent houses¹⁰. This rate differed by type of irrigation: 5.4 percent in major irrigation, 8.1 percent in minor irrigation, 6.3 percent in rain-fed areas and 12.6 percent in areas with agro-wells. But, no temporary house was reported from major irrigation and rain-fed areas in contrast to 8.5 percent reported from agro-well areas.

3.7.2 Basic Housing Facilities

76.6 percent (700 households) had electricity and 83.3 percent (762 households) had safe drinking water facilities.¹¹ About 98 percent (893 households) had latrines. With regard to the communication facilities, 397 households (43.4 percent) had land or CDMA telephone facilities

⁹ A household may be a one person household or multi person household. A one person household is one where a person lives by him/herself and makes separate provisions for the food. A multi person households is one in which a group of two or more persons live together and have common arrangements for provisions of food. Household includes not only members of the family but also others such as relatives who live with the family and share the same common arrangements of cooking and partaking of food with them.

¹⁰ Such units using a mixture of durable and non-durable materials were classified as semi-permanent. 2.7 percent (25) of the households reported as temporary structures.

¹¹ According to Census of Housing and Population in 2001 national figure of households with electricity was 63.7 percent and households with safe drinking water (water source of protected well, tube well and tap) was 81.8 percent (Department of Census and Statistics, 2006).

while 422 households (46.2 percent) had mobile telephones. 86.4 percent (790 households) reported that they had motorable roads for accessing their homes. The reported average distance from household to motorable road was 0.48 km.

3.8 Activity Status and Employment

3.8.1 Activity Status

In terms of activities of those over 15 years of age in the sample, 53.6 percent were employed. However, only 41.4 percent of females were employed against 65.7 percent of males. Unemployment rate amongst females (6.1 percent) was about double (3.5 percent) that of males.¹² There was a sizeable section of the household population (22.5 percent) who were engaged in educational pursuits.

3.8.2 Employment

Of the heads of the households, 89.3 percent were engaged as farmers and 0.5 percent as farm helpers. Of the total employed in the sample population, 191 (8.7 percent) was employed in the public sector and 139 (6.3 percent) were working in the private sector. Similarly, 2.8 percent were engaged in self-employment and another 2.1 percent were working as skilled labourers and 1.6 percent (35 persons) were working abroad.

Of the total population in the sample households, 2,199 (53.6 percent) were employed, of which about 1,020 (46.4 percent) were engaged in farming, while 695 (31.6) were engaged as farm helpers (Table 3.10). Of the total employed of the sample population, 401 (18 percent) were engaged in non-agricultural employment. Of those 46.1 percent were employed as permanent workers, while 15.2 percent had casual employment. The rest were engaged in temporary employment.

Table 3.10: Distribution of Employed Population by Main Occupation (Age 15 or more)

Type of main occupation	Number	Percentage
Farmer	1,020	46.4
Farm helper	695	31.6
Agricultural labourer	4	0.2
Non agricultural labourer	5	0.2
Government employment	191	8.7
Private sector employment	139	6.3
Foreign employment	61	2.8
Self employment	47	2.1
Skilled employment	35	1.6
Other	2	0.1
Total	2,199	100.0

Source: Socio-economic Survey Data, 2007/08, HARTI

Of those persons (16.5 percent) who were engaged as non agricultural workers, highest percent was engaged in personal services (16.6 percent) while 14.9 percent were engaged in military and police services. As revealed by survey data, the rest was engaged in manufacturing (11 percent),

¹² The definition of unemployment is persons who are not employed and were available and/or looking for work, and had taken specific steps to find employment during previous three months of the survey period.

trade and hotels (10 percent), transport, storage and communication and self-employment (15 percent), education and health (9.7 percent).

In addition to main occupation, 12 percent had a secondary occupation such as self-employment (4.2 percent), farmers (2.7 percent), skilled employment (1.7 percent) farm helpers (0.9 percent) and agricultural labourers (1.1 percent).

Table 3.11: Distribution of Non-agricultural Employment

Category	Number	Percentage
Electricity, gas, water	8	2.2
Manufacturing	45	12.4
Construction	29	8.0
Trade and hotel	42	11.6
Transport, storage and communication	40	11.0
Insurance and real estate	3	0.8
Personal services	60	16.6
Forces and police	54	14.9
Security (private)	2	0.5
Welfare	9	2.5
Education and health	35	9.7
Other government services	20	5.5
Not defined	15	4.1
Total	362	100.0

Source: Socio-economic survey data, 2007/08, HARTI

3.9 Unemployment

Of those 3,030 persons in the workforce in the sample population 256 (6.24 percent) were unemployed.¹³ This ratio of unemployment was much closer to unemployment ratio (6.5 percent) reported in the labour force survey of 2006. However, unemployment rate differed by source of irrigation water. Of the unemployed, the highest percentage (10.0 percent) was reported from minor irrigation areas while the lowest (6.2 percent) was reported from farm households using agro-wells (Table 3.12).

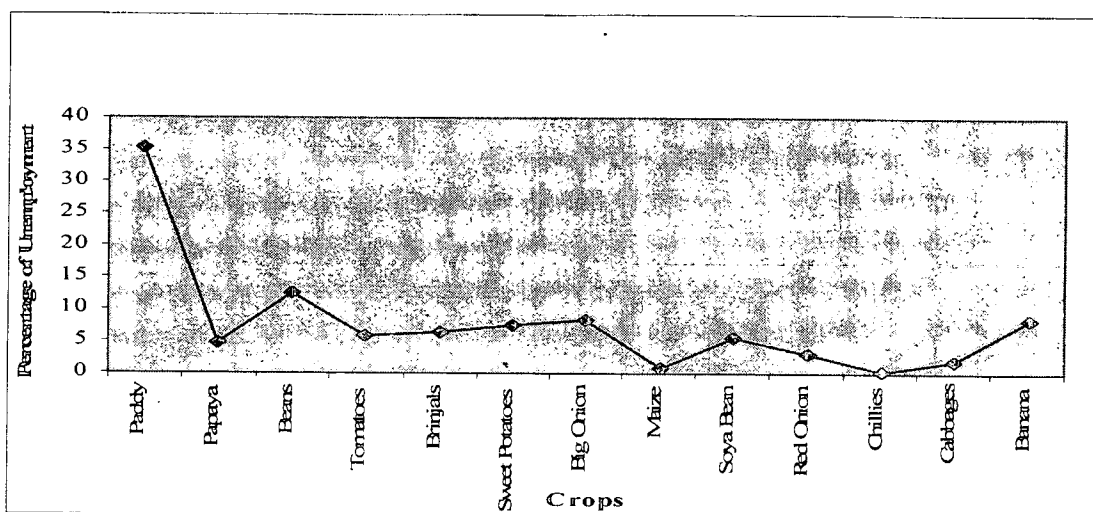
Table 3.12: Distribution of Unemployed Population by Source of Cultivation Water

Type of irrigation water	Percentage of female (N=174)	Percentage of male (N=82)	Total (N=256)	
			Number	Percentage
Major irrigation (workforce = 997 persons)	63	25	88	8.2
Minor irrigation (workforce = 499 persons)	31	19	50	10.0
Rain-fed (workforce = 797 persons)	51	21	72	9.0
Agro-wells (workforce = 737 persons)	29	17	46	6.2
Total (workforce = 3,030 persons)	174	82	256	6.2

Source: Socio-economic survey data, 2007/08, HARTI

¹³ In this survey workforce consider as persons who are aged between 15 to 64 years.

Figure 3.3: Distribution of the Unemployed Population by Cultivated Crops



Source: Socio-economic survey data, 2007/08, HARTI

3.10 Household Income

The present survey reveals that income from non-paddy is much higher than income from paddy farming. Though the sample households were selected on the basis of their engagement in farming of selected crops, a significant share of their household income (19 percent) came from non-farming activities.

Average annual household income of the sample households was Rs. 579,923 with a range between Rs.4,500 to Rs.6,375,150.¹⁴ On the whole, 81 percent of the sample household's derived income from agriculture. However, average household income varied according to the source of water for cultivation as well as type of crops cultivated. In terms of source of irrigation, highest annual average income was amongst those cultivating crops with water from major irrigation (Table 3.13).

High difference observed in the range of income is due to the differences in the cultivated extent. The lower annual average gross income of Rs. 310,482 was reported amongst the rain-fed farmers which range from Rs.12,000 to Rs.2,715,590. There is a large difference in annual average household income between areas under major and minor irrigation. For instance, in major irrigation areas, average gross annual income was Rs.579,923 while in minor irrigation areas average gross annual income was 348,486.

¹⁴ The highest income reported from businessman in Ampara.

Table 3.13: Average Annual Gross Income by Source of Irrigation

Source of irrigation	Highest annual income (Rs)	Lowest annual income (Rs)	Average annual income (Rs)
Major Irrigation	6,375,150.00	4,500.00	579,923.00
Minor Irrigation	1,573,200.00	17,040.00	348,486.00
Rain-fed	2,715,590.00	12,000.00	310,482.00
Agro-wells	6,048,000.00	36,000.00	868,735.00

Source: Socio-economic survey data, 2007/08, HARTI

Differences in annual average income between households cultivating rain-fed land and land irrigated with agro-wells are much higher. High income in agro-wells using households for irrigation is explained by the fact that they cultivate non-paddy cash crops geared to commercial orientation. The composition of average annual gross income is shown in Table 3.14.

Table 3.14: Composition of Average Annual Gross Income of Total Sample by Source of Income

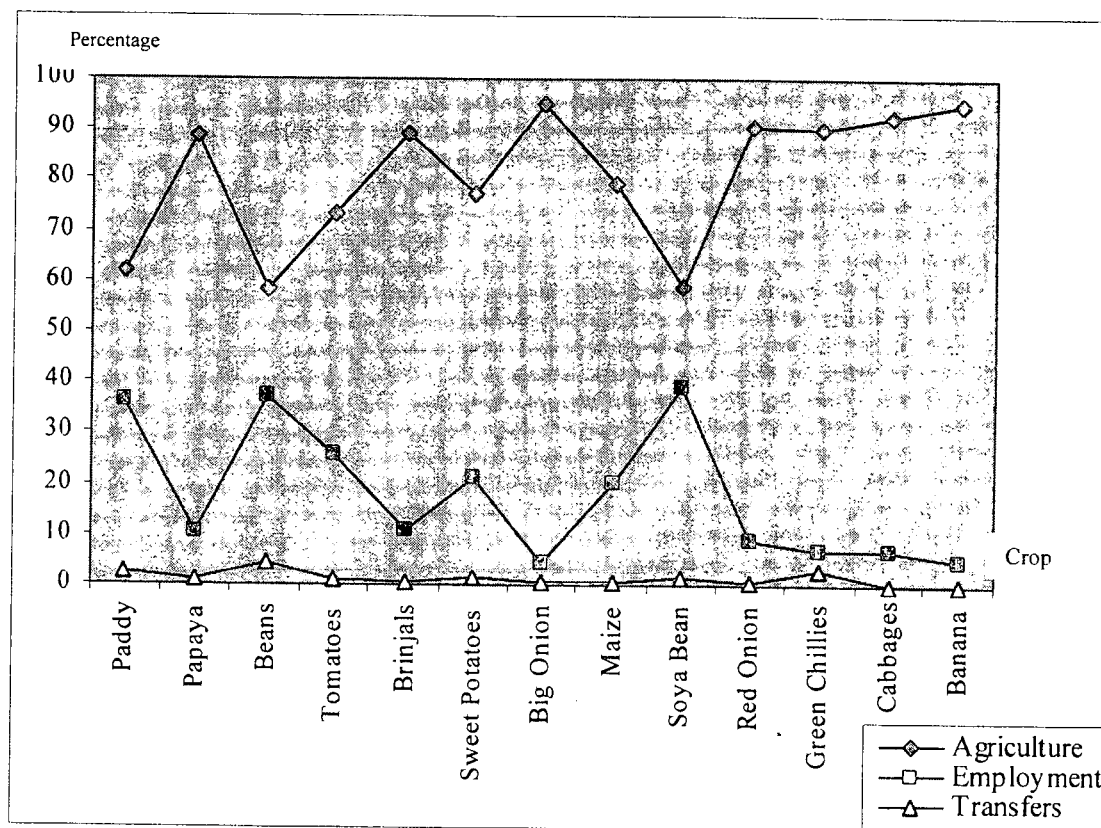
Source of income	Average annual gross income (Rs)	Percentage
Agricultural sector	444,329.00	80.8
Paddy	70,092.00	12.7
Other field crops	35,297.00	6.4
Vegetables	139,968.00	25.4
Annual crops	102,134.00	18.6
Plantation crops (tea, rubber, coconut, cinnamon etc)	17,320.00	3.1
Other crops	67,802.00	12.3
Livestock	3,145.00	0.6
Fishing	912.00	0.2
Agricultural labourers	1,195.00	0.2
Rental agricultural equipment/ machinery	6,463.00	1.2
Employment by sector	98,975.00	18.0
Government employments	38,628.00	7.0
Private sector employments	15,739.00	2.9
Skilled employments	7,469.00	1.4
Non-agricultural labourers	1,049.00	0.2
Self employments	28,200.00	5.1
Foreign employments	7,890.00	1.4
Income Transfers	6,758.00	1.2
Pensions, rents and lease	4,343.00	0.8
Government subsidies (<i>Samurdhi</i> etc.)	1,288.00	0.2
Others	1,126.00	0.2
Average annual gross income	550,062.00	100.0

Source: Socio-economic survey data, 2007/08, HARTI

Data in Table 3.14 above illustrate that nearly 81 percent of the total sample households' income came from agriculture. Data Table 3.14 and figure 3.4 below point to a number of features in the SFS. Firstly, paddy provides only 12.7 percent of the total farm household income. This is in spite of the fact that paddy is treated as the main stay of SFS. Secondly, compared to relatively lower income from paddy, income from vegetables (25 percent) and annual crops (18.6 percent) was

high. Thirdly, data in table 3.14 show that the contemporary farm enterprise is diversified to such an extent that dependency on paddy farming has reduced. Information in figure 3.4 show that amongst farmers, dependency on income transfers is low a factor attributable to selection of farmers in the sample.

Figure 3.4: Composition of Average Annual Gross Income by Crops (Percentage)



Source: Socio-economic survey data, 2007/08, HARTI

Data in table 3.15 show that bean farmers reported the lowest average annual gross income (Rs. 269,498) while cabbage (Rs.1,524,906) and brinjal farmers (Rs.1,032,264) reported highest annual average gross income. Other higher annual average gross income was reported from papaya, red onion, green chilli and banana farmers. Conversely, the lower average annual gross income reported groups included paddy (Rs. 361,393), tomatoes (Rs. 377,971), maize (Rs. 357,379), soya bean (Rs 291,208) farmers.

Besides the variation in income, it was found that higher the annual average gross income from farming, lesser the dependence of farming households on income from other employment. Higher percentage of paddy farmers (36), bean farmers (37), tomatoes farmers (25) and soya bean farmers (39) were dependant on other employments for a living. This shows the existence of part time employment amongst lower income farming groups. Generally the farmers reporting lower average annual income from farming also reported higher dependency on income transfers.

Table 3.15: Composition of Average Annual Gross Income of Sample Households by Crops and Source of Income

Farmers by crop	Annual average gross income (Rs)	Average annual gross income by component (Rs)		
		Agriculture	Other employment	Transfers
Paddy	361,393	222,700 (61.6%)	130,338 (36.1%)	8,355 (2.3%)
Papaya	919,707	813,156 (88.4%)	96,969 (10.5%)	9,581 (1.0%)
Bean	269,498	157,636 (58.5%)	99,686 (37.0%)	12,176 (4.5%)
Tomatoes	377,971	277,831 (73.5%)	96,439 (25.5%)	3,701 (1.0%)
Brinjal	1,032,264	918,283 (89.0%)	110,873 (10.7%)	3,108 (0.3%)
Sweet potato	466,711	359,722 (77.1%)	99,000 (21.2%)	7,988 (1.7%)
Big onion	485,025	460,582 (95.0%)	21,900 (4.5%)	2,543 (0.5%)
Maize	357,379	282,273 (79.0%)	72,579 (20.3%)	2,526 (0.7%)
Soya bean	291,208	171,980 (59.1%)	114,320 (39.3%)	4,908 (1.7%)
Red onion	836,011	757,655 (90.6%)	76,000 (9.1%)	2,356 (0.3%)
Green Chilli	901,328	811,015 (90.5%)	63,800 (7.1%)	26,513 (2.9%)
Cabbage	1,524,906	1,415,026 (92.8%)	106,400 (7.0%)	3,480 (0.2%)
Banana	977,373	928,803 (95.0%)	47,570 (4.9%)	1,000 (0.1%)

Source: Socio-economic survey data, 2007/08, HARTI

In addition to the variation in income by crop in the sample households, contribution of agricultural income to the household income also varied by source of water (Tables 3.16). Agro well farmers reported annual average gross income of Rs. 868,735 constituting of 91% of their household income. Rain-fed farmers had the lowest annual average gross income (Rs. 310,482) and only 59.7% of this income came from agriculture. This shows that farmers cultivating rain-fed land are amongst the poorest in Sri Lanka. They depend relatively more on other sources of income. Relatively higher dependency on other employment was also reported by farmers cultivating crops using water from minor irrigation (29.6%) and major irrigation (18.2%).

Differences in income by level as well as source of water are to be understood in relation to the context of farming. Water supply is relatively more assured in major irrigation schemes than that under minor irrigation schemes. Therefore level of assurance of water supply is likely to determine the level of income from farming. On the other hand, paddy, being a lower value crop, is so far the major crop cultivated under irrigated conditions. Similarly, crop cultivation under rain-fed conditions suffers from vagaries of weather and farmers are likely to confine to cultivation of selected vegetables and non-paddy cereal crops that inundate the market during a short period affecting the market prices. Farmers cultivating rain-fed land often work as hired

labourers to supplement farming income. Agro-well farmers have the opportunity to cultivate higher value crops throughout the year as well as reap the benefits from lean season price escalations. However, periodic escalation of fuel prices affect their profitability as water is pumped to the fields using machines.

Table 3.16: Composition of Average Annual Gross Income of Sample Households by Type of Irrigation and Source of Income

Type of irrigation	Annual average gross income (Rs.)	Average annual gross income by component (Rs)		
		Agriculture	Other employment	Transfers
Major irrigation	579,923	469,883 (81.0%)	105,433 (18.2%)	4,608 (0.8%)
Minor irrigation	348,486	234,522 (67.3%)	103,215 (29.6%)	10,749 (3.1%)
Rain-fed	310,482	185,419 (59.7%)	117,637 (37.9%)	7,426 (2.4%)
Agro-wells	868,735	791,450 (91.0%)	71,145 (8.2%)	6,140 (0.7%)

Source: Socio-economic Survey data, 2007/08, HARTI

The data in the Table 3.17 show that highest average household incomes are received by cabbage (Rs. 16,048,000) brinjal (Rs. 1,232,678), banana (Rs. 997,373), green chilli (Rs. 901,328) and red onion (Rs 836,011) farmers. The lowest income is received by groups farming bean (Rs. 269,498). Paddy farmers' average annual income (Rs. 360,600) was only 29 percent of brinjal farmers' income. This shows that disparity of income amongst farming community members depended on the crops cultivated.

Table 3.17: Highest and Lowest Annual Income of Farm Households by Crop

Farmers by their grown crop	Average annual income	Highest annual income	Lowest annual income
Paddy	360,600	6,375,150	4,320
Tomato	380,792	2,149,300	16,524
Brinjal	1,232,678	15,314,725	36,000
Sweet potato	519,587	2,948,500	53,745
Big onion	485,123	1,691,525	65,350
Papaya	900,151	2,674,000	120,000
Beans	269,498	1,169,160	12,000
Maize	374,062	1,004,600	98,380
Soya	442,315	8,870,850	56,780
Red onion	836,011	2,754,000	161,000
Green chillies	901,328	2,426,500	47,200
Cabbage	1,524,906	1,6048,000	233,600
Banana	997,373	4,369,200	4,500
Total	577,986	-	-

Note: Includes all sources of income of the sample households

Source: Socio-economic survey data, 2007/08, HARTI

Table 3.18: Gross Income Obtained from Different Crops (per Acre)

Crop	Average annual gross income obtained by crop (Rs)	Percentage share of household income by relevant crop
Paddy	118,585	32.9
Tomato	81,340	21.4
Brinjal	344,467	27.9
Sweet potato	242,436	46.7
Big onion	273,185	56.3
Papaya	463,584	51.5
Beans	69,856	25.9
Maize	148,361	39.7
Soya	41,269	9.3
Red onion	347,893	41.6
Green chillies	552,905	61.3
Cabbage	675,950	44.3
Banana	821,123	82.3

Source: Socio-economic survey data, 2007/08, HARTI

Table 3.18 show that the share of households' gross average annual income by each crop. Banana farmers achieve highest percentage (82.3) of the household income. Similarly, green chilli (61.3 percent), papaya (51.5 percent), sweet potato (46.7 percent), cabbage (44.3 percent) and red onion (41.6 percent) are also in the category of higher proportion of households' gross annual income. On the other hand, the lowest income from farming is reported by soya bean farmers. Even though beans are cash crop and tend to generate more income, due to some disease, beans cultivated farmers got less amount of income from the crop.

3.11 Access to Economic and Social Infrastructure

The majority of the sample households were located within one kilometre from a motorable road. The minor irrigation areas being the comparatively oldest human settlements; had households established in one area called the village. These generally had motorable road access on average within 0.28 km. Farmers from rain-fed areas however, had the longest distance of 1.49 km to access a motorable road. Rain-fed areas in the dry zone are newly expanding areas and infrastructure is poor. In the long run, they usually will catch up with established settlements with public utilities. The process takes a long time and until then settlers that inhabit these facilities suffer from paucity of infrastructure. However, the wet zone was marked with hilly terrains and narrow roads and it depended largely on rain water for agriculture.

Besides the access to motorable roads, average distance to access other service facilities like markets, weekly fairs, schools, health care and agricultural services were also examined in the household sample survey. The average distance to marketing facilities, health facilities, agricultural service stations and veterinary services were over 6 km for the whole sample (Table 3.19). However, the distance to services differed significantly between areas. The major irrigated areas had the services closer than minor irrigated and rain-fed areas. Households using agrowells for farming were located more distantly to services.

Table 3.19: Average Distance to the Community/Social Facilities from the Residence of the Household

Type of facilities	Average distance (km)				
	Major irrigation	Minor irrigation	Rain-fed	Agro-wells	Total
Motorable road	0.66	0.28	1.49	1.05	0.92
Weekly fair	3.85	5.66	5.15	9.98	6.20
Market	3.57	5.77	6.50	9.61	6.48
Primary School	1.21	1.54	1.19	1.06	1.22
Secondary School	2.93	2.99	4.04	5.01	3.78
Government Dispensary	3.85	4.06	4.79	6.33	4.82
Post Office	2.74	2.36	1.46	2.72	2.36
Private Medical Centre	3.36	3.40	4.37	6.18	4.36
Rural Hospital	3.84	4.42	5.23	10.51	6.07
Insurance Institute	6.14	8.34	7.80	13.27	8.87
Agrarian Development Centre	8.14	7.49	4.63	11.02	7.77
Veterinary Surgeon Office	5.45	6.93	5.59	12.62	7.51
Maternal and Child health Clinic	3.00	3.41	2.60	6.45	3.84
Mobile Health Clinic	0.65	1.12	0.67	0.93	0.80
Banks	3.72	6.15	4.89	8.54	5.64
Public Transport	0.43	0.82	0.86	1.15	0.48

Source: Socio-Economic Survey Data, 2007/08, HARTI

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Land Use Pattern

4.1 Introduction

Though the State uses relatively large financial resources for implementation of irrigated land settlement schemes in the dry zone, an excessive number of farmers are operating fragmented uneconomic holdings. Only a few of them have enough flexibility for intensification and diversification of production. Gravity of the land fragmentation problem could be understood by comparing data of Census of Agriculture 1982 and 2002 (see Map 4.1). The Census 2002 reported that, there were 3.3 million agricultural holdings in SFS. The corresponding number reported in the 1982 Agricultural Census was 1.8 million holdings. Of the holdings devoted for agricultural crops and livestock in 2002, about 45 percent were less than 40 perches (or quarter acre). Increasing land fragmentation is attributed to the division of land amongst farm family members as well as to higher demand for land for other competing purposes. Emerging land tenure situation might explain to a significant extent the observed conditions in the sector and the impasse it faces. This chapter examines the existing situation and emerging issues of land use pattern, land tenure and crop diversification.

4.2 Land Tenure and Use

Reported total number of plots in the Survey was 2,670. Many types of land tenure systems were reported by sample households. Land plots operated by farmers under different tenure arrangements included singly owned (2,055), ¹⁵jointly owned (99), land alienated under the Land Development Ordinance (7), land that had been encroached upon (95), *thattumaru* (5), *kattimaru* (1), *ande* (281), leased in (106) and mortgaged in (15). Of those, the great majority was singly owned (77 percent) and were reported by 95.6 percent of the households. The rest were *ande* (10.5 percent), leased in (4.0 percent), jointly owned (3.7 percent), government encroachment (3.3 percent), mortgaged in (0.6 percent) land under Land Development Ordinance permits (0.3 percent) and private encroached (0.2 percent) etc (Table 4.1). The data show that 25 percent of households operated 10 percent of land under *ande* (tenant) basis. There was a very small percentage of households and lands operating under joint ownership, *thattumaru* (operator rotation) and *kattimaru* (plot rotation). Reported "leased in" or "mortgaged in" type of land tenure systems are likely to show increasing prevalence of accessing land through financial transactions as well as increasing demand for land in the land market.

Total extent of land reported as operated in the sample was 3,791 acres. About 74 percent of the land area operated (2,805 acres) were as singly owned. This is the predominant type of land tenure of 95.6% households. Another 12.4 percent of land (471.4 acres) were operated under *ande* (tenure) basis (Table 4.1). 24.6% of the households operating land plots under *ande* basis.

¹⁵ In the study singly owned category included praveni land and state granted land under various deed names such as Jayabhoomi, Swarnabhoomi.

Table 4.1: Number of Plots, Total and Average Extent of Operational Land Holdings by Types of Land Tenure (all type of land)

Type of land tenure	Households		Plots		Total extent (acres)		Average extent (acres)
	No.	Percent	No.	Percent	No.	Percent	
Singly owned	874	95.6	2,055	77.0	2,805.13	74.0	1.54
Jointly owned	82	9.0	99	3.7	143.03	3.8	1.47
<i>Thattumar</i>	5	0.5	5	0.2	2.63	0.1	0.53
<i>Kattimar</i>	1	0.1	1	0.0	1.00	0.0	1.00
L.D.O. permits	6	0.6	7	0.3	9.50	0.2	1.36
Encroached (private)	6	0.6	6	0.2	8.25	0.2	1.38
Encroached (Govt.)	69	7.5	89	3.3	128.75	3.4	1.67
<i>Ande</i>	225	24.6	281	10.5	471.40	12.4	2.09
Leased in	82	9.0	106	4.0	180.25	4.7	2.00
Mortgaged	13	1.4	15	0.6	37.00	1.0	2.85
Others	6	0.6	6	0.2	5.00	0.1	0.83
Total	914	100.0	2,670	100.0	3,791.94	100.0	1.62

Source: Socio-economic survey data, 2007/08, HARTI

Average size of land plot operated by sample farmers was 1.62 acres. However, the size of plot operated varied by type of land. For example, reported average extent of lowland was 2.49 acres, home garden was 0.91 acre, highland was 2.26 acres and *chena* was 1.25 acres (Table 4.2). There are differences in terms of type and tenure of operational size of holdings. For instance, households that occupied land encroached from state reserves numbered 16, and they operated on average 1.7 acres as home garden, in comparison to 0.89 acres operated by single owners. Similarly, average size of lowland operated by single owners was 2.06 acres while an *ande* cultivator operated 2.09 acres.

Table 4.2: Number of Plots and Average Extent of Operational Land by Type of Land Tenure

Type of land	Home garden		High land		Low land		<i>Chena</i>	
	No. of Plots	Average extent (ac)	No. of Plots	Average extent (ac)	No. of Plots	Average extent (ac)	No. of Plots	Average extent (ac)
Singly owned	848	0.89	553	2.08	688	2.06	0	0.0
Jointly owned	44	0.94	14	2.63	41	1.66	0	0.0
<i>Thattumar</i>	0	0.0	0	0.0	5	0.53	0	0.0
<i>Kattimar</i>	0	0.0	0	0.0	1	1.00	0	0.0
L.D.O. permits	4	1.00	2	1.50	1	2.50	0	0.0
Encroached (private)	2	0.38	3	1.50	1	3.00	0	0.0
Encroached (Govt.)	16	1.70	53	1.80	11	1.25	9	1.25
<i>Ande</i>	0	0.0	1	0.25	280	2.09	0	0.0
Leased in	0	0.0	67	2.09	39	1.86	0	0.0
Mortgaged in	0	0.0	3	2.67	12	2.90	0	0.0
Others	0	0.0	5	0.95	1	0.25	0	0.0
Total	914	0.91	701	2.26	1,080	2.49	9	1.25

Source: Socio-economic survey data, 2007/08, HARTI

Of the total sample households, 1,080 lowland plots were reported by 718. Total extent of reported paddy lands was 1786.81 acres. Of this, 63.7 percent (1,138.53 acres) were singly owned, 3.6 percent (64.75 acres) were jointly owned and 26.4 percent (471.15 acres) were operated on *ande* basis¹⁶. 529 households reported 701 highland plots. The reported total extent of highlands was 1,193.22 acres.

Eight households reported 9 *chena* plots. These were encroached state lands. This reveals the transformation of land use pattern in agricultural sector. In comparison to the period from 1950s-1970s, cultivation of *chena* lands was significantly reduced¹⁷. On the other hand, due to pressure on land the farmers were using *chena* land for highland farming or home gardening using agrowells and water pumps for irrigation.

279 sample households reported 622.55 acres as rented in 2006/07 *maha*. Of these, 239 households reported 512.55 acres (82.3 percent) of lowlands. In 2006 *yala*, total extent of rented lands were 534.75 acres operated by 246 households. Among this 436.25 acres were reported as lowlands and cultivated by 208 households.

Operating size of land plots differed by cultivating season. For example, average size of land extent cultivated in 2006/07 *maha* was 3.30 acres and in 2006 *yala* it was 2.62 acres. According to the data in Table 4.3, average extent of cultivated land by type of crop differed by season. For instance, the average cultivated lowland was 2.13 acres in *yala* 2006 and 2.33 acres in *maha* 2006/07. The average cultivated highland was 1.65 acres in *yala* and 1.87 acres in *maha*. The average cultivated *chena* land was 1.19 acres in *maha*. As revealed by data in Table 4.3, farmers were using *chena* lands for cash crop cultivation like brinjal as well as big onion.

Table 4.3: Average Extent of Cultivated Land by Season

Crop	Average extent (acres) lowland		Average extent (acres) highland		Average extent (acres) <i>chena</i>
	<i>Yala</i> 2006	<i>Maha</i> 2006/07	<i>Yala</i> 2006	<i>Maha</i> 2006/07	<i>Maha</i> 2006/07
Paddy	2.45	2.56	-	-	1.33
Papaya	4.29	4.13	2.45	2.53	-
Bean	1.05	1.19	1.20	1.06	-
Tomato	1.20	1.73	1.35	1.52	-
Brinjal	1.15	2.24	2.43	2.48	0.50
Sweet potato	2.57	2.60	1.28	1.41	-
Big onion	1.29	-	1.72	-	1.00
Maize	0.72	2.32	0.71	3.40	-
Soya bean	1.51	2.13	0.95	1.59	-
Banana	2.61	2.61	2.43	2.43	-
Red onion	-	-	2.14	2.10	-
Green chilli	-	-	1.74	1.54	-
Cabbage	-	-	3.44	3.45	-
Total	2.13	2.33	1.65	1.87	1.19

Source: Socio-economic data, 2007/08, HARTI

¹⁶ According to Agricultural Census of 1952, in 1946, 212,151 acres out of total acreage of 899,970 of asweddumized paddy land (23.57 percent) were worked on *ande* system.

¹⁷ As reported by Agricultural Census of 1952, total extent of *chenas* in 1946 was 221,395 acres.

Of the total plots, 98.3 percent (2,624) were located within the farmers' own village. Only 1.5 percent (41 plots) was located outside the village but within the district.

4.3 Farmer Viewpoint on Landlessness

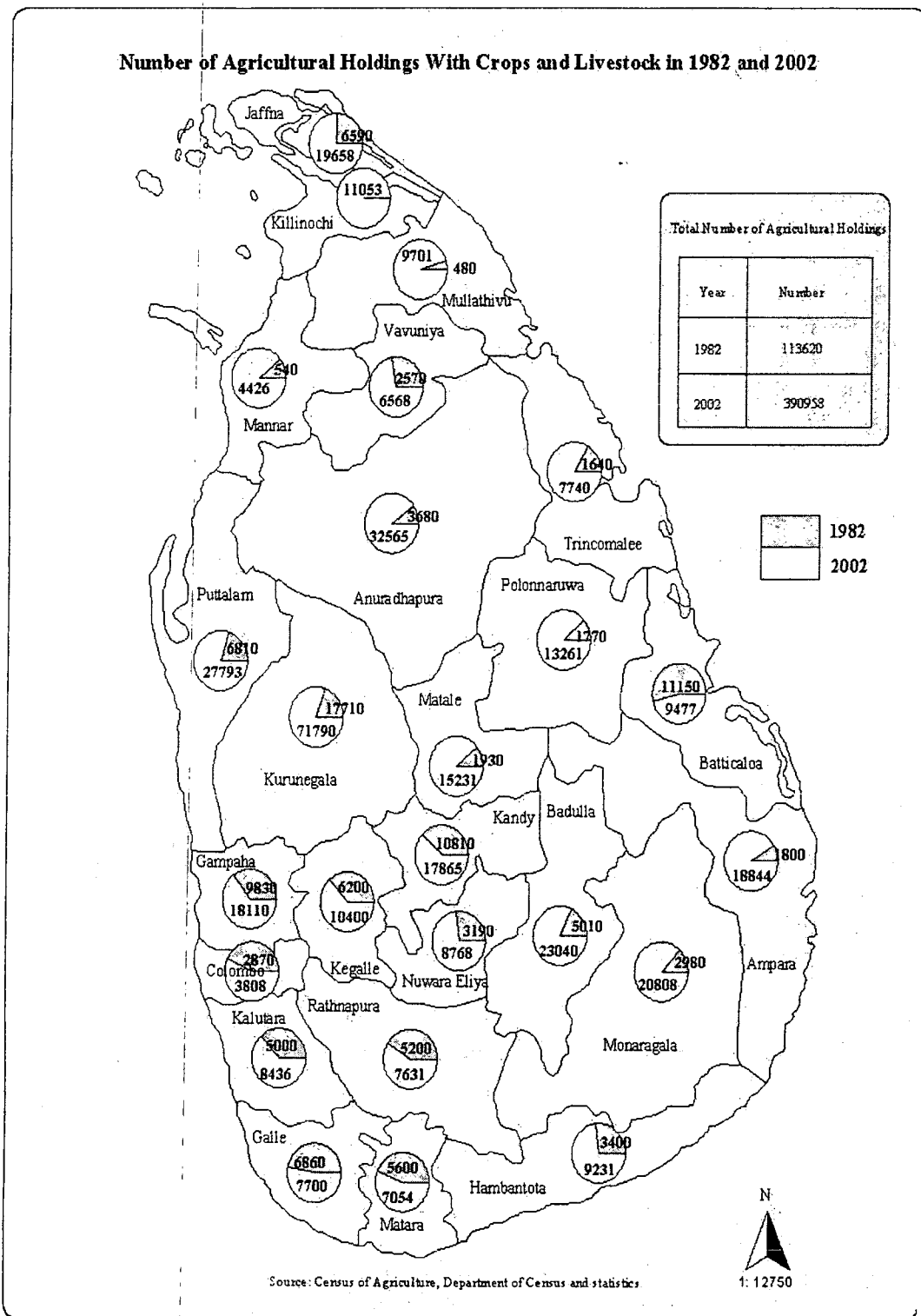
When interviewed as to whether the landless families in the area have increased over the past ten years, fifty one percent of the total sample respondents were affirmative of the situation while five percent said that they were not aware about it. Paddy farmers being the largest number (299) in the sample, 62 percent said that the incidence of landlessness had increased over the years. Seventy six percent of bean farmers and 60 percent of green chilli and sweet potato farmers were of the opinion that the landlessness has increased. About one-fifth to one-third of the tomato, big onion, maize, banana and papaya farmers said that landlessness had increased over the years.

Looking from the perspective of irrigation sources, relatively more farmers cultivating under minor irrigation schemes (61 percent) were of the opinion that the landlessness is increasing. This is due to the fact that those cultivating land under minor irrigation tanks constitute old tank communities where agricultural land area as well as irrigation resources had not expanded sufficiently to accommodate the growing population. Many respondents (376) to the questionnaire stated that the landless are mainly agricultural and non-agricultural hired labourers, and/or cultivating rented in lands or land obtained on *ande* basis.

The situation regarding the landless persons to access land was found to be gloomy. Sixty percent of the sample respondents stated that land plots were not given out on rent or lease. Only 18 percent was of the opinion that the land available on rent, lease or *ande* had increased. A similar number of farmers found that land available on rent, lease or *ande* had decreased.

It seems that only a small number of paddy lands are given out for cultivation. Only 9 percent of paddy farmers in the sample thought that paddy lands given out for cultivation had increased. In comparison, about two-fifth of those cultivating papaya, red onion, green chilli, cabbage and banana thought that land available for rent, lease or *ande* had increased. The differences of opinion are possibly due to several factors. It is possible that paddy lands are scarce and not offered on rent, lease or *ande*. On the other hand, paddy lands cannot be cultivated with other high value cash crops due to legal restrictions and environmental conditions in the wet zone even when they are available on rent or lease.

Map 4.1: Number of Agricultural Holdings with Crops and Livestock in 1982 and 2002



Prepared by APPE Division, HARTI on the basis of Department of Census and Statistics data

CHAPTER FIVE

Production and Productivity

5.1 Introduction

One of the key objectives of the present study was to examine and analyse the factors affecting the production and productivity of smallholder farming sector in Sri Lanka. This chapter examines and analyses the production and productivity differences of the same crop by type of irrigation, agro-ecological zones, districts as well as farming practices. Furthermore, it examines the income and profitability of crops, crop diversification, and farmer's behaviour on crop choices.

5.2 Paddy Farming

5.2.1 Methods of Land Preparation, Planting and Weed Management

Labour use for paddy farming, especially for land preparation and harvesting has been reduced from the 1990s. One major reason for the above is the reduction of labour supply. Shortfalls in labour supplies have been greatly affected in major paddy producing districts like Polonnaruwa, Anuradhapura and Hambantota. Due to differences of cultivation season in the districts of the north and east, labour gangs from places like Sammanturai of the Ampara district used to migrate to Polonnaruwa district for work on paddy fields. However, migrant labourers from the north and east had been greatly reduced from the mid 1990s due to risks involved with war conditions in those areas. Another fact is that corresponding to above situation and as a result of the open economy, some agricultural machinery was introduced for land preparation and harvesting related to paddy farming.

83.2 percent of paddy farmers in *yala* 2006 and 81.1 percent paddy farmers in *maha* 2006/07, used two wheel tractors for land preparation. The rate varied from 100 percent in both the Galle and Matara districts to 3.3 percent in the Ampara district. In contrast, around 80 percent (79.3 percent in *yala* 2006 and 83.3 percent in *maha*) paddy farmers used four wheel tractors for land preparation. In the Ampara district 96.7 percent used four wheel tractors for land preparation. On the other hand, 0.4 percent of the farmers prepared their land with buffaloes.

Around 97 percent of the paddy farmers applied the sowing technique. The rest did transplanting. This rate varied from 1.7 percent in major irrigation to 6.5 percent in rain-fed areas in *yala* 2006. One reason seems to be the land sizes in major irrigation schemes which is relatively larger than in rain-fed areas and needed more labour for transplanting. Therefore, farmers in major irrigation schemes tended to use sowing method.

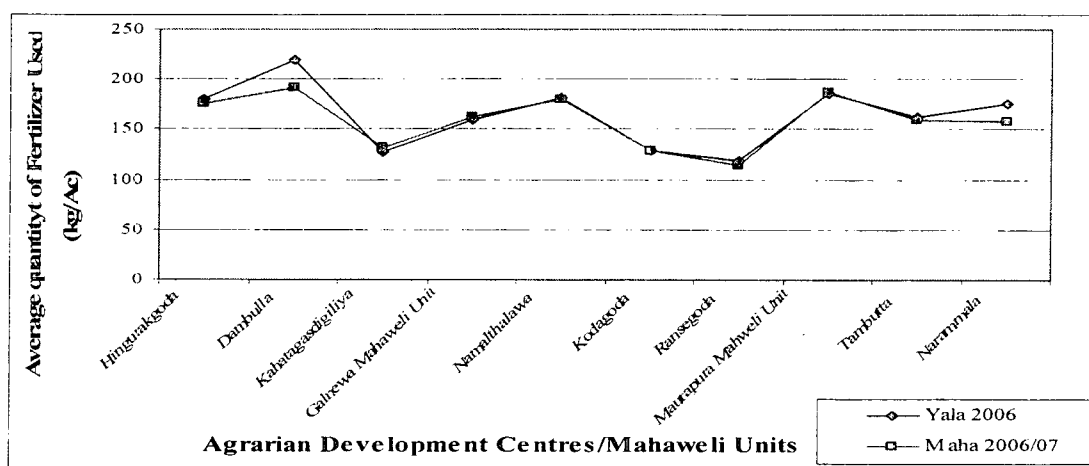
Ninety eight percent of paddy farmers used weedicides. The rest used both weedicides and manual weeding. Around 95 percent (237 in *yala* and 286 in *maha*) used many types of pest and disease control methods. Of these about 96 percent applied agro chemicals as a method of pest and diseases control. This ratio varied from 81 percent in the Hambantota district to 100 percent in the Anuradhapura, Ampara, Galle and Matara districts. The rest were using traditional methods (1.0 percent), non chemical (0.3 percent), integrated pest management (IPM) system (1.6 percent)

5.2.2 Application of Fertilizer

In *yala* 2006, 83.6 percent (250) of paddy farmers in the sample had used straight fertilizer. However, the ratio varied by type of irrigation. The highest percentage (99.2 percent) of those applied fertilizer were reported in major irrigation schemes while lowest (48.3 percent) were reported in minor irrigation schemes. In 2006/07 *maha*, 99.3 percent (297) paddy farmers used straight fertilizer for paddy farming. On the other hand, just a few paddy farmers used compost.

Average quantity of fertilizer used was 169 kg/ac in *yala* 2006 and 164 kg/ac in *maha* 2006/07. The average quantity varied from 219 kg/ac in Matale district to 118 kg/ac in Matara district in *yala* 2006. In *maha* season fertilizer application varied from 114 kg/ac in Matara district to 191 kg/ac in Matale district (Figure 5.1)

Figure 5.1: Average Quantity of Fertilizer Applied (by Agrarian Development Centres/Mahaweli Units)



Source: Socio-economic survey data, 2007/08, HARTI

Quantity of fertilizer used in major irrigation schemes was much higher than the quantity of fertilizer used in minor irrigation schemes and rain-fed areas.¹⁸ This pattern could be identified with in both *yala* and *maha* seasons. The data also clearly show significant differences on quantity of fertilizer applied in different locations (figure 5.1).

5.2.3 Labour use Pattern

Data in the table 5.1 show labour use pattern in paddy farming by type of irrigation and season. The highest labour demand (42 person days per acre) was reported in rain-fed areas in *yala* 2006

¹⁸ According to Department of Agriculture in *yala* 2006, total quantity of TSP, Urea and MOP fertilizers used as basal dressing varied from 84 kg/ac in Ampara East to 46 kg/acre in Kandy. Use of urea as top dressing for paddy varied from 129 kg/ac in Mahaweli H to 38 kg/acre in Kurunegala (rain-fed).

In *maha* 2006/07, total quantity of TSP, Urea and MOP fertilizers used as basal dressing varied from 79 kg/ac in Ampara East to 48 kg/ac in Kandy. Use of urea as a top dressing for paddy varied from 120 kg/ac in Polonnaruwa to 37 kg/ac in Kalutara. Quantity of MOP used per acre ranged from 45 kg/ac in Ampara east to 14 kg/ac in Mahaweli C. Use of MOP has not been reported in Gampaha district and Mahaweli B (Cost of Cultivation of agricultural crops, 2006 *Yala*, 2006/07 *Maha*, Department of Agriculture, Peradeniya).

and lowest labour demand (22 person days per acre) was reported in major irrigation in *maha* 2006/07.¹⁹ In both *yala* and *maha* seasons, relatively low labour used in major irrigation schemes, could be attributed to the adoption of mechanized techniques for land preparation and harvesting.

The data revealed that, land size of major irrigation systems were relatively larger than in other two systems and paddy cultivation in major irrigation schemes were more mechanised compared to rain-fed areas or areas of minor irrigation systems. This might explain relative low labour applied in major irrigation schemes.

Paddy cultivation is one of male labour dominating smallholder farming system in Sri Lanka. Of those labour used for paddy cultivation, 63 percent (minor irrigation in *maha* 2006/07) to 89 percent (major irrigation in *yala* 2006) of labour days were male (Table 5.1). Use of female labour was relatively low in paddy farming. The rate varied from 10 percent in major irrigation schemes to 36 percent in minor irrigation schemes. And also there is a negligible portion of use of child labour (around 1 percent of total labour).

Table 5.1: Total Labour Days Used for Paddy Cultivation (per Acre) by Season

Type of irrigation	<i>Yala</i> 2006	<i>Maha</i> 2006/07
Major irrigation		
Total Number of days (average)	28.03	22.11
Of which		
Male	25.08 (89.5 %)	19.37 (87.6 %)
Female	2.91 (10.4 %)	2.71 (12.2 %)
Child	0.04 (0.1 %)	0.03 (0.1 %)
Minor irrigation		
Total number of days (average)	36.27	36.69
Of which		
Male	28.39 (78.3 %)	23.05 (62.8 %)
Female	7.64 (21.1 %)	13.41 (36.5 %)
Child	0.24 (0.7 %)	0.23 (0.6 %)
Rain-fed irrigation		
Total number of days (average)	41.79	30.84
Of which		
Male	27.3 (65.3 %)	23.09 (74.9 %)
Female	13.94 (33.3 %)	7.35 (23.8 %)
Child	0.55 (1.3 %)	0.40 (1.3 %)

Source: Socio-economic survey data, 2007/08, HARTI

Male labour for paddy cultivation mostly comes from family. It varied by irrigation system as well as by season. For an example, of male labour days, around 58 percent in major irrigation, 63 to 68 percent in minor irrigation and 48 to 53 percent in rain-fed areas were reported to be family male labour.

In comparison with early stages of independence of the country, female labour participation in paddy farming had reduced and gender role had transformed. Female labour within the total

¹⁹ According to Department of Agriculture in *yala* 2006, total man days per acre ranged from 14-50. In *maha* season it varied from 28-34 in all districts except in Ampara east and Hambantota (Cost of Cultivation of agricultural crops, 2006 *Yala*, 2006/07 *Maha*, Department of Agriculture, Peradeniya).

labour used for paddy farming differed from 10.4 percent (3 person days) in major irrigation schemes to 33.3 percent (14 person days) in rain-fed areas in *yala* 2006. Furthermore, female labour used for paddy cultivation varied; 12.2 percent (3 person days) in major irrigation schemes to 23.8 percent (7 person days) in minor irrigation in *maha* 200/07.

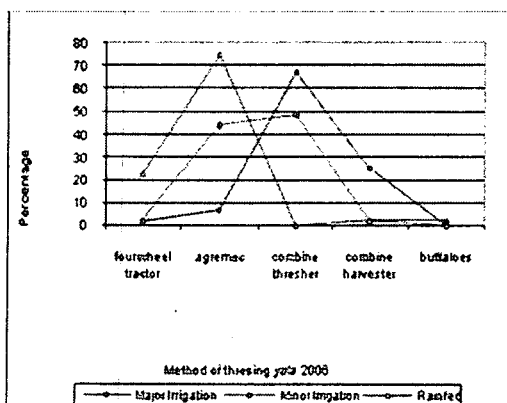
Among the female labour, hired labour component was high. For example, of the female labour 73 to 83 percent were reported in rain-fed areas, 67 to 78 percent in minor irrigation schemes and 64 percent in major irrigation schemes. On the other hand, it was reported that very little proportion (2 to 5 percent of total labour) was *aththam* (exchange) labour. It seems that the traditional practice of *attam* is fast disappearing.

5.2.4 Harvesting and Threshing

Three types of paddy harvesting methods were reported by sample households. These were manual labour (82 percent in *yala* and 84 percent in *maha*), harvester/cutter (4.8 percent in *yala* and 4.4 percent in *maha*) and combine harvester (12.8 percent in *yala* and 11.4 percent in *maha*). Use of highest proportion of the combine harvester (24.4 *yala*, 25.8 *maha*) and cutter (6.7 and 5.8 *maha*) was reported in major irrigation schemes. This finding supports the fact that paddy farming in major irrigation schemes is relatively mechanized, compared with minor and rain-fed areas. In general the mechanisation of paddy farming has increased from the 1960s.

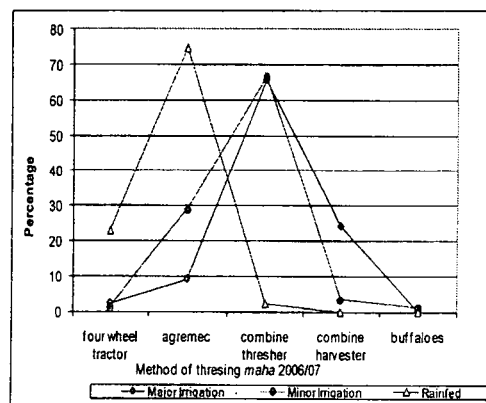
Five types of threshing methods such as use of four wheel tractors (9 percent), threshers like agremec (34 -37 percent), combine threshers (40-47 percent), combine harvester (11-13 percent) and buffaloes (0.4 percent) were reported. Even though highest number of paddy farmers used combine harvester/thresher (40.4 percent in *yala* and 47.5 percent in *maha*) as a threshing method, 100 percent farmers in Kahatagasdigiliya ADC and Galnewa Mahaweli Unit in the Anuradhapura district and Narammala ADC area in the Kurunegala district used combine thresher. In contrast, no one used combine thresher for threshing in Thambutta ADC in the Kurunegala district but a majority of the farmers were using thresher (agrimec). It is likely that new technology had not spread yet into remote areas. On the other hand being remote areas, relatively more labour was available in remote localities.

Figure 5.2: Distribution of Paddy Farmers by Threshing Methods used and Methods Type of Irrigation (yala 2006)



Source: Socio-economic survey data, 2007/08, HARTI

Figure 5.3: Distribution of Paddy Farmers by Threshing used and Type of (maha 2006/07)



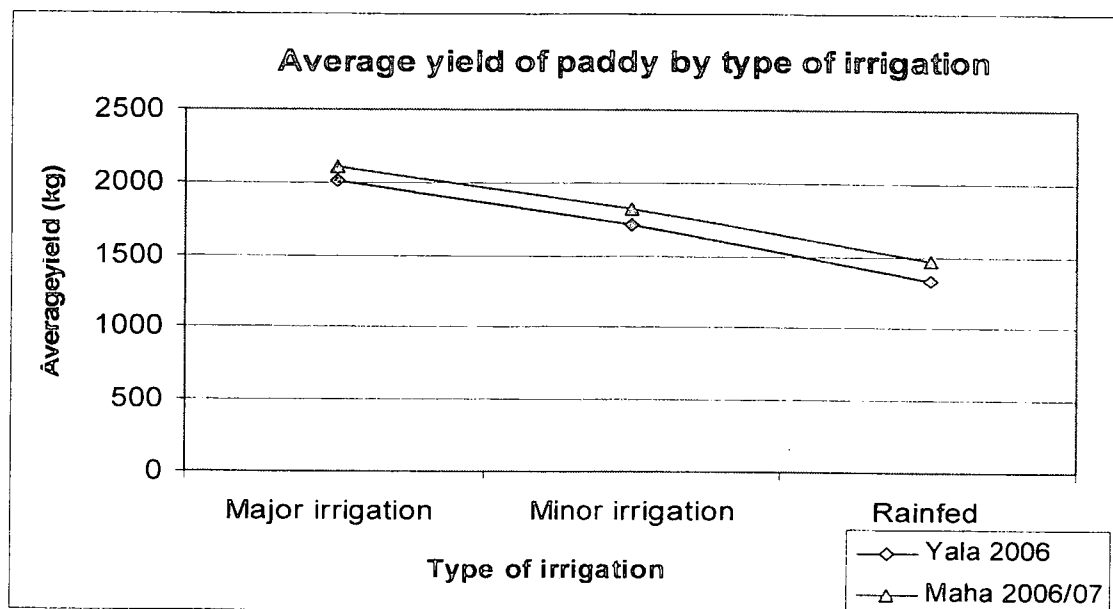
Source: Socio-economic survey data, 2007/08, HARTI

As shown in figure 5.2 and 5.3, threshing method used differed by type of irrigation. Most of the farmers in rain-fed areas used agrimec and four-wheel tractors for threshing. Factors explaining above situation might be the size of cultivated land plots in rain-fed areas being very small and combine thresher or combine harvester not being able to be used in swampy paddy lands in rain-fed areas in the wet zone.

5.2.5 Paddy Yields

Average paddy yield per acre differed by district, type of irrigation and season. Figure 5.4 indicate that the yield variation is more than 600 kg per acre between major irrigation and rain-fed areas. Furthermore, data in the table 5.2 also show that there is a considerable difference of paddy yield within a district by type of irrigation. This situation is shown by average paddy yield of major and minor irrigation schemes in the Anuradhapura district.

Figure 5.4: Average Paddy Yield per Acre by Type of Irrigation



Source: Socio-economic survey data, 2007/08, HARTI

Highest average paddy yield (2,094 kg/ac in *maha* 2006/07) was reported from the Polonnaruwa district in major irrigation systems whilst the lowest paddy yield (1,156 kg/ac in *yala* 2006) was reported from the Galle district in which paddy was cultivated mainly under rain-fed conditions. The reasons for the difference in yield levels is explained by assured water supply and relatively higher levels of inputs (fertilizer and agro chemicals) applied in major irrigation schemes than in minor irrigation system and in rain-fed cultivation system. Irrigated paddy farms are located in the dry-zone and the favourable climate for paddy farming in those areas also likely to influence yield levels achieved.

The data in Table 5.2 also show that excepting the districts like Matara and Kurunegala, paddy yield during *maha* season is typically higher than during water short *yala* season.

Table 5.2: Average Yield of Paddy per Acre by Type of Irrigation, District and Season

Type of irrigation	District	Average yield (kg)	
		<i>Yala 2006</i>	<i>Maha 2006/07</i>
All locations	-	1,843	1,937
Major irrigation	Average for major irrigation	2,016	2,103
	Polonnaruwa	2,080	2,094
	Anuradhapura	1,952	2,149
	Ampara	2,014	2,018
	Hambantota	1,985	2,177
Minor irrigation	Average for minor irrigation	1,715	1,819
	Matale	1,725	1,816
	Anuradhapura	1,591	1,808
	Kurunegala	1,851	1,831
Rain-fed	Average for rain-fed	1,330	1,467
	Galle	1,156	1,376
	Matara	1,303	1,265
	Kurunegala	1,661	1,763

Source: Socio-economic survey data, 2007/08, HARTI

5.2.6 Cost of Production

Average cost of production (including family labour cost) of paddy per kilogram in the total sample was Rs. 15.44 in *yala* 2006 and Rs. 13.42 in *maha* 2006/07. However, cost of production varied from Rs. 14.06 in major irrigation to Rs. 23.22 in rain-fed areas in *yala* 2006. Similarly, cost of production in *maha* 2006/07 too varied from Rs. 12.73 in major irrigation to 18.39 in rain-fed areas (Table 5.3). Furthermore, average unit cost (excluding the input value of family labour) for total sample was Rs. 11.03 in *yala* 2006 and Rs. 9.55 in *maha* 2006/07.

Cost of production of paddy per kilogram varied between areas and by irrigation system. Data in Table 5.3 show that the average cost of producing a kilogram of paddy in major irrigation schemes was lowest at Rs. 9.60 in *yala* and Rs. 8.92 in *maha* 2006/07. Comparable figures for minor irrigation were Rs. 11.90 in *yala* and Rs. 9.34 in *maha*. The cost of production in rain-fed areas was high at Rs. 16.68 in *yala* and Rs. 13.78 in *maha*. According to data, lowest unit cost is reported for *maha* season in all areas.

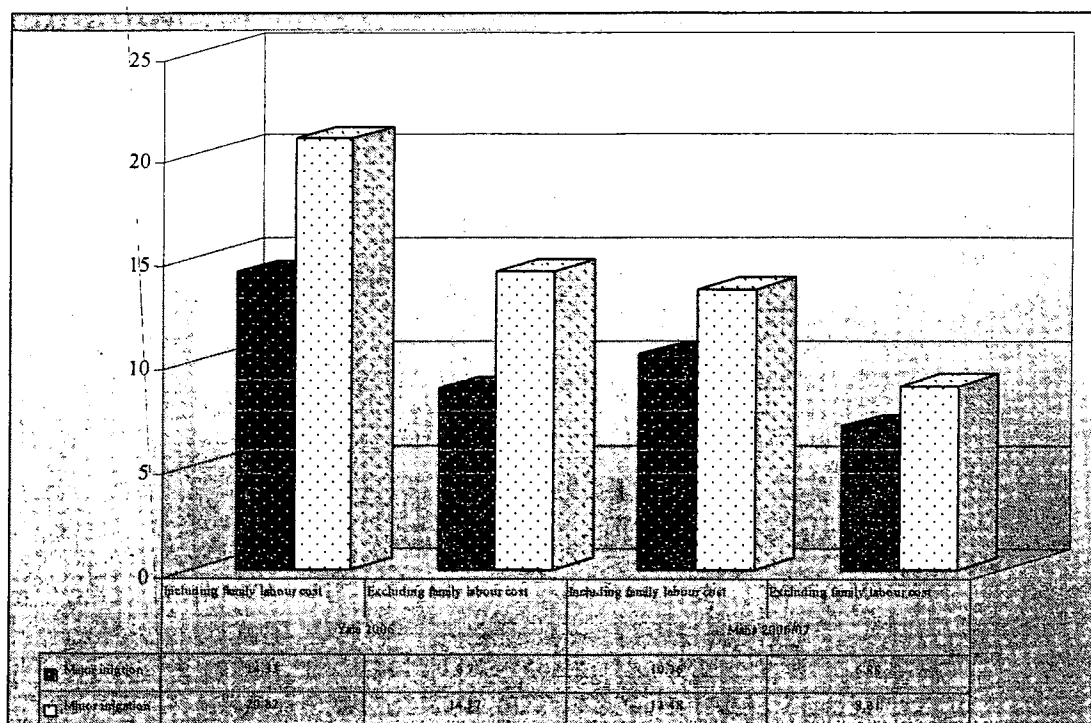
Table 5.3: Composition of Cost of Production per acre of Paddy (*yala* 2006) by Location

Type of irrigation	Location	Unit cost (Rs/kg)			
		<i>Yala</i> 2006		<i>Maha</i> 2006/07	
		Including family labour cost	Excluding family labour cost	Including family labour cost	Excluding family labour cost
All locations	Average for all locations	15.44	11.03	13.42	9.55
Major irrigation	Average for major irrigation	14.06	9.60	12.73	8.92
	Polonnaruwa	11.75	9.66	12.43	10.38
	Anuradhapura	14.33	8.70	10.36	6.88
	Ampara	16.25	12.03	15.94	13.18
	Hambantota	14.09	10.26	13.00	9.46
Minor irrigation	Average for minor Irrigation	17.10	11.90	14.31	9.34
	Matale	13.10	9.28	15.37	12.01
	Anuradhapura	20.82	14.37	13.48	8.81
	Kurunegala	13.00	8.51	12.43	8.29
Rain-fed	Average for rain-fed areas	23.22	16.68	18.39	13.78
	Galle	22.02	18.40	17.64	14.62
	Matara	21.67	10.97	21.91	15.41
	Kurunegala	17.46	12.86	16.16	11.99

Source: Socio-economic survey data, 2007/08, HARTI

Furthermore, cost of production of a kilogram of paddy varied by district, season and irrigation system. For example, cost of production per unit under major irrigation was lowest in Polonnaruwa district and highest in Ampara district. Similarly, average unit cost (including the impute cost of family labour) in major irrigation schemes in the Anuradhapura district was Rs. 14.33 in *yala* 2006 and Rs 10.36 in *Maha* 2006/07. Data also reveal that average unit cost of production for paddy for all locations in minor irrigation schemes is higher than in major irrigation schemes. In addition to data in Table 5.3, data in Figure 5.5 affirms that cost of production of paddy is higher in minor irrigation schemes in comparison to major irrigation schemes. This finding is true for both *yala* and *maha* season. This shows that the profitability of paddy farming is significantly different across the irrigation system, district and seasons. Therefore, guaranteed price for paddy by the government leaves farmers at diverse locations at different levels of profitability.

Figure 5.5: Variation of Unit Cost of Paddy by Type of Irrigation in the Anuradhapura District



Source: Socio-economic survey data, 2007/08, HARTI

Data in the table 5.4 show the distribution of the cost of production in *yala* 2006, both including and excluding family labour in all locations. Share of the cost of production (including family labour) was 53.2 percent, 27.5 percent and 19.3 percent for labour, machinery and input respectively. In contrast, the share of the cost of production (excluding family labour) in all locations was 34.5 percent, 38.5 percent and 27.0 percent for labour, machinery and input cost respectively.

Data reveal significant differences of machinery and input cost by type of irrigation as well as season (Table 5.4). The machinery cost (including family labour cost) differed from 23.5 percent in rain-fed areas to 29.3 percent in major irrigation areas in *yala* 2006. On the other hand input cost differed from 18.3 percent in major irrigation to 23.8 percent in rain-fed areas in *yala* 2006. The share of machinery cost within the total cost of production (excluding family labour) differed from 32.7 percent in rain-fed areas to 43.0 percent in major irrigation schemes. The share of input cost differed from 26.7 percent in major irrigation to 33.1 percent in rain-fed areas. In recent years, machinery has replaced labour, but yet labour is still the major item in cost of production when family labour is excluded. Increases in machinery cost when family labour costs included imply that certain paddy farmers have to exploit family labour to generate an income from paddy.

Table 5.4: Share of Cost of Production per Acre of Paddy (Yala 2006)

Type of irrigation and district	Cost of production (including family labour)				Cost of production (excluding family labour)			
	Total cost (Rs)	Labour (%)	Machinery (%)	Input *	Total cost (Rs)	Labour (%)	Machinery (%)	Input*
All locations	28,450	53.2	27.5	19.3	20,339	34.5	38.5	27.0
Major irrigation	28,346	52.4	29.3	18.3	19,354	30.3	43.0	26.7
Of which,								
Polonnaruwa	24,435	50.3	34.1	15.6	20,098	39.5	41.4	19.0
Anuradhapura	27,963	59.6	25.4	14.9	16,986	33.6	41.9	24.5
Ampara	32,721	51.5	27.5	30.0	24,233	34.5	37.2	28.3
Hambantota	27,984	48.9	30.6	20.4	20,377	29.8	42.1	28.1
Minor Irrigation	29,339	52.1	26.7	21.2	20,420	31.2	38.4	30.4
of which,								
Matale								
Anuradhapura	22,602	60.9	21.6	17.4	16,011	44.8	30.6	24.6
Kurunegala	33,121	50.5	27.1	23.5	22,860	28.3	39.3	32.4
	24,071	53.2	27.4	19.4	15,756	28.5	41.8	29.7
Rain-fed	30,877	52.5	23.5	23.8	22,184	34.1	32.7	33.1
of which,								
Galle	25,465	56.7	19.3	24.0	21,280	48.1	23.1	28.8
Kalutara	28,244	49.4	26.3	24.3	14,294	49.4	26.3	24.3
Kurunegala	29,005	52.9	26.0	21.1	21,365	36.1	35.2	28.7

* including fertilizer, agrochemical and seeds

Source: Socio-economic survey data, 2007/08, HARTI

5.2.7 Income and Profit from Paddy

In analysing profitability of paddy cultivation there are certain factors that need attention. Gross income from an acre of paddy could differ in terms of yields and prices received. The survey data revealed that the profitability of paddy farming varied according to the source of water, district or physical location of the paddy fields as well as cost of family labour as depicted by data in Table 5.5. The data in Table 5.5 show that gross average income for all sample households was Rs. 30,814 in *yala* 2006 and Rs. 31,749 in *maha* 2006/07. The districts of Polonnaruwa, Anuradhapura, Ampara and Hambantota had the most favourable conditions like the climate and assured irrigation water as well as application of higher levels of inputs.

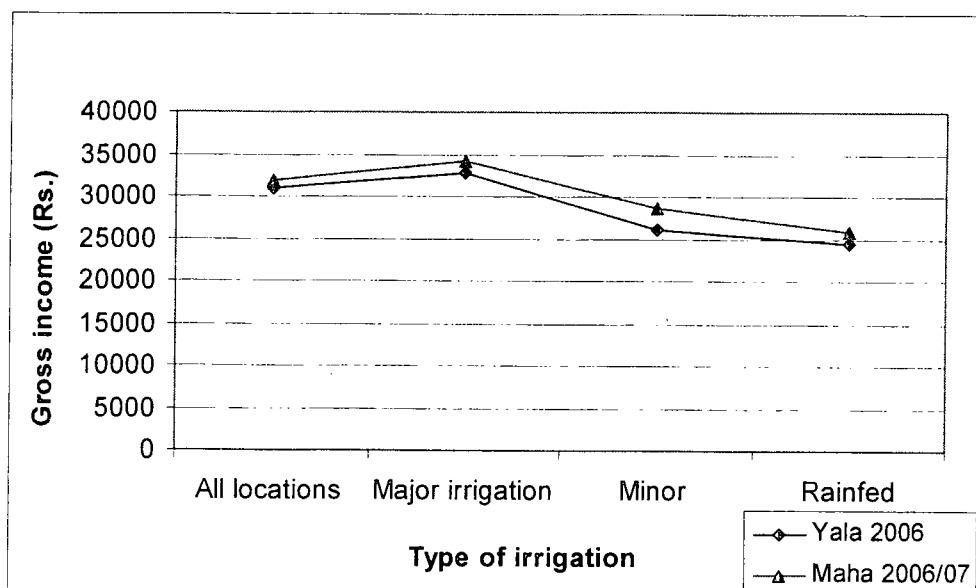
Data in Table 5.5 also reveal significant differences of gross income by type of irrigation. Highest gross income (Rs. 32,849 in *yala* 2006 and Rs. 34,186 in *maha* 2006/07) were reported by farmers in major irrigation schemes while the lowest (Rs. 24,336 in *yala* 2006 and Rs. 25,927 in *maha* 2006/07) was reported by rain-fed areas like wet zone districts of Galle and Matara which depend heavily on rain for paddy farming. Data in Figure 5.7 clearly indicate the influence of assured water supplies in determining the gross income from paddy farming.

Table 5.5: Paddy Farmers' Gross Income and Profit by Type of Irrigation, District and Season (per Acre)

Type of irrigation	District	Yala 2006			Maha 2006/07		
		Gross income (Rs.)	Profit including family labour cost	Profit excluding family labour cost	Gross income	Profit including family labour cost	Profit excluding family labour cost
All locations	Average gross income for all locations	30,814	2,364	10,475	31,749	5,757	13,249
Major irrigation	Average for major irrigation	32,849	4,504	13,496	34,186	7,412	15,421
	Polonnaruwa	33,247	8,812	13,149	33,255	7,229	11,523
	Anuradhapura	33,322	5,359	16,336	35,351	13,085	20,563
	Ampara	31,347	-1,375	7,113	32,960	784	6,366
	Hambantota	32,827	4,843	12,449	35,625	7,315	15,028
Minor	Average for minor irrigation	26,122	-3,217	5,701	28,521	2,494	11,525
	Matale	24,443	1,841	8,432	24,659	-3,251	2,838
	Anuradhapura	26,454	-6,668	3,594	29,833	5,457	13,905
	Kurunegala	28,000	3,929	12,244	31,333	8,569	16,156
Rain-fed	Average for rain-fed areas	24,336	-6,541	2,151	25,927	-1,054	5,707
	Galle	21,668	-3,797	388	25,210	932	5,086
	Matara	23,463	-4,782	9,169	22,449	-5,259	2,954
	Kurunegala	30,147	1,142	8,782	30,124	1,627	8,985

Source: Socio-economic survey data, 2007/08, HARTI

Figure 5.6: Paddy Farmers' Gross Income per Acre in All Locations by Type of Irrigation



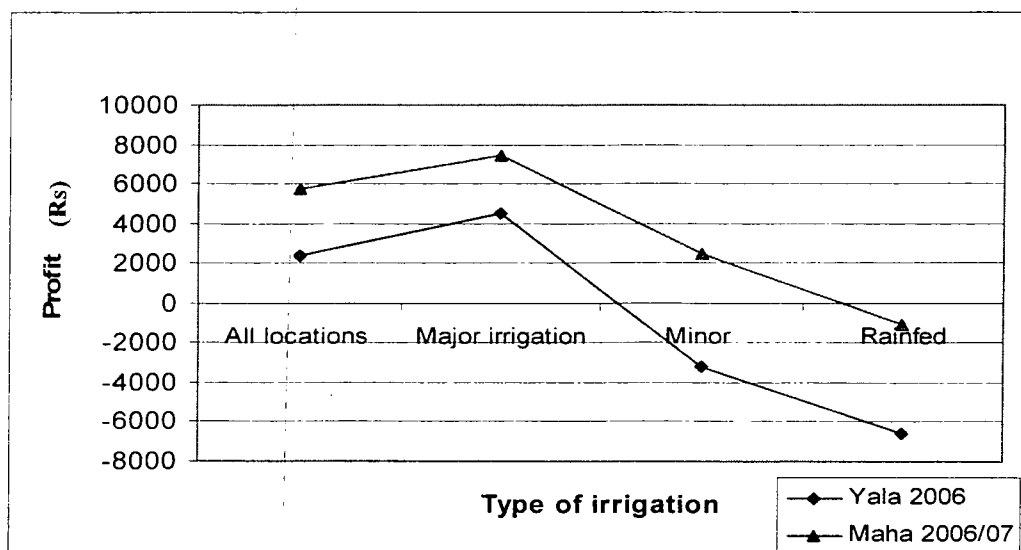
Source: Socio-economic survey data, 2007/08, HARTI

Profit per acre from paddy farming (including family labour) for all locations was Rs. 2,364 in *yala* 2006 and Rs. 5,757 in *maha* 2006/07 (Table 5.5). As in yield, profit from paddy farming differed by type of irrigation, district and season. In considering profit by type of irrigation, highest profit including family labour cost (Rs. 7,412) was reported by major irrigation schemes in *maha* 2006/07. The highest profit (excluding family labour cost) was reported as Rs. 15,421 in major irrigation schemes in *maha* 2006/07.

Data in Table 5.5 also reveal that when the family labour costs were included, the profitability per acre of paddy was highest in the major irrigation areas and lowest in rain-fed areas. For instance, highest profit excluding the family labour (Rs. 16,336 in *Yala* 2006 and Rs. 20,563 in *Maha* 2006/07) was achieved by the farmers in major irrigation schemes of Polonnaruwa district. In contrast paddy farmers in the Matara district reported to have lost Rs. 5,259 per acre in *Maha* 2006/07.

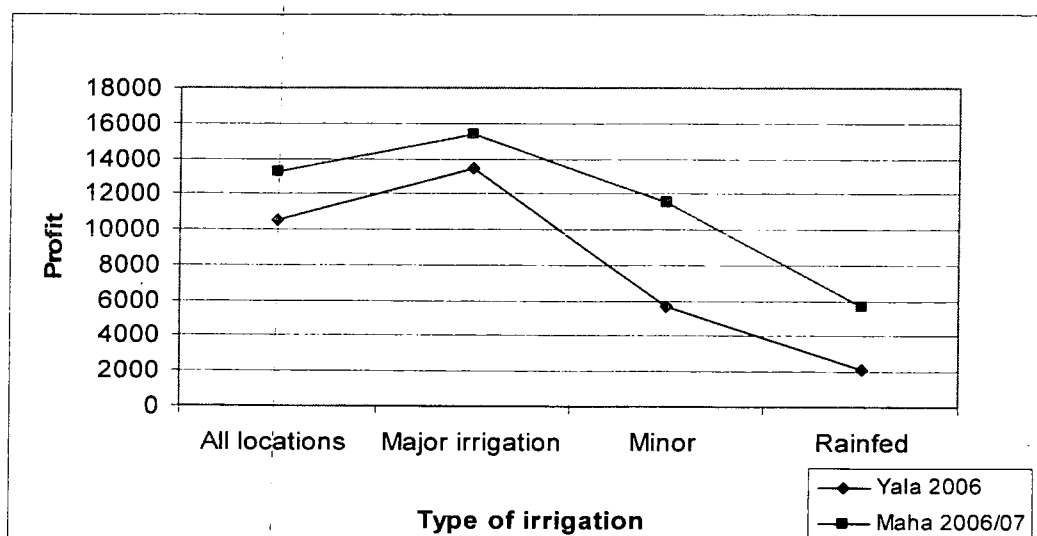
Figure 5.7 and Figure 5.8 below show a drastic decline in profitability of paddy farming in minor irrigation schemes compared to major irrigation schemes. Profitability declines further when paddy is cultivated in non-irrigated or rain-fed areas. In the latter areas, the farmers loose by cultivating paddy when the family labour costs are considered in cost of production (Figure 5.7). If they gain even marginally, it is when the family labour costs are not calculated in the cost of production (Figure 5.7). Figure 5.7 and Figure 5.8 also show higher profitability in major irrigation areas in comparison to all the extent cultivated with paddy by the sample households. Therefore, it is likely that the farmers cultivating paddy with water from major irrigation schemes benefit more from guaranteed price schemes. The rain-fed farmers are likely to remain with paddy farming for personal preferences and lack of alternative employment. Most farmers in the category have expressed that they cultivate paddy to maintain a stock for home consumption.

Figure 5.7: Paddy Farmer's Profit per Acre (Rs) including Cost of Family Labour



Source: Socio-economic survey data, 2007/08, HARTI

Figure 5.8: Paddy Farmer's Profit per Acre (Rs) excluding Cost of Family Labour



Source: Socio-economic survey data, 2007/08, HARTI

Data in the Tables 5.6 and 5.7 show further that paddy farming in rain-fed areas and certain irrigated areas are not cost-effective or results in losses. Certain areas served by major and minor irrigation schemes in Ampara and Anuradhapura districts, for instance, have reported losses when the family labour costs are included in the cost of production or when the return for hundred Rupees of investment is considered. Similarly, all rain-fed farming areas reported losses when the family labour costs were included in the cost of production or when the return to hundred Rupees of investment was calculated. For instance, rain-fed area farmers lost Rs. 6,541 per acre of paddy when the family labour cost was included during *Yala* 2006. Many factors affect the above situation. A major factor is crop damage or failure due to irregularity of water supply for paddy fields. Others include drastic changes in weather conditions and declining soil fertility.

Table 5.6: Paddy Farmer's Return for Expenditure (Rupees per Hundred Rupees) in *Yala* 2006

Type of irrigation and district	<i>Yala</i> 2006					
	Total cost (including family labour cost-Rs)	Profit (including family labour cost-Rs)	Return for Rs.100/= expenditure	Total cost (excluding family labour cost-Rs)	Profit (excluding family labour cost)	Return for Rs.100/= expenditure
All locations	28,450	2,364	8.30	20,338	10,475	51.50
Major irrigation	28,346	4,504	15.88	19,354	13,496	69.73
Of which,	24,435	8,812	36.06	20,098	13,149	65.42
Polonnaruwa	27,963	5,359	19.16	16,985	16,336	96.17
Anuradhapura	32,721	-1,375	-4.20	24,233	7,113	29.35
Ampara	27,984	4,843	17.30	23,777	12,449	61.09
Hambantota						
Minor Irrigation	29,339	-3,217	-10.96	20,420	5,701	27.91
Of which,	22,602	1,841	8.14	16,011	8,432	52.66
Matale	33,121	-6,668	-20.13	22,860	3,594	15.72
Anuradhapura	24,071	3,929	16.32	15,756	12,244	77.71
Kurunegala						
Rain-fed	30,877	-6,541	-21.18	22,184	2,151	9.69
Of which,						
Galle	25,465	-3,797	-14.91	21,280	388	1.82
Matara	28,244	-4,782	-16.93	14,294	9,169	64.14
Kurunegala	29,005	1,142	3.93	21,365	8,782	41.10

Source: Socio-economic survey data, 2007/08, HARTI

Data in Table 5.7 show the profitability of paddy farming in *maha* 2006/07. Farmers cultivating paddy under minor irrigation in Matale reported Rs.11.64 loss per hundred rupees of investment when the cost of family labour was calculated in the cost of production. Similarly, rain-fed farmers in Kalutara reported Rs 18.98 loss when the cost of family labour was calculated. Comparison of data in Tables 5.6 and 5.7 imply that during *Maha* there is a tendency to increase the profitability of paddy farming in most areas studied for this report.

Table 5.7: Paddy Farmer's Return for Expenditure (Rupees per Hundred Rupees) in Maha 2006/07

Type of irrigation and district	Maha 2006/07			
	Total cost (including family labour cost-Rs)	Return for Rs.100/= expenditure	Total cost (excluding family labour cost-Rs)	Return for Rs.100/= expenditure
All locations	25,992	22.15	18,500	71.61
Major irrigation				
Of which,	26,774	27.68	18,765	82.17
Polonnaruwa	26,026	27.77	21,732	53.02
Anuradhapura	22,267	58.76	14,788	139.05
Ampara	32,176	2.43	26,594	23.93
Hambantota	28,310	25.83	20,596	72.97
Minor Irrigation				
Of which,	26,027	9.58	16,996	67.81
Matale	27,910	-11.64	21,821	13.00
Anuradhapura	24,375	22.39	15,928	87.29
Kurunegala	22,764	37.64	15,177	106.45
Rain-fed	26,982	-3.90	20,220	28.22
Of which,				
Galle	24,278	3.83	20,124	25.27
Kalutara	27,708	-18.98	19,495	15.15
Kurunegala	28,497	5.70	21,139	42.50

Source: Socio-economic survey data, 2007/08, HARTI

Comparison of data in Tables 5.6 and 5.7 shows that the return per hundred rupees invested on paddy farming (including family labour cost) vary. For instance, in Anuradhapura returns for Rs 100 varied from Rs. -20.13 in minor irrigation in *Yala* 2006 to Rs. 58.76 in *Maha* 2006/07 in major irrigation. Farmers' return per hundred rupees spent on paddy farming excluding the family labour cost varied from Rs. 1.82 in the Galle district (rain-fed) in *yala* 2006 to Rs. 139.05 in the Anuradhapura district (major irrigation) in *maha* 2006/07. Thus, analysis of cost of production and profitability of paddy farming across irrigation sources, locations and seasons show that profitability vary significantly and some farmers loose out of paddy production while others gain significantly.

5.3 Farmer Opinions Regarding Profitability of Paddy Cultivation

The sample farmers were asked during the survey about the profitability of paddy farming even though some of them were interviewed to obtain cultivation and profitability of other crops. This was for two reasons. Firstly, farmers were interviewed to obtain information on non-paddy crops also cultivated paddy. Secondly, there was the need to understand observable tendency of farmers in relation to non-paddy crops.

Of 758 farmers who responded to the question on their opinion regarding paddy farming, 69 percent expressed that paddy farming was not profitable. However, 32.5 percent of the total sample (297 out of 914 farmers) indicated paddy farming was profitable, 57 percent said that paddy farming was not profitable. Similarly, between 75 percent to 93 percent of the farmers who represented other high value cash crops in the sample were of the opinion that paddy farming was not profitable.

In confirming the already established evidence regarding the profitability of paddy cultivation through the survey, sample farmer opinion about the profitability of paddy cultivation differed between irrigation regimes. For instance, 51 percent of the respondents from the major irrigation schemes and 45 percent of the responders from minor irrigation schemes said that paddy farming is profitable. As could be expected, 69 percent of the paddy farmers who were interviewed from rain-fed areas said that paddy farming was not profitable.

A question arises as to why farmers cultivate paddy if it is not profitable. Of all the farmers in the sample who said that paddy is not profitable (521) 86 percent said that they cultivated paddy to maintain rice security in the respective households. The next important reasons to remain with paddy cultivation were lack of alternative livelihoods (47 percent) and to need avoid abandoning the paddy land (34 percent). Other reasons were legal constraints preventing the use of paddy lands for cultivation of other crops (3 percent) and lack of knowledge to cultivate other crops (3 percent). This pattern of responses in the total sample was much similar amongst the farmers selected to represent cultivation and profitability of paddy.

5.4 Preference for Agriculture as a Livelihood

As noted earlier, there is high incidence of poverty in the agrarian population. The focus of this research, however, was to examine the existing dimension of SFS rather than explanation of agrarian poverty. Therefore, sample households cultivating different cash crops were studied rather than farming areas stricken by poverty. However, it is an established fact that income of those engaged in agriculture is lower than the income of those engaged in industry and services (World Bank, 2003).

Under these circumstances, one issue that arises is why farmers stick to agriculture. Therefore, a question to each respondent was presented inquiring as to whether they are willing to take up alternative employment if the opportunity exists. In answering this question 66 percent of the respondents said that they were not interested in alternative employment. However, those who were not interested in alternative employment differed substantially between groups of farmers interviewed to obtain agricultural practices and income regarding different crops. For instance, 92 percent of the banana farmers, 83 percent of cabbage farmers 78 percent of papaya farmers affirmed that they would rather stick to agriculture. Over 50 percent of all other farmers cultivating different crops including paddy (61 percent) stated that they were not interested in alternative employment. This shows that for the majority, farming is a way of life.

5.5 Cultivation of Other Crops

5.5.1 Yields

Data in Table 5.8 give the average yield per acre for non-paddy crops by district. It could be observed that the yield per crop differed by agro-ecological zone, district as well as source of water for cultivation whilst the management practices might have also contributed. Data indicate significant differences in productivity of a given crop type in different locations. For example, average yield of tomatoes varied from 4,529 kg/acre in Matale district to 8,933 kg/acre in Anuradhapura district. Productivity of crops like big onion, brinjal and papaya too differed from location to location as shown by data in Table 5.8. As the farmers sell the products to more or less the same market and during the same period. This influences the profitability of farmers growing the same crop in different locations. Many factors affect differences in productivity. Firstly, the production is influenced by agro-climatic factors and changes in weather conditions. Second, the farmer awareness, technology adoption and management practices influence

productivity. More specifically type of seeds used, level of fertilizer applied and different levels of usage of agro-chemicals influences crop productivity.

Table 5.8: Average Yield per Acre by Crop and District

Crop	District	Average yield (kg/acre)
Bean	Matale	1,869
Tomatoes	Matale	4,529
	Anuradhapura	8,933
Sweet potatoes	Matale	7,045
Red Onion	Puttalam	5,449
Big Onion	Matale	9,938
	Anuradhapura	4,804
Green chillies	Puttalam	8,823
Soya bean	Anuradhapura (major irrigation)	1,139
Maize	Anuradhapura (rain-fed)	2,370
Brinjals	Matale	13,274
	Anuradhapura	15,630
Cabbages	Puttalam	10,433
Papaya	Polonnaruwa and Hambantota (major irrigation)	9,183 (first year) 20,268 (second year)
Banana	Hambantota	6,791 (first year)
		8,163 (second year)

Source: Socio-economic survey data, 2007/08, HARTI

5.5.2 Cost of Production

Data in Table 5.9 show the unit cost, gross income and profit for non-paddy crops surveyed by district. The cost of profitability too varies by crop, with high profitability reported for second year of banana and papaya cultivation. There are considerable differences of unit cost for big onion (Rs. 6.69) by district. As revealed by data in the Table 5.9, unit cost of big onion was Rs. 13.02 per kilogram in Matale district and Rs. 20.71 per kg in Anuradhapura district. However, unit cost of brinjals was more or less similar in the Matale and the Anuradhapura districts (Rs. 9.76 and Rs. 9.64 respectively). Bean farmers (with impute value of family labour) reported highest unit cost at Rs. 33.65).

Compared to paddy, high profit margins of many other food crops including banana, papaya, brinjals, green chilli, red onion and cabbage were reported in the survey. Although some crops such as beans, papaya, green chilli, red onion and big onion cultivation were profitable, cost of cultivation of these crops too was high due to high input costs. For instance, farmers used imported high yielding seed varieties, applied large quantity of agro chemicals, fertilizers and pumped water. They also used relatively more hired labour in production compared to labour spent on paddy. In contrast, the unit cost of banana was low compared to unit cost of other crops and the profit margin was relatively high. The banana farmers incurred a higher proportion of cost in the first year on land preparation and planting. Expenditure on agro-chemicals and fertilizer on banana farming was about 20 percent of the total cost. Farmers in the Matale district cultivated crops like tomato and bean during the lean season (between two major rainy seasons) and gathered relatively high profit margins with increased income from farming. It is important to

device a system to increase lean season production to improve supplies as well as to increase the OFC farmer incomes.

Table 5.9: Gross Income and Profit by Type of Crop and District (yala 2006)

Crop	District	Gross income (Rs.)	Unit cost (including family labour cost-Rs.)	Profit (including family labour cost-Rs)	Unit cost (excluding family labour cost-Rs.)	Profit (excluding family labour cost-Rs)
Bean	Matale	92,541	33.65	29,650	20.38	54,445
Tomatoes	Matale	59,592	13.02	640	7.36	26,249
	Anuradhapura	20,5318	11.53	102,274	8.09	133,056
Sweet potatoes	Matale	83,999	6.69	36,869	5.13	47,840
Red Onion	Puttalam	255,753	27.14	107,842	21.61	138,020
Big Onion	Matale	224,753	13.02	95,400	9.68	128,526
	Anuradhapura	145,895	20.71	46398	12.36	86,510
Green chillies	Puttalam	296,440	21.90	103,211	18.96	129,185
Soya bean	Anuradhapura (major irrigation)	37,072	29.64	3,316	17.18	17,501
Maize	Anuradhapura (rain-fed)	52,473	11.00	26,405	5.93	38,410
Brinjals	Matale	220400	9.76	90,801	7.30	123,507
	Anuradhapura	416,354	9.64	265,684	7.56	298,175
Cabbages	Puttalam	301,610	11.53	181,344	8.64	211,489
Papaya	Polonnaruwa and Hambantota (major irrigation)	169,749*	14.95*	32,464*	11.03*	68,434*
		369,106**	5.37**	260,266**	4.15**	285,071**
Banana	Hambantota	339,037*	17.84*	217,873*	11.36*	261,870*
		389,951**	7.87**	325,682**	2.77**	367,344**

Note: * first year ** second year

Source: Socio-economic survey data, 2007/08, HARTI

Data in the table 5.10 show return per hundred rupees of investment on non-paddy crops or OFCs studied. Return for investment varied by crop, area and time period. For instance, return for Rs. 100 invested (excluding the family labour cost), farmers gained Rs. 1,624.91 in the second year of banana cultivation in Hambantota district, Rs. 1413.28 for brinjal cultivation in the Anuradhapura district, Rs.476.84 for brinjal cultivation in the Matale district, Rs. 399.05 for tomato cultivation in the Anuradhapura district. The highest return including the family labour cost was recorded by banana farmers (Rs. 506.75). Other crops with a relatively higher profitability were brinjal cultivation (Rs. 495.78) in the Anuradhapura district and papaya cultivation (Rs. 256.89) in Hambantota district. Tomato cultivation in the Anuradhapura district too recorded high profit.

Table 5.10: Return for Rs. 100 Invested on Selected OFCs

Crop	District	including family labour cost		Excluding family labour cost	
		Total Cost	Return for Rs. 100/=	Total Cost	Return for Rs. 100/=
Bean	Matale	66410	39.35	38096	142.91
Tomatoes	Matale	103044	0.62	72261	36.32
	Anuradhapura	58952	173.49	33343	399.05
Sweet potatoes	Matale	47129	78.23	36159	132.30
Red Onion	Puttalam	147911	72.91	117733	117.23
Big Onion	Matale	129353	73.75	96227	133.56
	Anuradhapura	99497	46.63	59384	145.68
Green chillies	Puttalam	193229	53.41	167255	77.24
Soya bean	Anuradhapura (major irrigation)	34985	5.96	19571	89.42
Maize	Anuradhapura (rain-fed)	26027	101.30	14063	273.12
Brinjals	Matale	58607	154.93	25901	476.84
	Anuradhapura	53589	495.78	21098	1413.28
Cabbages	Puttalam	120266	150.78	90121	234.67
Papaya	Polonnaruwa and Hambantota (major irrigation)	137285*	23.65*	108840*	62.87*
		101315**	256.89**	84035**	339.22**
Banana	Hambantota	121164*	179.81*	77167*	339.35*
		64269**	506.75**	22607**	1324.91**

Note: * first cultivation year ** second cultivation year

Source: Socio-economic survey data, 2007/08, HARTI

5.6 Agricultural Machinery Usage

Farm household respondents reported that they used agricultural machinery and equipments like four-wheel tractors (51.5 percent), two-wheel tractors (75.3 percent) and sprayers (98.7 percent) in production. Data in Table 5.11 show the agricultural machineries and equipments that were used and/or owned by the sample households. It is clear that the majority of the farmers were using two-wheel tractors for land preparation while nearly half the sample households reported that they used four-wheel tractors. Those who used four-wheel and two-wheel tractors mainly are paddy farmers.

Highest number of farmers was using sprayers and a majority used water pumps in their production. Those used water pumps and agro-wells for irrigation are largely OFC farmers. Increased usage of water pumps has increased the area under cultivation, especially in dryer areas of the country, more stable usage of the existing land compared to the traditional system

of *chena* (slash and burn) production which is confined to the rainy seasons and intensification of production and increased supplies to the market during lean season.²⁰

A new trend in using machinery in production process by the maize farmers was noted. For instance, more than half the sample households (52 percent) were using combined threshers. Of the sample households, maize farmers were using combine thresher in harvesting maize.²¹ The farmers save their time through use of machinery and earned relatively high farm gate prices making maize production a profitable venture. In comparison with 1950-60 position, there appears a trend towards transformation in use of agricultural machinery by smallholder farmers in Sri Lanka.

Table 5.11: Use of Agricultural Machinery

Type of Agricultural Machinery	Used		Owned	
	No.	Percentage	No.	Percentage
Four wheel tractor	471	51.5	53	5.8
Two wheel tractor	688	75.3	298	32.6
Sprayer	902	98.7	732	80.1
Power sprayer	58	6.3	44	4.8
Water pumps	549	60.1	475	52.0
Threshers (Agrimec)	208	22.8	34	3.7
Combined thresher	475	52.0	27	3.0
Combine harvester	50	5.5	5	0.5

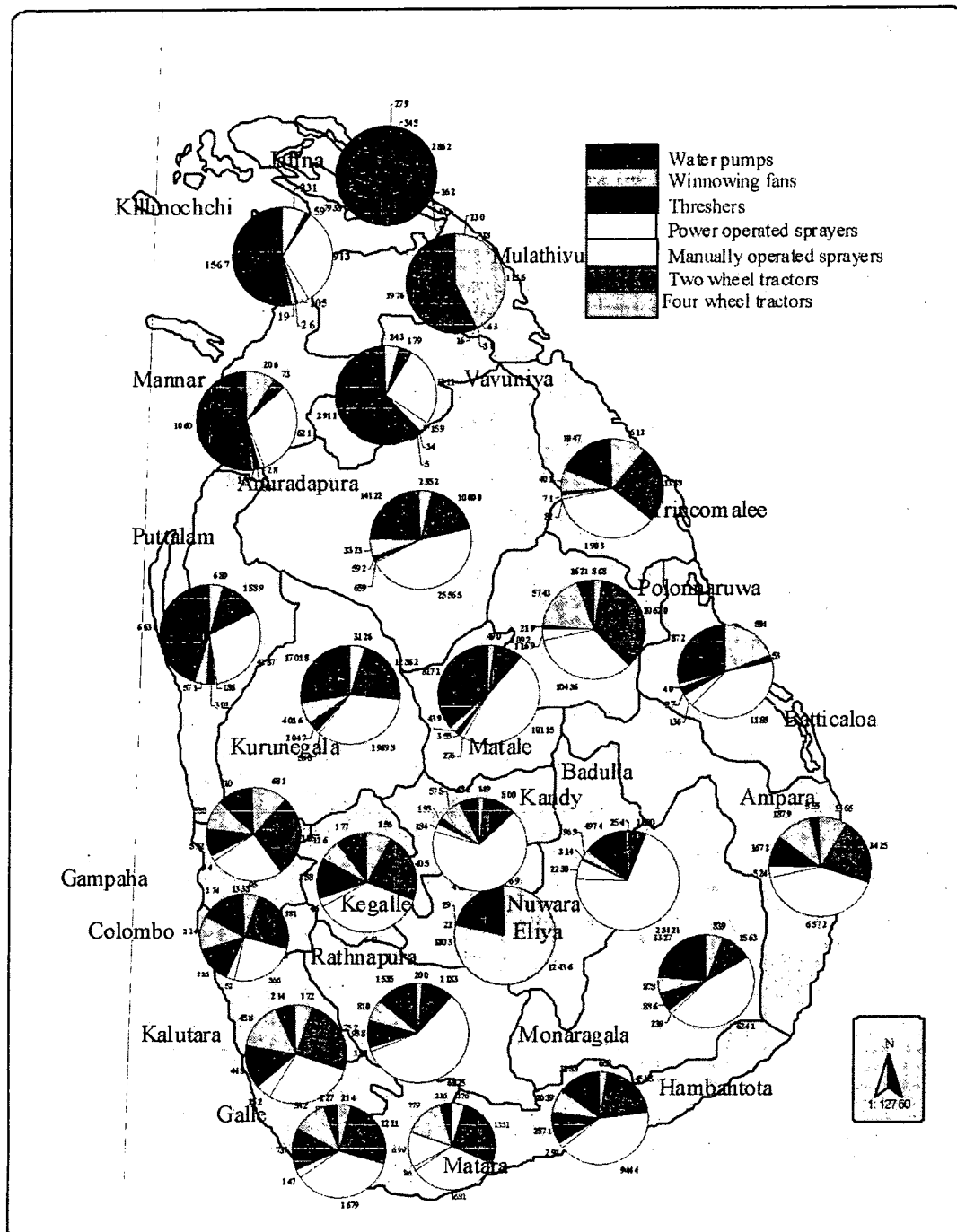
Source: Socio-economic survey data, 2007/2008, HARTI

Indicated in Map 5.1 is the number of farmers who used agricultural machinery accounting to the Census of Agriculture in 2002. In the present survey, it was discovered that a great majority of the farmers had sprayers while more than half of the respondents had water pumps. Nevertheless, fewer number of farmers reported having harvesting machines.

²⁰ There is a need for a comprehensive study of the circumstances under which the water pump or lift irrigation technology in production has caught in smallholder production and implication these have on production, supplies to the market as well as to assess the social, economic and environmental impacts.

²¹ Combined thresher was called "tsunami" by locals with the meaning that threshing is completed in one shot and too quickly. The wording given by the local farmers to combined thresher implicate the impact this has had in production, labour arrangements for threshing/harvesting and its quick social and economic effects. Therefore, there is a need for a separate study to gauge the overall impact of the spread of machinery in recent times in small farmer production in the country.

Map 5.1: Number of Agricultural Machinery Owned by Agricultural Operators by Districts in 2002



Prepared by APPE Division, HARTI on the basis of Department of Census and Statistics data

5.7 Crop Diversification

Crop diversification involves diversification from a dominant mono crop like paddy to another crop or series of crops for a pre-determined period or forever. Farmers adopt or Government encourages crop diversification for soil management, pest management, use efficiently of the scarce resources like irrigation water and shift to high value crops for increasing income or increase land use efficiency.

From the 1970s Sri Lankan Government, via agencies like the Irrigation Department, Agriculture Department, Mahaweli Development Authority has taken great efforts to induce farmers for crop diversification. These efforts were originally based on the need for water management or to meet the scarcity of irrigation water during the water short *Yala* season. Some major irrigation schemes such as Kirindi Oya or Lunugamwehera were aimed at crop diversification. During the survey, in depth interviews by the principal author of this report revealed that big onion cultivation boosted the agricultural economy of the Dambulla Divisional Secretariat Division (DDSD) area. The big onion cultivation had spread to other districts due to the success in the Dambulla area and has contributed to the expansion of the agricultural economy in the region.

5.7.1 Impediments to Crop Diversification

One major debacle faced by those farmers attempting to grow non-paddy crops is land fertility degradation. There are signs of reduction in natural fertility of land which the farmers attempt to overcome through increased application of fertilizer. Extensive reduction in sweet potato yield was reported in Aravula village located in Dambulla Agrarian Development Centre area. It was revealed that sweet potato farmers produced about 10,000 kg of sweet potato per acre few years ago, but now the yield has come down to about 8,000 kg. It is the same with papaya crop. During in-depth interviews, one young farmer indicated that he used to get on average of 3 kg of papaya fruits from his cultivation but now the yield has come down significantly.²²

Besides decreasing soil fertility or reduction in yields, another major technical problem in crop diversification is increasing incidence of plant diseases and pest attacks. Banana plantations in Udawalawe study area has been constantly affected by plant diseases. Most paddy lands are not conducive for crop diversification as land submerges in water during *maha* season. However, other crops are grown on paddy lands during the water short *Yala* season. The farmer's financial and time constraints also affect diversification from paddy to other high value crops. For instance the non-paddy cash crops demand more labour and financial inputs and those farmers do not have either of them. So they are likely to remain with paddy.

Time budget of the farm family as well as the leisure value, especially of the male farm householder influence the decision to adopt non-paddy crops. For example, paddy call for little labour inputs giving the land operator plenty of free time in between planting and harvesting times. In contrast, other field crops require more labour inputs, constant observation (for pest and virus attacks, growth performance) and crop management. Those having time budget problems as well as values influencing high degree of leisure are not likely to opt for non-paddy cash crops.

There are also legal and procedural limitations on crop diversification in paddy lands revealed during the survey and affirmed by recent HARTI research (Damayanthi and Nanayakkara, 2008). Irrigation works with large scale public funding have been constructed to make it possible to cultivate paddy in the dry zone areas of the country in order to be self sufficient in rice. Due to

²² C.K.N. Kodituwakku in Sewagama, Hingurakgoda, Polonnaruwa District.

this reason, growing perennial crops on irrigated paddy lands are regulated by the State mainly due to consideration of rice security of the nation. This policy remains unchanged in spite of the fact that paddy farming has become less attractive on some land in the wet zone and also in social and economic terms for the farmers. However, the Government allows or even encourages farming at non-paddy seasonal crops on paddy lands during the *Yala* season.

5.8 Agricultural Markets

Sri Lanka's major agricultural producer market from the time of the country's independence has been the Colombo wholesale and retail market. Besides the above, small scale producer markets that operate on a regular as well as weekly fair basis throughout the country have been serving small farmer producers to facilitate sale of their products.

Most prominent aspect of change in smallholder agricultural marketing in the country are newly emerging Dedicated Economic Centres (DECs). Dambulla Dedicated Economic Centre (DDEC) located in the Matale district operates night and day. DDEC emerged initially as a natural service centre, but with the Government support it has been established as a "State-of-the-Art" market for collection, wholesale and distribution of agricultural products.

Lorries loaded with vegetables and fruits are lined up at the sales outlets of DDEC by four O' clock in the evening with increasing intensity of arrivals by late evening. Lorries that reach the market with farm products vary depending on the season as well as the day of the week. During the season, on Fridays about 1,500 to 2,500 lorries arrive at the centre and on Saturdays a somewhat closer number arrive.. Most lorries bring heaps of products ranging from 4,000 to 5,000 kilograms. This pattern appears to be influenced by purchases by the retail traders at week-end fairs. Relatively fewer vehicles arrive on Mondays, but gathers momentum again by Friday.

DEC serves the smallholder producers who produce non-paddy food crops in one to two acres of in the Matale district and many other areas in the country. Wholesale traders and other distributors purchase their stocks at DDEC. Some stall operators of the DDEC have been provided with sale compartments at Welisara and Meegoda economic centres and these operators send their supplies to these centres from their purchases at DDEC. The second important distribution channel is *Pola* or Fair where vendors purchase their stuff at DDEC.

Emergence of Dambulla market as a dedicated economic centre has contributed immensely to agriculture based rural development. The niche DDEC serves is a widely dispersed area. Cantering from the DDEC, there appear to be a pattern of development that embraces distant areas in the island. Agricultural products for sale at DDEC are transported from neighbouring districts like Anuradhapura, Polonnaruwa, and Kurunegala as well as distant districts like Moneragala. DDEC also has been serving exotic vegetable (cabbage, beetroot, leaks, beans, etc) producing districts like Nuwara Eliya, Badulla and Kandy too.

Some regional development induced by operation of DDEC could be observed. First, besides providing a large scale agricultural market, the Dambulla town has expanded to serve the increasing demand for agricultural inputs, machineries, and equipment and vehicles sales. Flowing of money from cash crops has resulted in people demanding materials and services for construction of houses and building like cements, bricks, timber, iron, electrical appliances. There has been a large linear development of business along the roads leading to Dambulla town which was only a small dry zone town before the emergence of DDEC in the 1980s.

There is a notable development of banking and other financial institutions. Before 1990, there were two bank branches, both public and private sector owned, in the Dambulla town. Today there are bank branches belonging to almost all banks operating in the country. One public sector owned bank branch is located within the premises of DDEC and is operated night and day.

DDEC has become a major direct employer. It employs about 300 persons engaged in activities like unloading products and reloading the purchases. Mostly benefited by new employment creation at DDEC are landless labourers. One may not appreciate the drudgery involving shoulder loading heavy gunny bags for a living in the 21st century. But, in a relatively underdeveloped country, the centre provides some livelihoods for a significant number of people. Every stall also employs about 6 persons, mainly males to undertake day-to-day activities involving wholesale marketing. This means another 6,864 people are likely to have the access to full time employment in the centre.

CHAPTER SIX

Summary, Conclusion and Recommendations

6.1 Summary

Even before the beginning of the plantation agriculture in Sri Lanka, agriculture has dominated its economy. Whilst the British paid attention to SFS at the last stages of their rule of the country, the policy of supporting this sub sector was further invigorated by the national governments since independence in 1948. The policies to support the dissemination of productivity increasing technologies and increasing the area under paddy cultivation through augmentation of the irrigated land frontier were the major milestones of this policy. In 1977, the Government of Sri Lanka abandoned the import substitution and inward looking economic policies and adopted liberal policies encompassing an export led development strategy. This policy was pursued by reducing subsidies. There have been some changes in support of policies for SFS in line with this policy causing reduction of services provided by the state for agriculture marketing, extension, credit and distribution of seedling material. The import restrictions on domestically produced crops were relaxed from time to time though the government maintained a control on rice, onion and potato imports.

The government's patronage to SFS has benefitted the sector through reducing landlessness and increasing rural employment opportunities. For instance, increase of employment on farm and off farm has been substantial on irrigated land settlement schemes. Most importantly, government patronage and implementation of large-scale irrigation settlements and increased adoption of productivity increasing technology contributed to substantial increases in paddy productivity and production as well as increasing production of OFCs such as vegetables, big onion, potato and maize. As a result, SFS has grown faster than the plantation crops (tea, rubber and coconut) sector during the early years of economic liberalisation. Agrarian policy of the national government might have contributed to maintenance of rural quiescence, political stability, curtailing rural unrest and unplanned migration from rural to urban areas in seeking employment opportunities. Now the food deficit, excepting in certain livestock products like milk has been significantly reduced.

However, the performance of the entire agricultural sector has been short of expectations in comparison with industrial and service sectors as revealed in various studies (World Bank, 1996). SFS has started to experience problems by the mid 1980s, a factor largely attributed to slowing down of productivity of major crops cultivated in the island and sluggish growth in incomes from farming. Pressure from burgeoning population has placed significant demand on existing agricultural land resulting in increasing land fragmentation as shown by data from 2002 agricultural census. Though agriculture had played a significant role in Sri Lanka's economy, employment and income, with the structural transformation of the economy, country's dependence on agriculture sector has been declining gradually from around 1980s (World Bank, 1996).

Present study reveals that average family size of a farm household is 4.5 members. However, the family size varied from 3.7 members to 5.2 members. 91 percent of the heads of households were between 19-64 years of age. Of the sample of 914 households, 867 (94.8 percent) were headed by males and the rest (5.2 percent) were headed by females. Of the male heads, 92 percent were between 19-64 years of age. Of the female heads, 72.3 percent were in the age group of 19-64 years.

This shows that there is a large segment of the population that depend on agriculture as fulltime or part time farmers. The sample household members are largely economically active though fast ageing will need old age income security and health care. A large portion of the farming population in economically active group and relatively young age groups indicate the need for more lands or intensification of cultivation in existing land to provide a reasonable livelihood if they are to remain in the sector. Implications of these have to be further studied.

Those over 15 years of age in the sample, 53.6 percent were employed of which about 46.4 percent were engaged in farming and 18 percent were engaged in non-agricultural employment. In addition to main occupation, 12 percent were engaged in secondary occupations such as self-employment, farming, skilled employment, helping farm work and agricultural labourers. However, only 41.4 percent of the females were employed as against 65.7 percent of the males.

Of those in the workforce in the sample population, 6.24 percent were unemployed. However, unemployment rate differed by source of irrigation water. Further, dissimilar pattern in unemployment could be observed by crops and source of water supplies for farming. For example, of those reported as unemployed, the highest portion (35.2 percent) was reported from paddy farming households, while the lowest portion (0.2 percent) was reported by chilli cultivating households. Of the unemployed, the highest percentage (34.4 percent) was reported from major irrigation areas while the lowest (18.0 percent) was reported from farming households who used agro-wells.

Over time, literacy rates amongst members of agrarian community have increased with number of years of schooling. However, some differences of level of education could be observed in terms of gender, location, access to irrigation etc. The level of education of the heads of the households in major irrigation areas was far behind compared to those in the rain-fed and minor irrigation areas. This calls for attention if the farmers in the areas with low educational levels to be further induced for adoption of crop diversification and productivity improving technologies. There are no significant differences about reported number of household members who were computer literate within the major and minor irrigation areas or in rain-fed farming areas. Furthermore, significant differences in education between districts were found.

The majority of the sample households were located within one kilometre to a motorable road. The minor irrigation areas being the comparatively oldest human settlements, had households conglomerating in one locality called the village. These generally had motorable road access on average within 0.28 km. Farmers from rain-fed areas however, had the longest distance of 1.49 km to access a motorable road. Rain-fed areas in the dry zone is newly expanding and infrastructure facilities available to settlers were generally poor. Agriculture largely depended on rain in the wet zone and the region was marked with hilly terrains and narrow roads or foot paths. The average distance to marketing facilities, health facilities, agricultural service stations and veterinary services were located within a distance of about 6 kilometres for the whole sample. However, the distance to access a service differed significantly between areas. The settlers of major irrigation schemes had the services closer to them than those of the settlers in minor irrigation schemes and rain-fed areas. Households using agro-wells for farming were located at a relatively longer distance to services.

The study revealed a significant tendency towards mechanization of crop production system, crop diversification (from paddy to non-paddy cash crops) and adoption of new production technologies. Paddy farmers used more machines than the non paddy farmers. Around 80 percent of the farmers were using four-wheel or two-wheel tractors for land preparation. In contrast, only 0.4 percent of the farmers prepared their land by using buffalo. Use of buffalo in land preparation is fast disappearing.

Of the paddy farmers, 98 percent used weedicides as a method of weeding while 84 percent used recommended fertiliser. However, 97 percent of the paddy farmers used the technique of sowing though replanting was expected to increase productivity. Three types of paddy harvesting methods were reported in the sample. These were human labour (83 percent), cutter (4.4 percent) and combine harvester (12 percent). Similarly, four type of threshing methods (four-wheel tractors, thresher, combine thresher and buffalo) were reported. It was also revealed that technology adoption varied by type of irrigation. For instance, 99.2 percent of the farmers in major irrigation schemes reported fertiliser application while 48.3 percent of the farmers of minor irrigation schemes reported fertilizer use in paddy cultivation.

Labour used in production varied by crop and irrigation regime. The highest labour requirement (42 person days) for paddy farming was reported in rain-fed areas and the lowest (22 person days) was reported in major irrigation areas. This difference is largely explained by low usage of machinery in rain-fed farming. Paddy cultivation in major irrigation schemes are more mechanised compared to rain-fed or minor irrigation system. Thus the factor that influence labour use pattern is the land size and irrigation availability.

Average yield of paddy differed by district, type of irrigation and to some extent by season. The average yield variation was more than 600 kg per acre between major irrigation and rain-fed areas. Share of the cost of production (including family labour) was 53.2 percent, 27.5 percent and 19.3 percent by labour, machinery and input respectively. There was a significant difference between machinery and input cost by type of irrigation as well as season.

With regard to the average yield of other crops (OFCs) such as tomato, brinjal, big onion and maize that were studied in the survey, vast differences were found. The yield differences are largely explained by such factors as agro-ecological zone, type of irrigation and crop management practices. The lowest cost of producing a unit of agricultural output (one kilogram) with family labour (Rs 5.37) was reported by the papaya farmers for the second year of cultivation whilst the highest (Rs 33.65) was reported by the bean farmers. Compared to paddy farming, relatively high profit margins of certain OFCs like banana, papaya, brinjal, green chilli, red onion and cabbage were revealed. Highest income (Rs 503.75) per hundred rupees invested was reported by banana farmers.

Average household income of all the sample households was Rs 579,923 with a range between Rs 4,500 to Rs 6,375,150. Variation in average household income is due to such factors as land operated size, assured supply of water for cultivation and type of crop cultivated. Eighty one percent of the total sample household income came from farming whilst the remainder came from nonfarm sources. In terms of source of irrigation, highest annual average income was reported by those cultivating crops with water from major irrigation. The highest average annual income (Rs.1,232,678) as well as the highest annual income (Rs.15,314,725) by a single cultivator was reported from the brinjal cultivators. On the other hand, the lowest average annual gross income (Rs.269,498) from OFCs was reported by bean farmers.

There are significant differences of gross income as well as profit by type of irrigation in the paddy sub sector. The highest profit including the family labour per acre (Rs 7,412) was reported by farmers of major irrigation schemes whilst the paddy farmers in rain-fed areas reported a loss of Rs 6,541 per acre on average. Return per hundred rupees of investment on paddy cultivation (excluding family labour cost) varied from Rs. 1.82 in Galle district (rain-fed) in *yala* 2006 to Rs.139.05 in Anurādhapura (major irrigation) in *maha* 2006/07. Differences in returns are due to such factors as the size of plot cultivated, management practices, suitability of soils and

ecological environment and crop damages or failures resulting from irregular water supply in locations such as rain-fed farming areas.

6.2 Conclusion

The State use of a sizeable proportion of the annual budget for implementation of irrigated land settlement schemes for over a few decades has been instrumental in bringing large tracks of land in the dry zone under production keeping pace with increasing population pressure on land. However, the emerging situation is that an excessive number of paddy farmers are operating uneconomic holdings. Few of them have enough flexibility for intensification and diversification of production. As already noted, the Census of Agriculture in 2002 reported that there were 3.3 million agricultural holdings in SFS: nearly twice the number (1.8 million holdings) reported twenty years ago in the 1982 Agricultural Census. Of the holdings devoted for agricultural crops and livestock in 2002, about 45 percent were less than 40 perches (or quarter acre) making those insufficient for market oriented production or crop specialization.

Bleak situation reported by Agricultural Censuses of 1982 and 2002 regarding the small land plots operated by farmers is further exemplified by the findings of the survey undertaken for this report. For instance, the present study reported 2,670 land plots covering a total extent of 3,791 acres. Increasing land fragmentation is attributed to the division of land amongst the farm family members as well as to higher demand for land in the land market for other competing purposes. Emerging land tenure situation might explain to a significant extent the observed conditions in SFS like the reported impasse it faces and poverty of farm households.

Many types of land tenure arrangement for cultivation too were reported in the present study. Though the single ownership of land was the major category of land tenure reported (2,055 plots) in the present study, other tenure types like the joint ownership (99 plots), land under the Land Development Ordinance (7 plots), encroachments (95 plots), *thattumaru* (5 plots), *kattimaru* (1 plot), *ande* (281), leased in (106 plots) and mortgaged in (15 plots) were reported. Furthermore, 279 sample households operated 622.55 acres accessing those on a "rented in" basis in 2006/07 *maha*. Of this 512.55 acres (82.3 percent) were lowlands and were operated by 239 households. Tenure issues are more prevalent in the paddy sector than in the non-paddy sector.

The situation depicted by above findings show that archaic land tenure systems like joint ownership leading to cultivation of land on plot rotation and operator rotation basis are fast disappearing. On the other hand, archaic *ande* farming system is still prevalent. Findings show a slight tendency towards leasing or mortgaging of land for cultivation as a result of increased market orientation of smallholder farmers.

Therefore, issues on land tenure, especially the issue of increasing land fragmentation and adherence to complex land tenure arrangements to access land for cultivation by smallholder farmers have to be readily addressed by policy makers. This is mainly due to continued fragmentation of agricultural land holdings results in uneconomic holdings preventing transformation of SFS into a viable farming sector. One would say that smallholder agriculture cannot any longer be the "parking lot" for the growing rural population as farmers have to depend on fragmented and minute holdings to produce a crop for the market and earn a reasonable income. Policy makers recognize that the present day farmers produce crops not only for home consumption as in old days but also for the market. For a long time, smallholder agriculture also has been the "parking lot" for the poor in the country and the Government encouraging them to remain in farming as a strategy to maintain quiescence in the rural community. Rapid rural industrialization is needed not only to reduce the pressure of burgeoning

population on land if the country is to achieve the stated objective of becoming the miracle of South Asia.

Only eight households cultivated 9 *chena* plots which were encroached for crop production. This could be treated as a sign of transformation of land use pattern in SFS. On the other hand farmers used land for highland farming with agro-wells or by using water pumps for water supply due to pressure on land. In comparison with the period from 1950s to 1970s, cultivation of *chena* lands had been declined subsequently.

The highest labour demand (42 person days) per acre was reported in rain-fed areas in *yala* 2006 and lowest labour demand (22 person days) was reported in major irrigation in *maha* 2006/07²³. In both *yala* and *maha* seasons, relatively low labour usage was reported in major irrigation schemes. This could be attributed to the adaptation of mechanized land preparation and harvesting techniques. However, the study findings imply declining opportunities for rural employment in the paddy sector.

Compared to paddy, high investments are incurred in OFC production though they bring a higher income. Paddy farming has a lower profitability compared to farming of most OFC crops. This situation is in spite of the fact that the paddy sector is provided continually with fertilizer and irrigation subsidies and marketing assistance by the Government. There are also differences in costs and profits between various segments of the paddy farmers. Differences in cost of production and profitability influence how different segments of paddy farmers benefit from government support from subsidies and guaranteed price schemes. Increased usage of machinery in paddy farming has an adverse effect on labour. Yet labour is still the major item in cost of production even when the family labour is excluded.

The present study is based on a sample selected on the basis of the farmers' engagement with farming of selected crops like highly specialized non-paddy crops. Therefore it does not give a fuller picture of ordinary farmer's dependence on nonfarm sector for household income. However, most previous studies show declining importance of agriculture both in rural and agriculture household incomes. It was revealed in the present study that dependency on income transfers amongst the sample farmers too is low -- a factor attributable to the selection of farmers in the sample. On the whole, 81 percent of the total sample household income came from agriculture. However, agricultural contribution to the household income varied by crop as well as by source of water. The remainder of the household income (19 percent) came from the farmer engagement in non-farm sector. This still shows that the dependence of farming population on crop production for family income is declining even among other crops specializing farmers in SFS.

In spite of the continued state assistance to the paddy sector, there are discernible issues related to paddy cultivation. First, certain sectors of the paddy farmers particularly under rain-fed conditions incur losses, specially if family labour is included in cost of production. There is also a higher rate of unemployment in the paddy sub sector. For an example, of those reported as unemployed, the highest proportion (35.2 percent) was reported from paddy farming households showing that unemployment among them is high. The present study also found that income from paddy is much lower than income from non-paddy farming. This needs the attention of the policy makers.

²³ According to Department of Agriculture in *yala* 2006, total man days per acre ranged from 14-50. In *maha* season it varied from 28-34 in all districts except in Ampara east and Hambantota (Cost of Cultivation of agricultural crops, 2006 *Yala*, 2006/07 *Maha*, Department of Agriculture, Peradeniya).

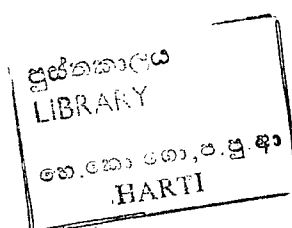
There are significant differences in annual average household incomes between areas under major and minor irrigation. For instance, it was noted that the average gross annual income in major irrigation areas was Rs.579, 923 whilst in minor irrigation areas it was Rs. 348,486. In contrast, those cultivating paddy under rain-fed conditions reported average gross income of Rs. 310,482 with a range of Rs.12,000 to Rs.2,715,590. Notable differences in the range of income from paddy farming are due to differences in irrigation availability, extent cultivated and management practices adopted.

Comparison of income from paddy and non-paddy crops show that generally the non-paddy crops provide a higher rate of income per unit of investment. For instance, this study found that paddy farmers' average annual income (Rs. 360,600) was only 29 percent of brinjal farmers' income. On the other hand, paddy provides only 12.7 percent of the total farm household income. The latter finding imply that the contemporary smallholder farm enterprise is diversified to such an extent that the farmer dependency on paddy cultivation has reduced. The observed conditions in the paddy sub-sector in SFS are in spite of the fact that paddy is treated as the major stay of SFS and therefore the major focus of Government supports programmes.

The paddy farmers have more leisure time compared to farmers engaged in other food crops cultivation. Therefore, they are more likely to be engaged in off farm and nonfarm activities for employment. On the other hand, they earn less profit from paddy farming compared to that of OFC farming. Income from paddy farming appears to be associated with factors like agro-ecological conditions and vagaries in weather conditions, land fertility, water retention capacity of the soil, technology application and management practices, quality of seeds used and access to assured irrigation.

In contrast to income from farming paddy, farmers who are engaged in OFC cultivation which is generally more labour as well as technology intensive earn more income or profit. The differences in annual average income between households cultivating paddy under major irrigation and households cultivating OFCs using agro-well irrigation are significantly high. Higher agricultural income in agro-wells using households for irrigation can be explained by the fact that they cultivate non-paddy cash crops, cater to lean season market, have a relatively more commercial orientation in production and apply relatively more advanced technologies.

Differences in paddy and non-paddy farm incomes entail the need for further intensification of paddy farming and crop diversification where possible. On the other hand, findings show the importance of further expansion of non-paddy farming if the observed stalemate in SFS to be surmounted. A fact to be determined in any move towards crop diversification is that even though the OFC cultivation generally brings about higher income per unit of investment in comparison with paddy, the findings of this study show that the average household income obtained from different OFC crops per unit of investment differs considerably. For instance, income reported for different crops like cabbage (Rs.16,048,000), brinjal (Rs.1,232,678), banana (Rs.997,373), green chilli (Rs.901,328) and bean (Rs.269,498) demonstrate such differences. Thus emerging situation in SFS and related dimensions like return to investment, behaviour of market as well as the factors like suitability of crops recommended for various agro-ecological conditions, land fertility, soil moisture, technology application and management practices that can be promoted amongst smallholder farmers. The quality of seeds used and access to assured irrigation have to be considered along with the extension efforts of the Government and efforts of those formulating policies for agrarian and rural development.



6.3 Recommendations

1. Given the observed difference of income between paddy and non-paddy sub sectors, there is a significant need for further assistance to smallholder farmers towards crop diversification. There is a possibility of assisting rain-fed paddy farmers to diversify into OFCs by providing certain facilities like agro wells, irrigation pumps and extension services. Some upland farmers cultivating OFCs under rain-fed conditions too could be assisted in this manner.
2. Agro-well irrigation is a recently diffused technology that has allowed the landless people like second or third generation settlers of irrigation schemes or wet zone landless to move out from the areas of their original habitation which are densely populated into new areas with open land or forests and forest reserves. However, the availability of forest land now is greatly limited due to clearance for human habitation and agriculture and restrictions imposed by the relevant government agencies in clearing those. Such policies are welcome. In adapting to the emerging situation, former shifting cultivation (*chena*) system has been greatly reduced. Therefore, those moving out of existing agricultural production areas into new areas use un-irrigated highlands as permanent croplands through well irrigation to earn a livelihood. Well irrigation also has other merits like cultivating high value cash crops during the lean season for a relatively lucrative market. It was found that relatively more farmers use well irrigation for production of import substitute crops and therefore protected by the government tariffs and through other policy instruments. Thus, by taking into account also the environmental implications like depletion of ground water and forest resources, the government may adopt a policy of extending assistance for well irrigated production systems with a package for infrastructure development in regions where such farmers are located or have the potential for expansion.
3. Recommendations in one and two above are also strategic instruments that could be applied in poverty reduction strategies of the government as marginal farmers living in marginal areas are a significant section of agrarian poor in the country. Such a policy also is instrumental in reducing agrarian and rural landlessness in the country.
4. The Sri Lankan population is in transition with ageing of the agrarian population. This study found that aged in agrarian households are in a vulnerable situation as they do not have regular and assured incomes, undergo transitory diseases calling for expensive and continued treatment. They are depending on their siblings or family incomes. Therefore, the government should take necessary action to implement planned programmes to take care of elderly in rural cum agrarian society. In the long run, the existing farmer pension scheme should be strengthened and encouraged particularly among middle-aged paddy farmers while special programmes should be set-up to guarantee well-being of the elderly farmers.
5. There is little knowledge of what emerging situation depicted in this study has meant for the female population located in SFS. For instance, certain activities like transplanting, manual winnowing, and de-husking of paddy using pestle and mortar were done by women sometime ago. In spite of the fact that such activities involved part of the drudgery that the rural women were obliged to undergo; these were the activities that have been the source of employment/livelihood opportunities for some women in rural areas. Furthermore, in home garden development and management, rural women used to play an important role. It is possible that new technologies may have had an influence

on the employment opportunities available to all including women. An intensive study to capture the situation of farm household women and female children is needed.

6. Growth in employment opportunities for women in the service and industrial sectors, in particular in the manufacturing sub-sector, might have meant a decrease in the availability of labour, especially among the female dominated fields. Therefore it will also be useful in a study to understand how female labour mobility in SFS in turn affects the production and income of farming households.
7. The field evidence revealed that conventional systems of farming in SFS fail to attract young people especially those who have had a minimum level of secondary education to agriculture. This is particularly so for paddy farming. The observed situation is attributable to poor incentives, lack of support services, drudgery and poor status involving agricultural production. Demographic transition, especially the ageing of the population also has implications for labour supply for production. Evolving labour market conditions might influence the cost of production, choice of crops for cultivation, technology adoption and land use intensification in turn affecting changes in agricultural production. Therefore, there is a need for comprehensive study to shed light on emerging situation and implications for policy making.

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Annex 01: Composition of Sample Households' Average Annual Gross Income by Crop

Table 1: Paddy Framers' Gross Income

Source of Income	Percentage of average annual gross income
Agricultural sector (Rs. 222,700)	61.6
Paddy	32.9
Other field crops	0.9
Vegetables	6.4
Annual crops	7.8
Plantation crops	8.4
Other crops	2.0
Livestock	0.7
Fishing	0.5
Agricultural labourers	0.4
Rental agricultural equipment/ machinery	1.7
Employment by sector (Rs.130,338)	36.1
Government employments	14.9
Private sector employments	6.7
Skilled employments	2.0
Non-agricultural labourers	0.7
Self employments	10.9
Foreign employments	0.9
Income Transfers (Rs.8,355)	2.3
Pensions, rents and lease	1.3
Government subsidies (<i>Samurdhi</i> etc.)	0.3
Others	0.7
Total (Rs.361,393)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 2: Papaya Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 813,156)	88.4
Paddy	6.1
Other field crops	0.0
Vegetables	1.4
Annual crops	74.2
Plantation crops	2.5
Other crops	0.1
Livestock	0.8
Fishing	0.0
Agricultural labourers	0.2
Rental agricultural equipment/ machinery	3.1
Employment by sector (Rs.96,969)	10.5
Government employments	4.4
Private sector employments	0.9
Skilled employments	0.3
Non-agricultural labourers	0.0
Self employments	4.2
Foreign employments	0.7
Income Transfers (Rs. 9,581)	1.0
Pensions, rents and lease	0.7
Government subsidies (<i>Samurdhi</i> etc.)	0.0
Others	0.3
Total (Rs. 919,707)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 3: Bean Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 157,636)	58.5
Paddy	5.0
Other field crops	0.0
Vegetables	40.0
Annual crops	0.3
Plantation crops	4.5
Other crops	5.5
Livestock	0.9
Fishing	0.0
Agricultural labourers	1.3
Rental agricultural equipment/ machinery	0.9
Employment by sector (Rs. 99,686)	37.0
Government employments	10.2
Private sector employments	6.3
Skilled employments	6.0
Non-agricultural labourers	0.6
Self employments	8.1
Foreign employments	5.9
Income Transfers (12,176)	4.5
Pensions, rents and lease	3.6
Government subsidies (<i>Samurdhi</i> etc.)	0.8
Others	0.1
Total (269,498)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 4: Tomatoes Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (277,831)	73.5
Paddy	10.9
Other field crops	2.9
Vegetables	44.8
Annual crops	0.7
Plantation crops	4.9
Other crops	7.6
Livestock	0.3
Fishing	0.0
Agricultural labourers	0.4
Rental agricultural equipment/ machinery	1.0
Employment by sector (96,439)	25.5
Government employments	17.5
Private sector employments	2.8
Skilled employments	1.1
Non-agricultural labourers	0.0
Self employments	3.2
Foreign employments	0.9
Income Transfers (Rs.3,701)	1.0
Pensions, rents and lease	0.1
Government subsidies (<i>Samurdhi</i> etc.)	0.7
Others	0.1
Total (Rs.377,971)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 5: Brinjal Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
<u>Agricultural sector (Rs.918,283)</u>	89.0
Paddy	7.7
Other field crops	2.9
Vegetables	51.4
Annual crops	2.7
Plantation crops	0.3
Other crops	23.1
Livestock	0.1
Fishing	0.4
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	0.4
<u>Employment by sector (Rs. 110,873)</u>	10.7
Government employments	3.5
Private sector employments	1.0
Skilled employments	1.1
Non-agricultural labourers	0.0
Self employments	4.2
Foreign employments	0.9
<u>Income Transfers (Rs. 3,108)</u>	0.3
Pensions, rents and lease	0.2
Government subsidies (<i>Samurdhi</i> etc.)	0.1
Others	0.0
Total (Rs.1,032,264)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 6: Sweet Potato Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 359,722)	77.1
Paddy	14.4
Other field crops	0.0
Vegetables	54.2
Annual crops	0.6
Plantation crops	1.4
Other crops	1.0
Livestock	1.9
Fishing	0.0
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	3.7
Employment by sector (Rs. 99,000)	21.2
Government employments	7.7
Private sector employments	4.1
Skilled employments	0.6
Non-agricultural labourers	0.0
Self employments	5.0
Foreign employments	3.8
Income Transfers (Rs. 7,988)	1.7
Pensions, rents and lease	1.4
Government subsidies (<i>Samurdhi</i> etc.)	0.3
Others	0.0
Total (Rs.466,711)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 7: Big onion Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (460582)	95.0
Paddy	10.5
Other field crops	4.3
Vegetables	31.4
Annual crops	0.1
Plantation crops	1.3
Other crops	45.4
Livestock	1.4
Fishing	0.1
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	0.5
Employment by sector (21,900)	4.5
Government employments	1.7
Private sector employments	0.3
Skilled employments	1.2
Non-agricultural labourers	0.0
Self employments	1.3
Foreign employments	0.0
Income Transfers (Rs.2,543)	0.5
Pensions, rents and lease	0.3
Government subsidies (<i>Samurdhi</i> etc.)	0.2
Others	0.0
Total (485,025)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 8: Maize Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (282,273)	79.0
Paddy	17.3
Other field crops	41.7
Vegetables	11.1
Annual crops	0.3
Plantation crops	0.8
Other crops	3.7
Livestock	1.0
Fishing	0.0
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	3.2
Employment by sector (Rs. 72,579)	20.3
Government employments	10.8
Private sector employments	4.2
Skilled employments	0.7
Non-agricultural labourers	0.0
Self employments	4.5
Foreign employments	0.0
Income Transfers (Rs. 2526)	0.7
Pensions, rents and lease	0.0
Government subsidies (<i>Samurdhi</i> etc.)	0.7
Others	0.0
Total (Rs.357,379)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 9: Soya bean Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
<u>Agricultural sector (171,980)</u>	59.1
Paddy	24.1
Other field crops	20.7
Vegetables	5.6
Annual crops	1.3
Plantation crops	1.7
Other crops	3.3
Livestock	1.2
Fishing	0.0
Agricultural labourers	0.4
Rental agricultural equipment/ machinery	0.7
<u>Employment by sector (Rs.114,320)</u>	39.3
Government employments	20.4
Private sector employments	6.9
Skilled employments	4.0
Non-agricultural labourers	0.0
Self employments	6.0
Foreign employments	1.9
<u>Income Transfers (Rs.4,908)</u>	1.7
Pensions, rents and lease	1.4
Government subsidies (<i>Samurdhi</i> etc.)	0.2
Others	0.0
Total (Rs.291,208)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 10: Red Onion Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs.757,655)	90.6
Paddy	0.0
Other field crops	32.1
Vegetables	33.3
Annual crops	4.5
Plantation crops	0.8
Other crops	19.6
Livestock	0.0
Fishing	0.0
Agricultural labourers	0.3
Rental agricultural equipment/ machinery	0.0
Employment by sector (Rs.76,000)	9.1
Government employments	0.0
Private sector employments	0.0
Skilled employments	0.0
Non-agricultural labourers	0.0
Self employments	6.0
Foreign employments	3.1
Income Transfers (2,356)	0.3
Pensions, rents and lease	0.0
Government subsidies (<i>Samurdhi</i> etc.)	0.3
Others	0.0
Total (Rs.836,011)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 11: Green Chilli Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 811,015)	90.0
Paddy	0.0
Other field crops	5.3
Vegetables	37.5
Annual crops	4.1
Plantation crops	0.7
Other crops	41.9
Livestock	0.0
Fishing	0.0
Agricultural labourers	0.3
Rental agricultural equipment/ machinery	0.0
Employment by sector (Rs.63,800)	7.1
Government employments	0.0
Private sector employments	0.8
Skilled employments	0.8
Non-agricultural labourers	0.0
Self employments	2.0
Foreign employments	3.6
Income Transfers (Rs.26,513)	2.9
Pensions, rents and lease	2.8
Government subsidies (<i>Samurdhi</i> etc.)	0.1
Others	0.0
Total (Rs.901,328)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 12: Cabbage Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs.1,415,026)	92.8
Paddy	0.0
Other field crops	12.1
Vegetables	53.3
Annual crops	0.7
Plantation crops	1.0
Other crops	25.7
Livestock	0.0
Fishing	0.0
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	0.0
Employment by sector (Rs.106,400)	7.0
Government employments	1.7
Private sector employments	0.6
Skilled employments	0.0
Non-agricultural labourers	0.0
Self employments	2.8
Foreign employments	1.9
Income Transfers (Rs.3,480)	0.2
Pensions, rents and lease	0.0
Government subsidies (<i>Samurdhi</i> etc.)	0.1
Others	0.2
Total (Rs.1,524,906)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 13: Banana Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs.928,803)	95.0
Paddy	5.0
Other field crops	0.0
Vegetables	2.6
Annual crops	84.0
Plantation crops	2.7
Other crops	0.0
Livestock	0.2
Fishing	0.0
Agricultural labourers	0.2
Rental agricultural equipment/ machinery	0.3
Employment by sector (Rs.47,570)	4.9
Government employments	0.5
Private sector employments	1.2
Skilled employments	1.9
Non-agricultural labourers	0.2
Self employments	0.8
Foreign employments	0.4
Income Transfers (Rs.1,000)	0.1
Pensions, rents and lease	0.0
Government subsidies (<i>Samurdhi</i> etc.)	0.1
Others	0.0
Total (Rs.977,373)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Annex 02: Composition of Sample Households' Average Annual Gross Income by Type of Irrigation

Table 1: Major Irrigation Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 469,883)	81.0
Paddy	20.3
Other field crops	2.4
Vegetables	3.8
Annual crops	47.9
Plantation crops	2.2
Other crops	1.3
Livestock	0.7
Fishing	0.3
Agricultural labourers	0.3
Rental agricultural equipment/ machinery	1.6
Employment by sector (Rs. 105,433)	18.2
Government employments	5.2
Private sector employments	3.0
Skilled employments	1.5
Non-agricultural labourers	0.2
Self employments	7.6
Foreign employments	0.7
Income Transfers (Rs. 4,608)	0.8
Pensions, rents and lease	0.4
Government subsidies (<i>Samurdhi</i> etc.)	0.1
Others	0.2
Total (Rs. 579,923)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 2: Minor Irrigation Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 234,522)	67.3
Paddy	20.7
Other field crops	1.3
Vegetables	36.4
Annual crops	0.6
Plantation crops	2.2
Other crops	1.4
Livestock	1.7
Fishing	0.0
Agricultural labourers	0.0
Rental agricultural equipment/ machinery	3.1
Employment by sector (Rs. 103,215)	29.6
Government employments	15.2
Private sector employments	5.9
Skilled employments	0.7
Non-agricultural labourers	0.1
Self employments	4.3
Foreign employments	3.4
Income Transfers (Rs. 10,749)	3.1
Pensions, rents and lease	2.5
Government subsidies (<i>Samurdhi</i> etc.)	0.5
Others	0.1
Total (Rs. 348,486)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

Table 3: Rain-fed Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 185,419)	59.7
Paddy	13.3
Other field crops	12.0
Vegetables	14.4
Annual crops	1.6
Plantation crops	12.8
Other crops	3.1
Livestock	0.5
Fishing	0.0
Agricultural labourers	0.6
Rental agricultural equipment/ machinery	1.5
Employment by sector (Rs. 117,637)	37.9
Government employments	19.2
Private sector employments	6.7
Skilled employments	3.6
Non-agricultural labourers	0.7
Self employments	6.2
Foreign employments	1.6
Income Transfers (Rs. 7,426)	2.4
Pensions, rents and lease	1.2
Government subsidies (<i>Samurdhi</i> etc.)	0.6
Others	0.7
Total (Rs. 310,482)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

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Table 4: Agro-well Farmers' Gross Income

Source of Income	Average annual gross income (Rs)
Agricultural sector (Rs. 791,450)	91.1
Paddy	5.0
Other field crops	8.7
Vegetables	42.8
Annual crops	6.8
Plantation crops	0.7
Other crops	26.3
Livestock	0.2
Fishing	0.1
Agricultural labourers	0.1
Rental agricultural equipment/ machinery	0.3
Employment by sector (Rs. 71,145)	8.2
Government employments	2.2
Private sector employments	0.7
Skilled employments	0.6
Non-agricultural labourers	0.0
Self employments	3.1
Foreign employments	1.5
Income Transfers (Rs. 6,140)	0.7
Pensions, rents and lease	0.5
Government subsidies (<i>Samudhi</i> etc.)	0.2
Others	0.0
Total (Rs. 868,735)	100.0

Source: Socio-economic survey data, 2007/2008, HARTI

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