VEGETABLE PRODUCTION AND MARKETING IN THE NUWARA-ELIYA DISTRICT

L P Rupasena
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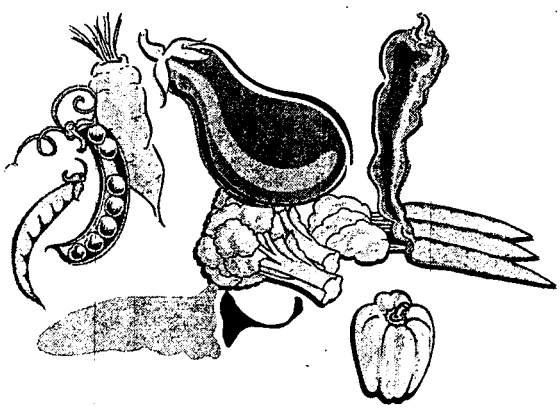

Research Study No. 103

August 1999

Hector Kobbekaduwa Agrarian Research and Training Institute
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ISBN 955 612 041 6

FOREWORD

This study was commissioned by the IRDP office in Nuwara-Eliya. The objective was to ascertain problems and constraints faced by the farmers living in remote areas of the Nuwara-Eliya district in production and marketing of vegetables, and suggest possible solutions and required actions to alleviate the situation. A team of HARTI researchers consisting of Messers L P Rupasena, I R Perera, J K M D Chandrasiri and Bandara Ratnayaka completed the report within a period of one month, i.e, from 15 June to 15 July 1998 utilizing Rapid Marketing Appraisal techniques. The team was assisted by Mr. T G Somaratne and Mr. K A Ranjith Pathmasiri of the Statistical Staff.

The report highlights a number of problems and constraints faced by the interior farmers. Among them, poor infrastructure facilities such as farm roads, market places, irrigable water and price information were the most critical. The researchers have found that the problems are location specific and hence micro-level planning is essential in the development process. Thus, location specific micro-level studies are needed for problem identification and formulation of actions. The IRDP office in Nuwara-Eliya is convinced of this problem.

The report also presents an action plan based on the problems/constraints so identified. HARTI hopes that the project formulation mission will look into it and make arrangements for implementation.

I would like to express my gratitude to the IRDP officials in Nuwara-Eliya, especially Mr. Kees Harteveld, Team Leader and Mr. Luck Bakker, Agricultural Advisor, for supporting and funding this study and the research team for its timely completion.

Dr. S G Samarasinghe
Director,
HARTI

ACKNOWLEDGMENT

The study team would like to thank officials of the IRDP specially, Mr. Kees Harteveld and Mr. Luck Bakker for supporting and funding this study. We greatly appreciate comments made on the first draft by the IRDP officials within a very short time period. Thanks are also due to the survey team, Mr. T G Somaratna and Mr. Ranjith Pathmasiri for their valuable service in data collection and data analysis.

Likewise the team expresses its gratitude to Dr. S G Samarasinghe, the Director and Dr. D Gamage, the Deputy Director of HARTI for making official arrangements for this purpose.

The research study team solicited the assistance and support of many people without whose cooperation, the success of this study would not have been possible. Regrettably there were too many to be mentioned and therefore we decided not to list them for fear that we may miss some names.

We are grateful to Dr. S M P Senanayake, Senior Lecturer of the University of Colombo for his valuable comments and editing of the report. Mr. S Rameswaran, Information and Publication Officer, HARTI did the final corrections and made arrangements to publish the report. His assistance is much appreciated. We also thank Mr. K D Siriwardana and the staff of the printing section of HARTI for printing the report.

L P Rupasena
I Ranasingha Perera
J K M D Chandrasiri
Bandara Ratnayake

LIST OF ACRONYMS

AI	Agricultural Instructor
ASC	Agrarian Services Center
CISIR	Ceylon Institute for Scientific & Industrial Research
CWE	Cooperative Wholesale Establishment
DO	Divisional Officer
DOA	Department of Agriculture
DS	Divisional Secretariat
EDB	Export Development Board
EPC	Economics & Planning Center
FO	Farmer Organization
GN	Grama Niladari
HARTI	Hector Kobbekaduwa Agrarian Research & Training Institute
IRDP	Integrated Rural Development Project
LDO	Land Development Ordinance
MARKFED	Marketing Federation
MFPD	Marketing & Food Policy Division
NGO	Non Governmental Organization
PRA	Participatory Rural Appraisal
PS	Pradeshiya Sabha
REAP	Rural Economic Advancement Program
RMA	Rapid Marketing Appraisal
RRDB	Regional Rural Development Bank
SLBDC	Sri Lanka Business Development Center
UNDP	United Nations Development Program

TERMINOLOGY

Grama Niladari	Officer of the Ministry of Public Administration at village level (earlier known as Village Headman).
Govi Niyamaka	A village level extension officer who has been appointed on a temporary basis by the Ministry of Agriculture and Lands and expected to be absorbed into the permanent cadre.
Samurdhi Niyamaka	A village level animator who has been appointed by the Ministry of Rural Development on a temporary basis, but expected to be appointed on a permanent basis.
Demand side Wholesaler	Trader coming from distant demand areas to supply areas to buy vegetables .
Resident Collector	Trader in the supply areas who collects vegetables from the farmer.
Govijana Kendraya	Divisional office of the Dept. of Agrarian Services (earlier known as Agrarian Services Center- ASC).
Anicut	A bund constructed across a water stream for diversion of the water way.
Maha	Production period from October to April.
Yala	Production period from May to September.
Pola	Periodic market which is held one to three times a week where itinerant traders and local retailers gather in a designated place such as an open field or an area with rows of open-sided, temporary or permanent structure.
Poly sack	Bag made of polythene.
Chena	Area under shifting cultivation (Slash and burn)
Pradesiya Saba	Local Government Council at Divisional Level.
Govigama	A high rank social caste.
Upcountry vegetables	Temperate climate vegetables such as cabbage, carrot, beetroot and leeks grown in the highlands.
Lowcountry vegetables	Tropical or semi-tropical vegetables grown in lower elevations such as okra (*Hibiscus esculentus*), lufa (*Lufa Acutangula*), and brinjal (*Solanum Melongena*).
Leafy vegetables	*gotukola* (*Centella Asiatica), mukunuwenna* (*Alternanthera Sessilis*), *kankun* (*Ipomoea Aquatica*), *sarana* (*Trianthema Monagyna)* and *thamppala* (*Amaranthus caudatus*).

Kurakkan	*Eleusine Coracana.*
Boutique	Small store selling a variety of consumer goods, such as sugar, box of matches, cigarettes and fruits and vegetables.
Nattami	Loading / unloading and portage labourer.
Market place	Group of shops, stalls or stands in a facility where buying and selling takes place.
Market Center	Group of shops or stands that are not within any designated facility.

EXECUTIVE SUMMARY

This research report is an outcome of a study carried out during mid June to July of 1998 by a team of interdisciplinary researchers of HARTI at selected locations of the Nuwara Eliya district on vegetable production and marketing. The study was funded by IRDP of the Nuwara Eliya district anticipating the findings and recommendations of the study could be used for the prospective development programs of the succession project of IRDP, once the present IRDP is terminated at the end of 1998.

The major objectives of the study were to identify problems and constraints in connection with vegetable production and marketing and to recommend remedial solutions for the identified problems together with concrete suggestions.

Rapid Marketing Appraisal was the methodology adapted, which included a number of techniques and strategies of social science research such as beneficiary interviews, key informant interviews, farmer group interviews, brainstorming, observations and informal surveys.

The findings show that vegetable production is characterized by high dependency on weather, small scale production, high use of family labor, and is concentrated in the remote areas where transport, electricity, communication and water facilities are lacking. With regard to input use two different pictures emerged. Farmers at Handawalapitiya and Mandaramnuwara used much higher quantities of fertilizer than the recommended level whereas farmers at Theripaha and Madulla used a much lower quantity than the recommended level. Incomes received from all the crops, except from cabbage at Manadaramnuwara, were positive for all the study locations even when family-owned inputs were costed. It was also revealed that average yield at farm level is well below the potential yields of most of the vegetables.

An analysis of marketing margins reveals that farmers' share was about 50% of the consumer price, except in Madulla where it was 92% due to direct selling to the consumer. Retailer's net margin was around 35% of the consumer price and it appears to be high. This is a result of the small scale of the business in which only 4 – 5 specialized varieties are sold. The amount of wastage was estimated at about 10% of the consumer price which is quite low compared to the findings of many other studies. It may be a result of the decentralized system of distribution existing for vegetables produced in the study areas in which the wholesalers take the ownership of goods and hence take appropriate precautions in packing, stacking, handling and transport so as to keep the losses to a minimum. This can be compared with the Colombo based commission system in which substantial losses occur. Due to the absence of transfer of ownership of the product, the retailer purchases vegetables from the commission agent which results in poor handling and transport.

The study team found a series of problems and constraints of vegetable production and marketing in the Nuwara Eliya district. The major problems faced by the farmers in relation to vegetable production included i) low productivity, ii) poor knowledge of the farmers on systematic vegetable cultivation due to insufficient extension services, iii) scarcity of irrigation water, iv) poor condition of the farm to market roads, and v) heavy crop damages done by wild animals. The main problems and constraints identified with regard to vegetable marketing included disorganized marketing system, and poor marketing infrastructure.

Based on these findings the study concludes that the existing production and marketing system is not efficient. This adversely affects the wellbeing of the farming community because over 75% of the farmers derive their main incomes from the cultivation of vegetables. It was observed that there is room for improvement of the vegetable production and marketing system in the study areas.

The major recommendations of the study include the following: i) removal of physical barriers and improvement of the access to study sites by providing basic infrastructure facilities, ii) strengthening of agricultural supporting services including extension, irrigation facilities etc., iii) diversification of rice-based cropping system with vegetables, iv) promotion of organized marketing mechanism for the area by providing training and awareness for relevant categories of farmers and traders, v) provision of marketing information for the pertinent parties, vi) setting up trading companies at farm level, and vii) development of market gardens.

The study spells out strategies and concrete actions proposed by the research team for implementation. All of these are based on the findings of the study which were reached by using a number of research techniques and on the observations of the research team coupled with the suggestions made by the farmers and officials. It is also important to solicit farmers' participation at the time of project implementation as done at the stage of problem identification and formulation of the solutions.

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CHAPTER ONE

Introduction

1.1 Background

The Integrated Rural Development Project (IRDP) in the Nuwara-Eliya district is expected to be terminated at the end of 1998 and a new program is being formulated for funding. The aim of the new program is to contribute to economic growth in the district, with special attention to employment generation and increased income of the poor people. This fits the policy intention of the Sri Lankan Government to convert the Integrated Rural Development Projects into Rural Economic Advancement Programs (REAP).

The vegetable production, processing and marketing are major and potentially most dynamic economic sectors in this regard. Nevertheless, the sector is also characterized by strong cyclical fluctuations, non-transparent marketing mechanisms, lack of consistent policies and threats to the environment.

It is therefore, necessary to identify problems and constraints prevailing in this sector in order to prepare an action plan to be implemented through interventions by the proposed program. Hence, the IRDP office in Nuwara-Eliya commissioned Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) to carry out a study to identify the problems and to indicate possible solutions and required actions. This study was carried out by a team of HARTI researchers to meet this requirement.

1.2 The Problem

Macro level information is easily accessible but is not always useful for the purpose of problem identification. The situation in Kandapola area is substantially different from the situation in Mandaramnuwara. This refers to the natural environment as well as marketing organization, infra-structure, etc. Therefore, additional to the macro-level information, location specific studies are useful to carry out project formulation.

1.3 Objectives

The principal objective is to identify problems and constraints and to suggest possible interventions that should be implemented through the proposed project. The specific objectives are:

1. to examine the characteristics of vegetable farming system, which includes selection of crops, crop rotation, harvesting methods and crop damage caused by animals,
2. to ascertain availability, accessibility, quality and usage of agricultural inputs and support services,
3. to ascertain efficiency in input use and production,
4. to work out the costs of production for major crops grown in the study area,
5. to describe the vegetable marketing system, identifying the principal components of the system and the major participants with their roles,
6. to calculate the quantum of vegetables contributed from the Nuwara-Eliya district to the total demand,
7. to study the potential market demand for processed vegetables,
8. to work out major marketing costs and price spreads,
9. to ascertain the effectiveness of the existing market information system,
10. to identify and diagnose problems and constraints in relation to the development of the vegetable sector, and
11. to recommend possible interventions to consider at the time of project formulation.

1.4 Study Method

The commodity system approach, which includes input supply, production, processing, distribution and consumption, was applied in this study. This approach is important to identify problems that are inter-related with one another. For instance most of the marketing problems, such as post harvest losses and high price variations are directly linked with problems of production. It is therefore, necessary to analyze the operation of the entire system to obtain a clear picture.

1.5 Study Locations

In selection of the study locations, the following criterions were taken into consideration:

1. Majority of the families receive low incomes,
2. Vegetable farming is the major, or potential income generating activity, and
3. Scant or no attention was paid in the development programs.

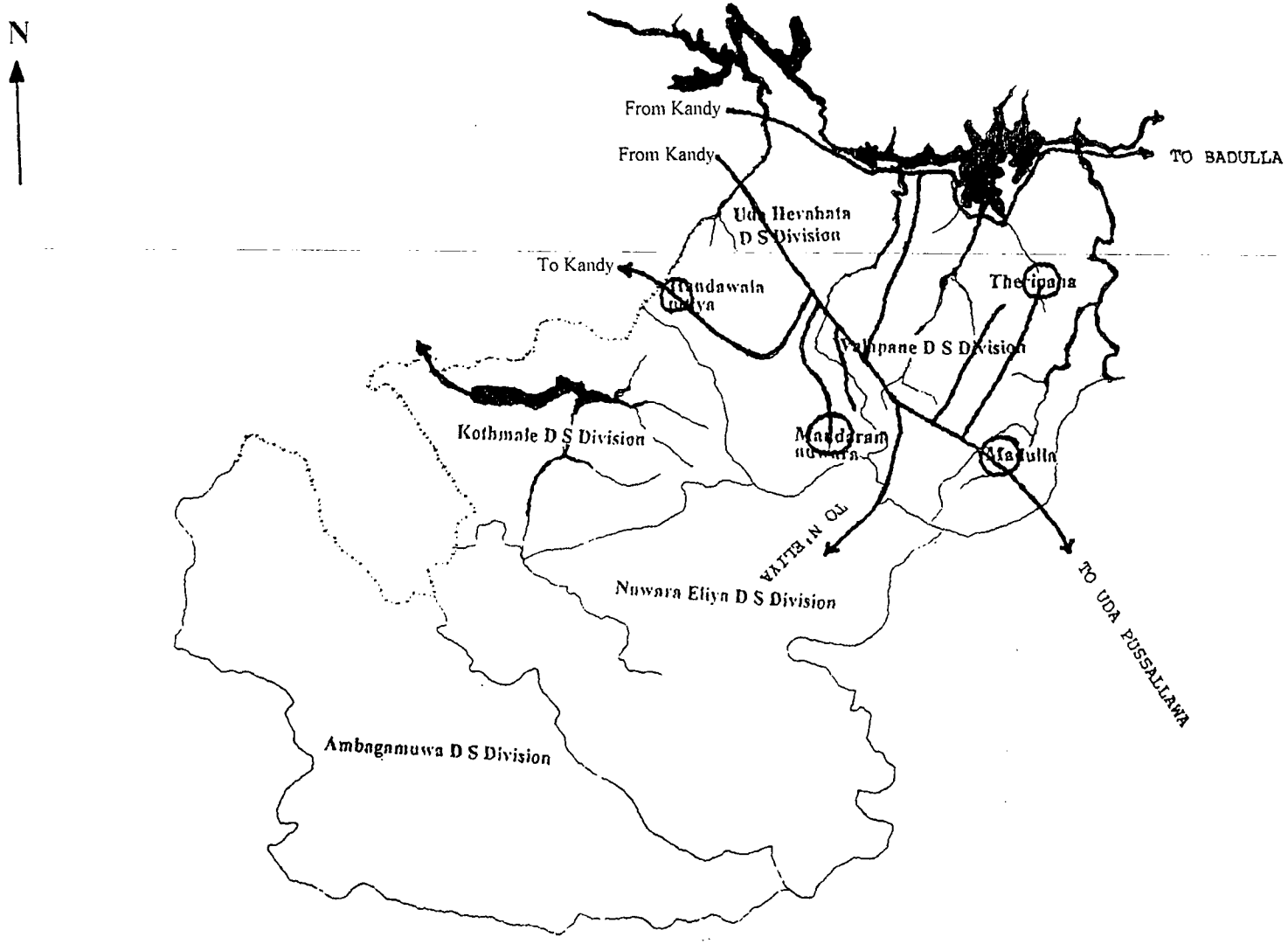
Having discussed with the IRDP officials, four study locations were chosen from two Divisional Secretariat areas. They were Handawalapitiya and Mandarmnuwara in the Hanguranketha Divisional Secretariat area and Theripaha and Madulla in the Walapane Divisional Secretariat area of the Nuwara-Eliya district (Chart 1.1).

1.6 Data Collection

This study was mainly based on the primary data obtained by using the Rapid Marketing Appraisal (RMA) technique. This technique involves in a series of interviews with

Chart 1.1

Study Location In Nuwara-Eliya District



market participants representing every segment of the marketing system. This process begins at the farm level and ends at the consumption level. However, this study was limited to the farm level due to time constraint. Nevertheless, wholesalers and retailers in relation to the major marketing channel in each study location were interviewed to collect data and information for the analysis of marketing margins.

Question guides were prepared for each type of participants such as farmers, collectors, wholesalers, transporters and brokers. Under the RMA, the following techniques were applied for data collection:

1. Key informant interviews - to get an understanding of the system operation.
2. Informal surveys - to collect quantitative data such as cost of production, level of input use, average yield, marketing cost and prices.
3. Focus group interviews - to identify problems and possible solutions.
4. Structured direct observations (video graphic, slides etc.) - to demonstrate some important aspects in the study localities.

For the marketing margin analysis, firstly major marketing channel was identified and then prices and costs of doing business were collected by tracing the product movement from farm level to the consumer level.

The approach of the study was presented at a workshop before the study commenced and the preliminary findings were also presented at a subsequent workshop.

1.7 Research Team

The RMA team consisted of four specialists in the area of agricultural marketing, institutional development, development communication and anthropology. The two member- survey team specialized in agricultural statistics assisted the RMA team.

1.8 Time Frame

This study was conducted during the period from 15 June - 30 July 1998. Data related to the margin analysis referred to the time period from 8 - 12 July 1998.

1.9 Limitations of the Study

Although the commodity system approach was applied in this study, collection of demand side information was limited only to the gathering of data required for the margin analysis. The RMA team did not visit demand areas due to the limited time allocated for the study. However, demand side traders who visited producing areas during the time of the study were interviewed.

Marketing margin analysis was based on the prices collected on a single day. Therefore, accuracy of the results needs to be confirmed after carrying out further investigations.

At the time of the study it was found that vegetable farmers, traders and bankers are frustrated due to "potato crisis" occurred as a result of the liberalization of potato imports. Consequently, farmers were of opinion that they were not safeguarded by the government policies even though data collections were carried out in the field by various institutions and individuals on the problems faced by the farmers. However, after explaining the objectives of the exercise, the study team was able to get the support from all relevant parties for the study which resulted in extremely satisfactory attendance for meetings held on each study locations.

1.10 Organization of the Report

This report consists of five chapters. Chapter one deals with the problem statement, the methods of the study and the study limitations. Macro analysis of the vegetable sub-sector is presented in chapter two. Production system of the study areas that include production characteristics, input use and economics of cultivation are discussed in chapter three. Organization, operation and performance of the marketing system for vegetables in the study locations are reviewed in chapter four. The report ends with chapter five in which problems and recommendations are discussed by the study team along with the actions suggested for prospective project formulation.

CHAPTER TWO

Overview of Vegetable Sector

This chapter describes macro situation of the vegetable sub-sector with special reference to production, consumption and trade. Next to rice, vegetable is the most important commodity in Sri Lankan diet that consists of "rice and curry". At least two vegetables contain in an average meal. An average consumer spends 10% of his food expenditure on vegetables which is the second highest, next to rice. The vegetables contribute 10% of the Colombo Consumer Price Index (CCPI) which is an official measure of inflation in the country. Also vegetables have been identified as a commodity with potential for export. The vegetable farming is a major economic activity in the districts of Nuwara-Eliya and Badulla and part of the Kandy district. Vegetable is also considered the cheapest source of nutritional intake.

2.1 Vegetable Production

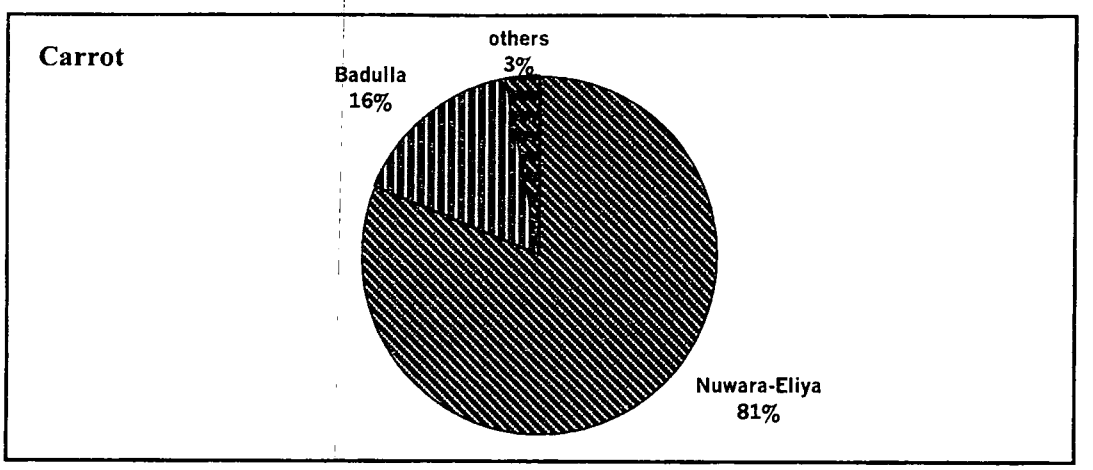
Vegetable industry in Sri Lanka is characterized by high dependency on weather, small scale production, perishability of the product, high use of family labor and is more concentrated in remote areas where transport, electricity, communication and water facilities are lacking. This results in severe price fluctuations, high post-harvest losses and high cost of business activities.

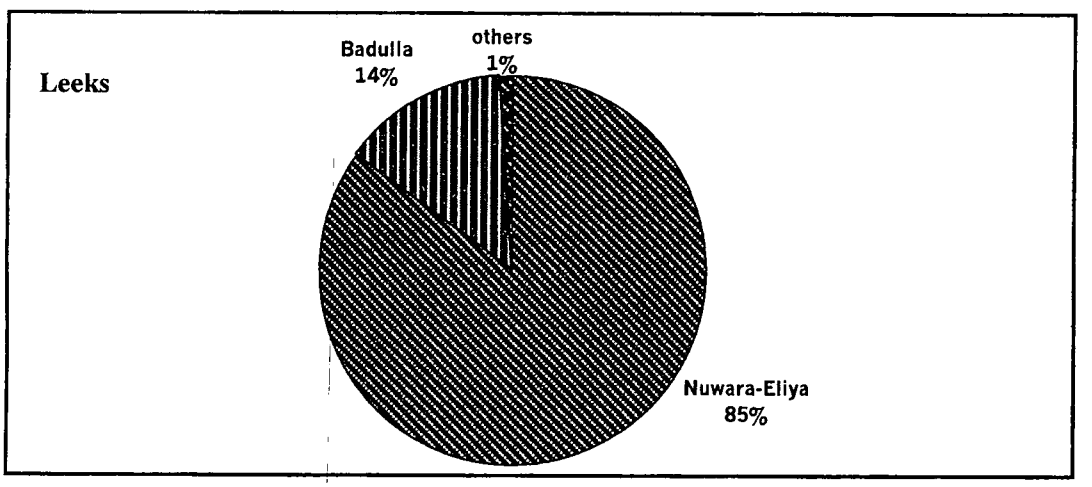
Although vegetables are grown throughout the country, a few districts are prominent especially for upcountry vegetables. The Chart 2.1 shows the major production districts for selected upcountry and lowcountry vegetables. As shown in the Chart 2.1, the Nuwara-Eliya district produces over 80% of the production of leeks and carrot followed by 60% of beetroot production. Considering the entire production and extent in the Nuwara-Eliaya district, percentage contribution to the total national vegetable production and extent is 20% and 15% respectively (Table 2.1). A considerable increase of extent under vegetables in Nuwara-Eliya was reported after 1989. This may be a result of shifting from tobacco cultivation to vegetable cultivation once again especially in Hanguranketha area. A record increase of extent after 1995 is due to cultivation of vegetables in the uprooted tea estates by the private companies.

The annual vegetable production is about 500,000 mt. with an extent of 70,000 ha. (Annex 1 & 2). The highest production so far achieved is 690,687 mt. in 1984. As shown in the production index in Table 2.2, vegetable production in Sri Lanka declined continuously since 1988 to 1995. Decline in both extent and yield attributed to this

Chart 2.1

Upcountry Vegetables - Major Producing Districts





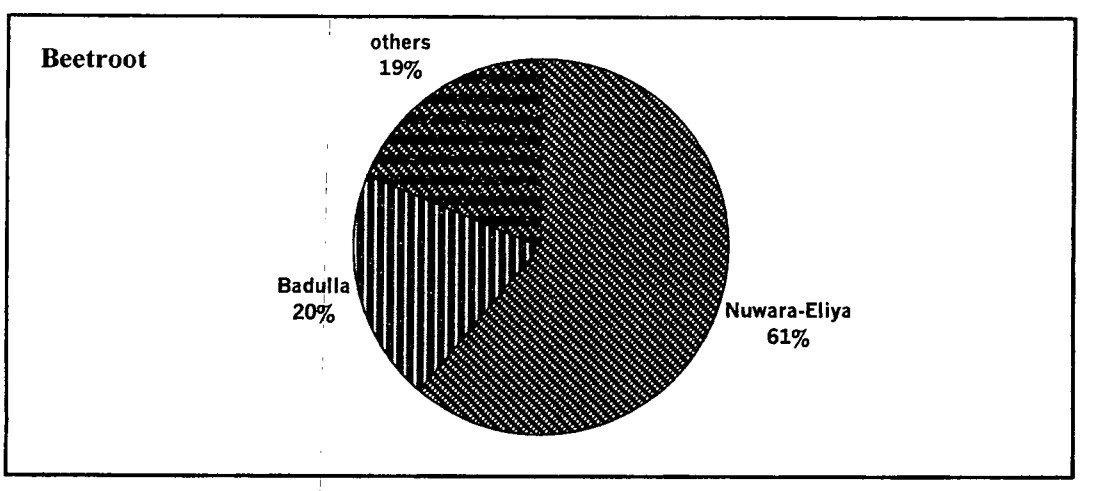
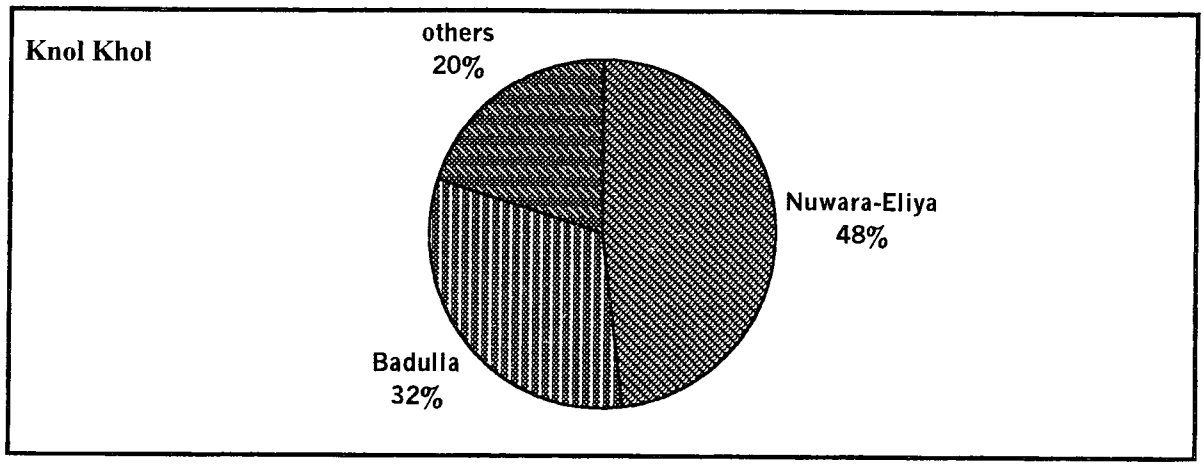
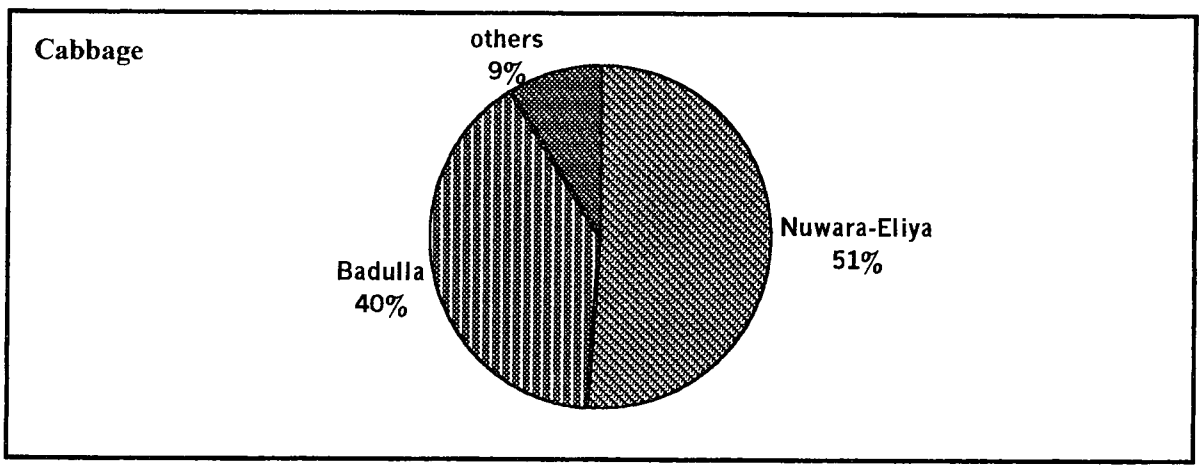


Chart 2.1

Upcountry Vegetables - Major Producing Districts (Contd.)





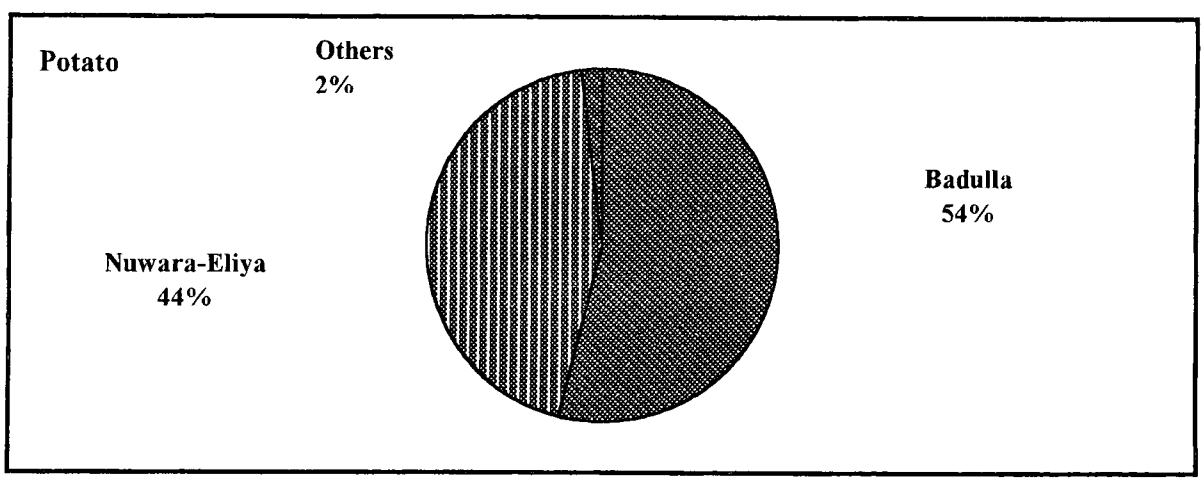
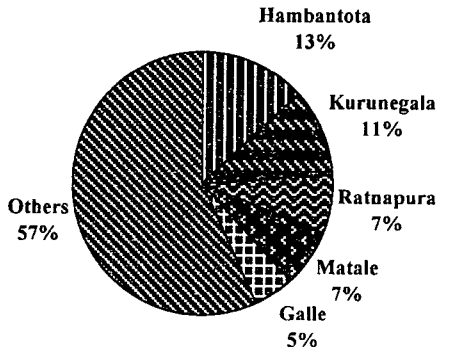


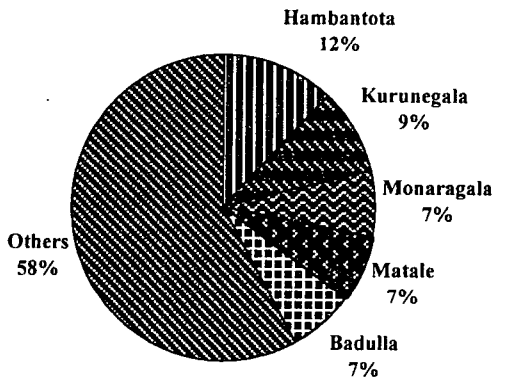
Chart 2.1

Lowcountry Vegetables - Major Producing Districts (Contd.)

Ladies Finger



Brinjal



Pumpkin

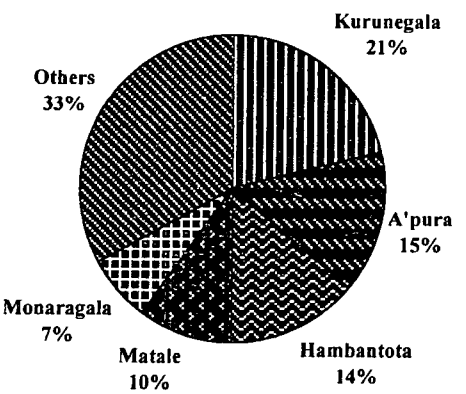


Table 2. 1

Vegetable Extent and Production in Nuwara-Eliya District and Percentage Contribution to the Total Production

Year	Extent (Ha)	% Change Year ago	Production (Mt)	% Change Year ago	% of Total	
					Extent	Production
1977	3903	-	18875	-	5.27	8.38
1978	4773	22.29	17229	-8.72	6.73	7.92
1979	3739	-21.66	22248	29.13	5.46	6.62
1980	2914	-22.06	22591	1.54	4.26	5.64
1981	5210	78.79	41284	82.75	6.93	9.98
1982	4985	-4.32	37919	-8.15	7.02	11.74
1983	5384	8.00	73917	94.93	7.49	14.25
1984	5647	4.88	69605	-5.83	7.61	10.08
1985	5738	1.61	79263	13.88	7.77	11.79
1986	5674	-1.12	67276	-15.12	8.04	10.45
1987	5465	-3.68	60954	-9.40	7.87	10.03
1988	5058	-7.45	51897	-14.86	6.88	7.85
1989	5296	4.71	54370	4.77	7.47	9.66
1990	6551	23.70	59959	10.28	9.42	10.96
1991	7182	9.63	77348	29.00	10.68	15.25
1992	7623	6.14	87359	12.94	11.72	17.41
1993	7759	1.78	81758	-6.41	11.93	16.81
1994	7793	0.44	81039	-0.88	12.21	18.58
1995	7783	-0.13	77505	-4.36	11.70	16.05
1996	8382	7.70	88384	14.04	12.07	17.86
1997	9263	10.51	96975	9.72	13.60	19.95

Source : Dept of Census & Statistics.

situation. The cultivated extent dropped to 68,128 ha. in 1997 from the peak level of 75,144 in 1981.

The overall acreage index given in Table 2.3 shows that the present extent under vegetable cultivation remains well below compared to that of mid 1970s. As revealed in the Table 2.2, this is mainly due to the reduction of extents devoted to many of the low country vegetables that were mainly grown on crown lands in the low country dry zone. As a result of implementation of massive irrigation projects such as Mahaweli, a large amount of crown lands were brought under paddy cultivation, which caused reduction of vegetable cultivation under shifting cultivation (*chena*) system. Also expansion of high value crops such as sugar cane, big onion, tobacco, and dried chilli lowered the extent under vegetables. Similarly, the government trade policy, especially since 1977 when the liberalized economic policies were introduced, discouraged the cultivation of vegetables. In 1994, zero duty was imposed on red dhal which was the highest demanded vegetable. Furthermore, license system which existed for the import of red dhal was removed in July 1996 to remove restriction on free imports. Another decision taken by the government was the liberalization of imports of potato after 25 years. As a result, imported potato was introduced into the market at cheaper prices, doubling the consumption to 12,000 mt. per month. This not only led to a reduction of domestically produced potato, but also to a reduction of vegetable production as a whole. A part of the income earned from potato cultivation is usually invested in cultivation of other vegetables.

2.2 Vegetable Consumption

As mentioned earlier, vegetable is the most important national food commodity next to rice which is the staple food. There are about 30 different types of vegetables available for consumers. Since most of the consumers do not have refrigerators, they usually purchase vegetables on day to day basis. In addition to the individual consumer, institutional buyers such as hotels, canteens and hospitals purchase vegetables and their preferences depend on target customers. For instance, there is a strong demand for potatoes from tourist hotels and for raddish from local hotels.

Consumer demand for vegetables varies on sectoral basis ie; urban, rural and estate as shown in Table 2.4. The highest consumption of many of the up country vegetables was reported in the estate sector followed by the urban sector. The per capita consumption of the estate sector in 1985/86 was 580 grams for bean, 405 for cabbage and 395 for brinjal per month which was well above in comparison to the other two sectors, urban and rural. On the other hand, consumption of leafy vegetables and some of the low country vegetables, namely cucumber, bitter gourd, lufa, and long beans was well below in the estate sector compared to other two sectors.

As in the estate sector, some special characteristics could be observed in the urban sector. As revealed in Table 2.4, the highest consumption of carrot and cucumber was reported in the urban sector, more than double compared to other sectors. Likewise, urban consumers

Table 2.2

Production Index for Vegetables, Sri Lanka 1977 - 1997 (1977 - 79 = 100).

Year	Bean	Carrot	Leeks	Beet-Root	Knol-Khol	Raddish	Cab-bage	Tomato	Ladies-Finger	Brinjal	Pump-kin	Cucu-mber	Bitter Gourd	Snake Gourd	Ash-Plantain	Total
1977	79	48	138	63	47	69	66	87	61	106	94	68	88	75	106	87
1978	82	94	48	72	38	84	64	74	86	96	76	77	98	80	105	84
1979	139	158	114	165	215	147	171	139	153	99	129	155	114	144	89	129
1980	155	137	114	189	193	256	191	158	159	128	130	167	134	129	156	154
1981	137	92	103	129	95	211	171	150	152	136	168	143	132	120	214	159
1982	132	64	94	125	90	194	148	75	125	113	121	124	124	102	147	124
1983	238	221	247	295	139	242	191	147	250	223	250	158	219	139	162	200
1984	273	196	240	248	184	340	187	162	296	263	400	184	206	153	328	266
1985	268	240	215	223	149	325	213	191	292	271	287	178	207	173	380	266
1986	278	259	97	250	154	279	189	185	276	248	308	159	190	158	334	248
1987	281	261	182	253	132	208	151	152	297	223	288	142	190	141	331	234
1988	284	243	173	253	138	186	193	198	289	243	427	158	211	150	292	254
1989	272	280	162	241	141	197	158	186	268	221	247	153	203	159	256	217
1990	269	308	134	208	161	187	153	194	267	209	267	176	194	161	218	211
1991	264	484	184	230	173	215	160	181	259	197	196	132	200	129	191	195
1992	267	598	211	270	174	214	146	195	253	188	199	121	216	134	167	193
1993	211	578	261	278	177	229	143	174	253	188	184	127	211	130	163	187
1994	197	550	264	265	171	226	146	179	251	188	178	124	202	121	80	168
1995	208	580	236	246	177	210	146	180	258	195	196	131	215	121	150	186
1996	218	573	257	240	172	225	169	239	247	203	186	125	198	112	150	191
1997	227	590	317	267	179	245	158	183	245	200	184	127	191	110	144	187

Source : Dept. of Census & Statistics.

Table 2.3

Acreage Index for Vegetables, Sri Lanka 1977 - 1997 (1977 - 79 =100).

Year	Beans	Carrot	Leeks	Beet-Root	Knol-Khol	Raddish	Cab-bage	Tomato	Ladies-Fingers	Brinjals	Pump-kin	Cucu-mber	Bitter Gourd	Snake Gourd	Ash-Plantain	Total
1977	90	86	106	100	78	98	108	105	101	109	111	98	120	101	105	104
1978	102	109	90	92	78	101	99	100	101	102	95	104	94	100	102	100
1979	108	105	104	108	144	100	93	95	98	89	95	98	87	99	94	96
1980	114	87	114	105	90	117	96	93	101	88	90	96	85	90	98	96
1981	138	95	121	121	88	127	98	102	109	109	122	95	89	94	95	106
1982	121	104	127	108	83	117	91	84	101	92	109	80	92	95	104	100
1983	131	112	147	112	78	121	95	86	103	91	106	85	94	97	103	101
1984	142	109	146	103	111	134	96	77	105	88	126	90	96	88	106	104
1985	142	132	141	103	96	127	100	92	104	91	112	84	95	87	106	104
1986	143	134	113	111	92	118	95	86	99	87	104	89	98	81	99	99
1987	156	131	115	111	94	108	89	88	102	87	98	101	98	79	91	98
1988	155	143	116	117	95	102	92	95	114	88	108	87	107	86	100	103
1989	154	149	112	127	92	100	89	87	104	87	92	88	103	85	99	100
1990	143	159	108	124	97	99	93	96	104	87	103	91	108	84	86	98
1991	149	203	122	113	98	106	96	89	104	86	94	89	106	78	77	94
1992	148	233	140	120	95	100	97	90	102	83	84	82	109	78	70	91
1993	141	247	184	129	95	102	101	84	99	83	83	80	105	79	72	91
1994	140	252	185	131	94	100	106	87	96	81	86	84	99	71	67	90
1995	142	262	179	127	97	99	107	90	100	83	90	89	107	74	73	93
1996	156	274	200	127	96	106	113	132	96	86	91	86	102	72	72	98
1997	154	311	235	145	99	109	117	96	95	85	95	88	100	71	70	96

Source : Dept. of Census & Statistics.

Table 2.4

Per Capita Vegetables Consumption by Sectors

(grams /Month)

Vegetables	1986/1987		
Up country	**Urban**	**Rural**	**Estate**
Bean	390.60	274.10	582.40
Carrot	124.70	53.60	52.50
Leeks	99.00	44.60	106.80
Beetroot	120.00	84.80	234.80
Knol Khol	31.40	42.30	73.00
Raddish	35.60	54.50	40.90
Cabbage	173.70	147.80	406.90
Tomato	40.90	49.50	56.20
Potato	229.00	222.40	221.10
Low country			
Ladies Finger	80.40	89.30	67.80
Brinjal	152.30	272.30	393.50
Capsicum	53.30	50.50	43.70
Pumpkin	160.20	206.50	158.60
Ash Pumpkin	5.00	6.80	1.00
Cucumber	48.10	29.20	6.90
Bitter Gourd	58.00	71.20	18.20
Snake Gourd	47.90	77.80	52.60
Drumstic	85.50	97.80	99.30
Luffa	36.40	78.40	23.30
Long Bean	68.10	156.80	40.40
Ash Plantain	89.60	113.40	79.60
Leafy Vegetables			
Mukunuwenna	241.10	144.20	54.20
Kankun	52.80	24.90	9.60
Gotukola	66.40	79.70	23.80
Kathurumurunga	36.40	24.10	0.90
Sarana	16.60	9.30	1.60
Thampala	10.20	13.90	3.80
Nivithi	29.80	34.30	12.50
Cabbage Leaves	10.20	18.90	20.50
Kohila	17.20	23.40	3.00

Source : Consumer Finance Survey - 1986/1987, Central Bank of Sri Lanka

purchase more leafy vegetables than others. This may be a reason for concentration and expansion of leafy vegetable production in the Greater Colombo area.

The rural consumers, consume more low country vegetables, recording the highest per capita consumption of pumpkin, bittergourd, snake gourd and long bean. The reason for high consumption of these vegetables may be that they themselves cultivate these vegetables in their homesteads. In Sri Lanka cultivation of vegetables in homesteads in the urban sector is not as common as in countries like Miyanmar, Singapore and Thailand.

The potato consumption is equally important in all three sectors. The national average per capita consumption of potato was around 250 grams per month. However, according to the import statistics, the consumption has doubled after imports were liberalized in July 1996. The monthly total imports are now around 10,000 mt. Before 1996, the monthly consumption was estimated at 5,000 mt. which was completely met by the domestic production.

Structural changes in vegetable consumption could be expected in the long run due to change in food habits resulting in factors like urbanization and increased income. Table 2.5 depicts results of the consumer finance surveys conducted by the Central Bank of Sri Lanka which shows changes in vegetable consumption over time. Accordingly, a continuous increase of consumption was observed for bean, beetroot, capsicum, bittergourd and tomato. Another factor is the continuous reduction of consumption of cabbage. As a whole, per capita consumption of vegetables stagnated around three kilograms per month during the period 1978 to 1987.

2.3 Vegetable Trade

Sri Lanka produce vegetables mainly for domestic consumption. Exports represent less than 1 percent of the total production. Imports are also negligible. Similarly vegetable processing industry is not developed yet. Only tomato is processed into pulp on a commercial scale and dehydration of vegetables such as bittergourd takes place on a small scale. Therefore domestic marketing system for fresh vegetables will be discussed in detail in the following section and the export situation will be considered briefly.

2.4 Domestic Marketing System for Vegetables

The domestic marketing system for vegetables includes organization, operation and performance of the vegetable trading. The "organization" refers to how the market is organized and it explains whether it is competitive or not. Marketing functions come under operation and the performance analysis includes a review of market prices.

Table 2.5
Per Capita Vegetable Consumption in Sri Lanka
(grams/month)

Variety	1978/79	1981/82	1986/87	1996/97
Bean	217.83	234.20	319.70	353.42
Carrot	44.30	41.70	66.40	109.92
Leeks	82.08	64.80	63.10	106.22
Beetroot	84.06	101.20	103.10	108.88
Knol khol	-	48.10	42.80	28.45
Raddish	51.97	67.10	49.70	77.47
Cabbage	215.27	192.70	173.10	201.86
Tomato	73.84	65.80	48.50	34.73
Ladies finger	88.61	106.30	86.00	101.87
Brinjals	266.11	296.00	260.00	239.88
Capsicum	35.22	46.20	50.50	58.81
Pumpkin	132.91	202.70	194.30	230.67
Ash pumpkin	9.09	13.40	6.00	8.61
Cucumber	23.86	29.90	30.80	42.26
Bitter Gourd	45.44	50.80	64.60	62.35
Snake Gourd	80.94	78.10	70.40	68.64
Drumstic	119.56	114.80	95.70	49.09
Luffa	72.99	78.50	66.40	74.74
Long bean	134.62	156.60	131.50	141.51
Ash plantain	114.17	139.40	106.40	89.82
Others	132.34	153.30	70.50	107.31
Leafy Vegetables				
Mukunuwenna	204.76	-	154.60	269.69
Kankun	36.35	-	28.70	43.29
Gotukola	44.30	-	72.80	115.67
Kathurumurunga	15.05	-	24.50	44.01
Sarana	11.36	-	10.00	10.53
Thampala	17.89	-	12.40	13.33
Nivithi	22.44	-	31.80	25.82
Cabbage leaves	17.04	-	17.50	12.58
Kohila	17.04	-	20.70	19.68
Others	63.05	-	83.20	14.41
Potato	209.02	253.30	234.70	440.14
Total Cunsumption	2683.51	2534.90	2790.40	3305.66

Source : Various Issues of Consumer Finance Surveys - Central Bank of Sri Lanka

2.4.1 System Organization

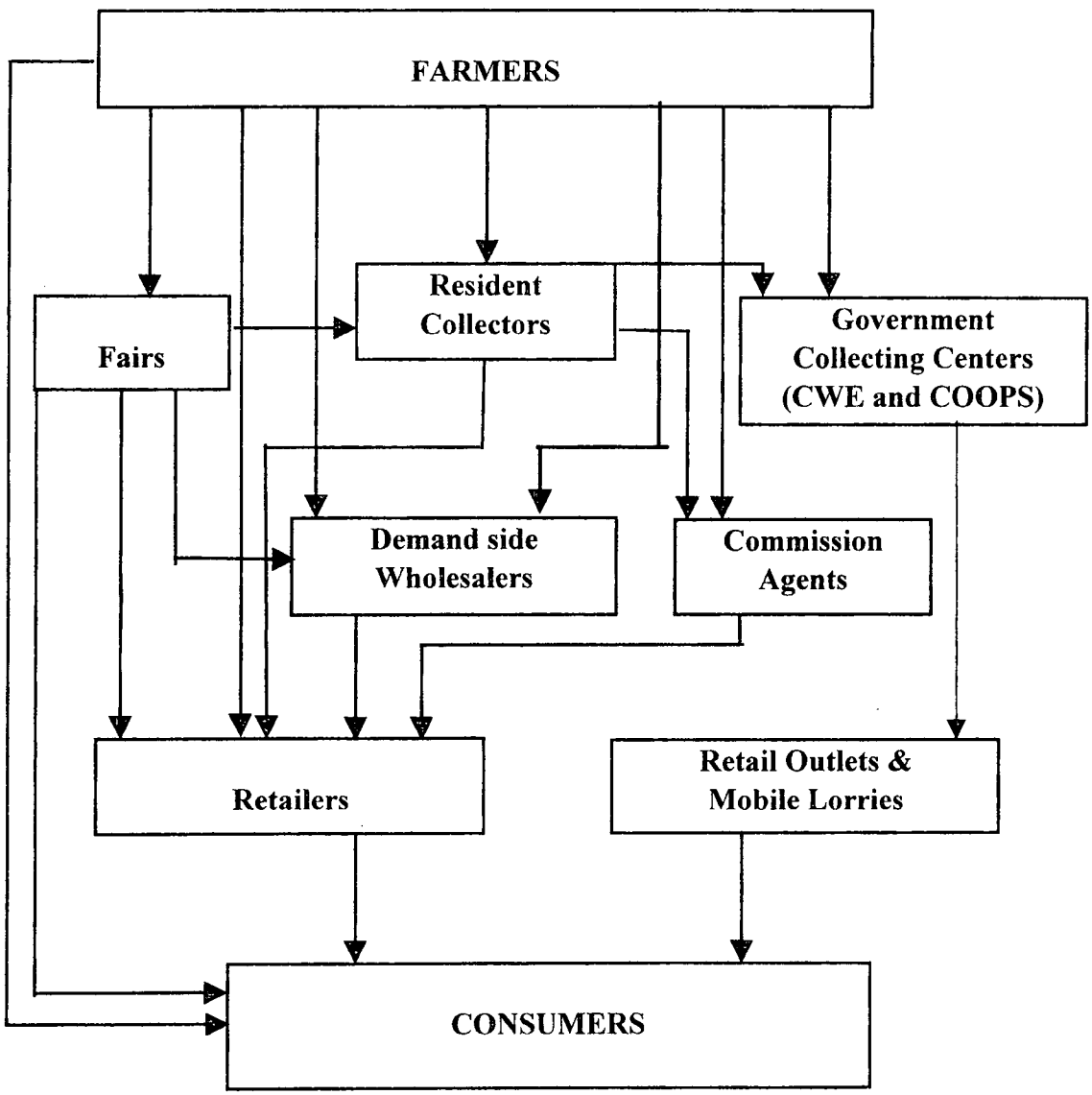
There are a large number of participants who are involved in the vegetable trade by performing various activities such as assembling, sorting, packing, transporting and selling. Chart 2.2 shows different types of marketing channels indicating that how vegetables move from the producer to the end consumer. Although the chart indicates different marketing channels available for farmers, it does not mean all channels available for all farmers everywhere. For instance, according to the findings of this study marketing channels are very few in the areas where road conditions are poor and the production is limited. Farmers at Theripaha in the Nuwara-Eliya district where roads are very bad, have only two marketing channels, namely dispatching vegetables to the Kandy market for sale on commission basis and selling to the demand side wholesalers. However, 95% of the farmers depend on selling vegetables on commission basis. Similarly, majority of the farmers at Madulla in the same district where production is limited, directly sell to the consumers at the fairs located in the area.

The other factor is that importance of each marketing channel is not the same for all the time. Since marketing is dynamic and always involves people, channels are opened up sometimes or disappear from the system. Direct selling to the consumer has disappeared in many areas and instead selling to collectors is added into the system. Until mid 1980s the commission system was the dominant marketing channel especially in the districts of Kandy, Nuwara-Eliya and Badulla. Today, its importance has declined significantly. For instance over 90% of the farmers at Kandapola sold their vegetables to the commission agents in Colombo till late 1980s but, over 95% of the farmers are now selling to the collectors. Although highly centralized commission system is existing in a few places such as Colombo and Kandy, a more decentralized trading system has emerged. Nevertheless, commission system has one advantage i.e., ability to sell all the stocks received at the market. Consequently, many resident traders use commission system to sell unsold stocks.

Under the decentralized marketing system, demand side traders who entirely depended on Colombo or Kandy terminal markets earlier, now directly visit the supply areas to purchase their requirements thus by-passing these terminal markets. This has a number of advantages for them. Firstly, quality vegetables can be purchased. Under the commission system, no one cares about the quality. Farmers send their stocks through a transport agent who often over load the vehicles in order to get more income and this damages quality of the vegetables. A market labourer (*Nattami*) carries two bags, one over another on his head which contain over 100 kg. of vegetables. Commission agents are not concerned about the quality, because they obtain 10% of the selling price. Secondly, purchases can be made at low price. If the traders visit terminal markets, they have to depend on the commission agents for their supplies. By visiting supply areas, they purchase vegetables at low price either from collectors or from farmers who are not organized as commission agents. Thirdly, they can avoid high traffic congestion in Colombo.

Chart 2.2

Vegetable Distribution System
in Sri Lanka



Another improvement which happened with the new decentralized marketing system is enhancement of competition, which result from entering new traders such as resident collectors into the system and emerging new market places such as Dambulla, Kegalle and Akurassa in demand areas and Haputale, Bandarawela and Nuwara-Eliya in the production areas. Although this new system has advantages, it has some disadvantages too. Since demand side traders visit supply areas in search of vegetables, the cost of business activities is high. This is particularly true in the Hanguranketha system in which demand side traders from different areas such as Avissawella, Kegalle, and Minuwangoda firstly visit Kandehandiya. After finalizing the orders by giving money and bags to the collectors, they then visit Haguranketha, Rekillagaskada and Mandaramnuwara respectively and finally Ragala by doing the same thing and start collection of vegetables from Ragala. These traders usually leave their towns in the very early morning at about 2.00 a.m. and come back at night around 10.00 p.m. They spend over 20 hours for this activity, indicating longer time for 'searching' vegetables. There are also three persons ie; trader, driver and cleaner in the lorry and costs for meals and others add to the total cost. Since most lorries are arriving empty, transport cost is high. When all these aspects are considered, the way of operation of the system is not cost effective. In many other countries what is happening is that the supply side traders visit demand areas to sell their products. In Sri Lanka it is happening for other products such as rice and coconut and imported items such as potato and onion.

Market Participants

In this section different types of market participants are explained, along with their roles.

Commission Agents

This type of traders sell vegetables on behalf of the suppliers such as farmers and collectors. The principal buyer is the retailer and transactions are made mostly on spot cash. The traders in Colombo and Kandy keep 10% of the selling price as commission, while Dambulla traders keep cents 50 per kg. Under the commission system, farmers or suppliers should supply vegetables to the market. Since the Colombo commission market (known as Manning market), is the oldest commission market in the country, it has a well established transport network to transport vegetables to the market. Therefore, the farmers send their vegetables to Colombo through the transport agent and get the bill from him after sale. Money is also sent through him if the farmer requires. Transport cost and unloading charges are deducted from the sale proceeds due to the farmer. The same practice is operating in the Kandy market too, but not at Dambulla market, where the supplier accompanies with the products. The commission agent provides credit to the farmer but it has declined substantially at present.

Demand Side Wholesalers

Traders who are established in the towns located in the consuming areas such as Galle and Matara belong to this category. Most of them now visit the producing areas to buy

their requirements. In most of the cases, there are specific dates of the week for them to visit supply areas. Those days are normally the previous days of the fair. These traders mostly purchase vegetables from the resident collectors on credit basis and sell them to the town retailers and traders at fairs on credit basis. Since demand side wholesalers usually come by trucks (a lorry with an open body), they have identified as *trucker buyers* in some reports. Most of them do not own lorries, and therefore have to hire them from others.

Resident Collectors

These traders are usually the residents in the vegetable production areas and some of them are input suppliers boutique keepers, and farmers. The number has increased with the deterioration of the commission system. If a group of these traders is established in a market place set up by the local authorities, such market is called *assembly market.* Examples are Nuwara-Eliya, Haputale and Bandarawela. If a group of traders is established in a semi structured or open place such places are called as *collecting points* or assembly points. Examples are Kandehandiya in the Kandy district (semi structured) and Rikillagaskada in the Nuwara-Eliya district (open space).

The role of the resident collector is collection of vegetables from the farmers at farm gates, roadsides, and their collecting centers and selling stocks to the demand side wholesalers and to the markets in Dambulla, Kandy, and Colombo. Some of these traders have their own lorries with open body. Majority of suppliers to the Dambulla market is resident collectors. There are some collectors especially in Nuwara-Eliya who undertake harvesting of cabbage, raddish and leeks using hired labor in order to maintain better quality. This study found that this trend has been extended to Hanguranketha areas to some extent.

Itinerant Traders

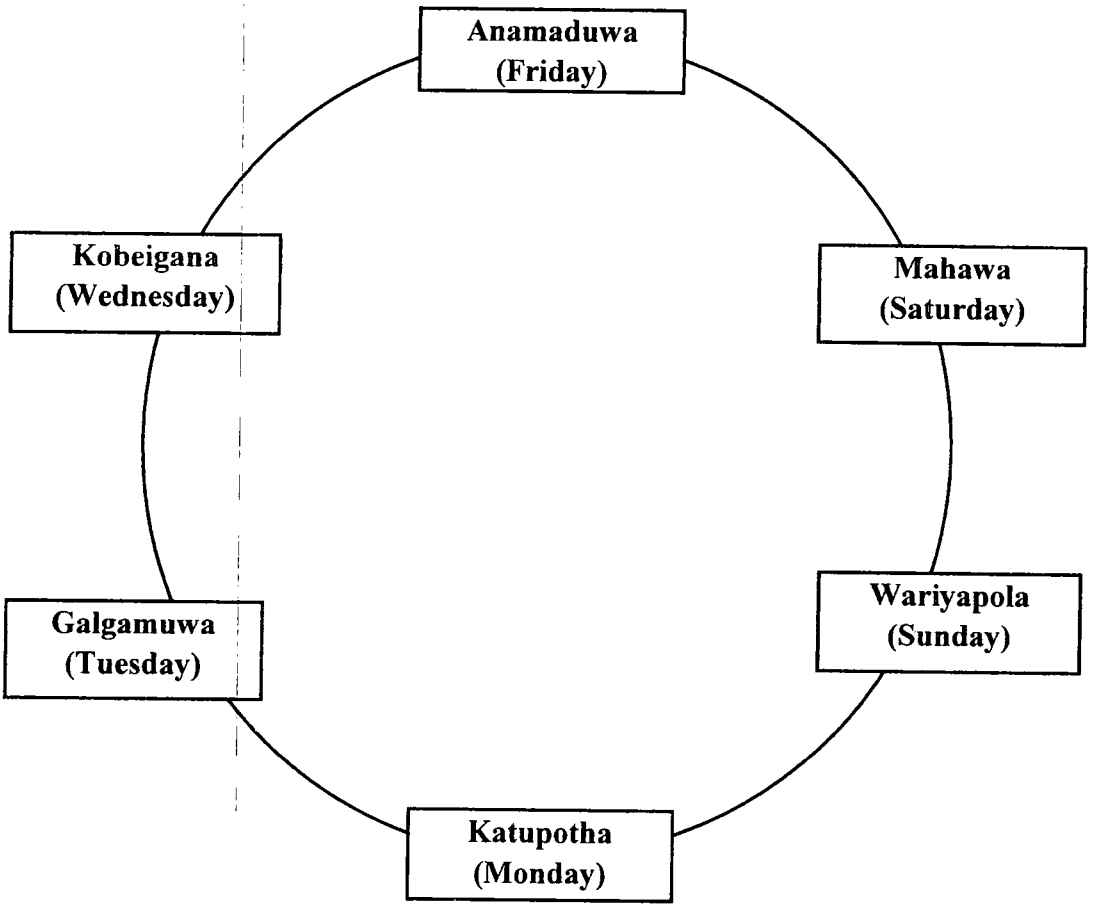
The mobile traders belong to this category. Many of the vegetable retailers at the fair are itinerant traders because they have mobile schedule for specific days of the week based on the operation day of the fair. The fair circle of the vegetable retailers in Puttalam is presented in Chart 2.3. These traders are small scale businessmen selling about 200 kg. of vegetables per day.

Retailers

Retailers are the end participants of the marketing chain. They mainly purchase from the demand side wholesalers in their towns and sell to the consumers. Most retailers make payments to the wholesalers after sale. The number of retailers is on the increase. A large number of pavement retailers and roadside retailers could be seen in the country. Daily over 300 three-wheelers carry vegetables from the Colombo wholesale market for the pavement traders and roadside vegetable shops around Colombo.

Chart 2

Operation of Fair Circles in the Puttalm Area



Source: Study of Agricultural Markets in Sri Lanka

2.4.2 System Operation

This section reveals the marketing functions undertaken by the system participants.

Cleaning

Cleaning of vegetables includes removal of soils, damaged items and unnecessary leaves and washing of vegetables, if necessary. This is a basic task for preparation of vegetables for the market. Nevertheless, scant attention is placed at farm level for cleaning of vegetables and hence much of the waste is carried up to the retail level. Under the present marketing system, retailers are undertaking cleaning activities. Unlike commission traders, demand side wholesalers seek cleaned vegetables. Also, they are much concerned about packing, loading and unloading, and transporting. They use lorries with open bodies which provide more ventilation for the products. As a result resident collectors especially in Nuwara-Eliya pay higher prices to the farmers for the quality stuff. As mentioned earlier, they have already started to use improved harvesting and packing methods of vegetables to ensure the quality.

Grading

Vegetables are not graded based on the appearance or size of the items. Nevertheless, wholesalers arbitrarily grade some vegetables by origin of the produce, such as Balangoda beans, and Kandapola cabbage. Also they group Nuwara-Eliya vegetables and Kandy vegetables which mostly include products from Hanguranketha area because latter group is inferior due to absence of proper cleaning. After the vegetables are cleaned all look identical and hence differentiation does not exist at retail level based on the origin of the product.

Packing

In Sri Lanka, simple packing is applied; all vegetables except, leeks, raddish, and tomato are packed in poly sack bags which are better than gunnies used in the past. The poly sacks provide more ventilation to the vegetables after packing, but the lifetime is shorter than gunnies. It can be used only two times and the damaged bags are used to bundle radish and leeks. The price of poly sack is in the range of Rs. 16 - 18/= per bag. Tomatoes are packed in the wooden boxes that cost Rs. 35/= per box. It could be used five times.

Over packing is common. Farmers do so to minimize their transport cost and packing cost. Usually about 45 - 55 kg. are packed in a bag and about 18 - 22 kg per wooden box. Traders deduct 3 - 4 kg. for a wooden box and 1 kg. for a bag for the weight.

Weighing

Many farmers in the country do not weigh vegetables before selling thus allowing traders to cheat them. The underweight is one of the problems cited by the farmers. Those who

are sending vegetables for sale on commission basis, weigh and mark their amount on a paper which is sent to the commission agent through the transporter. However, now the trend is to weigh the goods before sale. This study found that farmers at Mandaramnuwara weigh before sale, whereas none of the farmers at Handawalpitiya practice it.

Transporting

Since the majority of the vegetable farmers are in the remote areas, motorable roads are lacking. Hence, producers have to carry vegetables from the farm to the nearest motorable road or the collecting center. Transport from the farm level to the wholesale level and then to the retail point is done by lorries with or without body. The major problem with regard to transport is over loading. For instance a lorry with a capacity of 5 tons contains 10 - 12 tons of vegetables in transporting to the Colombo commission market. The intention of the transporter is maximization of profit by carrying maximum number of bags/boxes. As will be discussed in chapter four, transport cost is considerably high at farm level compared to the wholesale level.

2.4.3 System Performance

Price is a good indicator to monitor the performance of the vegetable marketing system. Therefore, the foregoing section deals with the analysis of the vegetable prices. This includes analysis of price spread, seasonal variations and the price trend.

Table 2.6 shows the price difference between the farm, wholesale and retail levels. This indicates that mark up price at retail level is considerable. This is mainly due to the small-scale business. There are often large numbers of vegetable retailers in the market/ fair in contrast to the quantity demanded. Hence, individual trader's turn over is limited ie; 100 - 150 kg per day in most cases.

The seasonal price index shows the price variation in a year. The index values worked out for different vegetables are presented in Table 2.7. The annual price is equivalent to 100 and the values above this level means that supply is inadequate to meet the market demand whereas below 100 means excess supply compared to the market demand. On the whole, there are two periods that index values are below 100 i.e; February to April and August to October which coincides with two harvesting seasons. During the former period, plenty of low country vegetables reach markets from the Dry Zone and a large quantity of up country vegetables mainly from Matale, Hanguranketha and Dambulla. Until recently vegetable lands in Nuwara-Eliya, Welimada and Bandarawela were occupied with potato. Nevertheless, the price of potato does not fall as much as other vegetables because over 50% of the production is used as seeds to be planted in *yala* season.

Table 2.6

Price and Price Spread for the Selected Vegetables in December 1997 (Rs/kg)

	Price			Price Spread		
Item	**Producer Price Nuwara-Eliya (1)**	**Wholesale Price Pettah (2)**	**Retail Price Colombo (3)**	**(2) - (1)**	**(3) - (1)**	**(3) - (2)**
Bean	30.20	34.50	52.74	4.30	22.54	18.24
Carrot	42.50	47.56	72.51	5.06	30.01	24.95
Leeks	35.00	40.12	60.80	5.12	25.80	20.68
Beetroot	43.63	47.48	74.85	3.85	31.22	27.37
Knol Khol	13.50	24.05	47.98	10.55	34.48	23.93
Raddish	10.25	16.86	32.65	6.61	22.40	15.79
Cabbage	24.38	28.97	50.96	4.59	26.58	21.99
	Hambantota					
Brinjal	19.55	21.87	42.54	2.32	22.99	20.67
Pumpkin	5.63	7.61	21.67	1.98	16.04	14.06
Cucumber	5.14	12.49	31.24	7.35	26.10	18.75
Bitter Gourd	25.13	32.35	52.48	7.22	27.35	20.13
Snake Gourd	17.13	21.92	36.68	4.79	19.55	14.76
Luffa	11.20	11.90	35.25	0.70	24.05	23.35

Source : Marketing and Food Policy Divition (HARTI)

Table 2.7

Seasonal Price Index for Vegetables (Annual Average = 100)

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bean	100.02	90.75	81.66	98.59	122.27	128.76	108.01	94.44	90.39	83.99	98.36	102.76
Carrot	108.93	93.17	87.48	91.59	109.61	140.86	120.51	89.46	76.70	76.98	93.65	111.04
Leeks	106.34	96.86	91.94	96.64	109.42	127.63	107.73	90.89	80.36	83.96	98.95	109.28
Beetroot	112.78	107.04	98.95	93.20	100.37	123.00	110.49	88.76	74.28	76.09	98.65	116.39
Knol khol	100.21	97.99	93.89	94.22	105.92	121.68	106.49	90.46	82.58	86.33	104.38	115.87
Raddish	92.82	83.90	83.86	93.84	111.56	126.89	108.25	95.78	86.60	92.76	110.03	113.71
Cabbage	90.83	88.96	88.12	91.79	104.24	124.34	111.56	103.73	94.04	91.28	104.49	106.62
Tomato	96.43	82.07	92.44	89.53	120.04	127.97	105.38	74.18	62.55	84.00	120.34	145.08
Ladies finger	88.76	97.89	94.27	93.75	109.24	125.61	110.17	92.78	86.81	92.33	106.43	101.95
Brinjal	96.06	84.26	78.16	91.76	100.42	116.92	107.93	96.49	97.52	102.17	112.46	115.85
Capsicum	102.83	99.35	94.33	96.18	97.42	109.25	115.18	97.42	79.34	88.31	107.99	112.41
Pumpkin	83.02	80.92	83.47	90.85	101.33	109.40	120.09	112.20	103.57	105.62	108.58	100.95
Cucumber	93.13	96.10	87.59	94.54	109.83	124.11	109.38	90.62	82.41	98.21	107.59	106.49
Bitter-gourd	95.20	92.33	88.23	92.08	102.54	115.92	105.74	94.78	90.13	100.69	113.46	108.91
Snake-gGourd	93.60	94.58	89.90	89.78	107.92	120.02	106.70	95.78	82.58	95.87	113.53	109.73
Luffa	89.55	89.82	87.74	91.84	109.28	121.47	108.16	95.20	89.17	101.04	113.14	103.58
Long bean	90.83	89.94	86.43	97.73	114.92	121.80	105.34	92.81	88.88	96.26	109.92	105.13
Ash plantain	102.27	99.68	97.16	98.39	97.87	104.82	99.52	88.73	93.62	100.47	107.88	109.62
Green Chilli	93.47	90.94	86.33	91.74	92.88	122.61	111.89	84.59	79.07	86.02	116.43	144.03
Lime	70.41	65.51	57.01	79.00	97.62	122.45	129.43	119.88	117.75	127.42	124.47	93.04

Source : Marketing & Food Policy Division

vegetables grown on the highlands where supplementary irrigation facilities are available. Due to large supply arriving from these areas, the price becomes the lowest either in September or October during the year.

Also there are two periods where vegetable prices are high, i.e; May - July and November - December. Except for a few vegetables like tomato, beet-root and ash-plantain, the prices of all other vegetables reach the peak in June during the year. Market supply during the period of May to July mainly depends on production of vegetables using water pumps. The use of water pumps especially after agro-well program has increased considerably. This results in lowering the price hike in the month of June. Price increase in June is now about 30% higher than the annual average. It was over 40% until the late 1980s. Price of tomato in December is well above the average, a 50% increase making the most expensive vegetable during the month. This has caused by a strong demand in the Christmas period. The price of bean drops in December due to arrival of stocks from Matale. Similarly, the prices of some of the low country vegetables decline due to stocks arriving from the surrounding areas of Colombo such as Kaduwela, Hanwella and Kalutara.

In contrast to the price variation of other food items, vegetables show the highest variation. This can be shown through the analysis of coefficient of variation. This is present in Table 2.8. Accordingly, the price variation for rice is around 10% of the mean value, but for vegetable it is over 20%. Further, the values of the coefficient have increased for vegetables over time indicating greater price instability. This reflects high fluctuation of production which affects uncertainty of the farm incomes.

Table 2.9 shows annual prices from 1985 to 1997 period for selected vegetables. It can be seen from the table that vegetable prices are on an upward trend with sharp increases in 1990 and 1994. However, the prices have declined in 1995 and 1996. The prices dropped in 1995 as a result of increased supply with satisfactory rainfall and cultivation of vegetables in the uprooted tea lands. As shown in the table, the annual price increase during the period 1985 - 1996 is around 15% which is above the general price increase, indicating that supply is not in line with the demand.

2.5 Vegetable Export

As mentioned earlier, vegetable export is around 1% of the production. Exporting of vegetables commenced in the late 1970s with the introduction of the open economy. The progress made so far of the vegetable export is quite satisfactory. The export earning from vegetables increased to Rs. 378 million in 1997 from Rs 29 million in 1977. Table 2.10 shows export earnings from vegetables for 1994 -1996. Sri Lanka mainly exports vegetables to the Middle-East countries, Maldives and European countries, contributing nearly 80% of the total vegetable export in 1997 as shown in Table 2.11. Sri Lanka's market share for the European countries has increased in the recent past. This is a good indicator for expansion of vegetable production. Unlike Asian consumers, European consumers are quality conscious. Therefore, the country can increase foreign exchange

Table 2.8

Coefficient of Variance for Selected Food Items

Year/item	1990	1991	1992	1993	1994	1995	1996
Rice							
Samba	11.95	13.27	6.11	6.43	8.65	6.99	7.66
Kora	5.15	9.11	5.47	7.10	6.67	6.11	8.12
Nadu	5.17	9.94	6.27	4.60	7.73	6.31	9.28
Raw red	6.09	9.62	7.78	9.48	5.55	6.82	12.78
Raw white	4.12	6.58	4.64	5.08	4.81	4.53	9.88
OFC							
Dried chilli	9.34	10.47	7.32	10.15	10.92	10.54	8.37
Red onion	32.42	35.16	32.93	40.04	25.03	29.53	33.32
Big onion	26.97	14.88	18.67	41.78	24.35	27.28	11.29
Green gram	10.88	17.63	10.86	9.41	27.32	5.54	3.19
Cowpea	10.82	9.80	14.65	6.61	10.03	5.65	5.07
Vegetables							
Bean	11.71	12.2	17.55	18.32	14.65	21.92	24.36
Carrot	10.60	16.38	15.87	24.18	24.9	24.67	32.55
Leeks	16.38	16.88	12.08	11.08	16.60	19.01	14.64
Beetroot	13.02	14.63	14.73	17.28	23.30	18.31	22.37
Knol khol	10.23	12.48	11.59	13.01	16.69	15.37	22.19
Raddish	12.74	13.62	13.01	15.15	10.87	19.30	20.09
Tomato	20.29	9.63	34.69	31.42	35.97	42.22	33.75
Ladies finger	13.36	12.93	13.63	12.34	11.55	17.20	22.54
Brinjal	16.43	11.52	12.47	14.36	13.05	25.02	18.98
Capsicum	13.26	8.25	7.84	17.98	14.61	18.59	26.26
Cucumber	14.73	13.43	16.33	10.79	4.85	20.21	18.99
Pumpkin	15.03	11.58	12.87	12.42	4.80	14.19	22.57
Bitter gourd	19.12	10.57	11.04	12.18	6.86	11.96	18.09
Snake gourd	15.57	10.93	13.23	14.79	13.64	16.01	18.95

Note : Coefficient of variance = Standard Deviation/Mean*100

Source : Marketing & Food Policy Division, H.A.R.T.I

Table 2.9

Annual Average Retail Prices of Vegetables at Colombo & Suburb Markets, (Rs/Kg.)

Item	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Bean	9.88	11.67	12.22	14.60	16.29	21.66	22.87	24.89	26.15	34.35	34.68	35.13	40.84
Carrot	10.83	13.56	13.83	14.69	17.61	21.06	22.58	25.91	26.81	35.48	37.84	37.24	42.60
Leeks	10.53	12.88	12.37	13.57	15.08	20.87	22.66	24.03	28.35	34.48	35.27	34.61	35.90
Beetroot	10.74	12.10	11.80	13.48	14.54	20.47	24.34	24.25	28.94	37.36	40.95	35.52	39.05
Knol khol	6.94	8.48	8.55	9.77	11.46	15.78	18.29	19.51	21.31	26.74	29.18	29.29	33.33
Raddish	5.40	6.05	6.71	7.20	8.83	10.60	11.98	14.96	15.34	17.50	19.45	20.07	22.45
Cabbage	7.89	8.86	10.24	11.26	12.60	15.49	16.32	18.34	20.21	26.92	29.88	28.23	30.58
Tomato	11.80	14.78	15.40	16.85	21.12	25.99	29.46	36.13	42.11	47.20	47.58	41.66	61.59
Ladies finger	9.60	10.66	10.79	13.05	14.78	19.94	21.01	23.32	24.86	29.04	28.50	28.57	31.66
Brijal	8.16	9.48	9.53	11.51	14.43	18.68	19.61	22.12	24.49	28.46	27.16	29.33	32.11
Capsicum	12.49	13.81	13.68	16.84	21.29	28.32	32.95	34.77	37.12	42.79	41.34	38.34	46.08
Pumpkin	6.23	7.33	7.08	7.75	9.43	10.89	12.67	14.11	13.18	15.29	16.45	19.41	22.37
Cucumber	6.35	7.45	8.22	8.66	9.54	12.91	13.64	15.75	16.38	18.30	20.19	22.49	25.08
Bitter-gourd	9.41	10.86	10.87	12.70	14.37	19.96	22.24	23.64	26.12	32.52	32.35	32.84	39.25
Snake-gourd	6.16	7.16	7.22	7.92	9.61	13.53	13.97	16.23	18.01	23.38	24.23	24.69	27.30
Luffa	8.91	9.70	9.74	10.72	12.99	16.95	18.41	21.30	22.66	26.96	29.62	30.44	34.56
Long bean	7.63	9.10	9.45	10.84	12.63	16.33	17.88	20.02	21.21	24.97	26.63	29.34	32.93
Ash plantain	8.45	10.51	13.11	14.43	15.62	20.70	24.44	29.13	33.14	33.85	33.02	36.41	40.58

Source : Marketing & Food Policy Division (HARTI).

Table 2.10

Quantity & Value of Vegetable Exports

Quantity in kg, Value in Rs. Million

Product	1994		1995		1996	
	Quantity	Value	Quantity	Value	Quantity	Value
Tomato	15,742	0.84	2,461	0.10	713	0.07
Onion & Shallot	51,700	1.28	8,842	0.28	-	-
Red Onion	-	-	-	-	25,079	0.54
Big Onion	-	-	-	-	1,449	0.04
Others	-	-	-	-	13,666	0.42
Garlic	20,518	0.70	3,188	0.20	113,148	5.94
Leeks	327,204	14.16	424,599	22.30	958,462	42.82
Cauliflower	1,853	0.05	12,307	0.37	1,200	0.05
Cabbage	21,334	0.70	3,571	0.11	6,088	0.25
Other Brassica	3,306	0.27	188	0.01	629	0.02
Carrot & Turnip	21,949	0.79	142	0.00	75	0.00
Beet, Raddish & Similar Roots	5,859	0.15	120	0.05	10	0.00
Gherkin	32	0.00	84,834	7.35	346	0.13
Cucumber	11,338	0.21	15,839	0.88	41,850	1.02
Winged Bean, Long Bean & Leguminous Vegetables	461	0.05	6,472	0.22	4,160	0.17
Bean	12,321	1.23	743	0.01	2,369	0.08
Brinjal	2,279	0.36	1,329	0.03	1,605	0.06
Celery	684	1.18	-	0.00	-	-
Mushroom & Truffle	65,012	19.28	60,550	19.86	5,360	1.60
Capsicum	131,620	5.11	108,667	4.15	128,536	3.10
Spinach	16	0.00	-	-	7,770	0.51
Sweet Corn	50	0.00	-	-	203	0.02
Potato	8,107	0.56	2,137	0.08	8,335	0.98
Manioc	675,652	23.86	1,534,741	45.62	1,085,854	34.92
Sweet Potato	207	0.03	185	0.00	430	0.02
Kiriala, Innala & Yam	347,672	12.75	626,695	29.51	636,761	27.46
Other Vegetables	2,946,319	118.82	241,886	163.33	3,866,624	152.29
Total	**4,671,235**	**201.44**	**6,139,496**	**294.46**	**6,910,768**	**272.53**

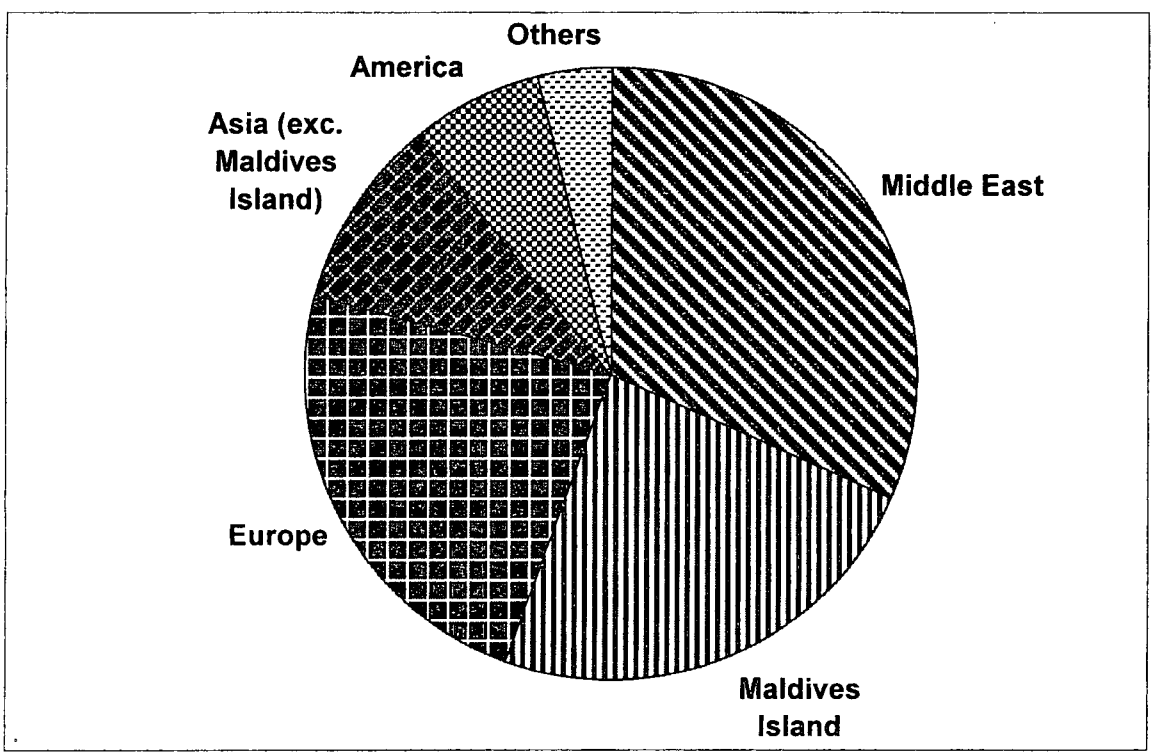
Source : Dept. of Customs.

Table 2.11

Vegetable Exports by Countries - 1997

Country	Amount(Mt)	%
Middle East	2903	31.59
Maldives Island	2192	23.85
Europe	2168	23.59
Asia (exc. Maldives Island)	932	10.20
America	637	6.93
Others	352	3.84
Total	9184	100

Source : Dept. of Customs



Source : Dept. of Customs

earnings by exporting quality vegetables. Leeks, cucumber, capsicum, manioc and yams (*kriala, Innala,*) are major exportable vegetables as seen in Table 2.10.

Major problems reported by exporters include the following: i) absence of continuous supply, ii) high cost of production, iii) poor quality (lack of uniformity), and iv) high price fluctuation. Due to these problems, exporters are unable to compete with countries, such as India where, there is a continuous supply at low cost.

2.6 The Government Policies in Relation to Vegetable Sector

The research exercise revealed a number of institutes operating at the district level that are directly or indirectly involved in production and marketing of vegetables. Chart No. 2.4 shows their mandates and activities. These institutes can be categorized into three major sections, namely: government, non-government and private. This section of the report gives an overview of those institutes highlighting their roles and functions, on-going activities and the main constraints encountered in carrying out their activities.

The research team interviewed the responsible authorities of the district level institutes and in some cases their subordinates. The responses received are categorized and listed in Chart No 2.4. As shown in Chart No 2.4, there are a number of government institutes involved in vegetable production and marketing at Nuwara Eliya. However, CWE is the only government institute that involves directly in marketing at present, whereas a number of government institutes were in operation in the past. As far as the problems and the constraints to the government institutes are concerned, the most common one was financial difficulties. In addition, declining trend of potato cultivation and inconsistent trade policies of the government were also listed in high priority. All commercial banks including the government owned and non-governmental agencies confirmed a declining trend of potato cultivation and inconsistent trade policies of the government as the most crucial constraints to their activities.

After implementation of the liberalized economic policies, the government's direct intervention has been curtailed. As a result, the Marketing Department which was involved in vegetable purchasing was closed down in 1993. The role of the government is to act as a facilitator. This includes research and development, provision of credit, imposing of market regulation and dissemination of market information.

With regard to credit, there are no specific credit schemes for vegetables, but there are a number of credit schemes applicable to the vegetable sector.

One of them is the New Comprehensive Rural Credit Scheme (NCRCS) operated by the People's Bank, Bank of Ceylon, Hatton National Bank, and Seylan Bank. The farmers who cultivate less than two acres are entitled to obtain loans at 16% interest under this scheme. The maximum amount that can be obtained is decided on a case by case occasional basis. The maximum limit for potato is Rs. 60,000 per acre.

The *surathura* credit scheme is another credit scheme which was introduced recently to provide micro finance to the educated unemployed to undertake self employment business which includes vegetable production and related processing activities. The Bank of Ceylon, People's Bank and Hatton National Bank operates this scheme. Under this scheme, loans are provided at 10% interest up to a maximum of Rs. 50,000. There is no need of collateral to obtain these loans.

The third is the Small and Medium Enterprises Assistance Project (SMEAP), implemented by the Bank of Ceylon that provides loans up to Rs. 10 million at 14% interest to start medium scale industries in which food processing industries are covered. Also, the Bank of Ceylon implements a credit scheme called Self-Employment Credit (SED). Under this scheme, credit can be obtained to purchase agricultural equipments such as water pumps and sprayers and to develop vegetable trading.

The fourth one is the *Niyogitha Seva Naya Kramaya* implemented by *SANASA* bank. This is aimed at providing credit for agricultural production including vegetable cultivation. Under this program, credit is given to the customers on the basis that the recovery could be made in kind.

Fifth is the Samurdhi Development Credit Scheme called *SASANA* which is aimed at promoting self-employment and income generation. This also can be utilized to get finance for vegetable cultivation and for other related activities.

Chart 2.4
Major Institutes Involved in Vegetable Sector in Nuwara Eliya District

Institution	Objectives	On – going Programs	Problems and Constraints
District Agricultural Extension Office	• Technology transfer to the farmers	• Farmer training • Increasing of potato yield through various interventions	• Lack of coordination between central government and the provincial government • Lack of funds
Department of Agrarian Services	• Establishment of farmer organizations • Delivery of agricultural inputs • Operation and maintenance of minor irrigation systems	• Registration, supervision and maintenance of Farmer Organizations • Implementation of special programs *"AMA"*[1], "seeds bean production" and *"Pola"*[2] program	• Lack of cooperation from the line agencies • Financial difficulties
Agricultural Development Authority (ADA)	• Establishing of coordination between farmers and the relevant agencies • Strengthening of coordination among the agencies involved in agriculture	• Implementation of agro-well program • Marketing credit program for small traders • Implementation of marketing activities under "AMA"	• Insufficient manpower • Financial difficulties
Co-operative Wholesale Establishment (CWE)	• Increasing of farmer prices	• Collection of vegetables from the registered FOs under CWE. • Delivery of vegetables to Colombo.	Not reported

Integrated Rural Development Project (IRDP)	• Infrastructure development • Promotion of people's participation	• Rehabilitation of irrigation systems • Construction of foot paths • Construction of foot bridges • Formation of farmer groups	Not reported
Municipal Council	• Provision of food items to urban dwellers	• Construction and maintenance of market places	• Financial difficulties
Bank of Ceylon	• Provision of credit	• Implementation of special credit programs such as *"NCRCS"*[3] *"SED"*[4] and *"SURATURA"*[5]	• Negative attitudes toward repayments of loans • Inconsistent trade policies of the government • Decreasing income of the farmers • Unsettled loans
People's Bank	• Provision of credit	• Implementation of special credit programs such as *"NCRCS"*	• Low return to the farmers
Regional Rural Development Bank (RRDB)	• Provision of rural credit	• Distribution of potato seeds on credit • Provision of credit to cultivation, water pumps, machinery etc.	• Low return to the farmers
Hatton National Bank (HNB)	• Provision of credit	• Implementation of *"NCRCS"*	• Low return to the farmers
Commercial Bank	• Provision of credit	No special programs	• Low return to the farmers • Inconsistent trade policies of the government

Seylan Bank	• Provision of credits	No special programs	• Low return to the farmer Inconsistent trade policies of the Government
Sanasa	• Promotion of farmers for self-reliant credit schemes • Marketing development	• Provision of credit • Implementation of *"Sannepa"*[6], *"Niyojitha Seva Naya Kramaya"*[7]	• Low return to the farmer • Inconsistent trade policies of the government
Participatory Action and Learning Methodology (PALM)	• Rural development	• Promotion of organic farming • Establishment of selling centers for organic products	• Marketing of organic products

1 ***"AMA"*** is the integrated agriculture development program of the Ministry of Agriculture and Lands
2 ***"POLA"*** is the periodic market of the locality
3 ***"NCRCS"*** refers to new comprehensive rural credit scheme
4 ***"SED"*** refers to self employment development
5 ***"SURATURA"*** is a special loan scheme introduced by the central government for self employment promotion through micro-
6 enterprises
7 ***"SANEEPA"*** is a project for development of marketing links between the farmers and the traders
8 ***"Niyojitha Seva Naya Kramaya"*** refers to a project which promotes the farmers to obtain loans in cash and repay them in kind

CHAPTER THREE

Production of Vegetables in the Study Sites

3.1 Handawalapitiya

3.1.1 Background

The village Handawalapitiya is a new land settlement established under the village expansion program of the government in1960s. It is situated 15 km. away from the township of Rikillagaskada. Handawalapitiya falls under the administrative jurisdiction of Hanguranketha Divisional Secretariat and is serviced by the Bulugahapitiya *Govijana Kendraya* (earlier known as Agrarian Services Center). Even though the village Handawalapitiya is composed of three *Grama Niladari* (GN) divisions at present, it was only one GN division before 1989. Currently, GN divisions of Daraoya, Handawalapitiya and Watastanna are independently operating within the old Handawalapitiya village. The total number of families at Handawalapitiya GN division where micro level information was searched for the exercise is around 170. Out of this total, 97 families are involved in farming and 65 are mainly depended on vegetable farming.

Since Handawalapitiya is a new land settlement, a uniform pattern of land ownership and size of land holdings are observed. Almost all farmers own only one acre of land portion for cultivation of both rice and other crops, but some have enlarged the farm plots by encroaching bordering crown lands. In *maha,* mostly rice is cultivated and in *yala* vegetables are the major crops. In terms of literacy, Handawalapitiya villagers are well off. According to the records of *Govi Niyamaka* and *Grama Niladari*, over 80% of the villagers are literate. However, as described by *Samurdi Niyamaka* more than 75% of the farmer families fall below the official poverty line. The common complaint of the farmers of the village in connection with the agricultural production is crop damages caused by wild boars. They estimated that around 50% of the production are damaged by the wild boars in each season.

3.1.2 Vegetable Production

The major vegetable crops grown at Handawalapitiya are tomato, bean, cabbage and carrot. Farmers grow vegetables on lowlands in *yala* and on highlands in *maha* under both rain-fed and irrigated conditions. Around 50% of the farmers cultivate their lands under irrigation and the rest merely depend on seasonal rains. As revealed in the study, the size of the vegetable plots of the farmers of Handawalapitiya range from .5 acre to .75 acre. Cultivation of vegetables in *maha* commences in January and *yala* commences in June.

However, *yala* cultivation is constrained by lack of rain and blustering wind. Peak harvesting months of *maha* and *yala* are March - April and August - September respectively. The cultivation of tomato, carrot and leeks that are restrained by stormy wind, are the principal crops grown in *yala* while bean is mostly grown in *maha.* The most popular vegetable among the farmers at present is tomato and is grown in both seasons. The high price prevailed in the recent past has motivated the farmers to invest more in tomato cultivation than any other crop. As explained by the farmers, red onion cultivation is also becoming popular once again with high market price. However, at the time of the field survey, onion was not a prominent crop.

Farmers grow multi crops in their small farm plots simultaneously but mixed cropping is not observed. Crop rotation, commonly known as *rawume wagawa* is widely practiced in the village. Farmers said that they never cultivate one crop throughout the year. In many cases, rice and vegetables are cultivated on the same plot on rotational basis and within the vegetable cultivation also crop rotation is applied. Nonetheless, crop rotation in vegetable sector is limited only to the farmers who have assurance of water for cultivation of both seasons. If one season is abandoned due to shortage of water, many farmers pay no attention to crop rotation. In most of the instances, vegetables are rotated on the following manner: bean – cabbage, bean – carrot, bean – tomato and bean – leeks. When the farmers were questioned about the reasons for crop rotation, none of the interviewees was able to answer the question in technical terms. But, almost every one was convinced about the advantages of the crop rotation. It was revealed in the key informant interviews that farmers violate existing crop rotational practices when price signals come from the market for a specific crop. For instance, key informants pointed out that the farmers of Handawalapitiya at present tend to cultivate tomato at every possible time due to high prices in the market.

3.1.3 Agricultural Inputs

Land

Land is a scarce resource in the village. However, maximum utilization of lands was not observed. Key informants stated that due to financial difficulties, tenure problems and ignorance of farmers on proper land use practices, many lands are not properly utilized. Neglected soil erosion was noticed in many farm plots but farmers justified it saying that those plots were cultivated under tenancy, leasing or mortgaging. Even though the lands of Handawalapitiya are more productive for vegetable cultivation, many farmers preferred to cultivate rice. Agricultural Instructor of the area said that it was very difficult for him to change traditional attitudes of the farmers for profit oriented commercial agriculture.

Water

Water is not a problem in *maha* at Handawalapitiya. However, in *yala* it is the most crucial problem for vegetable cultivation. Since the farmers are blessed with a natural water stream diverted to an irrigation cannel network, at least 50% of the farmers are

guaranteed with irrigation water in *yala* season. The rest have no options for cultivation. It was disclosed in the PRA session, that conflicts between vegetable farmers and rice farmers on irrigation water are common in *yala* season. Irrigation channel network of the village is in dilapidated condition, but some restoration works are being carried out at the moment.

Labour

Labour is not a big issue at Handawalapitiya. Hired labor is sporadically used and collective labour sharing method of the village called *attama* is widely practiced. As revealed in the PRA meeting, 60% of the farmers depend entirely on family labor for cultivation and 40% depend on both *attama* and family labour. Since hired labour input is insignificant in vegetable cultivation, farmers said that increasing day to day labour charges does not affect the cultivation cost of vegetables. Women labour is intensively used in all stages of cultivation except for the land preparatory stage in which more hard work was involved. It was disclosed that women labour was more productive in some cultivation activities such as planting, weeding, harvesting and sorting of produce. The number of man days used in cultivation of major crops is presented in Table 3.1. More labour is required for bean and tomato because of additional activities such as fixing supports and many harvesting times.

Table 3.1
Level of Input Use Per Acre

Crops	Labour	Fertilizer	Agro. Chemical		Seeds
	(Man days)	(Kg.)	(Kg.)	(Le.)	
Cabbage	136	438	0.4	12.2	102 (g)
Bean	174	385	-	3.9	14 (Kg)
Tomato	162	338	1.5	3.15	130 (g)

Source: Survey Data

Seeds, Fertilizer and Agro-Chemicals

Some 80% of the farmers purchase seeds, agro-chemicals, and fertilizer from village grocery shops that sell inputs too. There are four such shops in the village. Out of these four, one purchases vegetables too. But, farmers said that they do not have any obligations to sell their produce to the trader who sells inputs. A dealer from Hanguranketha distributes seeds to the shops on delayed payment. Around 80% of the farmers purchase vegetable seeds on the basis of delayed payments. However, in bean cultivation, farmers themselves produce their own seed requirements. A comparison of actual use of seeds with the recommendation is given in Table 3.2.

Table 3.2
Comparison of Actual Use of Seeds per Acre with the Recommended Levels

Variety	Actual Use*	Recommendation**
Cabbage	102 (g)	81 – 101 (g)
Beans	14 (Kg)	18 – 24 (Kg)
Tomato	130 (g)	69 – 81 (g)

Sources: * Survey Data, ** Dept. of Agriculture

The seed rate for tomato at farm level is well above the recommended level. Many opinion leaders expressed that there is a shortage of seeds both in the *Govijana Kendraya* and in the shops of private traders during the planting period. A variety of other complaints on seeds were also brought up in the PRA meeting.

Availability of fertilizer and agro-chemicals is not a considerable problem in the study site. However, the quality, price and knowledge of the farmers on fertilizer and agrochemical application were highlighted as problematic issues. The amount of fertilizers and agro-chemicals applied and seeds used by the farmers in cultivation of major crops are presented in table 3.1. It depicts that fertilizer application is lower for tomato than bean and cabbage. However, use of agro-chemicals (liquid) for cabbage is four times higher than bean and tomato.

Table 3.3 explains the actual use of fertilizer along with the recommendation of the Department of Agriculture. It shows that farmers at Handawalapitiya used excess amounts of fertilizer for all the crops concerned. This is more evident for nitrogen fertilizer.

Table 3.3
Comparison of Actual Usage of Fertilizer with the Recommended Levels

Quantity in Kg/Acre

Variety	Actual Usage*				Recommendation**				Difference				
	N	P	K	Total	N	P	K	Total	N	P	K	Total	%@
Cabbage	252	141	45	438	134	111	30	275	118	30	15	163	159
Beans	229	18	138	385	89	111	45	245	140	-93	93	140	157
Tomato	115	156	67	338	80	137	53	270	35	19	14	68	125

N - Nitrogen, P - Phosphorus, K - Potassium
@ Total amount of actual use as a percentage of the total recommended amount.
Sources: * Survey Data ** Dept. of Agriculture

Agricultural Credit

The principle sources of agricultural credit to the farmers of Handawalpitiya are Rural Bank, *Govijana kendraya* and private traders. Many farmers voiced that they have serious problems in connection with agricultural credit. They added that they can obtain credits from the private traders but various socio-economic implications are involved in the transaction. When inquired about the effectiveness of the credit program of *Govijana kendraya*, operated under the scheme of revolving fund, none was happy about it. Farmers said that the revolving fund is not a practical credit scheme. Rural Bank is also not considered by the farmers as a worthy institute to cater to the needs of farmers. When farmers were brought into a brainstorming exercise on the credit issue in the PRA session, they said that majority of the villagers are defaulters. Loans taken from *Govijana kendraya* were not repaid for years and years and currently revolving fund has no money to disburse more loans to the farmers. They accepted the fact that until recoveries are made, revolving fund cannot be operated successfully.

Agricultural Extension Service

Most of the farmers are not pleased with the agricultural extension service of the government. Confirming this fact, the research team also observed that more extension services are needed for the farmers to solve their agricultural problems. Many farmers complained about the officials of the Agricultural Department for not visiting the village. The Agriculture Instructor of the area also accepted this complaint but clarified that infrequent visits to the villages were not intentional but as a result of the resources allocated by the Department for visits. He added, in contradiction to the opinion of the farmers that even though the farmers complain on the officials for not providing services, their attendance is very poor for the agricultural training sessions organized by the department. At the PRA session, this view was brought up and all farmers accepted it as a fact. However, they added that the calendar of the training sessions is not set as of the time availability of farmers and that has led to poor attendance.

3.1.4 Average Yield

The average yield and the potential yield of three vegetables grown in the village are presented in Table 3.4. The actual yields for all the vegetables concerned remain well below the potential. As shown in the table, yield gap is as high as over 60% for cabbage. The reason might be over use of fertilizer and agro-chemicals, which was found in this study.

Table 3.4
The Average Yield and the Potential Yield

Crop	Average Yield* (Mt/Ac)	Potential Yield** (Mt/Ac)	Gap of potential Yield (%)
Beans	3.39	4.82	-29.66
Cabbage	3.36	9.3	-63.87
Tomatoes	3.4	4.3	-20.93

Note: Since agro-climatic conditions in the study locations are similar to as in Kandy, potential yields in relation to the Kandy district were taken.

Sources: * Survey data
** Horticulture Division, Dept. of Agriculture

3.1.5 Costs of Production

The cost of production for major crops grown at Handawalapitiya is given in Table 3.5. Labor cost accounts for over 50% of the total cost for all the studied crops, when farmer's own inputs are added to the cash cost. However, cash cost is very low because of the usage of the family labour. The unit cost is less than Rs. 3.75 for all crops concerned. Fertilizer is the major cash cost, representing about 40% of the total cash cost. Detailed information on costs of production is given in the Annex 3.1.

3.1.6 Income of the Vegetable Farming

Table 3.6 shows gross and net income received by the farmer. As shown in the table, farmers get positive returns for all the crops concerned even in the situation where own farm inputs were valued at market price. Further, farmers get higher return for bean, but the investment is also high for bean as shown in Table 3.5.

Table 3.5 A

Costs of Production of Selected Vegetables Grown by the Handawalapitiya Farmers (Rs/Acre) Including Imputed Cost

Cost	Bean	%	Cabbage	%	Tomato	%
Seeds	4000	9.61	1930	6.84	1238	4.08
Labour	23700	56.95	18650	66.12	21700	71.58
Fertilizer	5034	12.10	4161	14.75	4285	14.13
Agro Chemicals	2405	5.78	3106	11.01	1223	4.03
Others*	6480	15.57	360	1.28	1869	6.17
Total	41619	100	28207	100	30315	100
Avg. Yield	3388		3357		3400	
Cost (Rs/Kg)	12.28		8.40		8.92	

* Refer to the Annex 3.1.1 - 3.1.3

Source : Survey data

Table 3.5 B

Costs of Production of Selected Vegetables Grown by the Handawalapitiya Farmers (Rs/Acre) Excluding Imputed Cost

Cost	Beans	%	Cabbage	%	Tomato	%
Seeds	1000	8.41	1930	18.56	1238	11.36
Labour	3450	29.02	1200	11.54	4150	38.09
Fertilizer	5034	42.34	4161	40.02	4285	39.33
Agro Chemicals	2405	20.23	3106	29.87	1223	11.22
Total	11889	100	10397	100	10896	100
Avg. Yield	3388		3357		3400	
Cost (Rs/Kg)	3.51		3.10		3.20	

Source : Survey data

Table: 3.6
Farm Income from the Selected Vegetables (Rs/Acre)

Crops	Gross Income	Net Income	
		Exe. Imputed Cost	Inc. Imputed Cost
Tomato	44,812	33,916	14,497
Cabbage	39,445	29,048	11,238
Bean	63,762	51,873	22.143

Source: Survey data

3.2 Mandaramnuwara

3.2.1 Background

Mandaramnuwara is a settlement scheme set up by the government in 1960's situated about 21 kilometers away from Rekillagaskada town. The village falls under the administrative boundaries of Hanguranketha *Pradesiya Sabhawa* and Hanguranketha Divisional Secretariat. Former Mandaramnuwara *GN* division has been divided today into five *Grama-Niladari* divisions namely: i) Mandaramnuwara, ii) Malsaranuwara, iii) Hunukotuwa, iv) Udawela and v) Madawela. The total number of families of Mandaramnuwara *GN* division for which the detailed information were collected for the study was 160 of which 139 were *Samurdi* recipients. This depicts that a vast majority of the families of the village are below the poverty line. Literacy rate of Mandaramnuwara *GN* division is 82% as of the records of *Samurdi Niyamaka.* The total land area is 215 acres which includes highlands and homesteads. The major livelihood of the villagers is farming and almost all depend on cultivation of vegetables. With regard to the material quality of life of the villagers, every farmer has a permanent house and 90% of the villagers are provided with facilities of electricity. Hundred percent of the families have radios while 25% of the families have television sets. One of the special characteristics of Mandaramnuwara *GN* division is that a number of community development organizations are operating at the village level. This includes farmer organizations, organizations of UNDP, a sports club, a youth club and a death donation society.

3.2.2 Vegetable Production

It was found that almost all the families of Mandaramnuwara are involved in vegetable cultivation and over 95% of them depend mainly on vegetable cultivation. It was revealed in the discussions held with the opinion leaders that crop selection decisions and decisions on input use are taken mainly by the head of the family, often by the father. Many farmers have around one acre of highland and half an acre of lowland for cultivation. Above 80% of vegetable plots are cultivated by the owner operators.

Farmers of Mandaramnuwara GN division cultivate vegetables on highlands throughout the year under the irrigated conditions. These farmers obtain water through channel 9 and 10 of Uduwela irrigation scheme. Farmers in other areas grow vegetables under rain-fed conditions. *Maha* is the major cultivation season. Planting of vegetables takes place in December and January and most crops are usually harvested in March and April. During the *yala,* season vegetables are cultivated on paddy fields and on some highlands where water supply is assured. Peak cultivation months are June and July and the peak harvesting takes place in September and October. Major crops grown in the area are bean, carrot, leeks, tomato and beetroot. Potato was the major crop planted on lowlands during *yala* season before the potato cultivation collapsed in 1996 with liberalization of potato imports. Almost all the farmers grow more than one crop on their vegetable plots at the same time. In the discussions, they described that this practice minimizes the price risk of vegetable marketing. At present, tomato is the most popular crop among the farmers of Mandaramnuwara. This is an outcome of high price prevailed in the market.

3.2.3 Agricultural Inputs

Land

Since Mandaramnuwara is a settlement scheme, land is an extremely scarce resource. Expansion of the area of arable land is not possible unless the crown lands are brought into cultivation. Nevertheless, these are designated as forest and are essential for water resources. In terms of the land utilization, Mandaramnuwara farmers are well ahead when compared to the farmers of other areas where the research was undertaken. Key informants stated that due to scarcity of lands coupled with the availability of irrigation water, many farmers tend to utilize the land in a proper manner. However, they added that financial difficulties of the farmers, tenure problems and ignorance of farmers on technicalities of land use, influence the land productivity adversely. Soil erosion is an immense problem in the area. The research team observed, however, that this problem is extremely difficult to be solved because of the unsuitability of lands that were used for cultivation. It was revealed in the study that many lands encroached by the farmers are not suitable for vegetable cultivation but for reservations. As of the view of Agricultural Instructor of the area, the lands of Mandaramnuwara are more productive for vegetable cultivation than that of rice. However, in practice, many farmers preferred to cultivate rice even under the conditions of very low productivity.

Water

Water is not a severe problem both in *maha* and *yala* at Mandaramnuwara GN division. Since the farmers are blessed with a natural water stream diverted to an irrigation cannel network maintained by the Department of Agrarian Services, almost every one obtains irrigation water for cultivation. In *yala,* when severe drought conditions exist in the area, water becomes a problem. In the PRA session held at the village, many farmers pointed out the need for renovation of the irrigation channel network. It was said that this irrigation system was in a dilapidated condition.

Labour

As far as the labour is concerned, it is not a big issue at Mandaramnuwara. Hired labour is sporadically used for cultivation at the rate of Rs. 100.00 for male and Rs. 75.00 for female per day with meals. Collective labour sharing method of the village called *attama* is widely used as in the other study areas. As revealed in the interviews held with the farmers, 80% of the farmers depend entirely on family labour for cultivation and 20% depend on both *attama* and family labour. Women labour is intensively used in all stages of cultivation except during the land preparatory stage. The number of man days used in cultivation of major crops is presented in Table 3.7. As shown in the table, leeks is a high labor- intensive crop. This results in longer crop duration, i.e., 4 – 5 months and intensive nursery management

Table 3.7
Level of Input Use Per Acre

Crops	Labour	Fertilizer	Agro. Chemical		Seeds
	(Man days)	(Kg.)	(Kg.)	(Le.)	
Cabbage	116	725	12	30.53	138 (g)
Bean	163	363	0.8	13.13	17 (Kg)
Tomato	173	314	3	30.75	96 (g)
Leeks	288	1050	4.8	3	1040 (g)

Source: Survey data

Seeds, Fertilizer, and Agro-chemicals

Fertilizers, agro-chemicals and seeds are the major inputs bought by the farmers for vegetable cultivation. Farmers have to buy all varieties of seeds, except bean from the private traders. In many cases, farmers themselves produce their own seed requirements for cultivation of bean. There are three input shops in the village and majority of the farmers obtain fertilizer and agro-chemicals from them on delayed payments. A few farmers purchase inputs from shops located at Rikillagaskada about 18 km. away from the village and from the Agrarian Services Center of the area located at Elamulla 5 km. away from the village. One out of three input suppliers is involved in vegetable purchasing too. Due to the fact that most of the farm plots are small in size, purchasing is done in small scale such as 10 kgs of urea, 100 grams of carrot seeds etc. which are purchased but at a higher price. For instance, the price of a bag (50 kg.) of urea costs about Rs. 350.00 while one kg. is priced at Rs. 8.00 which makes an additional profit to the input seller. Use of organic fertilizer is not in practice at all at Mandaramnuwara. The amount of fertilizers and agro-chemicals applied and seeds used by the farmers in cultivation of major crops are presented in Table 3.7. Fertilizer use in cultivation of

cabbage is double the quantity when compared to bean and tomato. Use of agro-chemicals is considerably high compared to Handawalapitiya.

Table 3.8 presents a comparison of fertilizer use at Mandaramnuwara with the recommendations of the DOA. As could be seen, excess use is prominent. The quantity used for leeks and cabbage is more than double compared to the recommended level. As at Handawalapitiya, use of nitrogen fertilizer is much higher compared to others.

Table 3.8
Comparison of Actual Usage of Fertilizer with the Recommended Levels

Quantity in Kg/Acre

Variety	Actual Usage*				Recommendation**				Difference				
	N	P	K	Total	N	P	K	Total	N	P	K	Total	%@
Leeks	540	330	180	1050	182	112	61	355	358	218	119	695	296
Tomato	151	73	90	314	80	137	53	270	71	-64	37	44	116
Beans	156	115	92	363	89	111	45	245	67	4	47	118	148
Cabbage	339	231	155	725	134	111	30	275	205	120	125	450	264

N - Nitrogen, P - Phosphorus, K - Potassium
@ Total amount of actual use as a percentage of the total recommended amount.

Sources: * Survey Data ** Dept. of Agriculture

A comparison of seed used by the farmer and the recommendation of the DOA are given in Table 3.9. Accordingly, seed rate at farm level is higher for cabbage and tomato than recommended levels. Nevertheless, seed rate for bean is in line with the recommendation.

Table 3.9
Comparison of Actual Use of Seeds per Acre with the Recommended Levels

Variety	Actual Use*	Recommendation**
Cabbage	138 (g)	81 - 101 (g)
Beans	17 (Kg)	18 – 24 (Kg)
Tomato	96 (g)	69 – 81 (g)
Leeks	1040 (g)	1500 (g)

Sources: * Survey Data, ** Dept. of Agriculture

Agricultural Credit

The principle source of agricultural credit to the farmers at Mandaramnuwara is private traders. It was revealed in the discussions held with the farmer groups that credit is a serious problem for them. As a result of the crisis of potato cultivation, almost all farmers are reported to be indebted at present. One of the input sellers of the area informed the research team that he himself has given inputs on credit basis worth of Rs. 85,000/= to the farmers but the recovery was extremely low. He further mentioned in the discussions that he couldn't keep hopes for immediate recoveries from the farmers. This is a result of sudden collapse of the vegetable economy in the area. On the other side of the coin, farmers informed the research team that they are in an extremely difficult situation in obtaining credits for cultivation because, private traders are reluctant to provide credit for them. However, it was found in the exercise that this situation has surprisingly increased the demand for institutional credit. For example, the Rural Bank set up in 1997 at Mandaramnuwara has granted Rs. 1.5 million worth of credit to vegetable farmers for 1997/98 *maha* season.

Agricultural Extension Service

As far as the extension service of the government is concerned, no substantial differences were found in comparison to the other areas of the study. The study team interviewed opinion leaders, farmers, farmer leaders, local officials and the extension staff in this connection and found following deficiencies as the common characteristics of the extension problem. The deficiencies were insufficient extension staff of the department, poor co-operation and co-ordination between farmers and officials, insufficient fund allocation from the government and lack of farmer organizations functioning at the village level.

3.2.4 Average Yield

The average yield and the potential yield of four selected vegetables are presented in Table 3.10. The actual yields for all the vegetables, except for tomato, remain well below the potential.

3.2.5 Costs of production

The costs of production for major crops grown at Mandaramnuwara is given in Table 3.11. Labour costs account for over 50% of the total cost for all the studied crops, when farmer's own inputs are added to the cost. However, cash cost is very low because of the usage of the family labour. Nevertheless, the unit cost (Rs/kg) of cabbage is over Rs. 5.50 because of high usage of fertilizer and agro-chemicals. The cost of fertilizer and agro-chemicals accounts for over 50% of total cash cost. Detailed information on costs of production is given in the Annex 3.2.

Table 3.10

The Average Yield and the Potential Yield

Crop	Average Yield* (Mt/Ac)	Potential Yield** (Mt/Ac)	Gap of Potential Yield (%)
Bean	3.56	4.82	-26.14
Cabbage	3.52	9.3	-62.15
Tomato	4.57	4.3	+6.28
Leeks	7.72	-	-

Note: Since agro-climatic conditions in the study locations are similar to as in Kandy, potential yields in relation to the Kandy district were taken.

Sources: * Survey data

** Horticulture Division, Dept. of Agriculture

3.2.6 Income from the Vegetable Farming

Table 3.12 shows gross and net income received by the farmer. Positive returns could be seen for all the crops concerned, except for cabbage even after farm inputs are costed. Although crop duration is long for leeks, it gives the highest return to the farmer.

Table 3.11 A

Costs of Production of Selected Vegetables Grown by the Mandaramnuwara Farmers

(Rs/Acre) Including Imputed Cost

Cost	Bean	%	Cabbage	%	Tomato	%	Leeks	%
Seeds	4216	10.50	4060	11.43	1132	2.96	6545	10.76
Labour	23050	57.43	16950	47.73	24350	63.67	39700	65.26
Fertilizer	3714	9.25	8867	24.97	4533	11.85	10060	16.54
Agro Chemicals	2664	6.64	5437	15.31	6730	17.60	4165	6.85
Others *	6495	16.18	200	0.56	1502	3.93	360	0.59
Total	40139	100	35514	100	38247	100	60830	100
Avg. Yield	3560		3520		4569		7722	
Cost (Rs/Kg)	11.28		10.09		8.37		7.88	

* Refer to the Annex 3.2.1 - 3.2.4

Source : Survey data

Table 3.11 B

Costs of Production of Selected Vegetables Grown by the Mandaramnuwara Farmers

(Rs/Acre) Excluding Imputed Cost

Cost	Bean	%	Cabbage	%	Tomato	%	Leeks	%
Seeds	1216	11.76	4060	20.94	1132	6.98	6545	25.65
Labour	2750	26.59	1025	5.29	3825	23.58	4750	18.61
Fertilizer	3714	35.90	8867	45.73	4533	27.95	10060	39.42
Agro Chemicals	2664	25.75	5437	28.04	6730	41.49	4165	16.32
Total	10344	100	19389	100	16220	100	25520	100
Avg. Yield	3560		3520		4569		7722	
Cost (Rs/Kg)	2.91		5.51		3.55		3.30	

Source : Survey data

Table: 3.12
Farm Income from the Selected Vegetables (Rs/Acre)

Crops	Gross Income	Net Income	
		Exc. Imputed Cost	Inc. Imputed Cost
Tomato	69,220	53,000	30,973
Cabbage	35,200	15,811	-314
Bean	82,948	72,604	42,809
Leeks	122,162	96,342	61,032

Source: Survey data

3.3 Theripaha

3.3.1 Background

The village Theripaha is situated 15 kilometers away from the township of Nildandahinna which is the closest commercial center for the villagers of Theripaha. Motorable road that reaches Theripaha from Nildandahinna ends at Theripaha. From this point, there is no extended road network to other towns. Theripaha falls within the administrative boundaries of Walapane *Pradesiya Sabha* and Walapane Divisional Secretariat. After reformation of GN divisions in 1989, the village Theripaha has been divided into seven GN divisions, namely: i) Theripaha, ii) Helagama, iii) Mallagama, iv) Dulana v) Hagasula, vi) Abagahatanna, and vii) Bolagandawala. Of these divisions, Mallagama, Helagama and Theripaha are prominent among others for cultivation of vegetables.

The vast majority of families of Theripaha are living below the poverty line. Nevertheless, the literacy rate of the village is around 90% and over 80% of the people have received secondary level education or above. A few families have electricity facilities. However, no one has telephone facilities. Almost all the villagers have radios but only five families have television sets.

Over 90% of the families of the above mentioned three *GN* divisions (Mallagama, Helagama and Theripaha) are involved in farming, while all families are involved in vegetable farming at Theripaha *GN* division where micro level informations were gathered for the study. Lowlands are specifically used for rice cultivation and vegetables are grown on highlands. In addition, farmers engage in *chena* cultivation using the encroached crown lands of the area. *Chena* is used to cultivate grains such as *kurakkan, kollu* and maize.

3.3.2 Vegetable Production

Vegetables are cultivated both on highlands and lowlands, mostly under the rain-fed conditions. Around 20 farmers at Mallagama have water pumps and they cultivate crops

throughout the year. Majority of the farmers have vegetable farm plots ranging from 0.50 - 01 acre in size. However, the average size of the farm plots of Dunkollawatta area that falls under Mallagama *GN* division is one acre. It was found that over 80% of the vegetable farmers of the area are owner operators.

Vegetables are grown during both cultivation seasons, *maha* and *yala*. Planting in *maha* commences in November and December and peak period of harvesting takes place in February and March. With regard to *yala*, crops are planted usually in May and June and harvested in August and September. Beans, cabbage, carrot, brinjal, and green chilli are the principal crops grown in the locality. Majority of the farmers used to grow multi-crops in the vegetable farms in order to minimize price risk.

3.3.3 Agricultural Input

Land

The total land area of Thripaha *GN* division is about 600 acres. Of this, around 150 acres are covered with vegetable farm plots. Many lands are under LDO permits and they are not in cultivable form due to severe water shortage, especially during the *yala* season. To compensate this disadvantage, farmers have encroached bordering crown lands of the area for cultivation of grains, which provides them an additional income in the *maha* season.

Water

Majority of the farmers of the area studied depend on seasonal rains. Around 30% of the farmers of Theripha *GN* division obtain irrigation water through Walihindavewa irrigation system. It was observed that some farmers use motors for pumping of irrigation water from the channel for cultivation of highlands which is illegal under the irrigation ordinance, but commonly seen in the hill country areas. Some 21 farm families out of 55 at Dunkolawatta which fall under Mallagama *GN* division have agro-wells equipped with pumps.

Labour

Exchanged labor is widely used. The team of members, called *attam kalliya* which consists of 5 to 6 farmers in each group is popular in the village. Women are mainly involved in some cultivation activities such as weeding, earthing up and harvesting. If hired labour is required for a cultivation purpose, farmers have to pay at the rate of Rs 100/= - 125/= for a man and Rs. 50/= - 75/= for a woman per day. It is customary that the farmer provides meals for the hired labourer. Provision of hired labour without meals are not found in the study area. The number of man days used in cultivation of major crops is presented in Table 3.13. Labour requirements for cultivation of brinjal are much lower than crops such as bean, cabbage and tomato.

Table 3.13
Level of Input Use Per Acre

Crops	Labour	Fertilizer	Agro. Chemical		Seeds
	(Man days)	(Kg.)	(Kg.)	(Le.)	
Brinjals	54	118	-	0.2	119 (g)
Beans	183	199	10.08	7.25	14 Kg)
Cabbage	128	162	-	4.8	88 (g)
Tomato	152	178	-	2.25	78 (g)

Source: Survey data

Seeds, Fertilizers and Agro-chemicals

Fertilizers, agro-chemicals and seeds are the major inputs purchased by the farmers. There are no specialized input shops in the village, but inputs are sold in two groceries and in *Govijana Kendraya* of the area. Majority of the farmers obtain fertilizers, agro-chemicals and seeds from *Govijana Kendraya* either for spot cash or on delayed payments. In 1997, the total value of the sales of fertilizers and agro-chemicals of the *Govijana Kendrays* was Rs 295,526/=. Many farmers who purchase inputs on credit basis have to depend on two grocery shops of the village. *Govjana Kendraya* does not provide inputs on credit for the farmers who have not repaid their previous loans. It was found that about 30% of the farmers purchase inputs directly from Nildandahinna, the closest commercial center of the area. The use of carbonic fertilizer at Theripaha is negligible. Animal husbandry is not found as an income generating activity but a few farmers are engaged in cattle rearing.

The amount of fertilizers and agro-chemicals applied and seeds used by the farmers in cultivation of major crops are presented in Table 3.13. As shown in the table, use of agro-chemicals in cultivation of bean is well above the level of the same in other crops. However, fertilizer application at Teripaha is much below the recommended level (3.14). The situation is worse for brinjal; actual usage of fertilizer represents only 35% of the recommended quantity. Even from this amount, bulk consists of nitrogen fertilizer. Nevertheless, seed rate for cabbage and tomato is in line with the recommended level as seen in Table 3.15. Farmers used to put more seeds in the nursery in planting brinjal because of need to select good plants.

Table 3.14
Comparison of Actual Usage of Fertilizer with the Recommended Levels

Quantity in Kg/Acre

Variety	Actual Usage*				Recommendation**				Difference				
	N	P	K	Total	N	P	K	Total	N	P	K	Total	%@
Brinjals	68	30	20	118	130	136	69	335	-62	-106	-49	-217	35
Beans	128	40	31	199	89	111	45	245	39	-71	-14	-46	81
Tomato	41	94	43	178	80	137	53	270	-39	-43	-10	-92	66
Cabbage	95	44	23	162	134	111	30	275	-39	-67	-7	-113	59

N - Nitrogen, P - Phosphorus, K - Potassium
@ Total amount of actual use as a percentage of the total recommended amount.

Sources: * Survey Data ** Dept. of Agriculture

Table 3.15
Comparison of Actual Use of Seeds per Acre with the Recommended Levels

Variety	Actual Use*	Recommendation**
Brinjals	119 (g)	142 – 152 (g)
Beans	14 (Kg)	18 – 24 (Kg)
Cabbage	88 (g)	81 – 101 (g)
Tomato	78 (g)	69 – 81 (g)

Sources: * Survey Data
** Dept. of Agriculture

Agricultural Credit

Govijana Kendraya implements two credit schemes for delivery of inputs for the farmers. These include the revolving fund program which functions under the Ministry of Agriculture and Lands and its own credit program. For the revolving fund program, financial provisions are made by the Ministry of Agriculture and Lands and the other is in operation using the limited funds of *Govijana Kendraya*. Loans are given in kind up to

maximum value of Rs. 4000/= per person. The procedure for obtaining a loan from *Govijana Kendraya* is quite simple. The basic requirement is submission of two farmers with farmer identity cards as the guarantors to the loan. In 1997/98 *maha* season *Govijana Kendraya* has provided loans worth of Rs. 65,000/= from the revolving fund and Rs. 25,000.00 from the own funds of *Govijana Kendraya*. The recovery rate up to the end of May 1998 was about 65%.

Since most of the farmers use family labour and exchanged labor for cultivation purposes and obtained fertilizer and agro-chemicals on delayed payment, lack of credit was not a problem for them. Yet, about 5% of the farmers are reported as the borrowers of Bank of Ceylon and People's Bank. In addition, the farmers of Dunkolawatta themselves have formed groups for disbursement of credit under the guidance of UNDP. These groups are formed with 5 members each and are expected to fulfill the savings and credit needs of the members. The research team met one of the leaders of a group and found that his group was functioning well. This leader said that each member of his group saves an amount of Rs. 50/= per month with the group fund and if credit is requested, accumulated fund is given to the requested member with no interest. When asked how many members have obtained credit from the group fund, his reply was negative. However, he added that credit requirements of the members of his group was minimal and the accumulated fund was deposited with the People's Bank. He further stated that non-members also can request loans from the fund but an interest is charged.

Agricultural Extension Service

As found in the study, agricultural extension is a considerable problem at Theripaha. The research team observed that yields of all vegetable crops cultivated in the area were extremely low and the knowledge of farmers on vegetable cultivation was not satisfactory. However, in contrary to this observation, farmers of the area did not highlight the extension problem as a significant issue. Many complained about the problems related to the distribution of material inputs for cultivation but not about the extension services. The interviewees said that visible extension problem of the farmers of the area was lack of instructions from the Department of Agriculture for application of fertilizer and agro chemicals. However, they added that this gap was filled by the traders of the area and by the experienced farmers of adjacent farm plots. *Govijana Kendraya* of the area is located at the heart of the village, but frequent interactions between farmers and the officials of *Govijana Kendraya* were not observed. Agricultural Instructor of the area said that his service to the farmers was constrained considerably by the amount of funds allocated and by the lack of human resources.

3.3.4 Average Yield

The average yield and the potential yield of four selected vegetables grown in Teripaha are presented in Table 3.16. The actual yields for all the vegetables concerned remain well below the potential. With regard to cabbage, actual yield is 50% below the potential. The lowest yield was reported for brinjal.

Table 3.16
The Average Yield and the Potential Yield

Crop	Average Yield* (Mt/Ac)	Potential Yield** (Mt/Ac)	Gap of Potential yield (%)
Bean	3.45	4.82	-28.42
Cabbage	4.71	9.3	-49.35
Tomato	3.42	4.3	-20.47
Brinjal	2.5	-	-

Note: Since agro-climatic conditions in the study locations are similar to as in Kandy, potential yields in relation to the Kandy district were taken.

Sources: * Survey data

** Horticulture Division, Dept. of Agriculture

3.3.5 Costs of production

The cost of production for major crops grown at Theripaha is given in Table 3.17. Labor costs accounted for 60% or above of the total cost for all the crops studied, when the costs of farmer's own inputs are added to the cost. However, cash cost is very low because of the usage of the family labour. When the imputed cost is removed from the total cost of bean cultivation, its cost comes down to Rs. 2.74 as shown in Table 3.17B. Cost for agro-chemical and fertilizer in cultivation of all the crops concerned account for over 50% of the cash cost. Cash cost is as low as Rs. 1.60 per kg. for bean. In case of tomato cost for agro-chemicals alone represents 45% of the cash cost. Cultivation of brinjal does not require much cash. As shown in the table, its cost amounted to Rs. 2900/= per acre, which is less than three-fold compared to other crops. The detailed information on cost of production is given in the Annex 3.3.

3.3.6 Income from Vegetable Farming

Table 3.18 shows gross and net income received by the farmer from cultivation of vegetables. Although average yield is well below the potential, the farmer received the highest return for cabbage. The gross income earned from bean is the second highest, but it becomes the lowest when own inputs are costed.

Table 3.17 A
Costs of Production of Selected Vegetables Grown by the Theripaha Farmers
(Rs/Acre) Including Imputed Cost

Cost	Bean	%	Cabbage	%	Tomato	%	Brinjal	%
Seeds	4166	9.59	1908	7.90	958	3.02	175	1.71
Labour	25850	59.51	18250	75.55	21575	68.11	7750	75.77
Fertilizer	3027	6.97	2286	9.46	2032	6.42	910	8.90
Agro Chemicals	2390	5.50	1512	6.26	4515	14.25	1313	12.84
Others *	8003	18.42	200	0.83	2595	8.19	80	0.78
Total	43436	100	24156	100	31675	100	10228	100
Avg. Yield	3465		4711		3420		2500	
Cost (Rs/Kg)	12.54		5.13		9.26		4.09	

* Refer to the Annex 3.3.1 - 3.3.4

Source : Survey data

Table 3.17 B
Costs of Production of Selected Vegetables Grown by the Theripaha Farmers
(Rs/Acre) Excluding Imputed Cost

Cost	Bean	%	Cabbage	%	Tomato	%	Brinjal	%
Seeds	2116	22.25	1908	25.68	958	9.65	175	6.04
Labour	1975	20.77	1725	23.21	2425	24.42	500	17.25
Fertilizer	3027	31.84	2286	30.76	2032	20.46	910	31.40
Agro Chemicals	2390	25.14	1512	20.35	4515	45.47	1313	45.31
Total	9508	100	7431	100	9930	100	2898	100
Avg. Yield	3465		4711		3420		2500	
Cost (Rs/Kg)	2.74		1.58		2.90		1.16	

Source : Survey data

Table: 3.18
Farm Income from the Selected Vegetables (Rs/Acre)

Crops	Gross Income (Rs.)	Net Income (Rs.)	
		Exc. Imputed Cost	Inc. Imputed Cost
Tomato	54,104	44,174	22,429
Cabbage	77,873	70,442	53,714
Bean	58,073	48,565	14,637
Brinjal	30,000	27,102	19,772

Source: Survey data

3.4 Madulla

3.4.1 Background

Madulla is located 8 kilometers away from Nildandahinna town which is the closest commercial center for the farmers of Madulla. Before the reformation of *GN* divisions in 1989, Madulla had only one *GS* division but it has been divided into four *GN* divisions today. These four *GN* divisions are; Madulla north, Madulla south, Kandeyaya and Morahela. Madulla falls under the administrative jurisdictions of Walapane Divisional Secretariat and Nildandahinna *Govijana Kendraya* area. Due to the reason that Madulla is somewhat distinct in terms of location specific characteristics such as low rainfall, mountains, severe shortage of water both for drinking and cultivation, the socio-economic setup of the villagers, production patterns and marketing characteristics are also shaped by these features.

In geographical terms, Madulla falls under up-country dry zone. Most of the rains are received during *maha* season, particularly in November and December. There are several natural water streams in the area but most of them are not perennial. Based on the permanent streams, irrigation anicut schemes have been constructed by the government or by the community specially for cultivation of rice. These anicut schemes are i) Keenawela Ela Scheme, ii) Illukpelassa Scheme, iii) Radigewela Scheme, iv) Gangaragolla Scheme, and v) Kimbula Ela Scheme. As of the records of *Grama - Niladari*, the total cultivated land area of Madulla is around 650 acres. Of this around 30% is under paddy cultivation when the whole area is considered. However, this percentage changes from one GN division to another.

When the whole area is considered, there are 701 families; 238 at Madulla north, 189 at Madulla South, 75 at Kandayaya, and 209 at Morahela. Predominant ethnic group of the area is Sinhalese. The majority belongs to Govigama and the minority composes of several low cast families. As far as the educational status of the village is concerned, the study team found a relatively low literacy rate in this village in comparison to other areas

of the study. The literacy rate reported by *Grama-Nildars* was 80%. *Grama-Niladari* stated that 17% of the labor force of Madullla North and 20% of the labor force of Madulla South are unemployed which are considerably higher than that of the national average. *Grama-Niladari* also added that over 98% of the population are *samurdi* recipients who fall below the poverty line income. With regard to the infrastructure facilities, only about 25% of the population have electricity while none has telephone facilities. However, 99% of the families have radios and about 15% have television sets. When the road network of the area is considered, a relatively better condition is observed in comparison to other areas of the study.

In general, almost all families in the area are involved in crop cultivation activities and animal husbandry. More than 95% of the families depend mainly on farming. The rest are government servants, specially in armed services and the privately owned garment factories. Some families provide wage labor on a casual basis.

3.4.2 Vegetable Production

Vegetable cultivation is not the primary income source of the villagers of Madulla. It is a secondary crop that provides them an additional income. The primary income source of the villagers of Madulla area except the *GN* division of Kandeyaya is cultivation of rice. In Kandeyaya *GN* division where rice is not cultivated due to severe water shortage, vegetable is the main crop. As of the records of *Grama-Niladari* of the area 30% of the farm families of Madulla South and 40% of the families of Madulla North cultivate vegetables, but not on commercial basis. *Grama-Niladari* said that the number of farm families depend mainly on vegetable cultivation in Madulla North is only one and in Madulla South only 10. However, he further said that in the *GN* division of Kandeyaya 100% of the families depend on the cultivation of vegetables.

In Madulla, vegetables are grown on high lands during *maha* season entirely under the rain-fed conditions. However, in *yala,* a few rice lands are also kept under the cultivation of vegetables using irrigation water. In the discussions held with the opinion leaders of the area, it was disclosed that farmers pay more attention to cultivate rice than vegetables under the prevailing setting, even though the physical conditions of the area are pretty much favorable to the cultivation of vegetables. The logic behind the cultivation of rice is quite simple as expressed by the opinion leaders: i) In the discussions, they clarified that the cultivation of rice assures the food security at home whereas vegetable doesn't, ii) Rice is not a perishable crop but vegetables are, iii) Rice is relatively an unsusceptible crop for diseases and pest attacks but vegetables are highly susceptible for diseases and pests, iv) Vegetables are to be marketed immediately after the harvest though rice is not, and v) Income of the family is always at risk when vegetables are cultivated and this risk is minimal in the case of the cultivation of rice.

Establishing the facts discovered in the discussions, the research team also found minimum usage of lands for cultivation of vegetables in the study location. It was estimated by the research team that the lands under the cultivation of vegetables in the

area were under 5% at the time of the study. In a discussion held with the Agricultural Instructor too, unwillingness of farmers for cultivation of vegetables was taken up. The Agricultural Instructor said that he attempted to motivate farmers for vegetable cultivation in several occasions through various interventions but was not successful. Yet, he said that he was able to motivate the farmers to a certain degree to cultivate maize.

According to the results of the sample survey and the interviews with the key informants, it was revealed that the cultivation period of vegetables in *maha* season varies from location to location based on the availability of labour. In Kandeyaya area, villagers commence the *chena* cultivation at the start and then go to the highland for cultivation of vegetables. As a result, planting period of vegetables in Kandeyaya area commence in January and February and harvesting is done in April and May. However, at Madulla North and Madulla South where *chena* is not the priority, planting of vegetables commences in November and December and the harvesting is done in January and February.

One of the noticeable features of vegetable cultivation at Madulla area is the variety of vegetables grown in the area. All vegetable varieties except bean, tomato and cabbage grown in the area are low country vegetables. The major crops cultivated in the area are brinjal, tomato, ladies finger, bitter gourd, luffa gourd, snake gourd, chilli, bean and cabbage. In *chenas*, the most common vegetable crops grown are chilli, wing bean, cucumber and pumpkin. To a certain extent, farmers practice crop rotation techniques. In a discussion with a farmer, for example, following rotational practice was described. In the first year, lufa or snakegourd is cultivated followed by brinjal or tomato. In the second year, bittergourd or lufa is cultivated followed by tomato.

Cultivation of multi-crops is a common practice in the study area especially on highlands. Study team observed a number of farm plots that were under the cultivation of multi-crops mixed with a variety of crops. For example, one of the observed mixed crop cultivation methods was cultivation of bittergourd, lufa, snakegourd and long bean. The logic behind the mixed cropping as explained by the farmers, was risk minimization, plus continuous income from the farm plot.

3.4.3 Agricultural Inputs

Land

As far as the problem of land resources is concerned, the villagers of Madulla do not suffer from the problem. In the discussions, the villagers did not bring any grievance with regard to the shortage of lands but brought about the utilization of land due to shortage of water. It was revealed in the discussions that many farmers have more than one acre of land for cultivation at least in *maha* season under rain fed conditions. In Kandeyaya the land utilization pattern is different from the other GN divisions of Madulla. Without even a single drop of irrigation water, farmers of Kandeyaya cultivate

vegetables. In addition, *chena* cultivation is also practiced in larger scale at Kandeyaya than in other locations. In some scattered land plots, cultivation is also being done under irrigation from agro-wells.

The average size of a land holding of Madulla area is about one acre while in Kandeyaya the average size is little over 2.5 acres which is the largest land unit reported in this whole study. Despite the fact that availability of land at this location is high, production and farmer incomes are reported to be very low in comparison to the size of the land unit.

Water

Water is a scarce resource at Madulla. There is a number of small scale anicut irrigation schemes in Madulla which provides water for rice lands in *maha*. The scarcity of water in *yala* season is the major barrier for cultivation of both rice and vegetables in the village. Many lands are kept uncultivated due to water shortage in *yala*. At the time of the investigation in mid *yala* it was observed that more than 90% of the lands were not cultivated.

Labour

In cultivating vegetables, the farmers entirely depend on both family and *attama* labour. About 80% of their labour requirements are provided from the family and the gap is from shared labour called *attama*. It was reported that due to the reason that males are having opportunities for getting jobs out side the village, the cost of hired labour has gone up recently from Rs. 100/= to Rs. 125/= for a male per day. The labour cost for female is reported at Rs. 75/= per day. The involvement of women is also found in cultivation activities such as weeding and harvesting. The number of man days used in cultivation of major crops is presented in Table 3.19. It was revealed that labor use in cultivation of brinjal is less than 50% of bean and tomato.

Seeds, Fertilizers and Agro-chemicals

The supply of seeds is not a severe problem for the farmers of Madulla. Farmers produce most of their own seed requirements. This includes seed varieties such as bean, brinjal, luffa and bittergourd. Some farmers produce seeds for the market. The opinion leaders were of the view that production of seed bean is more profitable than producing green bean at Madulla. The seed rate for brinjal and tomato is considerably high compared to the recommendation (Table 3.20). This may be a result of use of seeds produced by themselves. Germination capacity of own produced seeds is low. On the other hand, many farmers are unaware of recommended quantity. With regard to the other seed requirements, farmers depend on private traders and *Govijana Kendraya* of the area. The common complaint on the seeds is the poor quality.

Table 3.19
Level of Input Use Per Acre

Crops	Labour	Fertilizer	Agro. Chemical		Seeds
	(Man days)	(Kg.)	(Kg.)	(Le.)	
Beans	123	190	-	3.5	18 (Kg)
Tomato	165	168	2.4	0.8	220 (g)
Brinjals	58	194	0.2	8.32	269 (g)

Source: Survey Data

Table 3.20
Comparison of Actual Use of Seeds per Acre with the Recommended Levels

Variety	**Actual Use***	**Recommendation****
Beans	18 (Kg)	18 – 24 (Kg)
Brinjal	269 (g)	142 – 152 (g)
Tomato	220 (g)	69 – 81 (g)

Sources: * Survey data
** Dept. of Agriculture

As far as the application of fertilizer is concerned, as much as 90% of the farmers in Madulla area use only chemical fertilizers. Utilization of organic fertilizer is a practice at Kandayaya to a certain extent. With regard to the utilization of agro chemicals not more than 50% of farmers use them. As viewed by the Agricultural Instructor of the area, application of both agro chemicals and fertilizers is relatively low at Madulla in comparison to bordering villages. He further stated that accessibility to fertilizers and agro chemicals is a problem in this area to a certain extent due to its remoteness. Confirming this fact, the *Goviniyamaka* also pointed out about the accessibility of agro chemicals and fertilizers but added that he himself has opened an input shop at the village now to solve this problem. He said that his shop would not satisfy the entire input needs of the farmers at present but in the near future it would. The amount of fertilizers and agro-chemicals applied and seeds used by the farmers in cultivation of major crops are presented in Table 3.19. Also, an attempt was made to compare actual use with the levels recommended by the DOA. Results are presented in Table 3.21. It is clear from the table that low level of fertilizer application is prominent at Madulla.

Table 3.21
Comparison of Actual Usage of Fertilizer with the Recommended Levels

Quantity in Kg/Acre

Variety	Actual Usage*				Recommendation**				Difference				
	N	P	K	Total	N	P	K	Total	N	P	K	Total	%@
Beans	113	34	43	190	89	111	45	245	24	-77	-2	-55	76
Brinjals	97	47	50	194	130	136	69	335	-33	-89	-19	-141	58
Tomato	71	51	46	168	80	137	53	270	-9	-86	-7	-102	62

N - Nitrogen, P - Phosphorus, K - Potassium
@ Total amount of actual use as a percentage of the total recommended amount.

Sources: * Survey Data,
** Dept. of Agriculture

Agricultural Credit

Farmers in Madulla are not used to obtain credit for vegetable farming. The way of farming at Madulla is traditional. As they do not spend more money on agricultural inputs such as fertilizers and chemicals, credit needs are also relatively low. On the other hand, culturally, they are reluctant to obtain credit. One farmer said that credit is not a good term in their culture. Most of the transactions are carried out on spot cash. As they openly expressed in the PRA session, obtaining of credit was a way for them to be indebted but not a way to accelerate their income generating activities. However, in the discussions held with the Divisional Officer of the area, the views of the farmers were not confirmed. He said that he has a number of good customers who transact with *Govijana Kendraya.*

Agricultural Extension Services

Due to the fact that the cultivation of vegetables is not predominant in the rural economy of Madulla, at present, requirements for extension services are also low. In spite of this given condition, the research team is of the opinion that provision of extension services for the villagers of Madulla is an important priority because the high potential of the area for cultivation of vegetables.

3.4.4 Average Yield

The average yield and the potential yield of three vegetables grown in Madulla are presented in Table 3.22. The actual yields for all the vegetables concerned remain well below the potential. The situation is worse for beans in which actual yield is 58% less than the potential level. The lowest yield is registered for brinjal.

Table 3.22
The Average Yield and the Potential Yield

Crop	Average Yield* (Mt/Ac)	Potential Yield** (Mt/Ac)	Gap of Potential Yield (%)
Bean	2.02	4.82	-58.09
Tomato	3.12	4.3	-27.44
Brinjal	1.97	-	-

Note: Since agro-climatic conditions in the study locations are similar to as in Kandy, potential yields in relation to the Kandy district were taken.

Sources: * Survey data

** Horticulture Division, Dept. of Agriculture

3.4.5 Costs of Production

The cost of production for major crops grown at Madulla is given in Table 3.23. Labor cost accounts for around 50% of the total cost for all the crops studied, when the cost of farmer's own inputs are added to the cost. However, cash cost is very low because of the usage of the family labor.

The unit cash cost is less than Rs. 4.00 for all the crops concerned. However, costs for fertilizer and agro-chemiclas represents over 75% of the cash cost in cultivation of brinjal and tomato. Cash requirement for cultivation of brinjals is Rs. 4500/= which is half of the cash needed for tomato farming. Detailed information on costs of production is given in the Annex 3.4.

Table 3.23 A

Costs of Production of Selected Vegetables Grown by the Madulla Farmers (Rs/Acre) Including Imputed Cost

Cost	Bean	%	Tomato	%	Brinjal	%
Seeds	4700	13.13	1620	4.67	395	3.03
Labour	17900	50.01	23850	68.73	8175	62.68
Fertilizer	2146	6.00	2639	7.61	2308	17.70
Agro Chemicals	2280	6.37	4160	11.99	2005	15.37
Others*	8765	24.49	2430	7.00	160	1.23
Total	35791	100	34699	100	13043	100
Avg. Yield	2019		3120		1966	
Cost (Rs/Kg)	17.73		11.12		6.63	

* Refer to the Annex 3.4.1 - 3.4.4

Source : Survey Data

Table 3.23 B

Costs of Production of Selected Vegetables Grown by the Madulla Farmers (Rs/Acre) Excluding Imputed Cost

Cost	Bean	%	Tomato	%	Brinjal	%
Seeds	1700	22.59	620	6.84	95	2.11
Labour	1400	18.60	1650	18.19	100	2.22
Fertilizer	2146	28.51	2639	29.10	2308	51.20
Agro Chemicals	2280	30.29	4160	45.87	2005	44.48
Total	7526	100	9069	100	4508	100
Avg. Yield	2019		3120		1966	
Cost (Rs/Kg)	3.73		2.91		2.29	

Source : Survey Data

3.4.6 Incomes from Vegetable Farming

Table 3.24 shows gross and net income received by the farmer from cultivation of vegetables. It shows that tomato fetched the highest return of Rs. 3,5501/= per acre even in the situation where own farm inputs are costed. Table 3.24 further reveals that bean does not give a high return. It gives only Rs. 3,236/= per acre after deducting the cost of own inputs.

Table 3.24
Farmer Income from the Selected Vegetables (Rs/Acre)

Crops	Gross Income	Net Income	
		Exc. Imputed cost	Inc. Imputed cost
Bean	39,027	31,501	3,236
Tomato	70,200	61,131	35,501
Brinjal	20,800	16,292	7,757

Source: Survey data

CHAPTER FOUR

Marketing of Vegetables in the Study Sites

4.1 Handawalapitiya

4.1.1 System Organization

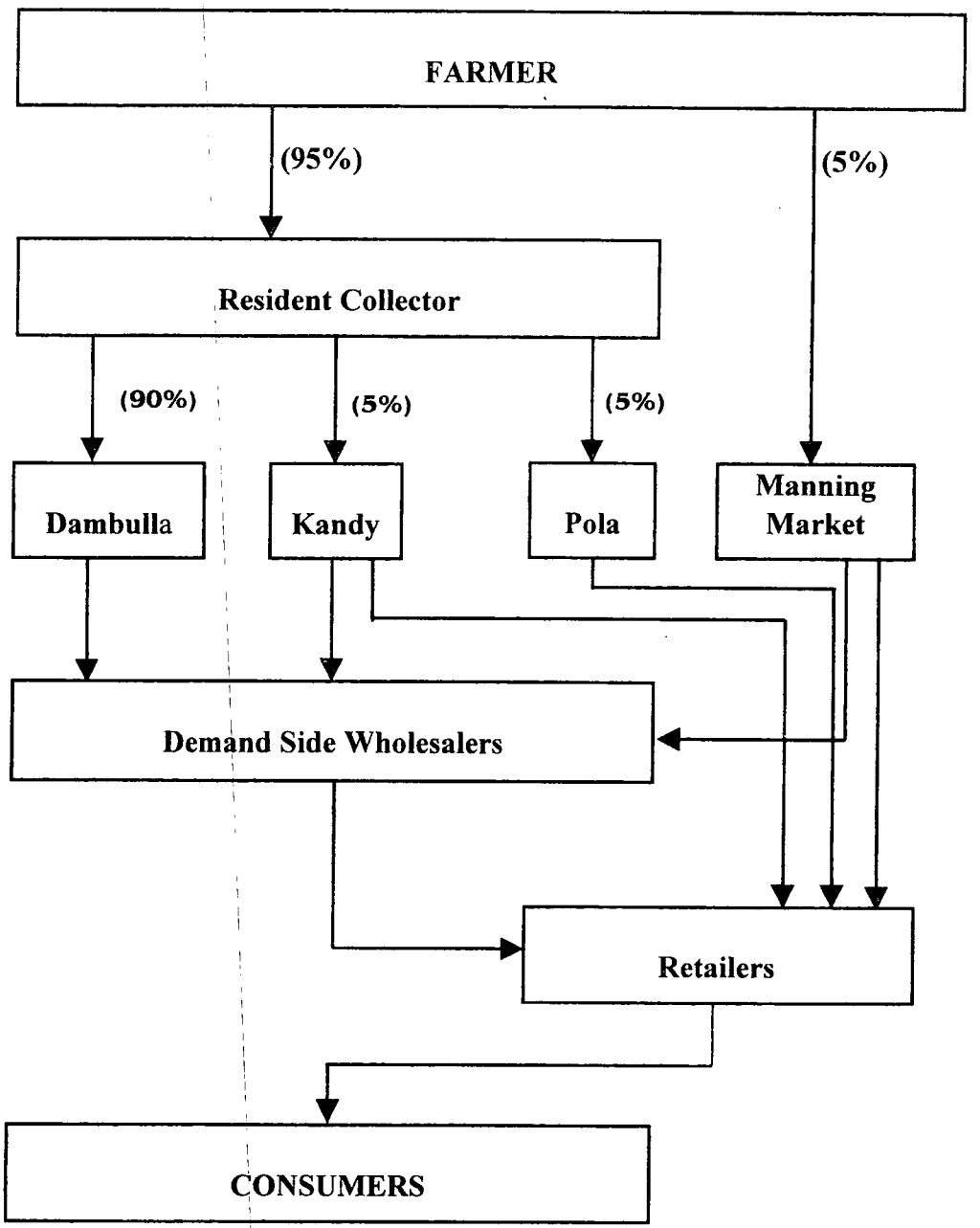
Farmers of Handawalapitiya have two alternatives to market their vegetables (Chart 4.1). The first alternative is to sell them to the resident collectors and the second is to send the produce to Manning market in Colombo for sale on commission basis. There are four vegetable collectors in the territory who employ four distinct trading tactics and avenues in marketing vegetables. Two of them trade their collections to Dambulla market and one of them trades at Kandy market too on commission basis. The third collector carries out his business activities with the Colombo *Manning* market and the fourth collector supplies his vegetables to Chilaw, a city of western border of the country and sells to *pola* retailers of the area. His business is in operation at Handawalapitiya both on Tuesdays and Fridays and he transports the vegetables purchased by him on the same day for trading among the *pola* retailers of Chilaw on subsequent days.

The market share of these four traders is over 95% of the total marketed surplus of vegetables in the area. The biggest collector who owns an input shop has access to about 40% of the market share. It was discovered in the discussions held with the farmers at Handawalapitiya that none of the traders is competing with each other for purchasing of vegetables from the farmers. They work either as a cartel or as a coalition in order to maintain their profit margins. However, non-price competition among the traders is observed in the village. For example, some traders disburse agricultural inputs free of charge and sell fertilizers and agro-chemicals to the farmers on credit basis anticipating more purchases from their customers. As disclosed in the interviews with the traders, dispatching of vegetables to Manning market in Colombo is a new development in the area. This has commenced a few months ago by a trader who has bought a new lorry.

About five years back, farmers sent vegetables to the Kandy market through a transport agent. This particular trader has quitted the business due to non-business related reason. At the time of the investigation he was in the process of commencing the business again. This indicates that free entry and exit are possible for the traders of this area.

Chart 4.1

Marketing Channals for Vegetables Grown at Handawalapitiya



With regard to the application of specialized marketing techniques the research team did not observe any development at Handawalapitiya. Product differentiation does not exist in the farm level market due to the absence of sorting, grading and packing modifications. Hence, no observable reasons are found that could lead to price variations among the produce. Almost all the farmers supplied their produce to the mass market where differentiated products were not expected.

It was noticed that the farmers were unaware of the prices of the markets where their vegetables are sold while traders were well aware of both market prices and the supply situation of their purchasing locations. Under these circumstances, traders of the territory are observed to be in a better position to dictate the prices for the produce than that of the dependant farmers. Opinion leaders of the area described that the vegetables brought down to the roadsides on the purchasing days cannot be taken back to homes by the farmers and that has been an additional opportunity for the traders to fix the price unilaterally. The opinion leaders also highlighted the fact that the high perishablity of vegetables which too helps the traders in dictating the price.

4.1.2 System Operation

The harvesting days are always based on the marketing schedule of the resident collectors. At the initial step of the operation, it is required for the farmer to bring his produce to the roadside for sale. Then resident collector purchases them mainly on spot cash particularly from the farmers who are not obliged to sell him. In the instances where the collector has provided inputs to the farmer on credit basis or input is transported to the farmer free of charge, delayed payment is also experienced. Under these situations, to a certain extent, the farmer is also obliged to the collector for selling his produce. The quality of the produce is neither a main concern for the collector nor the farmer. The marketing web of the collectors in this area is somewhat peculiar when compared with the developed trading sector of vegetables. It was found that four collectors of the area have four different distinct patterns of trade that leads to keep the farmer in a deeper trouble if he is interested to know about the day to day prices of the market. As mentioned in the first paragraph under marketing organization of Handawalapitiya, out of the four collectors, one sells to Dambulla wholesale market. The second one sells his collection to Kandy wholesale market on the same day and the other day to Dambulla wholesale market. The third one sells his vegetables to retailers of periodical markets of Chilaw area and the fourth supplies to the Colombo Manning market for sale on commission basis while working as a vegetable transport agent.

As in many places, the major packing material is poly sack. A poly sack can contain about 45 - 55 kg. of vegetables and can be used for more than one time. The cost of a poly sack is around Rs. 17/= and the cost is borne by the farmer. The collector returns the bag to the farmer when he comes to collect vegetables. At the time of the purchase, the trader reduces one kilogram per bag as the weight of the sack. Tomato is packed in wooden boxes and a box contains about 18 - 22 kilograms. The weight deducted in this business

is 3 kilograms per box. The price of a wooden box is around Rs. 35/= and the box can be used 5 - 6 times.

All vegetable conveyances are lorries with open bodies that provide more ventilation for vegetables during the transportation process. A lorry load contains about 3,500 kilograms of vegetables handled by a crew of three members. The crew consists of the trader, driver and an cleaner. In the case of transportation of vegetables to Dambulla market, the lorries leave at 5.00 pm. on the scheduled day and in the event of transportation to Colombo market scheduled leaving time is 8.00 pm. Due to the fact that the Colombo wholesale market is well organized customarily, the trader is not accompanied with the lorry.

4.1.3 System Performance

By reason of the major marketing channel to Handawalapitiya vegetable farmers is Dambulla, the cost of vegetable transportation to Dambulla market is worked out below. The total cost for transporting to Dambulla is Rs. 1,960/= per load or cents =/65 per kg. Food expenditure for three persons accounts for 30% of the cost. The hiring charge from Handawalapitiya to Dambulla is Rs. 2,500/= per trip.

Table 4.1
Cost of Vegetable Transportation to Dambulla Market

Items	Amount in Rs.
Fuel	900
Driver	250
Assistant	200
Meals	600
Parking	10
Total	1960
Cost per Kg (3000 Kg load)	0.65

Source: Survey data

The Table 4.2 and Chart 4.2 given below display analysis of marketing margin for selected crops. The marketing channel used for this analysis is the farmer →the resident collector → *Dambulla* market → the retailer who is the prominent person.

As shown in the Table 4.2 farmers have received 41% of the consumer price on an average. Price spread between prodducer and wholesale level is Rs 7/= per kg which represents 17% of the consumer price. The gap between wholesale and retail level is Rs. 18/= per kg. which represents 42% of the consumer price. After reduction of the major variable costs, resident collector's net margin is 14% of the consumer price followed by 28% for the retailer. The value of the wastage represents 8% of the consumer price. As usual, the wastage for cabbage is higher than others. The reason is harvesting with more leaves to protect the product while transporting.

The Table 4.2 further indicates that retailer's net margin is higher for vegetables with low prices. For instance, net margin for raddish is as high as 40% of the consumer price and it exceeds the producer's margin as well. According to the retailers, they fix low price for expensive vegetables because consumers are consious. This also confirms from the study findings. As shown in the table, retailer's margin is the lowest for carrot which is the most expensive vegetable.

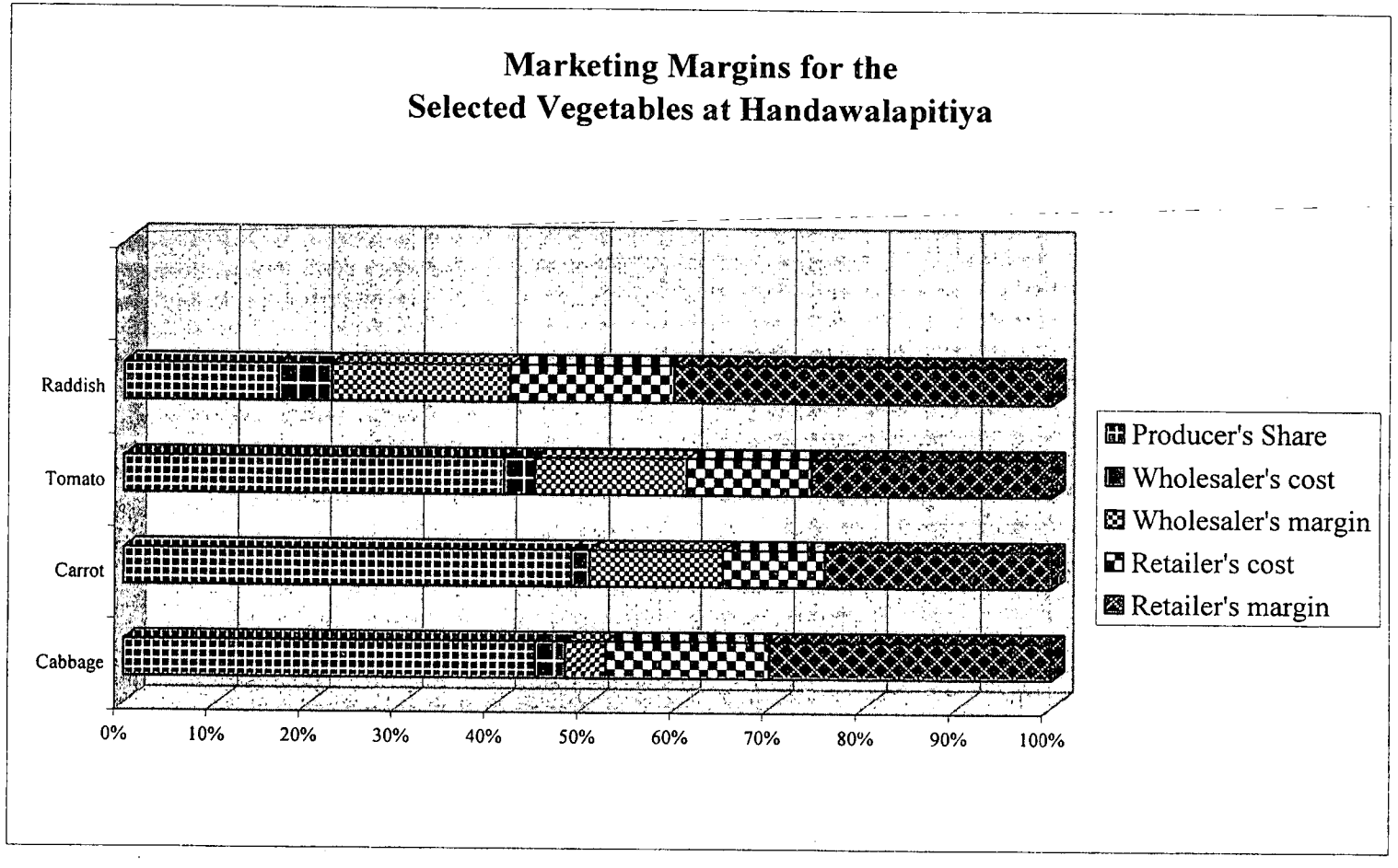
Table 4.2
Analysis of Marketing Margins for Selected Vegetables Grown at Handawalapitiya (Rs./100 Kg.)

	Cabbage		Carrot		Tomato		Raddish	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
1.Producer's Price	1600.00	44.4	2800.00	48.3	2300.00	41.1	400.00	16.7
Cost (Resident Collector)								
Transport to Dambulla	45.00	1.3	45.00	0.8	112.50	2	67.50	2.8
Commission (Cents 50/Kg.)	50.00	1.4	50.00	0.9	50.00	0.9	50.00	2.1
Parking	.0.50	0.01	0.50	0.01	0.50	0.01	0.50	0.02
Meals	20.00	0.6	20.00	0.3	20.00	0.4	20.00	0.8
Margin	159.50	4.4	834.50	14.4	917.00	16.4	462.00	19.3
2. Retailer's Purchasing Price	1875.00	52	3750.00	64.7	3400.00	60.8	1000.00	41.7
Cost (Retailer)								
Transport to Hingurakgoda	20.00	0.6	20.00	0.3	50.00	0.8	30.00	1.2
Market levy	33.00	0.8	33.00	0.6	33.00	0.6	33.00	1.4
Loading/Unloading	20.00	0.6	20.00	0.3	50.00	0.8	30.00	1.2
Wastage	412.50	11.5	412.50	7.1	468.00	8.4	180.00	7.5
Meals	150.00	4.2	150.00	2.6	150.00	2.7	150.00	6.3
Margin	1089.50	30.3	1414.50	24.4	1449.00	25.9	977.00	40.7
3. Consumer's Buying Price	3600.00		5800.00		5600.00		2400.00	

Marketing Channel : Farmer (Handawalapitiya) -> Recident Collector (Handawalapitiya) -> Dambulla Wholesale Market -> Retailer (Hingurakgoda) -> Consumer

Source: Survey Data.

Chart 4.2



Source : Survey data

4.2 Mandaramnuwara

4.2.1 System Organization

Farmers have three options to sell their produce: 1) demand side wholesalers 2) resident collectors and 3) fair retailers (Chart 4.3). Many demand side wholesalers mainly from Kegalle, Mawanella, Avisawella, Minuwangoda and Ampara come on Tuesdays and Saturdays due to the fact that *polas* of their localities are operating on the subsequent days. Farmers who have their cultivation plots near by motarable roads bring their vegetables to road sides and the farmers who cultivate in the interior carry vegetables to *pola* located in the junction called Bogahahandiya. The number of lorries coming from distant demand areas to *pola* exceeds 100 per day during the peak season and 5 to 10 lorries in the lean period. During the intermediate season number of lorries that come to the location is reported to be about 25 per day.

With regard to the number of collectors operating in the area is concerned, there are about 5 resident collectors in and around Mandaramnuwara and all of them have lorries. Almost every one has roughly about 20% regular customers out of his total. The common strategies applied by the collectors to establish relationship with the customers are; provision of facilities for transportation of fertilizer and provision of credit to meet the emergency requirements of the clientele.

Although there is a large number of traders at Mandaramnuwara, bargaining power of the farmer is seemed to be undermined due to the absence of accurate and reliable price information plus unorganized selling. Due to the reason that the vegetable collecting point at Bogahahandiya is composed of hundreds of farmer suppliers with ample amount of vegetables during the peak season, market is created providing more say to the buyer than the seller which could be defined as a "buyers" market.

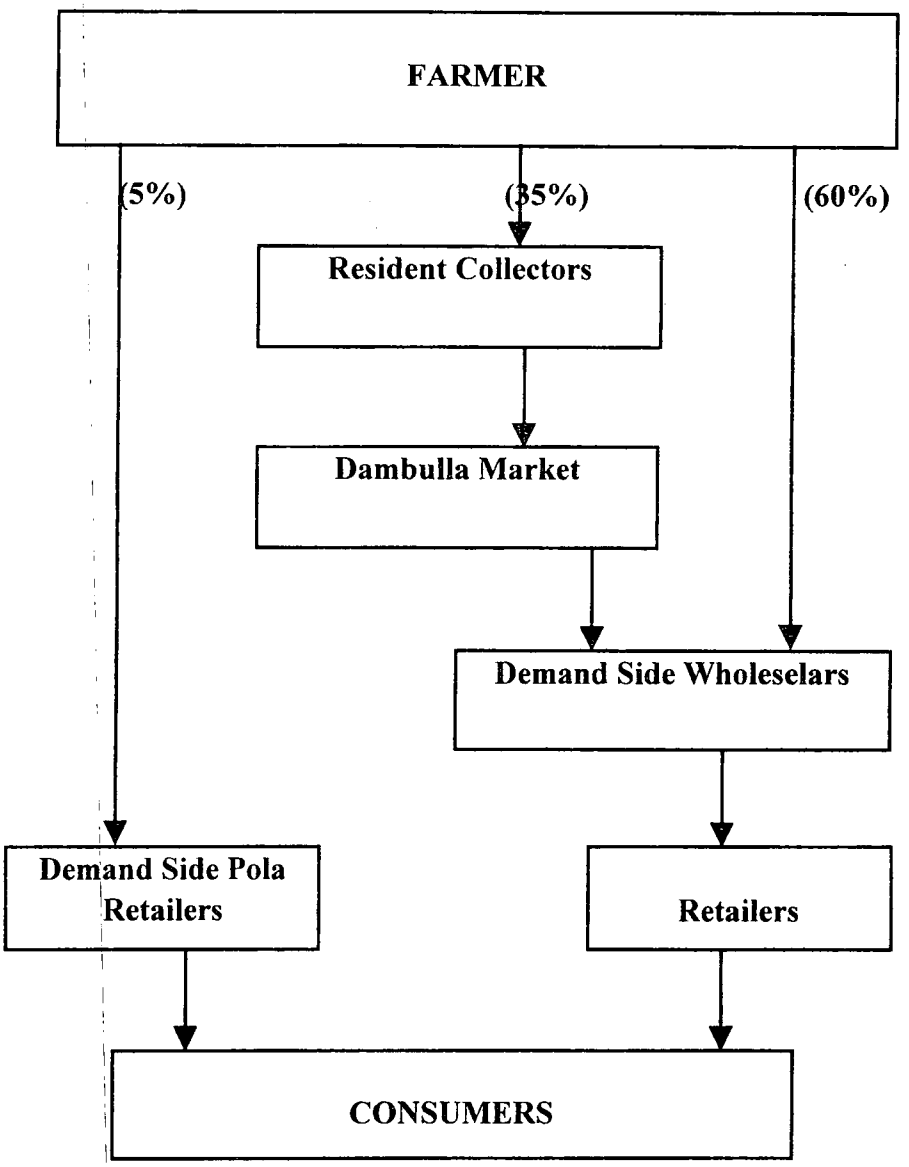
No entry barriers are found for the traders to enter into the vegetable trade at farm level. The initial capital requirement estimated for a trader to be in the business at the farm level is around Rs. 35,000/=. It was detected that two new traders have entered into the vegetable business during last three years and some five traders have quitted the business during the same period. The identified reasons for the quitting were financial losses occurred in the vegetable trading sector with the collapse of potato cultivation.

4.2.2 System Operation

In connection with the marketing system in operation at Mandaramnuwara, resident collectors and demand side traders play key roles. Resident collectors and demand side traders purchase vegetables from *pola* by competing with each other on *pola* days and on the other days collect vegetables from roadsides where vegetables are kept at various places in a scattered manner. Almost all vegetables purchased by resident collectors are transported to Dambulla wholesale market for sale. Lorries leave for Dambulla at about

Chart 4.3

Marketing Channals for Vegetables Grown at Mandaramnuwara



5.00 p.m. and return from Dambulla at about 4.00 am on the subsequent day. Wholesale trading at Dambulla takes place at night, mostly between 8 to 10 p.m. As a matter of course, unloaded lorries return from Dambulla. Unlike in commission trading in Colombo, the trader himself attend in transactions with Dambulla market. Surprisingly, at Dambulla market, price decisions are made finally by the suppliers and not by the traders. In Colombo, however, commission agent takes decisions on selling price on behalf of the supplier. Selling of vegetables at Dambulla market is on spot cash.

The demand side traders commence their chain of transactions giving orders to collectors with sacks at Kandehandiya, then at Hanguranketha, and at Rikillagaskada. Their last destination is Madaramnuwara, the place where they directly purchase from farmers and leave for other places for purchasing.

Many vegetables are packed with poly sack bags and each of them contains about 45 to 55 kg. of vegetables. The cost per bag is around Rs. 17/=. Many reported that the bag can be used only once but the damaged ones can be used for packing of leeks and raddish. Tomato is packed with wooden boxes which contain 18 - 22 kg. A wooden box costs around Rs. 40/=. Traders deduct one kilogram for a poly sack and 3 kilograms for a tomato box at the time of purchasing vegetables from farmers.

To a greater extent, the price paid to the farmer is determined by the wholesale price prevailed in the previous night at the Dambulla wholesale market. Traders are in a more stronger position in price formation than that of the farmers for the reason that the farmers are unaware of the current prices. It was also found in the discussions that farmers couldn't take unsold vegetable stocks back to their homes and that too contributes to reinforce the position of the trader. Demand side traders purchase vegetables entirely on spot cash while resident collectors purchase mostly on spot cash and in some cases on delayed payments. In most of the cases, resident collectors are able to purchase quality vegetables than that of the demand side traders and there are instances where they themselves harvest crops of the farmers like cabbage in order to ensure the quality. Traders reported that they spend about Rs. 1,000/= for harvesting of 2,000 kg. of cabbage per day for labour, packing and transporting them to the road side.

4.2.3 System Performance

In this section, two analysis are carried out; the major costs for transporting vegetables to Dambulla and marketing margin. Table 4.3 indicates expenditure incurred for transporting vegetables to Mandaramnuwara to Dambulla transport cost to Dambulla is cents 90 per kg. Daily expenditure, namely meal cost is Rs. 500/= for a trip. This is the second highest, next to fuel.

Table 4.3

Costs for Transporting Vegetables to Dambulla

Cost Items	Amount in Rs.
Fuel	800
Driver	250
Assistant	200
Meals (3)	500
Parking	15
Total	1765
Cost per Kg. (2000 Kg. Load)	Rs.0.88.

Source: Survey data

The table and chart given below display analysis of marketing margins for selected crops. The marketing channel used for this analysis is the farmer →the resident collector → *Dambulla* market → the retailer who is the prominent person.

As shown in the Table 4.4 the farmers received 50% of the consumer price on an average. Price spread between producer and wholesale level is Rs 5/= per kg which represents 11% of the consumer price. The gap between wholesale and retail level is Rs. 18/= per kg. which represents 39% of the consumer price. After reduction of the major variable costs, resident collector's net margin is 8% of the consumer price followed by 25% for the retailer. The value of the wastage represents 7% of the consumer price. With regard to individual vegetable, farmer's share is as low as 25% of the consumer price for raddish because retailers keep high margin (40%). Retailers usually maintain big margin for cheaper vegetables like raddish. With regard to wastage, value of wastes of cabbage nearly 15% of the consumer price. This is due to sending cabbage with discarded leaves from the farm level to the retail level. Farmers used to harvest cabbage with discarded leaves in order to protect the quality of the product while transporting.

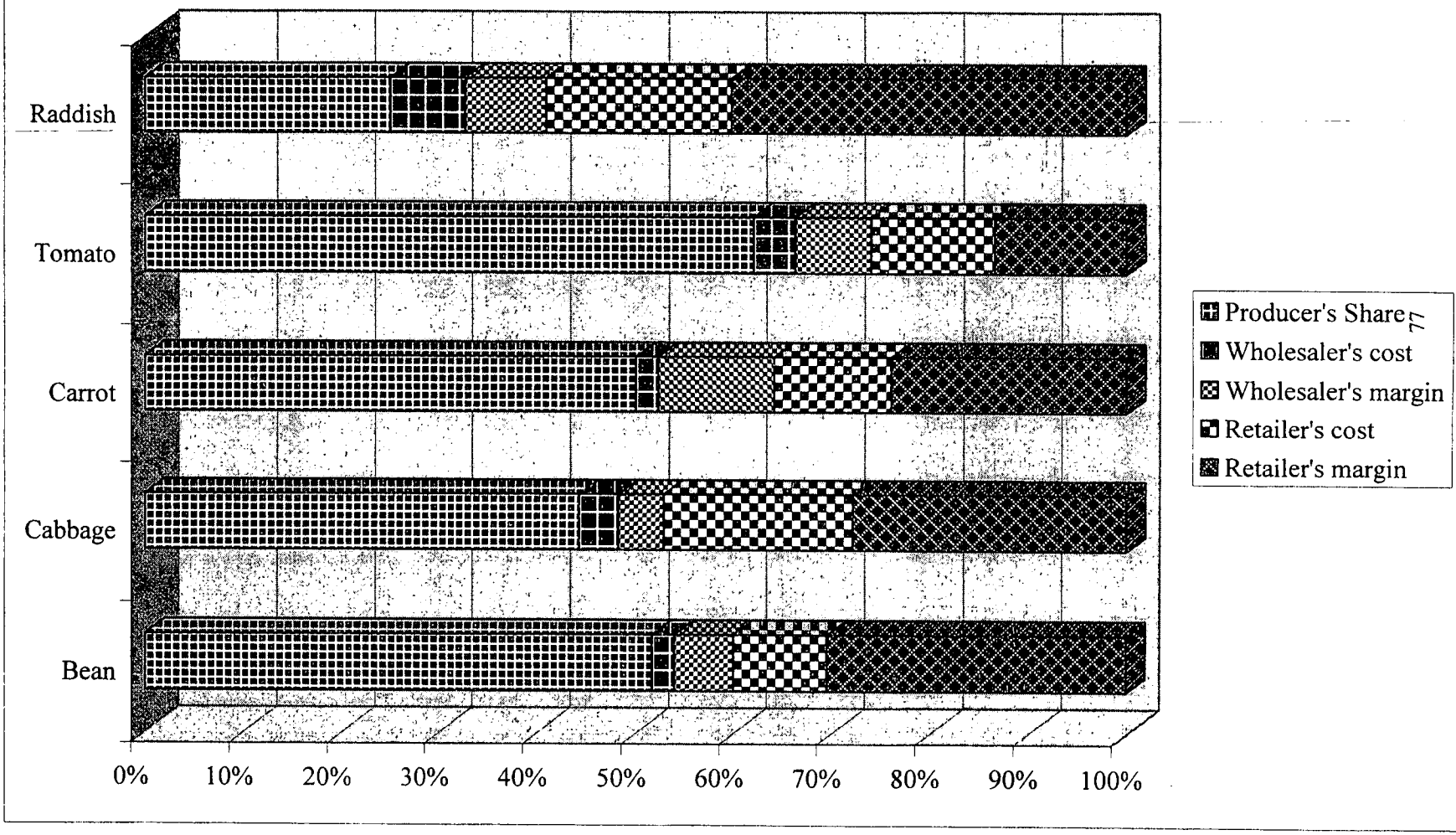
Table 4.4
Analysis of Marketing Margins for Selected Vegetables Grown at Mandaramnuwara (Rs./100 Kg.)

	Beans		Cabbage		Carrot		Tomato		Raddish	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
1.Producer's Price	3100.00	52	1550.00	44.3	3000.00	50	3350.00	62	550.00	25
Cost (Resident Collector)										
Transport to Dambulla	62.50	1.0	62.50	1.79	62.50	1.05	156.25	2.9	93.75	4.26
Commission (Cents 50/Kg.)	50.00	.84	50.00	1.43	50.00	.84	50.00	.94	50.00	2.27
Parking	0.75	.01	0.75	.02	0.75	.01	0.75	.01	0.75	.03
Meals	25.00	.42	25.00	.71	25.00	.42	25.00	.46	25.00	1.14
Margin	361.75	6.02	161.75	4.62	711.75	11.9	418.00	7.75	180.50	8.2
2. Retailer's Purchasing Price	3600.00	60	1850.00	52.9	3850.00	64.2	4000.00	74.0	900.00	40.9
Cost (Retailer)										
Transport to Bakamoona	20.00	.33	20.00	.57	20.00	.33	50.00	.93	30.00	1.36
Market levy	25.00	.42	25.00	.71	25.00	.42	25.00	.46	25.00	1.14
Loading/Unloading	20.00	.33	20.00	.57	20.00	.33	50.00	.93	30.00	1.36
Wastage	360.00	6.0	462.50	13.2	500.50	8.3	400.00	7.41	180.00	8.18
Meals	150.00	2.5	150.00	4.29	150.00	2.5	150.00	2.78	150.00	6.83
Margin	1825.00	30.4	972.50	27.8	1434.50	23.9	725.00	13.4	885.00	40.2
3. Consumer's Buying Price	6000.00		3500.00		6000.00		5400.00		2200.00	

Marketing Channel : Farmer (Mandaramnuwara) -> Resident Collector (Mandaramnuwara) -> Dambulla Wholesale Market -> Retailer (Bakamoona) -> Consumer

Source: Survey Data.

Chart 4.4
Marketing margins for the
Selected Vegetables at Mandaramnuwara



4.3 Theripaha

4.3.1 System Organization

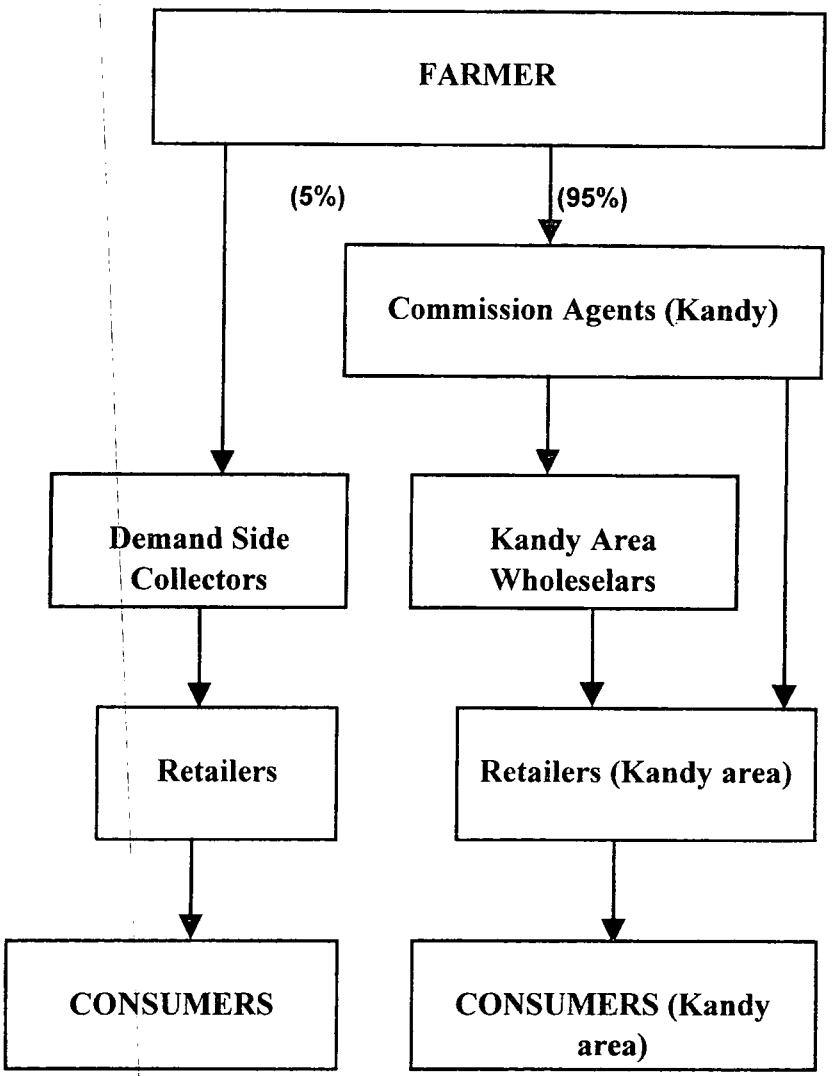
There are two options for the farmers of Theripaha to sell their products (Chart 4.5). They are: a) marketing of vegetables to Kandy market on commission basis and b) selling the produce directly to the demand side traders at Kalaganwatta located about 5 kilometers away from the village. No vegetable collectors are found in this area either on large scale or on small scale. It was revealed in the discussions with the farmers, that farmers have complete freedom to change their marketing channels or traders with no harmful repercussions. Farmers of Theripaha send their vegetables to several commission agents. Price is considered as the most crucial factor in selecting an agent. Selling of vegetables to the demand side traders gives more economic benefits to the farmers but it is not easy to access them due to transportation problems. Many farmers have to carry vegetables on their head if they select demand side traders. Otherwise, Rs.75/= per bag (50 kg) is charged by the hired labourers to carry the stuff from the farm-gate to the center of collection. It was estimated that over 95 % of the farmers are dependent on commission traders because of these given circumstances. As far as the amount of vegetable production of Theripaha is concerned, it is estimated that five fully loaded lorries per week carry vegetables to the Kandy market during the off season. It was revealed in the discussions that this production is doubled during the peak production period. The lorries have specific dates and places to collect vegetables. No competition is observed among them in transporting the items.

No observable restrictions are found for a new trader to enter into the vegetable business at Theripaha. However, surprisingly the number of traders has not increased during last three years. It was revealed in the interviews with the traders that due to extensive financial investments in the business and due to high risks involved in vegetable marketing, new traders were reluctant to enter into the business

Farmers declared that there is no reliable and independent source available for the farmers to know about the day to day wholesale market prices of Kandy. They said, therefore, in many instances, they have to depend on the information provided by the lorry drivers. Some farmers used to listen to the Colombo wholesale prices broadcast by the radio. The farmers who listen to the radios stated that those information are important for them to have an idea about the price behavior of the marketing network although the informations are not directly relevant to them. In this study it was confirmed that in the absence of an accurate and reliable market information system, the possibility of emerging a competitive price for the farmers is unrealizable. Currently, Theripaha farmers merely depend on the untrustworthy market information which leads them to be exploited by the commission traders.

Chart 4.5

Marketing Channals for Vegetables Grown at Theripaha



4.3.2 System Operation

As far as the operation of the marketing system is concerned, farmers have to adhere to the transportation schedule of the lorry drivers if they need to sell the vegetables to Kandy wholesale market. For instance, they have to harvest the crop at about 10 am. and should bring them to the roadsides at about 2.00 p.m. for transportation. The lorries leave for Kandy at about 8.00 p.m. on the scheduled day in order to be in the queue early. In the process of selling vegetables, commission agent charges 10% of the selling price as his commission. In addition, he deducts the costs involved in transportation (Rs.40/= per bag (50 Kg) of vegetables and Rs. 30/= for a box of tomato) and charges involved in unloading (Rs. 2/= per bag to *Nattami*). The balance is paid to the lorry driver with the detailed bill to be conveyed to the farmer. In many instances, farmer gets his money from the lorry driver on the next vegetable collection day. Farmers are of the opinion that this commission system has inherent disadvantages for the farmers and is deficient remarkably in terms of competitiveness. They also added that in this system, the price of the produce is known by the farmer after the sale and also farmers have to rely on the price reported by the commission agent. In addition, it was revealed in the discussions that commission trade provides opportunities for the agents to cheat the farmers in terms of reporting under weight and low quality.

The demand side wholesalers purchase vegetables on spot cash directly from the farmers. Price paid to the farmer rests mainly on the prices of Dambulla wholesale market. Since these traders are so much concerned about the quality of the product, farmers have some additional work to be performs in the selling process. These include cleaning, washing and sorting of vegetables. Since the quality is a concern, demand side wholesalers pay more attention for packing and loading too. All the vegetables, except leeks and radish are packed in special bags called poly sack. One bag contains 45 - 55 kg of vegetables. Tomato is packed in wooden boxes, each box contains 18 - 22 kg. Leeks and radish are bundled with damaged poly sack using coir ropes.

4.3.3 System Performance

Due to the fact that the commission trading is established at Theripaha, transporters play a key role in the business. It is known that commission trading is possible only if an efficient transportation system is in operation from the farm gate to the wholesale market. Following is a list of cost items that involves in transportation of one lorry load of vegetables from Theripaha to Kandy.

Table 4.5

Transportation Cost of Vegetables Theripaha to Kandy

Items	Amount in Rs.
Fuel	500
Driver	150
Assistant	100
Meals (3)	300
Parking	15
Total	1065
Cost per Kg. (7,500 Kg. Load)	0.14

Source: Survey data

By reason, one fully loaded lorry contains 150 bags of vegetables and transport charge per bag is Rs. 40/=, the total gross income per trip is Rs. 6000/= for the lorry owner. His net income is Rs. 4,935/= which was calculated after reduction of transport cost (Rs. 1065/=) from the gross margin. However, depreciation cost of the lorry is also included in this value. Expenditure for meals is the second highest, next to fuel.

The table and chart given below display an analysis of marketing margins for selected crops. The marketing channel used for this analysis is the farmer →Commission Agent (Kandy) → the retailer who is the prominent person.

As shown in the Table 4.6 farmers have received 42% of the consumer price on an average. Price spread between producer and commission agent (wholesaler) is Rs 3/= per kg which represents 8% of the consumer price. The gap between wholesale and retail level is Rs. 20/= per kg. which represents 50% of the consumer price. After deduction of the major variable costs, retailer's margin is 39% of the consumer price. This appears to be high when compared to 28% for the Handawalapitiya system and 25% for the Mandaramnuwara system. The value of the wastage represents 6% of the consumer price. This is in line with the other two locations. As regard to vegetables seperately, farmer's share is 32% for cabbage and 38% for brinjal.

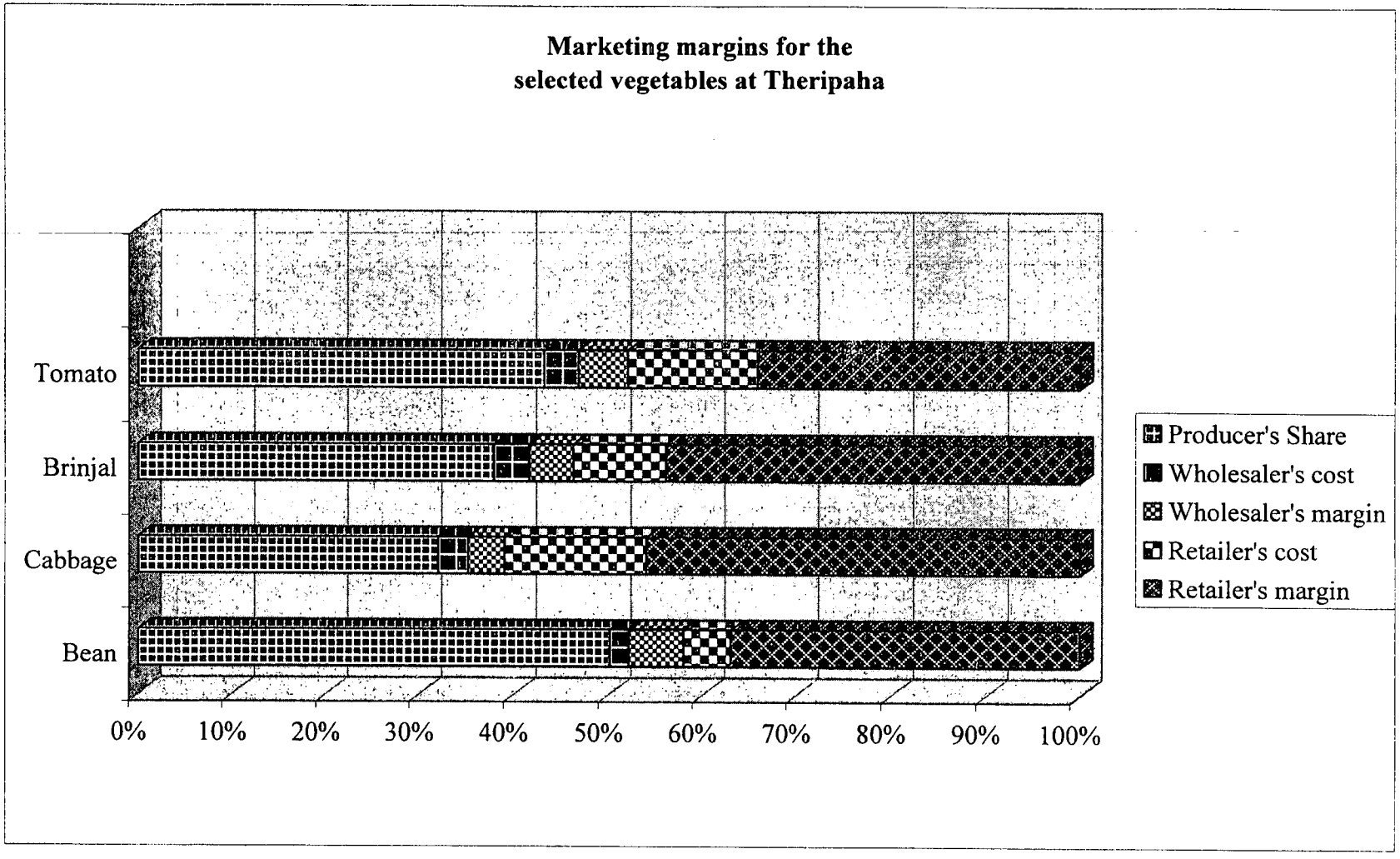
Table 4.6
Analysis of Marketing Margins for Selected Vegetables Grown at Theripaha (Rs./100 Kg.)

	Bean		Cabbage		Brinjal		Tomato	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
1.Producer's Price	2510.00	50.2	1025.00	32.1	1025.00	38	2075.00	43.2
Cost (Farmer)								
Transport to Kandy	90.00	1.8	90.00	2.8	90.00	3.3	150.00	3.1
Unloading	10.00	0.2	10.00	0.3	10.00	0.4	25.00	0.5
Commission Agent's Share (10%)	290.00	5.8	125.00	3.9	125.00	4.6	250.00	5.2
2. Retailer's Purchasing Price	2900.00	58	1250.00	39	1250.00	46.3	2500.00	52
Cost (Retailer)								
Transport to the Retail Point	6.00	0.12	6.00	0.2	6.00	0.2	6.00	0.1
Market levy	10.00	0.2	10.00	0.3	10.00	0.4	10.00	0.2
Wastage	87.00	1.7	312.50	9.8	100.00	3.7	500.00	10.4
Meals	150.00	3	150	4.7	150.00	5.6	150.00	3.1
Margin	1847.00	36.9	1471.50	46	1184.00	43.8	1634.00	34.1
3. Consumer's Buying Price	5000.00		3200.00		2700.00		4800.00	

Marketing Channel : Farmer (Theripaha) -> Commission Agent (Kandy) -> Retailer (Kandy) -> Consumer

Source: Survey Data.

Chart 4.6


Marketing margins for the
selected vegetables at Theripaha
Tomato
Brinjal
Cabbage
Bean
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Producer's Share
Wholesaler's cost
Wholesaler's margin
Retailer's cost
Retailer's margin

4.4.1 System Organization

With regard to the system organization of marketing is concerned, farmers of Madulla area have four different marketing channels: i) direct selling mainly to consumers and then to wholesalers or to retailers in the vicinity of *polas* located at Ragala, Nuwara-Eliya and Kandapola, ii) selling to resident collectors who in turn sell at fairs, iii) selling to resident -farmer cum collectors who in turn sell at fairs and iv) demand side collectors (Chart 4.7). Direct selling of vegetables by farmers at fairs is paramount and some 60% of the village vegetables are passing through this major channel. Many farmers who take products to these fairs sell directly to the consumers.

There are about 25 resident collectors who operate as small scale businessmen. They customarily collect two or three bags of vegetables which they can bring with them while traveling by means of public transport. Many of those traders are in the land-less category while few are village level shop keepers. Some 25% of the marketable surplus of vegetable production in the village is purchased by these business persons. The second category of collectors is farmer cum collectors and 10% of the production conveys through this channel. There are about 10 farmer cum collectors in the village. Since the quantity of vegetables produced by themselves is too small to engage in a business they purchase produce from near by farmers too.

Demand side collectors habitually do not come to this village and farmers have to convey their products either to the fair at Adiyarawatta 10 kilometers away from the village or to the collecting center at Balumgala, three kilometers away from the village. Due to transport problems, only about 5% of the marketable surplus is sold to these traders.

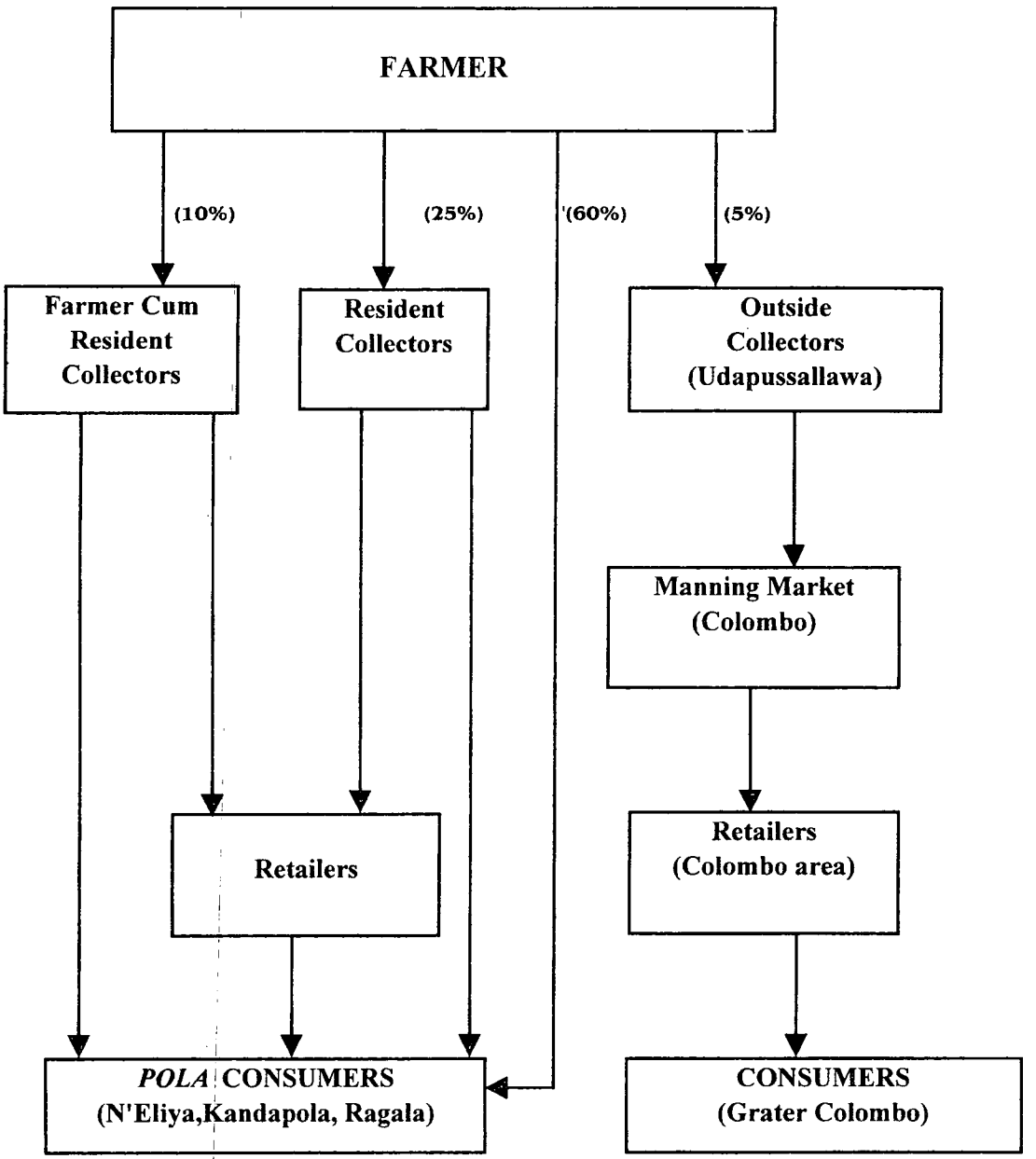
4.4.2 System Operation

Due to the fact that the marketable surplus is very low in this village in comparison to other villages of the study, 60% of the vegetables produced in the village are sold in fairs located at Nuwara-Eliya (45 km), Ragala (25 km), and Kandapola (35). Most the vegetables produced in the area belong to the category of low country vegetables which have a high demand from the consumers of up country. In addition to the vegetables, these farmers also bring items like *polos* to sell at the fair.

Usually, vegetables are harvested in the evening of the previous day of the sale and packed in poly sacks. Villagers leave for fair early in the morning at about 2 - 4 am. on each *pola* day by using public transport. There are three private vans that transport vegetables and one out of those three belongs to a person from the village itself. In addition, a group of about 5 collectors, hire a vehicle at a cost of Rs. 2,000/= for transporting vegetables to Nuwara Eliya. Since road conditions from Madulla to Nuwara Eliya is so poor, transport charges are extraordinarily high. For instance, transport cost to

Chart 4.7

Marketing Channals for Vegetables Grown at Madulla



Nuwara-Eliya (45 km) is Rs 40/= per bag (50 kg) and passenger charges are Rs. 15/= per person whereas transport cost to Colombo from Uda-Pussallawa (about 225 kg) is Rs. 40/= per bag.

Majority of the farmers sell directly their produce to the consumers whereas the collectors mostly sell to the wholesalers at fairs. All the dealings are on the spot cash basis. As mentioned earlier, demand side wholesalers do not come to this village and therefore, farmers at Madulla South have to carry their stocks on heads to Balumgala. Those who sell their vegetables at Sunday fair located at Aidiyarawatta travel by vans early in the morning.

4.4.3 System Performance

As far as the performance of the marketing system is concerned, marketing system at Madulla remains still at the early stage of evolution of marketing. This is probably due to subsistence oriented production system in the area. As a consequence, marketable surplus is limited and farmers often themselves sell their produce to near by consumers. In this context, farmers have ample time to perform all activities of vegetable cultivation such as production, transporting and direct selling to consumers. In instances of direct selling to final consumer, producer receive hundred percent of the consumer price since no middlemen are involved in the process.

The Table 4.7 and Chart 4.8 display an analysis of the marketing margins for a few selected crops. The marketing channel used for this analysis is the farmer → the consumer who is the prominent person.

The results indicate a completely different picture when compared to the three locations discussed earlier. Farmers receive as high as 92% of the consumer price. Wastage is also low with 3% because of limited handling. This is an ideal situation, but farmers should undertake marketing activities such as transporting, cleaning and selling. In Malaysia, farm markets have been set up in order to give high return to the farmers in some places, but not every where. There is a possibility to establish a farm market in Nuwara-Eliya town for the farmers at Madulla. A part of the existing *pola* could be converted into the farm market and the physical facilities available there could be improved through the assistance of the proposed project.

Table 4.7

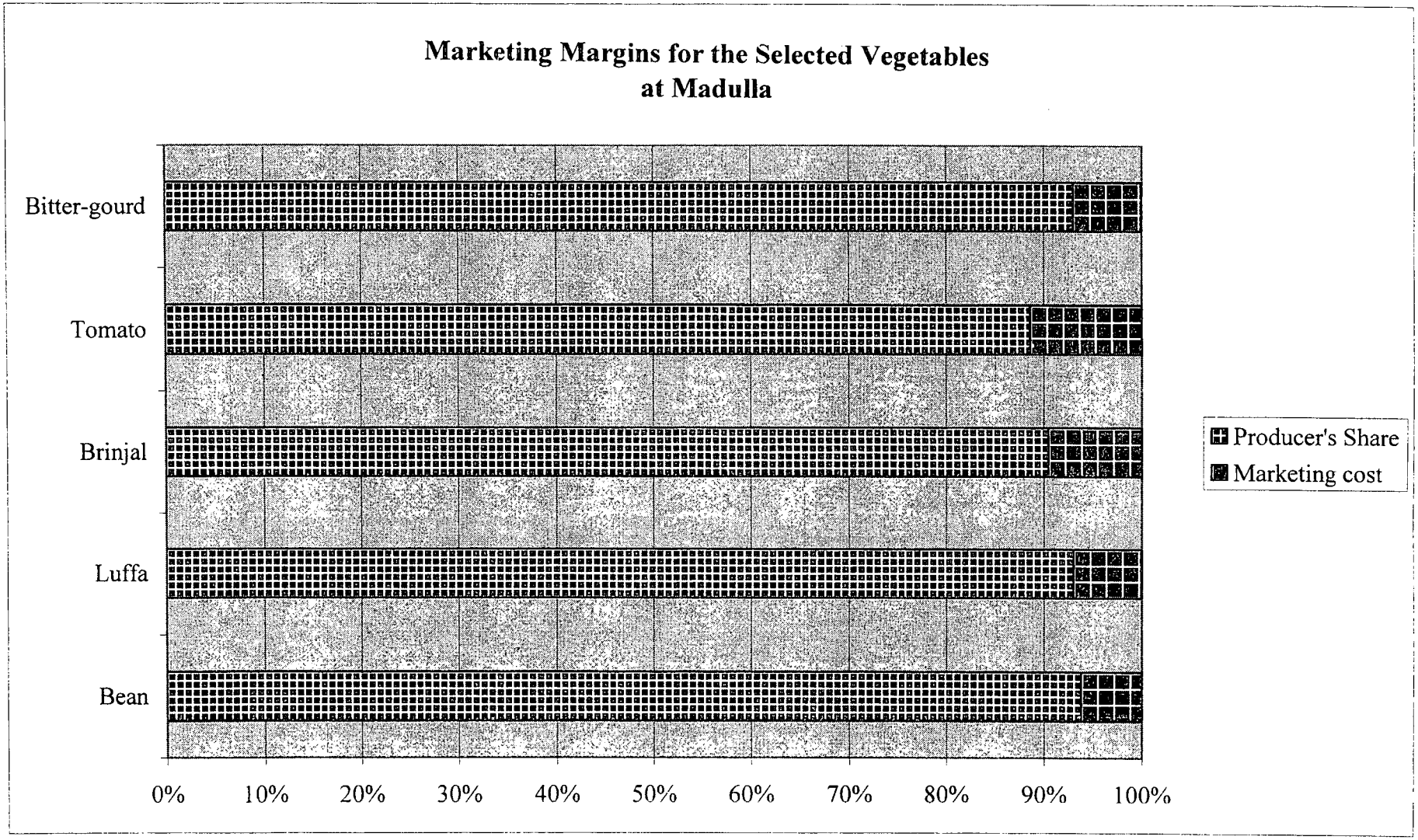
Analysis of Marketing Margins for Selected Vegetables Grown at Madulla (Rs./100 Kg.)

	Bean		Luffa		Brinjal		Tomato		Bittergourd	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
1.Producer's Price at Farm Level	3329.00	93.8	2790.00	93	2412.00	90.47	3545.00	88.62	2790.00	93
Cost (Farmer)										
Transport to Ragala Fair	75.00	2.11	75.00	2.53	75.00	2.81	165.00	4.12	75.0	2.50
Unloading	10.00	0.28	10.00	0.33	10.00	0.37	25.00	0.63	10.00	0.33
Market levy	15.00	0.42	15.00	0.50	15.00	0.56	15.00	0.38	15.00	0.50
Wastage	71.00	2.00	60.00	2.00	104.00	3.90	200.00	5.00	60.00	2.00
Meals	50.00	1.42	50.00	1.60	50.00	1.89	50.00	1.25	50.00	1.67
2. Consumer's Buying Price	3550.00		3000.00		2666.00		4000.00		3000.00	

Marketing channel : Farmer (Madulla) -> Consumer

Source: Survey Data.

Chart 4.8


Marketing Margins for the Selected Vegetables at Madulla
Bitter-gourd
Tomato
Brinjal
Luffa
Bean
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Producer's Share
Marketing cost

CHAPTER FIVE

Problems, Constraints and Recommendations

This chapter illustrates both major problems and constraints to vegetable production and marketing together with the recommended remedial solutions. It also spells out strategies and concrete actions proposed by the research team for implementation. It should be noted that all of the suggestions presented in this chapter are based on the findings of the study which was carried out by using a number of research techniques used in the inquiry and on the observations of the research team coupled with the suggestions made by the farmers and officials. The major problems and constraints and solutions suggested by the farmers of the study sites are annexed to this report.

5.1 Problems, Constraints and Recommendations Related to Production

Problem 1

Vegetables are mostly (75%) grown under rain-fed conditions in all the study locations. These results in high risk in cultivation, causing crop damages either by excess rain or by severe drought which are unpredictable. It also creates high price fluctuation due to the nature of the seasonality of the production. Under these uncertain circumstances, the farmers are reluctant to invest both their own resources and/or other externally available resources in a large scale on the vegetable farming.

Strategy

1. Develop a program for irrigated vegetable farming that ensures year round production and high returns to the farmers with high yields. The farmers who cultivate under the irrigation facilities provided by agro-wells have already obtained higher yields and incomes.
2. Promotion of the cultivation of vegetables in "green houses"- Preferably, at Mandaramnuwara, on an experimental basis.

Actions

1. Construction of an anicut on the top of the Lulkandura hill where Pollellawa natural lake is located at Handawalapitiya
2. Rehabilitation of Walihindawewa at Theripaha

3. Construction of agro-wells at appropriate sites in all the villages especially at Theripaha and Madulla.
4. Extension of Rupaha Oya- Ilukpalassa irrigation channel at Madulla
5. Rehabilitation of No.10 Irrigation channel and Udawela main channel at Mandaramnuwara
6. Implementation of irrigation water management programs by farmer organizations.
7. Undertake a feasibility study regarding economic viability of setting up green houses.

Problem 2

Most of the vegetable farm plots are small in size and their maximum potentials have not been materialized yet. This results in high cost of production and low returns that lead to keep the farmers below the poverty line income. The productivity of lands is directly associated with the new technology. It was found that the existing extension system does not adequately support the farmers to adapt new appropriate technology. The villages that were studied are located in remote areas where transport was difficult. The discussions held with some AIs of the area revealed that their traveling allocations have been reduced from Rs. 1200 to Rs. 400 per month which was provided under the Second Agricultural Extension Project. When the high fuel prices and required extensive traveling for extension are taken into consideration, the reduction of traveling allowance of AIs is extremely problematic. This has badly affected the cultivation of vegetables. Unlike paddy, vegetable plots are scattered in the areas where accessibility is rather difficult.

Another factor associated with the low productivity is farmer's subsistent mentality. Most of the Sri Lankan farmers do not follow the cost minimization approach that is an essential characteristic of commercial farming. They always complain about the low price of vegetables in the market regardless of the consumer's purchasing ability. This is probably a consequence of the practices adapted during the period of closed economy especially from 1970 - 1977. Many argue that the biggest mistake made by the agricultural policy makers in this country is the failure to take necessary action to transform the highly protected inefficient agricultural sector into a commercial agricultural sector even after the open economic policies were introduced.

Strategy

Increased productivity of lands.

Action

1. Select a group of farmers, preferably young farmers and ensure availability, accessibility and quality of all inputs (seeds, fertilizer and agro- chemicals)

and credit and extension service to them. The project can support the establishment of input shops to be run by these farmer groups.

2. Conduct awareness programs for the farmers to educate them on the importance of productivity increase because many farmers interviewed couldn't realize the need for good extension service. The Economic and Planning Center of the DOA could conduct these training programmes. Since this center is involved in the regular collection of cost of production data of vegetables, they are in a good position to advise farmers on yield increase and cost minimizing methods.
3. Form new farmer organizations or strengthen existing farmer organizations for receiving extension services to the village in a collective manner. This will solve the problem of travelling of AIs to a greater degree. At the initial stages, the project can involve in this task by recruiting an expert in the subject.
4. Conduct soil testing programs and recommend most suitable crops.
5. Encourage farmers to use carbonic fertilizer with chemical fertilizer as being done by the Kandapola farmers.
6. Implement programs for production of vegetable seeds such as bean, tomato, brinjal, lufa and okra for specific production areas. Production of low country vegetable seeds can preferably be promoted at Theripaha and Madulla, while bean seed production can be promoted at Mandaramnuwara.

Problem 3

There are substantial crop damages caused by animals, mainly wild-boars. This is a major problem reported by many farmers at Handawalapitiya. Due to this problem some farmers have changed their cropping patterns. For example, many farmers have given up cultivation of some root crops like cassava and sweet potatoes due to crop damage caused by wild boar.

Strategy

Provision of shot guns

Actions

1. Reconsider the lifting of the regulation that was imposed during the period of civil disturbances in 1989. Under this regulation, shot guns were taken from people by the government as a security measure.

Problem 4

Almost all the farmers are used to adapt the rice- based cropping system; *maha* paddy and *yala* vegetables. This does not give maximum return from the land because, yield of

paddy is low in the area. Farmers reported that the average yield is around 40 bushels per acre which is 45% below the national average. The study team found two - three farmers who grow vegetables during the *maha* season earning higher incomes.

Strategy

1. Diversification of rice-based cropping system into vegetables. At the outset, the project can recruit an Agronomist to work in this area.

Actions

1. Introduce a pilot project by selecting a group of farmers who are enthusiastic for earning higher incomes.
2. Provide all the necessary advise and technical guidance to the target farmers.

Problem 5

Many farmers obtain fertilizer and agro chemicals on delayed payments. This results in high price and limited choices.

Strategy

Introduce a group lending scheme to be operated by farmers themselves.

Action

1. Provide funds for operation of the group lending schemes at the village level.
2. Provide assistance and guidence to the farmers on the successful operation of the fund.

Problem 6

Ninety eight percent of the farmer families at Madulla are below the poverty line and 20% are unemployed.

Strategy

Introduce new income generating activities for the farmers of the area.

Actions

1 Train target farmers on market gardening in which vegetables are grown in the areas nearby towns for the urban consumers. At present, farmers at

Madulla produce low country vegetables for the consumers in Nuwara-Eliya town. This needs to be strengthened.

2 Provide necessary support to the target beneficiaries to develop the market gardening programs in the area.

3 Develop marketing links between the target beneficiaries and the target markets.

Problem 7

Although availability of fertilizer and agro-chemicals is not a crucial issue, many complained about prices and the quality of the commodity. The study team observed that selling price and expiry date are not printed in many products. Also the price varies from one to another.

Strategy

1. Regular inspection tours.
2. Support to set up more input shops to enhance competition.

Actions

1. Implementation of the consumer protection act.
2. Provision of financial assistance to *Goviniyamaka* to set up an input outlet.

5.2 Problems, Constraints and Recommendations Related to Marketing

Problem 1

Operation of marketing activities appears to be disorganized in the study locations. Under the present system, demand side wholesalers from distant areas visit vegetable producing areas for searching vegetables. For instance, traders from Avissawella, Minuwangoda, Kegalle and Ratnapura visit firstly Kandehandiya and make orders giving money and poly sack bags to the resident collectors, then proceed to Hanguranketha, Adikarigama, Rekillagaskada and finally to Mandarmnuwara. In Nuwara-Eliya and Welimada areas, although demand side traders visit producing areas, they do not go here and there searching for vegetables. Most of the traders from down south purchase vegetables from Bandarawela market where all requirements can be met. This is because vegetables such as leeks and beetroot grown in Nuwara-Eliya can also be purchased at the Bandarawela market.

The visiting of demand side traders to producing areas for purchasing vegetables is not in practice in many other countries and even in Sri Lanka for other food products. This practice results in high cost of doing business due to a number of reasons: i) longer

searching time for vegetables, ii) high daily expenditure at least for three people accompanied in the lorry i.e; the trader, driver and assistant for three days iii) high transport cost due to in-coming empty lorries and traveling to different locations in the production areas and iv) loosing freshness of vegetables.

Strategy

Develop an orderly vegetable marketing system for all the study areas to distribute vegetables to demand areas through the traders from supply areas.

Action

1. Set up a trading company by recruiting skillful unemployed youth of the village. At the initial stage, investments should be made through the project.
2. Organize training programs on agribusiness including subjects such as business management, business communication, and business accounting. The Sri Lanka Business Development Center (SLBDC) would be a possible agency to conduct this training because it has experts in the area of business management.
3. Make an advance marketing plan by consulting buyers, initially CWE, exporters, hotels, canteens and later, demand side wholesalers,
4. Purchase vegetables and distribute to the buyers.

Problem 2

Farmers do not offer vegetables to the buyers in an attractive manner by cleaning, sorting, washing and grading. Customer satisfaction is a basic principle for successful businesses, but this had been ignored at farm level in the vegetable trade. Farmers usually include damaged, and rotten vegetables in the middle of the bag and do not clean them properly by removing unnecessary leaves, roots and soils. Over packing is also common. All these result in deterioration of the quality. Retailers reported that they need 3 -4 laborers to clean the vegetables purchased by them. Traders have labeled vegetables coming from Hanguranketha areas as "garbage". As a result, farmers get lower price, some times Rs. 5/kg less compared to Nuwara-Eliya vegetables because of high value losses. It was observed that Kandy vegetables fetch lower price at wholesale level. Although there are different price levels for the same vegetable produced from different locations at wholesale level, such differentiation does not exist at retail level. When vegetables are cleaned, they are identical even though they come from different places. For instance, the consumer is not in a position to differentiate between carrot produced in Hangurnaketha from those produced in Nuwara-Eliya.

Supplying uncleaned vegetables to the town has caused a problem of removal of garbarge. If the cleaning is done by the farmers at the farmgate, wastes can be processed as compost. Also transporting of un-cleaned vegetables adds to the cost.

Strategy

Educate farmers on how to prepare vegetables for the market.

Action

1. Introduce a marketing extension training program on pre and post harvest activities for Agricultural Instructors (AI) and for the target farmers,
2. Organize a study tour program locally and abroad for the AIs and for the targeted farmers.

Problem 3

Marketing infrastructure facilities such as market place, farm roads, and market information remain unsatisfactory. None of the study areas have good road facilities. As a result arrival of traders by trucks have been curtailed. Farmers have to take stocks on their head for long distance. For instance, farmers from Dunkolawatta at Theripaha had to take the vegetables about two and half kilometers on head through hill areas (5 kilometers on the usual route) to sell vegetables to the collectors which was the one and only way of selling before the new road was opened. After construction of the new road with the assistance of UNDP, collectors are coming to the village and transporters are collecting vegetables to send them to the Kandy market. This is a good case to show that providing a good road system can enhance the competition among the traders.

The study team did not find any market place in the study locations except at Mandaramnuwara where a fair (*pola*) is operated. This fair does not have basic facilities such as shelter, water, electricity, drainage system and sanitary facilities. Nevertheless *Pradesiya Sabha* has tendered this fair at Rs. 51,000 for the year 1998. There is another fair, about 5 kilometers away from Madulla with same conditions. By improving facilities, local authorities can earn more income because, Sri Lanka's main income source for many local authorities is the revenues collected from the fair. It is recommended that an agreement be signed with the respective local authorities to impose a new rule indicating that at least 10% of the incomes of the fair should be allocated by the local authority for the development of the rural fair before the construction of the fair begins under the proposed project.

The access to market information, which is a key to success in business, is lacking in all the areas studied. Farmers are entirely dependent on the price information provided by

traders and transporters. That is not an independent source because they are part of the marketing system. Since farmers of these areas depend on wholesale prices at Kandy and Dambulla markets, the HARTI price dissemination program which provides information on Colombo market is not much beneficial to them.

Strategy

Improvement of marketing infrastructure facilities in all the study areas.

Actions

1. Development of the fair at Mandaramnuwara (over 100 lorries are coming to this place for purchasing vegetables during the peak production period)
2. Improve the condition of the road from Mandarmanuwara to Ragala so that traders who come from Ragala to Mandarmnuwara can easily reach Mandaramnuwara. At present they travel via Padiyapalalla.
3. Construction of a new connecting road from Theripaha to the Randenigala highway,
4. Renovation of Madulla -Watthegedara road
5. Construction of a road from Watthegedara junction to Lihiniyakanda at Madulla
6. Construction of a new road from Handawalapitiya to Delpathkada
7. Tarring of the newly constructed road at Theripaha
8. Establishing timely, reliable and accessible market information system. This should include daily wholesale prices at Kandy and Dambulla markets and food marketing news which shall include supply situation and government policy changes. It is recommended that the possibilities to set up a community radio station be examined as has been done in the Mahaweli program. The Dambulla wholesale prices prevailing in the night between 8.00 to 10.00pm. and the Kandy wholesale prices prevailing between 7.00 - 9.00 am. should be broadcast after the morning news on the following day.

Problem 4

Price difference between wholesaler and retailer (retail margin) is considerably high in comparison with the costs of marketing services performed by these retailers. This is mainly due to the nature of small scale business at retail level in which individual retailers have a very small daily turnover.

Strategy

1. Introduce direct selling to the target consumers such as institutional buyers and dwellers in large housing complexes in Colombo and suburbs.

Action

1. Make selling arrangements with institutional buyers including hotels, restaurants, hospitals, and security forces.
2. Select one or two housing schemes and commence direct selling to the consumers through the setting up a fair or home delivery program (There may be a possibility to launch a home delivery program because, many of the dwellers in housing schemes are wage owners and hence their opportunity cost of time is high).

Problem 5

The price of tomato declines significantly during peak harvesting period. There are instances where the prices fall below the break-event point and farmers are unable to cover even the variable cost of the product.

Strategy

Promote agro-based industries. Project should finance to recruit a Marketing Specialist to implement this task.

Action

1. Establish a processing factory for tomato and other possible products. The CISIR could assist in identifying potential commodities.
2. Identify and promote the cultivation of varieties suitable for processing.
3. Establish marketing links with tourist hotels and air-line catering services.

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Annex 1

Vegetable Production, Sri Lanka 1977 - 1997 (Mt).

Year	Beans	Carrot	Leeks	Beet-Root	Knol-Khol	Raddish	Cab-bage	Tomato	Ladies-Finger	Brinjal	Pump-kin	Cucu-mber	Bitter Gourd	Snake Gourd	Ash-Plantain	Total
1977	10,558	2,034	8,153	3,466	3,272	6,136	15,597	15,492	9,112	35,191	30,924	9,841	9,012	12,997	53,504	225,289
1978	10,883	4,020	2,855	3,992	2,686	7,421	15,123	13,063	12,866	31,861	25,060	11,080	10,036	13,865	52,681	217,492
1979	18,435	6,715	6,741	9,142	15,080	12,939	40,644	24,735	22,998	32,964	42,446	22,349	11,718	24,832	44,567	336,305
1980	20,632	5,814	6,765	10,477	13,527	22,598	45,371	27,984	23,843	42,597	42,794	24,034	13,716	22,231	78,303	400,686
1981	18,146	3,915	6,111	7,152	6,667	18,603	40,778	26,667	22,750	45,462	55,064	20,566	13,519	20,662	107,485	413,547
1982	17,493	2,741	5,571	6,928	6,318	17,164	35,088	13,333	18,733	37,748	39,763	17,862	12,703	17,594	73,874	322,913
1983	31,687	9,424	14,584	16,328	9,752	21,398	45,412	26,109	37,549	74,214	82,039	22,808	22,437	23,923	81,168	518,832
1984	36,337	8,359	14,180	13,726	12,907	30,012	44,371	28,820	44,311	87,701	131,320	26,486	21,120	26,368	164,669	690,687
1985	35,567	10,210	12,698	12,322	10,436	28,706	50,643	33,864	43,706	90,279	94,052	25,692	21,208	29,831	190,750	689,964
1986	36,976	11,038	5,727	13,810	10,807	24,619	45,077	32,945	41,402	82,732	101,050	22,865	19,463	27,244	167,966	643,721
1987	37,333	11,111	10,756	14,018	9,270	18,332	35,957	27,059	44,554	74,268	94,477	20,427	19,482	24,232	166,424	607,700
1988	37,733	10,337	10,244	13,998	9,680	16,470	45,879	35,182	43,320	80,906	139,987	22,854	21,631	25,920	146,671	660,812
1989	36,144	11,907	9,558	13,315	9,865	17,412	37,580	33,031	40,245	73,631	81,097	22,065	20,794	27,483	128,647	562,774
1990	35,716	13,121	7,913	11,492	11,319	16,539	36,378	34,528	39,969	69,725	87,717	25,436	19,877	27,788	109,436	546,954
1991	35,040	20,601	10,883	12,712	12,107	18,974	38,053	32,234	38,799	65,583	64,414	19,087	20,553	22,311	95,970	507,321
1992	35,481	25,439	12,506	14,954	12,183	18,910	34,732	34,708	37,949	62,824	65,429	17,502	22,160	23,074	84,014	501,865
1993	28,028	24,621	15,423	15,371	12,430	20,252	34,021	30,932	37,856	62,841	60,490	18,312	21,656	22,355	81,917	486,505
1994	26,158	23,415	15,590	14,649	11,986	19,929	34,781	31,746	37,653	62,601	58,247	17,838	20,683	20,828	39,982	436,086
1995	27,595	24,668	13,941	13,613	12,401	18,551	34,836	31,986	38,716	65,158	64,443	18,955	22,093	20,836	75,224	483,016
1996	28,931	24,374	15,227	13,301	12,063	19,830	40,114	42,415	37,020	67,653	60,964	18,002	20,310	19,293	75,478	494,975
1997	30,148	25,109	18,730	14,761	12,523	21,606	37,513	32,442	36,735	66,795	60,487	18,247	19,583	19,017	72,504	486,200

Source : Dept. of Census & Statistics.

Annex 2

Vegetable Extent, Sri Lanka 1977 - 1997 (Ha).

Year	Beans	Carrot	Leeks	Beet-Root	Knol-Khol	Raddish	Cab-bage	Tomato	Ladies-Finger	Brinjal	Pump-kin	Cucu-mber	Bitter Gourd	Snake Gourd	Ash-Plantain	Total
1977	4,117	684	605	1,170	1,161	2,074	3,087	5,312	7,395	11,903	7,706	2,516	4,160	3,629	18,595	74,114
1978	4,649	862	515	1,081	1,154	2,131	2,851	5,082	7,383	11,085	6,595	2,658	3,266	3,605	18,018	70,935
1979	4,897	831	592	1,270	2,123	2,117	2,662	4,847	7,153	9,741	6,593	2,521	3,015	3,558	16,589	68,509
1980	5,188	693	648	1,229	1,335	2,475	2,748	4,711	7,407	9,601	6,301	2,451	2,964	3,244	17,370	68,365
1981	6,264	756	691	1,422	1,309	2,674	2,817	5,164	7,987	11,858	8,472	2,446	3,097	3,387	16,800	75,144
1982	5,505	827	726	1,270	1,222	2,476	2,617	4,257	7,403	10,081	7,579	2,054	3,216	3,425	18,397	71,055
1983	5,970	891	841	1,319	1,159	2,549	2,721	4,356	7,511	9,886	7,366	2,182	3,268	3,482	18,347	71,848
1984	6,484	866	835	1,210	1,647	2,834	2,751	3,924	7,674	9,554	8,807	2,310	3,340	3,153	18,802	74,191
1985	6,472	1,049	803	1,204	1,420	2,686	2,857	4,668	7,571	9,959	7,784	2,164	3,302	3,128	18,824	73,891
1986	6,505	1,061	642	1,299	1,362	2,489	2,728	4,394	7,223	9,484	7,209	2,295	3,418	2,923	17,545	70,577
1987	7,087	1,038	659	1,297	1,384	2,269	2,537	4,479	7,439	9,447	6,802	2,582	3,419	2,843	16,186	69,468
1988	7,037	1,134	662	1,374	1,410	2,143	2,649	4,822	8,328	9,651	7,543	2,244	3,714	3,079	17,722	73,512
1989	7,018	1,179	638	1,493	1,362	2,115	2,557	4,427	7,616	9,534	6,424	2,257	3,589	3,041	17,609	70,859
1990	6,518	1,263	615	1,453	1,436	2,078	2,667	4,867	7,596	9,493	7,203	2,334	3,764	3,032	15,193	69,512
1991	6,772	1,608	694	1,332	1,447	2,231	2,747	4,518	7,584	9,363	6,525	2,290	3,679	2,806	13,626	67,222
1992	6,738	1,844	797	1,403	1,398	2,097	2,792	4,566	7,423	9,062	5,849	2,099	3,794	2,799	12,365	65,026
1993	6,429	1,957	1,048	1,510	1,411	2,146	2,907	4,246	7,240	9,055	5,784	2,059	3,647	2,825	12,776	65,040
1994	6,398	1,999	1,056	1,533	1,387	2,102	3,026	4,405	7,046	8,832	6,010	2,142	3,433	2,558	11,898	63,825
1995	6,462	2,076	1,020	1,495	1,440	2,089	3,053	4,560	7,292	9,099	6,302	2,280	3,714	2,663	12,968	66,513
1996	7,108	2,170	1,139	1,487	1,425	2,241	3,242	6,718	6,993	9,408	6,370	2,196	3,567	2,581	12,788	69,433
1997	7,030	2,465	1,342	1,697	1,460	2,307	3,356	4,878	6,956	9,319	6,649	2,248	3,484	2,540	12,397	68,128

Source : Dept. of Census & Statistics.

Annex 3. 1. 1

Cost of Production of Vegetables (Rs/Ac)

Village : Handawalapitiya Crop : Bean Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	19	10	10		100	50	2,850	1,000	1,500	0	1,000	0		
Nursery													4,000	
Planting	2	1	3	1	100	50	300	100	450	100	300	50		
Fertilizer Application	7	3			100	50	1,050	300	0	0	0	0	5,034	
Fixing Supports	6	5	3		100	50	900	500	450	0	300	0	6,200	
Weeding & Earthing Up	6	6		2	100	50	900	600	0	200	0	100		
Pest Control	7		2		100	50	1,050	0	300	0	200	0	2,405	280
Water Management	27	4	7		100	50	4,050	400	1,050	0	700	0		
Harvesting	22	10	5	6	100	50	3,300	1,000	750	600	500	300		
Total	96	39	30	9			14,400	3,900	4,500	900	3,000	450	17,639	280

* Hired labour without meals is not reported

Average Yield (Kg)	3,388
Price of Produce (Rs/Kg)	18.82
Inc. Imputed Cost (Rs)	41,619
Exc. Imputed Cost (Rs)	11,889
Unit Cost Inc. Imputed Cost (Rs/kg)	12.28
Unit Cost Exc. Imputed Cost (Rs/kg)	3.51

Source : Survey data

Annex 3. 1. 2

Cost of Production of Vegetables (Rs/Ac)

Village : Handawalapitiya Crop : Cabbage Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	29	6	6		100	50	4,350	600	900		600			
Nursery	3	2	1		100	50	450	200	150		100		1,930	
Planting	4	3	1		100	50	600	300	150		100			
Fertilizer Application	9	6	1		100	50	1,350	600	150		100		4,161	
Weeding & Earthing Up	6	7	1		100	50	900	700	150		100			
Pest Control	9	1			100	50	1,350	100	0		0		3,106	360
Water Management	23	6			100	50	3,450	600	0		0			
Harvesting	6	4	2		100	50	900	400	300		200			
Total	89	35	12				13,350	3,500	1,800		1,200		9,197	360

* Hired labour without meals is not reported

Average Yield (Kg)	3,357
Price of Produce (Rs/Kg)	11.75
Inc. Imputed Cost (Rs)	28,207
Exc. Imputed Cost (Rs)	10,397
Unit Cost Inc. Imputed Cost (Rs/kg)	8.40
Unit Cost Exc. Imputed Cost (Rs/kg)	3.10

Source : Survey data

Annex 3. 1. 3

Cost of Production of Vegetables (Rs/Ac)

Village : Handawalapitiya Crop : Tomato Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	14	6	17		100	50	2,100	600	2,550	0	1,700	0		
Nursery	4	1			100	50	600	100	0	0	0	0	1,238	
Planting	1	1	4		100	50	150	100	600	0	400	0		
Fertilizer Application	4	3	2		100	50	600	300	300	0	200	0	4,285	
Fixing Supports	6	5			100	50	900	500	0	0	0	0	1,669	
Weeding & Earthing Up	3	5	8	1	100	50	450	500	1,200	100	800	50		
Pest Control	5		6		100	50	750	0	900	0	600	0	1,223	200
Water Management	25	17			100	50	3,750	1,700	0	0	0	0		
Harvesting	8	11	3	2	100	50	1,200	1,100	450	200	300	100		
Total	70	49	40	3			10,500	4,900	6,000	300	4,000	150	8,415	200

* Hired labour without meals is not reported

Average Yield (Kg)	3,400
Price of Produce (Rs/Kg)	13.18
Inc. Imputed Cost (Rs)	30,315
Exc. Imputed Cost (Rs)	10,896
Unit Cost Inc. Imputed Cost (Rs/kg)	8.92
Unit Cost Exc. Imputed Cost (Rs/kg)	3.20

Source : Survey data

Annex 3. 2. 1

Cost of Production of Vegetables (Rs/Ac)

Village : Mandaramnuwara Crop : Bean Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	20	11	5		100	75	3,000	1,375	750	0	500	0		
Nursery													4,216	
Planting	6	3			100	75	900	375	0	0	0	0		
Fertilizer Application	7	3			100	75	1,050	375	0	0	0	0	3,714	
Fixing Supports	5	3	3	2	100	75	750	375	450	250	300	150	6,295	
Weeding & Earthing Up	5	4	1	2	100	75	750	500	150	250	100	150		
Pest Control	5	1			100	75	750	125	0	0	0	0	2,664	200
Water Management	18	11	6	2	100	75	2,700	1,375	900	250	600	150		
Harvesting	21	10	5	4	100	75	3,150	1,250	750	500	500	300		
Total	87	46	20	10			13,050	5,750	3,000	1,250	2,000	750	16,889	200

* Hired labour without meals is not reported

Average Yield (Kg)	3,560
Price of Produce (Rs/Kg)	23.30
Inc. Imputed Cost (Rs)	40,139
Exc. Imputed Cost (Rs)	10,344
Unit Cost Inc. Imputed Cost (Rs/kg)	11.28
Unit Cost Exc. Imputed Cost (Rs/kg)	2.91

Source : Survey data

Annex 3. 2. 2

Cost of Production of Vegetables (Rs/Ac)

Village : Mandaramnuwara Crop : Cabbage Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	27		8	3	100	75	4,050	0	1,200	375	800	225		
Nursery	4				100	75	600	0	0	0	0	0	4,060	
Planting	3	3			100	75	450	375	0	0	0	0		
Fertilizer Application	11	1			100	75	1,650	125	0	0	0	0	8,867	
Weeding & Earthing Up	8	2			100	75	1,200	250	0	0	0	0		
Pest Control	5				100	75	750	0	0	0	0	0	5,437	200
Water Management	25	6			100	75	3,750	750	0	0	0	0		
Harvesting	7	3			100	75	1,050	375	0	0	0	0		
Total	90	15	8	3			13,500	1,875	1,200	375	800	225	18,364	200

* Hired labour without meals is not reported

Average Yield (Kg)	3,520
Price of Produce (Rs/Kg)	10.00
Inc. Imputed Cost (Rs)	35,514
Exc. Imputed Cost (Rs)	19,389
Unit Cost Inc. Imputed Cost (Rs/kg)	10.09
Unit Cost Exc. Imputed Cost (Rs/kg)	5.51

Source : Survey data

Annex 3. 2. 3

Cost of Production of Vegetables (Rs/Ac)

Village : Mandaramnuwara Crop : Tomato Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	18	11	10		100	75	2,700	1,375	1,500	0	1,000	0		
Nursery	5	2			100	75	750	250	0	0	0	0	1,132	
Planting	3	2	2	2	100	75	450	250	300	250	200	150		
Fertilizer Application	6	1	3		100	75	900	125	450	0	300	0	4,533	
Fixing Supports	9		2	2	100	75	1,350	0	300	250	200	150	1,022	
Weeding & Earthing Up	5	3	4	9	100	75	750	375	600	1,125	400	675		
Pest Control	12	4			100	75	1,800	500	0	0	0	0	6,730	480
Water Management	15	13	3	3	100	75	2,250	1,625	450	375	300	225		
Harvesting	12	9		3	100	75	1,800	1,125	0	375	0	225		
Total	85	45	24	19			12,750	5,625	3,600	2,375	2,400	1,425	13,417	480

* Hired labour without meals is not reported

Average Yield (Kg)	4,569
Price of Produce (Rs/Kg)	15.15
Inc. Imputed Cost (Rs)	38,247
Exc. Imputed Cost (Rs)	16,220
Unit Cost Inc. Imputed Cost (Rs/kg)	8.37
Unit Cost Exc. Imputed Cost (Rs/kg)	3.55

Source : Survey data

Annex 3. 2. 4

Cost of Production of Vegetables (Rs/Ac)

Village : Mandaramnuwara Crop : Leeks Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	25	16	13	5	100	75	3,750	2,000	1,950	625	1,300	375		
Nursery	23	4			100	75	3,450	500	0	0	0	0	6,545	
Planting	2	11		4	100	75	300	1,375	0	500	0	300		
Fertilizer Application	8			3	100	75	1,200	0	0	375	0	225	10,360	
Weeding & Earthing Up	10	17		12	100	75	1,500	2,125	0	1,500	0	900		
Pest Control	9	2			100	75	1,350	250	0	0	0	0	4,165	360
Water Management	38	37		11	100	75	5,700	4,625	0	1,375	0	825		
Harvesting	20	7		11	100	75	3,000	875	0	1,375	0	825		
Total	135	94	13	46			20,250	11,750	1,950	5,750	1,300	3,450	21,070	360

* Hired labour without meals is not reported

Average Yield (Kg)	7,722
Price of Produce (Rs/Kg)	15.82
Inc. Imputed Cost (Rs)	61,130
Exc. Imputed Cost (Rs)	25,820
Unit Cost Inc. Imputed Cost (Rs/kg)	7.92
Unit Cost Exc. Imputed Cost (Rs/kg)	3.34

Source : Survey data

Annex 3. 3. 1

Cost of Production of Vegetables (Rs/Ac)

Village : Theripaha Crop : Bean Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	22	14	3	1	100	75	3,300	1,750	450	125	300	75		
Nursery													4,166	
Planting	5	5			100	75	750	625	0	0	0	0		
Fertilizer Application	6	6			100	75	900	750	0	0	0	0	3,027	
Fixing Supports	11	6			100	75	1,650	750	0	0	0	0	7,643	
Weeding & Earthing Up	4	5	4	1	100	75	600	625	600	125	400	75		
Pest Control	8	2	1		100	75	1,200	250	150	0	100	0	2,390	360
Water Management	27	8	5		100	75	4,050	1,000	750	0	500	0		
Harvesting	20	13	3	3	100	75	3,000	1,625	450	375	300	225		
Total	103	59	16	5			15,450	7,375	2,400	625	1,600	375	17,226	360

* Hired labour without meals is not reported

Average Yield (Kg)	3,465
Price of Produce (Rs/Kg)	16.76
Inc. Imputed Cost (Rs)	43,436
Exc. Imputed Cost (Rs)	9,508
Unit Cost Inc. Imputed Cost (Rs/kg)	12.54
Unit Cost Exc. Imputed Cost (Rs/kg)	2.74

Source : Survey data

Annex 3. 3. 2

Cost of Production of Vegetables (Rs/Ac)

Village : Theripaha Crop : Cabbage Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	26	7	9	1	100	75	3,900	875	1,350	125	900	75		
Nursery	5	1			100	75	750	125	0	0	0	0	1,908	
Planting	1	1	1	1	100	75	150	125	150	125	100	75		
Fertilizer Application	5	4	1	2	100	75	750	500	150	250	100	150	2,286	
Weeding & Earthing Up	5	4		3	100	75	750	500	0	375	0	225		
Pest Control	4		1		100	75	600	0	150	0	100	0	1,512	200
Water Management	26	8			100	75	3,900	1,000	0	0	0	0		
Harvesting	6	6			100	75	900	750	0	0	0	0		
Total	78	31	12	7			11,700	3,875	1,800	875	1,200	525	5,706	200

* Hired labour without meals is not reported

Average Yield (Kg)	4,711
Price of Produce (Rs/Kg)	16.53
Inc. Imputed Cost (Rs)	24,156
Exc. Imputed Cost (Rs)	7,431
Unit Cost Inc. Imputed Cost (Rs/kg)	5.13
Unit Cost Exc. Imputed Cost (Rs/kg)	1.58

Source : Survey data

Annex 3. 3. 3

Cost of Production of Vegetables (Rs/Ac)

Village : Theripaha Crop : Tomato Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	21	2	4	2	100	75	3,150	250	600	250	400	150		
Nursery	4				100	75	600	0	0	0	0	0	958	
Planting	1	2		3	100	75	150	250	0	375	0	225		
Fertilizer Application	11		2		100	75	1,650	0	300	0	200	0	2,032	
Fixing Supports	5	5	7		100	75	750	625	1,050	0	700	0	2,275	
Weeding & Earthing Up	7	6		4	100	75	1,050	750	0	500	0	300		
Pest Control	8	5			100	75	1,200	625	0	0	0	0	4,515	320
Water Management	23	8			100	75	3,450	1,000	0	0	0	0		
Harvesting	7	10	3	2	100	75	1,050	1,250	450	250	300	150		
Total	87	38	16	11			13,050	4,750	2,400	1,375	1,600	825	9,780	320

* Hired labour without meals not reported

Average Yield (Kg)	3,420
Price of Produce (Rs/Kg)	15.82
Inc. Imputed Cost (Rs)	31,675
Exc. Imputed Cost (Rs)	9,930
Unit Cost Inc. Imputed Cost (Rs/kg)	9.26
Unit Cost Exc. Imputed Cost (Rs/kg)	2.90

Source : Survey data

Annex 3. 3. 4

Cost of Production of Vegetables (Rs/Ac)

Village : Theripaha Crop : Brinjal Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	9	7	3		100	75	1,350	875	450		300			
Nursery	5				100	75	750	0	0		0		175	
Planting	2	1			100	75	300	125	0		0			
Fertilizer Application	3	1	2		100	75	450	125	300		200		910	
Weeding & Earthing Up	3	1			100	75	450	125	0		0			
Pest Control	2	1			100	75	300	125	0		0		1,313	80
Water Management	6				100	75	900	0	0		0			
Harvesting	5	3			100	75	750	375	0		0			
Total	35	14	5				5,250	1,750	750		500		2,398	80

* Hired labour without meals not reported

Average Yield (Kg)	2,500
Price of Produce (Rs/Kg)	12.00
Inc. Imputed Cost (Rs)	10,228
Exc. Imputed Cost (Rs)	2,898
Unit Cost Inc. Imputed Cost (Rs/kg)	4.09
Unit Cost Exc. Imputed Cost (Rs/kg)	1.16

Source : Survey data

Annex 3. 4. 1

Cost of Production of Vegetables (Rs/Ac)

Village : Madulla Crop : Bean Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	23	2	8		100	75	3,450	250	1,200		800			
Nursery													4,700	
Planting	4	1			100	75	600	125	0		0			
Fertilizer Application	5	2			100	75	750	250	0		0		2,146	
Fixing Supports	8	3	2		100	75	1,200	375	300		200		8,525	
Weeding & Earthing Up	7	1	2		100	75	1,050	125	300		200			
Pest Control	6	1			100	75	900	125	0		0		2,280	240
Water Management	19	2			100	75	2,850	250	0		0			
Harvesting	15	10	2		100	75	2,250	1,250	300		200			
Total	87	22	14				13,050	2,750	2,100		1,400		17,651	240

* Hired labour without meals is not reported

Average Yield (Kg)	2,019
Price of Produce (Rs/Kg)	19.33
Inc. Imputed Cost (Rs)	35,791
Exc. Imputed Cost (Rs)	7,526
Unit Cost Inc. Imputed Cost (Rs/kg)	17.73
Unit Cost Exc. Imputed Cost (Rs/kg)	3.73

Source : Survey data

Annex 3. 4. 2

Cost of Production of Vegetables (Rs/Ac)

Village : Madulla Crop : Brinjal Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	10	8			100	75	1,500	1,000	0		0			
Nursery	3	1	1		100	75	450	125	150		100		395	
Planting	3	1			100	75	450	125	0		0			
Fertilizer Application	3	2			100	75	450	250	0		0		2,308	
Weeding & Earthing Up	2	2			100	75	300	250	0		0			
Pest Control	4				100	75	600	0	0		0		2,005	160
Water Management	6	2			100	75	900	250	0		0			
Harvesting	5	5			100	75	750	625	0		0			
Total	36	21	1				5,400	2,625	150		100		4,708	160

* Hired labour without meals is not reported

Average Yield (Kg)	1,966
Price of Produce (Rs/Kg)	10.58
Inc. Imputed Cost (Rs)	13,043
Exc. Imputed Cost (Rs)	4,508
Unit Cost Inc. Imputed Cost (Rs/kg)	6.63
Unit Cost Exc. Imputed Cost (Rs/kg)	2.29

Source : Survey data

Annex 3. 4. 3

Cost of Production of Vegetables (Rs/Ac)

Village : Madulla Crop : Tomato Season : Maha 97/98

Operation	Family Labour No. of Days		Hired La. No. of Days		Wage. Rate (Rs/day) With Meals *		La.Cost(Inc.Imputed) Family		La.Cost(Inc.Imputed) Hired		La.Cost(Exc.Imputed) Hired		Material Cost	Machinery & Equipment Cost
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Land Preparation	19	8	6		100	75	2,850	1,000	900	0	600	0		
Nursery	7				100	75	1,050	0	0	0	0	0	1,620	
Planting	4	2			100	75	600	250	0	0	0	0		
Fertilizer Application	8	4			100	75	1,200	500	0	0	0	0	2,639	
Fixing Supports	14	2			100	75	2,100	250	0	0	0	0	1,950	
Weeding & Earthing Up	12	8			100	75	1,800	1,000	0	0	0	0		
Pest Control	12				100	75	1,800	0	0	0	0	0	4,160	480
Water Management	31		6		100	75	4,650	0	900	0	600	0		
Harvesting	10	6		6	100	75	1,500	750	0	750	0	450		
Total	117	30	12	6			17,550	3,750	1,800	750	1,200	450	10,369	480

* Hired labour without meals is not reported

Average Yield (Kg)	3,120
Price of Produce (Rs/Kg)	22.50
Inc. Imputed Cost (Rs)	34,699
Exc. Imputed Cost (Rs)	9,069
Unit Cost Inc. Imputed Cost (Rs/kg)	11.12
Unit Cost Exc. Imputed Cost (Rs/kg)	2.91

Source : Survey data

Annex 4

Farmers Recommendations for the Problems Identifed at Study Sites

Handawalapitiya

Problems identified

Problem No.1- Shortage of cultivable lands

This problem consists of the following aspects: (a) Soil erosion (b) Excessive use of agro chemicals which leads to unfertile lands (c) Poor knowledge of farmers on soil conservation practices, and (d) Shortage of lands

Suggested solutions

1. Conduct farmer training programs on soil conservation
2. Control soil erosion by the farmers with the help of government agencies
3. Construction of agro-wells at appropriate sites for expansion of cultivable lands
4. Careful use of agro-chemicals for protection of soil fertility.

Problem No.2- Water scarcity

The problem of water scarcity includes the following aspects. (a) Inadequate irrigation water (b) Water wastage (c) Deforestation at the upper stream of the channel, and (d) Improper water management practices

Suggested solutions

1. Construction of agro-wells at appropriate sites
2. Implementation of irrigation water management programs by the farmers
3. Prohibition of de-forestation at the upper catchment area of the channel
4. Construction of an irrigation water reservoir at the top of the Hope Estate where Pollellawa natural lake is located
5. Conduct farmer training programs on irrigation water management

Problem No. 3- Shortage and unavailability of quality seeds

This problem consists of the following aspects: (a) Unreasonable and illegal price changes created by the seeds sellers (b) Low quality of seeds (c) Farmers poor knowledge on seed production and storage, and (d) Inadequate rules and regulations covering seed trading sector.

Suggested solutions

1. Price of seeds should be marked permanently on the container of seeds
2. Date of expire should also be clearly marked on the container

3. Rules, regulations and laws should be introduced to protect the quality of seeds and constant supervision has to be done
4. Farmers should be trained on production and storage of seeds.

Problem No. 4- Unavailability of quality fertilizers

The problem of fertilizer includes the following aspects: (a) Adulteration of fertilizer (b) Fertilizer shortage at the village (c) Credit based fertilizer and it's repercussions such as low quality and high price and (d) Farmers inadequate knowledge on fertilizer applications

Suggested solutions

1. Motivation of farmers for application of direct fertilizers
2. Training on proper use of chemical fertilizers
3. Training on usage of organic fertilizers
4. Implementation of demonstrative organic farming plots

Problem No. 5- Issues related to Agro-chemicals

This problem has the following constituents: (a) Illegal changes of prices by the sellers (b) Unwritten expiry dates (c) Low quality (d) Farmers poor knowledge on agro-chemical applications and (e) Unavailability of instructions in Sinhala language

Suggested solutions

1. Training of farmers on use and misuse of agro-chemicals
2. Urging the sellers to show prices and the expiry dates of chemicals on the labels
3. Ingredients of chemicals, prescriptions and application methods should be written in both major languages

Problem No. 6- Inadequate agricultural credits

Following are the components of the problem: (a) Inability to obtain loans at required time (b) When materials are borrowed, high prices are charged by the local credit suppliers (c) Farmers are obliged to sell their crops to the local money lender, when credit is obtained (d) Insufficient monetary institutes at the village level.

Suggested solutions

1. Formation of monetary institutes such as *SANASA* at the village level
2. Spot cash based transactions with local input dealers

Problem No. 7- Poor extension services

Following are the components of the problem: (a) Low yield (b) Farmers deficient knowledge on fertilizer and agro-chemical applications and (c) Low quality seeds and planting materials

Suggested solutions

1. Farmers themselves should be organized into groups and the services of the Agricultural Instructor should be obtained for farmer training programs. Classroom and practical training programs are to be organized specifically on the following.
   - Pest and disease control
   - Use and misuse of agro chemicals
   - Fertilizer applications
   - Seed production

Problem No. 8- Crop damages by animals

Following are the animals that damage crops: (a) Wild boars (b) Rabbits (c) Porcupines and (d) monkeys. The biggest damage is done by wild boars. Others are insignificant in terms of the damages.

Suggested solutions

1. Provision of shot guns for wild boar hunting
2. Intensive watching

Problem No.9- Difficulties for Marketing

This problem consists of the following components. (a) Inadequate information about the daily vegetable prices of Colombo, Kandy and Dambulla markets (b) Malpractice weighing (c) Delayed payments (d) Transportation problems, and (e) Organized buying of vegetables by local traders

Suggested solutions

1. Displaying the daily prices of vegetables at an appropriate place of the village
2. Weighing vegetables by farmers before sale
3. Construction of a new road to Delpatkada (about 1.5 kilo meter)
4. Bringing more traders to the village for creation of a competitive market

The most crucial problems to be solved in order of priority

1. Crop Damages
2. Irrigation Problem
3. Reconstruction of roads

Mandaramnuwara

Problems identified

Problem No.1- Issues related to lands

This problem consists of the following aspects: (a) Shortage of lands (b) Soil erosion and farmers poor knowledge on soil conservation practices (d) Cultivation on reservation lands (e) Unavailability of land permits for cultivable lands, and (f) Poor knowledge of farmers on soil conditions of their farm plots.

Suggested solutions

1. Provision of land permits for the farmers who do not posses them
2. Distribution of uncultivated, but cultivable crown lands of the village among the land-less families
3. Conduct farmer training programs on soil conservation
4. Provision of financial subsidies for farmers to adapt soil conservation practices
5. Provision of services of the Department of Agriculture for the farmers to test soil samples of their farm lands
6. Provision of specific advisory services for the farmers for application of chemical fertilizers based on the results of soil tests
7. Control of soil erosion of the farm lands with technical assistance of government agencies
8. Distribution of uncultivated lands of Maturata Plantation Company among vegetable farmers

Problem No.2- Water scarcity

The problem of water scarcity includes the following aspects: (a) Inadequate irrigation water (b) Water wastage (c) Un-rehabilitated channel system (d) Improper water management practices, and (e) Water disputes among farmers

Suggested solutions

1. Operation of water sharing programs by farmers
2. Rehabilitation of No. 10 irrigation channel
3. Diversion of another water stream to irrigation channel net-work at channel No. 10 (This water stream comes from Belihuloya and farmers have already done some construction work)
4. Rehabilitation of Udawela main channel

Problem No. 3- Shortage and unavailability of quality seeds

This problem consists of the following aspects. (a) Unreasonable and illegal price changes effected by seed sellers (b) Shortage of quality seeds (c) Low weight (d) High

price (e) Unavailability of improved varieties for the area (f) Unmarked prices and expiry dates on seed packets (h) Inadequate rules and regulations for seed trading sector, and (g) Instructions available only in English language (in some cases)

Suggested solutions

1. The Department of Agriculture should take adequate measures to maintain quality of seeds that are sold by the private sector
2. The Department of Agriculture should increase the supply of seeds
3. The Department of Agriculture should assist the farmers to produce their own seeds by providing technical supervisory services
4. Price of seeds should be marked clearly on the container of seeds
5. Date of expiry should also be clearly marked on the container
6. Rules, regulations and laws should be introduced to protect the quality of seeds and constant supervision has to be done
7. Farmers training programs have to be organized at village level for production and storage of quality seeds
8. Containers of seeds should provide instructions for the farmers in both local languages

Problem No. 4- Unavailability of quality fertilizers

The problem of fertilizer includes the following aspects: (a) Adulteration of fertilizer (b) High price (c) Credit based fertilizer and it's repercussions such as low quality and high price (d) Inadequate knowledge of farmers on fertilizer applications (e) Excessive use of chemical fertilizer, and (f) low use of organic fertilizer

Suggested solutions

1. Conduct of soil tests and provision of appropriate fertilizer recommendations
2. Close supervision by the government to maintain the quality of fertilizer
3. Motivation of farmers for application of direct fertilizers
4. Training on proper use of chemical fertilizers
5. Training on organic fertilizers
6. Implementation of demonstrative organic farming plots

Problem No. 5- Issues related to Agro-chemicals

This problem has the following constituents: (a) Improper handling of agro-chemicals (b) Illegal changes of prices by sellers (c) Unwritten expiry dates (d) Low quality (e) Poor knowledge of farmers on agro-chemical applications, and (f) Unavailability of instructions in Sinhala language

Suggested solutions

1. Training of farmers on use and misuse of agro-chemicals
2. Training of farmers on proper handling
3. Urging the sellers to show prices and the expiry dates of chemicals on the labels

4. Ingredients of chemicals, prescriptions and application methods should be written in both major languages

Problem No. 6- Inadequate agricultural credits

Following are the components of the problem: (a) When materials are borrowed from the local input dealers, high prices are to be paid (b) Majority of the farmers are defaulters due to collapse of potato cultivation (d) Insufficient monetary institutes at the village level.

Suggested solutions

1. Provision of credit subsidies for the potato farmers
2. Formation of monetary institutes such as *SANASA* at the village level
3. Re-designing the recovery schemes of loans already taken by farmers for potato cultivation (Farmers need relatively lengthy period for recovery of their loans due to indebtedness)
4. Strengthening of revolving fund of the Department of Agrarian Services

Problem No. 7- Poor agricultural extension services

This problem has the following aspects: (a) Lethargic government extension service (b) Lack of extension staff of the government (c) Profit oriented, untrustworthy private extension service (d) Inactive farmer organizations at the village level that are considered as the receiving mechanism of extension service (e) Low yield (f) Deficient knowledge of the farmers on fertilizer and agro-chemical applications, and (g) Low quality seeds and planting materials

Suggested solutions

1. Farmers themselves should be organized into groups and the services of the Agricultural Instructor should be obtained for farmer training programs.
2. Classroom and practical training programs are to be organized specifically on the following:
   - Pest and disease control
   - Use and misuse of agro-chemicals
   - Fertilizer applications
   - Seeds production and storage
3. Before the season is commenced, training schedules have to be prepared both by the instructors and the farmers
4. Farmer organizations should be strengthened to fill the extension gap created by the insufficient departmental staff
5. Untrustworthy private extension service should be discouraged and the government extension service should be encouraged

Problem No. 8- Crop damages by animals

Following are the animals that damaged the crops. (a) Wild boars (b) Rabbits (c) Porcupines and (d) Monkeys. The biggest damage is done by wild boars. Others are insignificant in terms of the damages.

Suggested solutions

1. Provision of five shot guns per each GN division for wild boar hunting
2. Intensive watching

Problem No.9- Difficulties for Marketing

This problem consists of the following components: (a) Inadequate information about the daily vegetable prices of Colombo, Kandy and Dambulla markets (b) Malpractice in weighing (c) Delayed payments (d) Transportation problems, and (e) Organized buying of vegetables by local traders

Suggested solutions

1. Mandaramnuwara *GN* division should have a separate marketing center for the farmers of the area
2. Road stretch from Bogahahandiya to Mandaramnuwara wasama (where school is located) should be rehabilitated
3. Broadcasting time of vegetable prices by the radio should be changed (The appropriate time is immediately after the news broadcast at night)
4. Rupavahini should also make arrangements to telecast daily prices of vegetables like ITN (ITN cannot be viewed by the farmers of Mandaramnuwara)
5. Five nos. of mini-marketing centers based on *GN* divisions should be introduced for Mandramnuwara area
6. Each marketing center should be provided with a common scale for the use of farmers. This would reduce the possibility of low weighing by the traders
7. Strengthening of farmer organizations for achievement of marketing objectives

The most crucial problems to be solved in order priority

1. Problem of lands
2. Irrigation water
3. Agricultural extension service

Theripaha

Problems identified

Problem No.1- Issues related to lands

This problem consists of the following aspects: (a) Shortage of lands (b) Land tenure problems (c) Soil erosion and poor knowledge of farmers on soil conservation practices (d) Infertile lands (e) Land permit problems and (f) Poor knowledge of farmers on soil conditions of their farm plots.

Suggested solutions

1. Provision of land permits for the encroached cultivated lands
2. Re-acquire of uncultivated encroached lands by the government and distribute them among the active farmers of the area
3. Distribution of uncultivated, but cultivable crown lands of the village among the landless families
4. Conduct of farmer training programs on soil conservation
5. Provision of services of the Department of Agriculture for the farmers to test soil samples of their farm lands
6. Control of soil erosion of the farm lands with technical assistance of government agencies

Problem No.2- Water scarcity

The problem of water scarcity includes the following aspects: (a) Water wastage (b) Water shortage (c) Un-rehabilitated channel networks under minor irrigation systems of the area, and (d) Improper water management practices

Suggested solutions

1. Reforestation and protection of catchment areas of irrigation tanks
2. Desilting of Walahinda irrigation tank and rehabilitation of channel network
3. Implementation of irrigation water management programs by the farmer organizations
4. Construction of new irrigation channels at appropriate locations
5. Construction of agro-wells at appropriate locations
6. Provision of water pumps

Problem No. 3- Shortage and unavailability of quality seeds

This problem consists of following aspects: (a) Unreasonable and illegal price changes effected by the seed sellers (b) Shortage of seeds (c) Low quality (d) High price (e) Poor knowledge of farmers on seed production storage

Suggested solutions

1. The government should take adequate measures to maintain the quality of seeds that are sold by the private sector
2. The Department of Agriculture should increase the supply of certified seeds
3. The Department of Agriculture should sell seeds on subsidized basis
4. Farmers training programs have to be organized for production and storage of quality seeds and the Department of Agriculture should provide technical services

Problem No. 4- Issues related to fertilizer

The problem of fertilizer includes the following aspects. (a) Shortage of fertilizers at the Agrarian Services Center (b) Adulteration of fertilizer (c) High price (d) Poor knowledge of farmers on fertilizer applications

Suggested solutions

1. Conduct of soil tests and provision of appropriate fertilizer recommendations
2. Close supervision by the government to maintain the quality of fertilizer
3. Agrarian Services Center should maintain adequate stocks of fertilizer
4. Training on usage of organic fertilizers

Problem No. 5- Issues related to Agro-chemicals

The only issue highlighted by the farmers in connection with agro-chemicals is poor knowledge. Following are the suggested solutions:

1. Training of farmers on use and misuse of agro-chemicals
2. Training of farmers on integrated pest management

Problem No. 6- Poor agricultural extension services

This problem has the following aspects. (a) Inactive government extension service (b) Lack of extension staff of the government

Suggested solutions

1. Conduct of demonstration farm plots at the village
2. Distribution of instructional leaflets
3. Conduct of training programs by the extension service
4. Implementation of mass-communication techniques to educate farmers

Problem No. 7- Crop damages by animals

Following are the animals that damage crops: (a) Wild Elephants (b) Wild boars (c) Monkeys and (d) Cows. The biggest damage is done by the wild boars

Suggested solutions

1. Construction of an electric fence at the border of Randenigala reservoir
2. Provision of five shot guns per each *GN* division for wild boar hunting

3. Intensive watching
4. Proper caring of cattle by the farmers

Problem No.8- Difficulties in Marketing

This problem consists of two major components: (a) Transportation (b) Inadequate information about daily vegetable prices of Kandy and Dambulla markets

Suggested solutions

1. Construction of a road from Rajamawatha to Theripaha
2. Construction of Theripaha – Mudagamuwa Road via Bolagandawa and Bathmedilla
3. Construction of farm roads
4. Prices of vegetables at Kandy and Dambulla markets should be conveyed by the Kandurata radio service and Swadeshiya radio service

The most crucial problems to be solved in order of priority

1. Lands
2. Irrigation water
3. Agricultural extension service

Madulla

Problems identified

Problem No.1- Marketing difficulties

Suggested solutions

1. A lorry should be arranged to the village at least once a week to collect vegetables
2. Cultivation of multi-vegetable crops
3. Production of vegetable seeds during the period of low prices for green vegetables

Problem No.2- High rents for cultivable lands

Suggested solutions

1. Provision of credit to the farmers to meet initial expenditures of cultivation

Problem No. 3- Shortage of irrigable lands

Suggested solutions

1. Provision of water pumps to the farmers on credit basis
2. Implementation of an agro-well program in the village
3. Extension of Rupaha Oya-Illukpalassa irrigation channel

Problem No. 4- Unavailability and inadequacy of agro-chemicals and fertilizers

Suggested solutions

1. Implementation of a program organized by the village level farmer organization to distribute agro- chemicals and fertilizers.

Problem No. 5- Unavailability of quality seeds

Suggested solutions

1. Conduct of training programs for the farmers on seed production and storage

Problem No. 6- Transportation difficulties

Suggested solutions

1. Construction of a road stretch of 1 km. from Wattegedara junction to Lihiniya Kanda. This provides benefits to 40 vegetable farmer families.
2. Rehabilitation of the eroded portion of Madulla – Wattegedara Road (about half a kilo meter)

Problem No. 7- Poor knowledge of farmers on vegetable farming

Suggested solutions

1. Conduct of classroom and practical training programs on the following
   - Pest and disease control
   - Use and misuse of agro-chemicals
   - Fertilizer applications
   - Seed production
   - Irrigation water management, and
   - Marketing

Problem No. 8- Unavailability of agro-credits

Suggested solutions

1. It was revealed that farmers are reluctant to obtain agro-credit in the given circumstances. However, they were of opinion that if, the problems mentioned above are solved, there will be a huge demand for agro-credit.

The most important problems to be solved in order of priority

2. Water
3. Transportation
4. Seeds, fertilizers and agro-chemicals