

POTATOES: FARM, FORK AND WHAT'S BETWEEN

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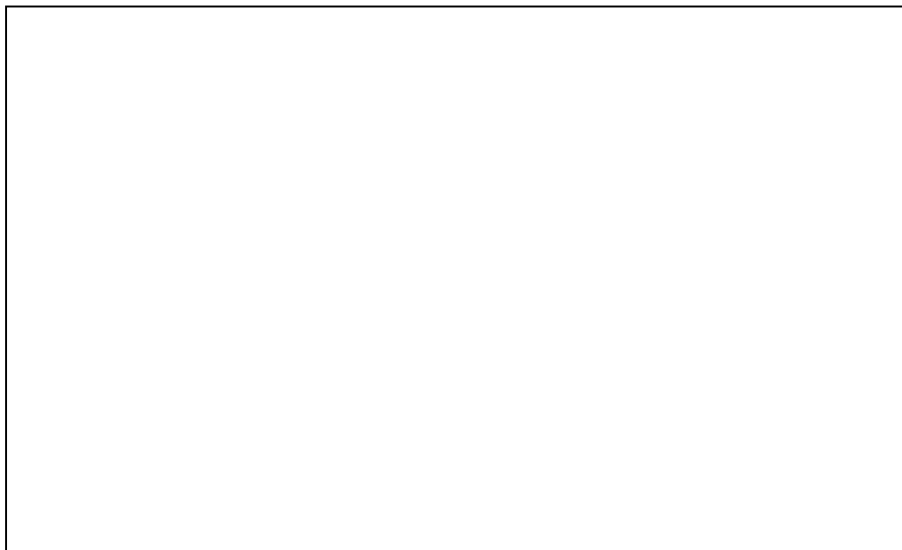
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FOREWORD

Potatoes are important. As of now. On the one hand, it is or rather has become an integral part of the Sri Lankan diet and as such there's a demand that needs to be met in a combination of cultivation and imports. In addition to the matter of food security there is the issue of livelihoods on account of the large number of smallholder farmers cultivating potato and of course stakeholders along the relevant value-chain. Analysis of the value-chain, then, is important to find ways and means of improving overall performance in the sub-sector and inter alia manage import-dependency.

The problems are not unknown: low average yield due to poor seed quality, inadequate seeds, affordability issues, gaps in market information and lack of market knowledge which constrain when prices are negotiated, difficulty in obtaining policy support for greater public investment and an overall environment that inhibits substantial levels of private investment. These as well as the impact of the sudden ban on importing agrochemicals and other factors that are not necessarily the preserve of this sub-sector have been taken into consideration in this study.

The close examination of factors following information gathered has yielded important policy recommendations which, if implemented, could resolve some of the problems along the potato value-chain.

Perhaps, in the context of the current economic woes and the predicted global food crisis which could very well see hoarding at all levels including potato exporting countries which would have to worry about the calorie needs of their own populations, it would not be out of place to ask a few questions that have hitherto been unasked or just whispered at the margins of the economic discourse pertaining to cultivation, consumption and food security.

We know potato. We know sweet potatoes. We know manioc. And if pushed to name others, we might come up with two or three more. Well, it has been mentioned that there are 93 kinds of yams that can be grown locally. Indeed, many of them have been grown or gathered and consumed for centuries. And yet, they are for the most part not commercial crops. Nothing wrong in that of course for not all crops are made for formal markets. Put another way, some crops can be made marketable but it might require hefty advertising budgets. Possible, but has not happened. One reason is the lack of knowledge.

Manioc is supposed to have been brought to the island by the Portuguese but recently it has been established that there was a local variety that predates their arrival: '*kirikavadi.*' *Udala, Raja Ala, Angel Ala, Gahala, KatuKukulala, Kaha Ala, Keedaaran, Jaavaa Ala, Habarala, Hirithala, Gonaala, KahataAgala, KambuKodol, rathuKodol, Kiri Wel Ala, Ratala, Sudu Ala, Katu Ala, Buthsarana, Kiri Ala, Kiribaru Ala, Kikis Ala, Kolakana Ala, Hingurala, Lena Danthila, Kiri Habarala, Seeruvalli, Rathu Ala, Rathna Ala, Revulla, Seeni Ala, Sevel Ala, Dandina Ala, Dehi Ala, Uyala, Kandala, Hondala, Kiri Sambala, Panu Ala, SeeniKehel Ala, Ahu Ala, Thun Mas Rosa, Thun Mas Sudu, Nitaaala, Bul, Oviti Ala, Kahata, Pittu Ala, Paththaraa Ala, Yaku Ala, Kola Habarala, Relburulaa, Adadam, Binara, Kaberi Ala, Vel Ala, Thiringala, Savkendaa, Gorok Ala, Gotu Ala, Kiri Hingurala, Bola Buthsarana, SuduButhsarana, Goma Ala, Hulankeeriya, Deshala, Kalu Ala, Kandala, Demas Ala, Heramas Ala and Nil Keedaran* make a splendid list of potato alternatives. The question: when did potato become the alternative and how? And if these other yams were known, recognised, grown/gathered and consumed, how would it impact the import dependency?

For all this, potatoes are important. They are known, recognised, demanded, cultivated, purchased and consumed. For this reason alone, the social and economic factors that bear upon the entire process from land-preparation through purchase/cultivation of seeds, tending, harvesting, transportation and sale to consumption need to be understood if the sub-sector is to be developed. This study provides information and analysis. Necessary and, like all important investigative forays, has generated questions that need to be asked and for which answers have to be sought.

Malinda Seneviratne
Director/Chief Executive Officer

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We would like to express our sincere thanks to Mr. Malinda Seneviratne Director of HARTI for his support extended to finalize and publish this report in time. We wish to convey our gratitude to Ms. Renuka Weerakkody, Additional Director for her continuous support and facilitation in the completion of this study. Our gratitude goes to Ms. Susila Lurdu, former Head of Agricultural Policy and Project Evaluation Division for her support and guidance provided throughout the study. We are also thankful for Ms. Ruvini Vidanapathirana, Senior Research Officer of HARTI for reviewing the report and providing us with her constructive comments. Our special thanks also go to Dr. N.P.G. Samantha, Head, Information and Communication Division for his support rendered in various means.

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EXECUTIVE SUMMARY

Sustainability of the potato sub-sector, has always been an important aspect of the Sri Lankan agricultural policy since the potato has qualified as one of the “sensitive” crops in both economic and political facets. On one hand, it is important as a food category from a Food Security aspect and from a political and socio-economic aspect owing to the larger number of smallholder farmers and other stakeholders along the value chain that depend on the sub-sector for their livelihood. Sri Lanka does not hold a comparative advantage in exporting potatoes. Yet, in order to cater to the demands of the local consumption, Sri Lanka is left with the option of importing potatoes on a regular basis. Hence, the potato value chain is important in broader terms as it is directly linked to import substitution policies. Value chain that spans across this sub-sector from the farmer to the consumer is the foundation of the performance of the sector. Therefore, based on these economic scenarios, this study was carried out to review and analyse major characteristics, recent developments and changes in the potato value chains in Sri Lanka. The study was conducted in the districts of Nuwara Eliya and Badulla. The primary data was collected from all actors in the potato value chain using a questionnaire survey (for 60 farmers) and key informant interviews (for other value chain actors). Secondary information was collected from various government institutions.

Key processes, direct and indirect actors of Potato value chains identified by the study are almost similar in both Nuwara Eliya and Badulla. Among the identified marketing channels, trading through commission agents in DECs was the most prominent one in both districts. Marketing through collectors and selling the product directly to collecting centres of supermarkets were the other trading channels for locally produced potatoes. Imported potatoes were trading from the importer through the intermediaries in the Pettah market to wholesalers, then to the retailer and finally to the consumers. Within the potato value chain, commission agents in the Dedicated Economic Centres (DECs) and the main wholesale markets in major producing areas with sufficient information about the supply flows act as key value chain governors and set prices accordingly. Since the smallholder farmers are not organized and are not governing the value chain, they do not possess sufficient bargaining power.

The key challenges that have to be overcome by potato farmers are, low average yield due to lack of quality seed in sufficient quantities at an affordable price, lack of market knowledge or difficulties in accessing market information needed to negotiate prices, getting policy support by allocating

more public investment and make suitable environment to seek substantial levels of private investment.

Lack of adequate amount of fertilizer and agrochemicals due to the government's one-off policy decision of banning chemical fertilizer and agrochemicals, issues related to seed potato, high labour cost, poor extension services, poor access to credit facilities, competition with low-priced imports and transportation problems and poor infrastructure were identified as major constraints facing potato value chain actors.

Improving the seed system by strengthening the government seed production programme, strengthening the marketing system by creating strong linkages among the chain actors, and empowering farmers to organize into groups to enable them to increase bargaining power are the key opportunities identified to develop the potato value chain.

Strengthening the government seed production programme in order to provide farmers with high-quality seed potatoes at an affordable price in a timely manner, will create a favourable policy environment to find solutions for constraints, create opportunities, improve productivity and reduce risks in the farming systems to safeguard the unique role played by smallholders in the potato value chain. Expanding and improving the current extension system that bridge the knowledge gap existing in the potato subsector, encouraging producers to promote cooperative activities in order to reduce transaction cost, enjoying the advantages of easy access to credit, collective marketing, the economy of scale, and to gain bargaining power are among major recommendations suggested by the study. It is also recommended to improve research and development facilities and expand the existing crop insurance scheme. Finally, it is proposed to implement a long-term and solid potato import policy to safeguard and encourage local producers.

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ABBREVIATIONS

CIF	-	Cost, insurance, and freight
COP	-	Cost of Production
CR	-	Consumer Price
DEC	-	Dedicated Economic Centre
DS	-	Divisional Secretariat
FAO	-	Food and Agriculture Organization
GAP	-	Good Agricultural Practices
GM	-	Gross Margin
GMMp	-	Producers' Gross Marketing Margin
HARTI	-	Hector Kobbekaduwa Agrarian Research and Training Institute
MC	-	Marketing Cost
MRP	-	Maximum Retail Price
OFC	-	Other Field Crops
PP	-	Producer Price
PS	-	Producer Share
SCL	-	Special Commodity Levy
TFC	-	Total Fixed Cost
TGMM	-	Total Gross Marketing Margin
TR	-	Total Revenue
TVC	-	Total Variable Cost
UNIDO	-	United Nations Industrial Development Organization

CHAPTER ONE

Introduction

1.1 Potato in the World

Potato is the world's number one non-grain food commodity and it has emerged as the world's fourth most important staple food crop after rice, maize and wheat. It is cultivated on 17,578,672 ha, producing 370.437 million Mt in 2019 (FAOSTAT, 2021). The potato production of Asia was 189.810 million Mt, whilst the potato production of Europe, America, Africa and Oceania was recorded as 107.265 million Mt, 45.084 million Mt, 26.534 million Mt and 1.743 million Mt respectively, as of 2019 (FAOSTAT,2021). Potato is grown by more than 100 countries in the world where presently, China, India, Ukraine, Russia and the United States of America contribute to a major share of the total world production. China was the largest producer of potatoes in 2019, with an annual production of 91.881 million Mt followed by India with nearly half of the total potatoes produced by China. Asia and Europe are the world's major potato producing regions.

Potato proved to be originated in the Andes highlands in Peru and remains an essential crop in Europe. Until the early 1990s, most potatoes were grown and consumed in Europe, North America, and the former Soviet Union countries. Since then, there has been a dramatic increase in potato production and demand in Asia, Africa and Latin America. By 2007 China led the world in potato production, and nearly a third of the world's potatoes were harvested in China and India.

Table 1.1: Top Potato Producers, 2020

Rank	Country	Production Thousand Tonnes/year
1.	China	78237
2.	China, mainland	78184
3.	India	51300
4.	Ukraine	20838
5.	Russian Federation	19607
6.	United States of America	18790
7.	Germany	11715
8.	Bangladesh	9606
9.	France	8692
10.	Poland	7849

Source: FAOSTAT, 2021

In terms of quantity, the Netherlands, France, Germany, China and Egypt are the major exporters of potatoes worldwide in 2021 (FAOSTAT) whereas Belgium, Germany, Netherlands, Spain and Italy are the major importers of potatoes in the world.

1.2 Potato in Sri Lanka

Potato has been cultivated in Sri Lanka for more than a century and occupied an important place in its list of major food crops. It is a subsidiary food item consumed as a vegetable in Sri Lanka, while it constitutes as the staple food in many countries of the world. Potato is known as 'the king of vegetables' and is a main item in the country's food basket. It has emerged as one of the most important food crops in Sri Lanka mainly for its high consumer preference and high net return. Potato is considered a nutritionally superior vegetable owing to its dry matter content, edible energy and protein content and has proven to be useful in achieving the nutritional security of the nation. The crop fits well with double cropping and intercropping systems mainly due to its short and highly flexible vegetative cycle, which brings yields within 100 days. On the other hand, potato crops are highly adaptable to a wide variety of farming systems.

In Sri Lanka, potato cultivation is highly concentrated in the up country, whereas it is extensively cultivated in Nuwara Eliya and Badulla districts. Jaffna is the other district where potatoes are grown to a lesser extent.

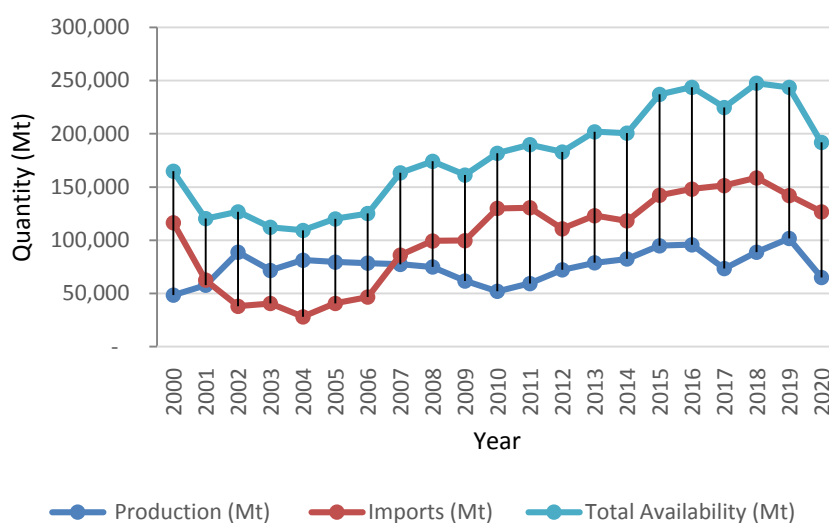
Table 1. 2: Extent and Production of Potato in Districts, 2020

District	Extent (Ha)	Production (Mt)
Kandy	5	68
Nuwara Eliya	1,379	28,181
Badulla	2,090	35,729
Jaffna	90	1,105
Vavuniya	0.1	1.3

Source: Department of Census and Statistics (2021)

Even though the local production of potatoes shows a slight increment over time, the rate of increase of imports is much higher during the considered period of time. In 2018 around 5174 ha of land was utilized for potato cultivation in Sri Lanka while around 88,897 Mt is domestically produced (Department of Census and Statistics, 2019). However, to meet the domestic potato requirement the country imported 158,695 Mt spending

around Rs. 5,286,618 in 2018 (Department of Customs, 2019) revealing that 64% of the total potato requirement is still being imported to the country. Data reveals that the country is importing more than 50% of the local requirement of potatoes in each and every year where this amount is greater than 70% in most of the years.



Source: Department of Census and Statistics, Department of customs

Figure 1.1: Production, Imports and Total Availability of Potato

Table 1. 3 Per capita Consumption of Potato

Period	Per capita consumption (kg/year)
95/96	2.39
2002	4.23
2005	4.97
2006/07	5.59
2009/10	5.80
2012/13	6.08
2016	5.84

Source: Household Income & Expenditure Survey - Dept. of Census & Statistics

Though the productivity of potato in Sri Lanka is stagnating over time sans a significant growth, it has a higher per area production potential. Most importantly, potatoes can both be used as a staple food crop for household consumption whilst sustaining Food Security or sold as a cash crop.

Therefore, the twin role of the potato provides a path out of subsistence farming and poverty with little risk exposure to farmers. At the same time there is an increasing trend of using potato by the food processing sector to meet the increasing demand of the fast food and snacks which creates as a result of growing urban populations and changing dietary habits. This has opened new market opportunities to participants in the potato value chain and such opportunities could increase incomes and create employment in the sector.

On the other hand, sustainability of the sub-sector, has always been an important aspect of the Sri Lanka's Agricultural Policy as potato is one of the major vegetable crops grown in the country. From a Food Security aspect, Potato is important as a food category whilst it carries a political and socio-economic aspect owing to the existence of a larger number of smallholder farmers and other stakeholders along the value chain that depend on the sub-sector for their livelihood. The value chain that spans across this sub-sector from the farmer to the consumer is at the foundation of the performance of the sector.

1.3 Importance of the Value Chain Approach

Over the time, it has become clear that farming for a market cannot be promoted by stimulating the supply side. Instead, there should be a system-induced process to extract relevant information on the demand and deliver to the side of the supply. Therefore, it is important to encourage the creation of a system in which all stakeholders co-operate and closely engage with each other to generate the highest possible value in the chain. Such chains are identified as Value Chains.

The concept and definition of a Value Chain, which was initially introduced by Michael Porter, were further developed in the academic sphere which can simply be summarised as follows. Simply, Value Chain can be defined as the conduit that runs from a farmer down to a final user, through which the commodity passes and which embodies these transactions and activities is conveniently referred to as a "marketing and processing chain" or a "supply chain" or a "value chain" (FAO, 2005). Value Chains are a key framework for understanding how inputs and services are brought together and then used to grow, transform, or manufacture a product. It is basically an illustration of how the product moves physically from the producer to the customer and how the value increases along the way (Kaplinsky and Morris, 2002, World Bank, 2010). Further, Value Chain Analysis facilitates an improved understanding of competitive challenges, whilst helping in the

identification of relationships and coordination mechanisms, assists in understanding how chain actors deal with powers and also helps comprehend the power concentrations influencing the chain. Developing Value Chain helps improve access to markets and ensure a more efficient product flow where all actors in the chain can benefit.

The success of a Value Chain depends on the effective flow and use of information along the entire chain, from the market via traders, retailers and processors to farmers and agro-input suppliers. Further, the success of the chain depends on understanding market opportunities and the whole chain, rather than looking at its part of the chain in isolation.

1.4 Justification of the Study

Being a tropical country with considerable climatic variations, Sri Lanka is home to more than 50 genres of vegetables. For some of the vegetables, Sri Lanka holds a comparative advantage in producing for the export market. However, the vegetables that do not possess a comparative advantage in exporting, have become entirely import-dependent over the time, which has now reached a level of prioritizing the sustenance of the local consumption demand rather than exporting. Potato is the best example, which befits the said situation. The production of potatoes and the number of farmers involved in the cultivation have considerably dropped over the time and Sri Lanka is left with the option of importing potatoes on a regular basis to cater to the local consumption demand. Although it is profitable to import when the price competitiveness is decreasing, it is the responsibility of the government to devise policies focused on the welfare of the farmers whilst ensuring the sustainability of a Value Chain. Therefore, in broader terms potato Value Chain is important since it is directly linked to import substitution policies.

On the other hand, potato is a heavily debated commodity in Sri Lanka in every budget statement. Every year the government imposes a tax on importation to encourage and protect local producers. However, even with the importation tax, Sri Lanka still has to import to cater to its consumption demand. Imported potatoes are sold at a lower price. Sri Lanka imports potatoes mainly from Pakistan, where Sri Lanka holds no price advantage. The trade deficit between the export and import of potatoes is much higher and at the same time, the local production is not enough to cater to the consumption demand. Therefore, the potato Value Chain is a crucial factor within the discourse of import substitution.

At the same time, potato has been one of the leading cash crops grown in Sri Lanka while it can be used as a staple food crop for household consumption and Food Security. At the same time, potatoes as a crop possess a high-income capability and therefore it has the potential to play a broad role in food systems and in the rural economy of Sri Lanka. Moreover, Potato has qualified as one of the "sensitive" crops, both economically and politically, and often difficult policy decisions were required to safeguard the interest of local producers. In recent years, horticultural producers have been facing increased competition from imports and liberalization of the import regime has been negative, affecting rural employment considerably (FAO,2005).

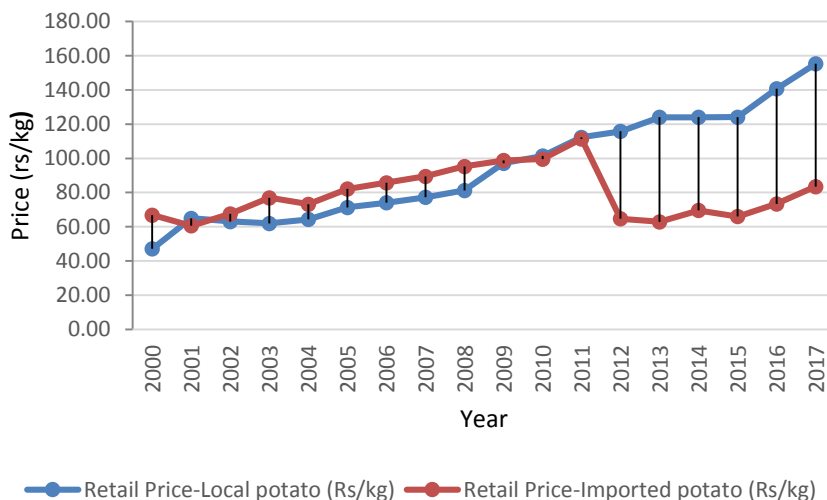
By conducting a Value Chain Analysis, the actors in the potato Value Chain can make informed choices, including policy makers and donors. Also, a Value Chain Analysis can be utilized to identify weaknesses that curtail progress and suggest actions for improvement. In addition, it helps to formulate policies and make decisions to uplift the potato cultivation in Sri Lanka.

Further potato has been identified in the new government's national policy framework; "Vistas of Prosperity and Splendor" as an important crop among the Other Field Crop (OFC) category whose production and cultivation should be promoted.

1.5 Research Problem

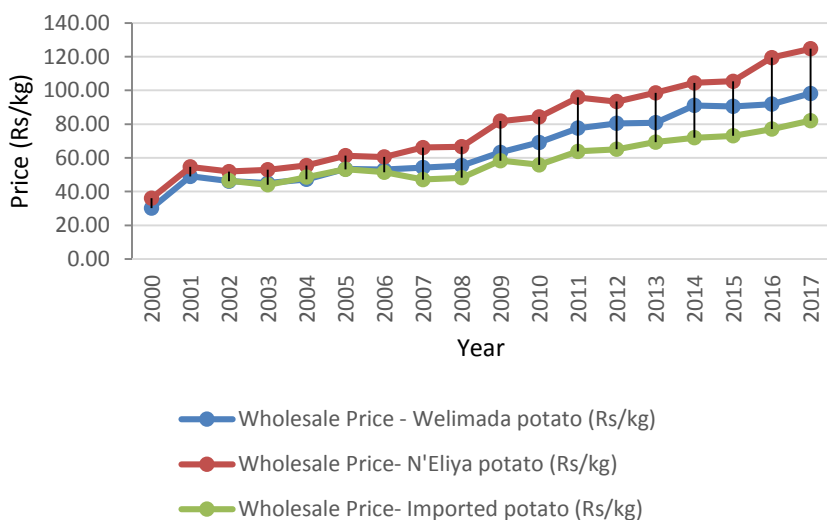
Although potato is a high-value cash crop and simultaneously, an important sub farming sector of the economy, several factors have contributed to hinder the growth of the sector. The cost of production of potatoes is relatively high and the productivity levels of the crop are relatively low in comparison to other potato producing countries in the region. However, the potato crop has higher per area production potential in Sri Lanka since the country has favourable conditions for the growth of the crop and also potato crops are identified as highly adaptable to a wide variety of farming systems. On the other hand, even if the local production of potatoes shows a slight increment over the time, the rate of increase of imports is much higher during the past decade. Alternatively, there is an increasing trend in per capita consumption of potatoes during the past and in order to meet the domestic potato requirement, Sri Lanka has to import more than 70% of the total potato requirement in most of the years. Until 1996, potato remained a highly protected crop and with the relaxation of import restrictions by the government in 1996, local producers have faced a plethora of difficulties in

competing with the imports. Potato producers are now confronted with severe difficulties in marketing their products due to the availability of cheaper imports. In most of the years prices of imported potatoes are lower than the prices of local potatoes (Figures 1.2 and 1.3).



Source: HARTI Price Data

Figure 1. 2: Retail Prices of Local and Imported Potato



Source: HARTI Price Data

Figure 1.3: Wholesale Prices of Local and Imported Potato

Following the said factors, a considerable widespread of poverty and income inequalities in these communities has become apparent. In order to overcome these problems facing by the farming community in this sub-sector, it is essential to examine the whole process of production i.e. from farmer to end-user/consumer. Therefore, based on these economic scenarios of potato production and marketing, this study is trying to review and analyse major characteristics, recent developments and changes of the potato Value Chains in Sri Lanka.

1.6 Objectives of the Study

1.6.1 Primary Objective

To identify and analyze the prevailing development gaps of the potato sector in Sri Lanka using a Value Chain approach to propose remedial actions for the development of this sector.

1.6.2 Specific Objectives

1. To identify the Value Chain actors and map potato Value Chains existing in study areas
2. To assess the economic performance of different actors along the potato Value Chains
3. To identify key systemic constraints and opportunities prevailing in potato Value Chains
4. To suggest actions and policy recommendations to improve the Value Chains in order to up lift the potato cultivation in Sri Lanka.

1.7 Conceptual Framework for Potato Value Chain

The Value Chain concept entails the addition of value as the product progresses from input suppliers to producers to consumers. Typical Value Chain linkages include input supply, production, transport, storage, processing, wholesaling, retailing and utilization. Value Chain represent the value of each commodity as it passes along the chain to the final consumer. It includes direct actors who are commercially involved in the chain (Input suppliers, producers, collectors, retailers, consumers) and indirect actors who provide services or support the functioning of the Value Chain. Further, a Value Chain illustrates horizontal and vertical relationships of chain actors that are jointly aimed toward delivering products to a market. The conceptual framework for potatoes is more or less similar to those of many other agricultural commodities. Major Value Chain actors involved in the

chain are input suppliers, producers, collectors, retailers and consumers where most of the farmers sell their products to collectors at the field level. The conceptual framework for potatoes is shown in Figure 1.4.

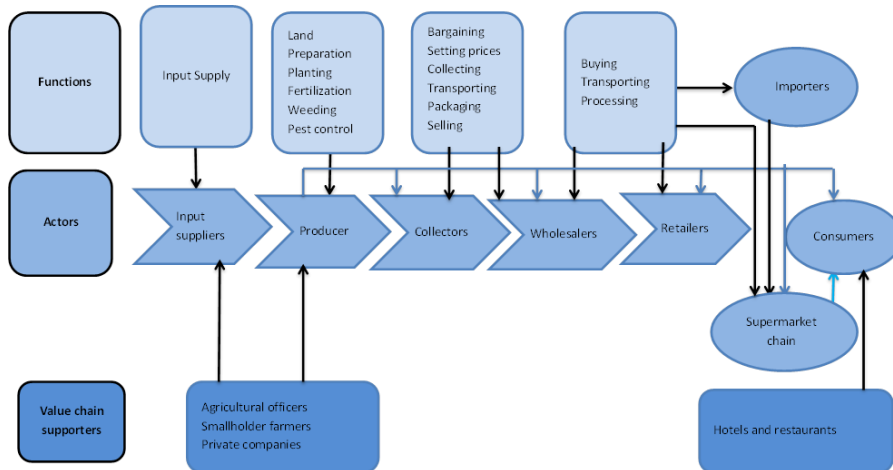


Figure 1. 4 Conceptual Framework for Value Chain Analysis of Potato

1.8 Methodology

The research design used for this study is inclusive of a sample survey which consists of both qualitative and quantitative components to collect primary information on the subjects under study, and an analysis of secondary information available in the public domain on macroeconomic indicators, agriculture production and price data. The analysis of both secondary information and the primary data were used to gain an understanding of the performance of the Value Chain as a whole at the macro level. Primary data were used to understand the conduct and performance aspects of each stakeholder segment within the chain at a micro-level.

1.8.1 Data Collection

The method of data collection for this study consists of three major components;

- 1) Literature review and collection of national data and statistics
- 2) Interviews with key stakeholders in the sub-sector and chain
- 3) Value Chain Analysis using tools such as mapping

The Value Chain mapping will include stakeholder mapping, activity mapping, network mapping, product mapping and area location mapping. In addition, this study investigates data related to the economic aspect as well. The economic analysis focuses on looking at gross margins, break-even conditions of the farming activity, and contribution of different cost components to the total variable cost. In addition, this study has identified the value distribution in Value Chains.

In terms of gross margin analysis, data was collected from the farmers using a farm survey questionnaire. This questionnaire was designed to capture all the variable costs, revenues and the marketing mix of potato. The farmer survey consisted of a representative sample of farmers in Nuwara Eliya and Badulla districts.

In addition, the research study looked at all the stakeholders in the Value Chain, such as input suppliers, farmers, intermediaries, and the trade represented by wholesalers, retailers, managers of supermarket chains and government-owned economic centres.

Furthermore, participatory data collection tools, namely key informant discussions and focused group discussions were also employed to collect data from the identified Value Chain actors.

Information related to prices, imports and production was obtained from government institutions such as Hector Kobbekaduwa Agrarian Research and Training Institute, Department of Census and Statistics and Sri Lanka Customs in the form of Secondary Data.

1.8.2 Study Locations

Two districts were selected for the farmer survey by analysing the secondary data on the extent and production of potatoes in the country. These include Nuwara Eliya and Badulla since these districts collectively account for almost all the potato production in Sri Lanka.

1.8.3 Sample Selection

The sample for the study was drawn from all the actors involved along potato Value Chains, such as producers, importers, collectors, wholesalers, retailers and consumers. Total sample of 60 farmers was selected including 30 from each district; Badulla and Nuwara Eliya as respondents for the farmer survey. Within each district, divisional secretariat (DS) divisions were

selected proportionately to the cultivated extent of potato and then farmers from each DS division were randomly selected. Sample of Value Chain actors is shown in tables 1.4 and 1.5.

Table 1. 4: Sample of Value Chain Actors of the Study

Value Chain Actor	Sample size
Farmers	60
Collectors	5
Commission Agents	15
Importers	2
Wholesalers	8
Retailers	10

Table 1. 5 Sample Distribution of Potato Farmers

District	DS Division	No. of Farmers
Badulla	Hali-Ela	1
	Welimada	28
	Haputhale	1
	District Total	30
Nuwara Eliya	Nuwara Eliya	18
	Walapane	4
	Hanguranketha	3
	Kothmale	5
	District Total	30
Total sample		60

1.8.4 Data Analysis

Data collected was analyzed using descriptive statistics such as frequency, percentage and tables.

Objective 1: To identify the value chain actors and map potato Value Chains existing in study areas

Value Chain mapping was analysed using functional analysis. The core processes, actors involved, flow and quantity of product at each node of the Value Chain were determined. A flow chart was used to represent the activities in the Value Chain.

- Functional distribution
 - Stakeholder map
 - Actors and activity map
 - Value chain network maps
- will be used as tools for functional analysis.

Objective 2: To assess the economic performance of different actors along the potato Value Chains

An economic analysis was conducted to assess the economic performance of different actors along the Value Chain. Gross margins, break-even conditions of the farming activity, contribution of different cost components to the total variable cost and value distribution in Value Chains were calculated.

- Gross margin calculations
- Producer share
- Estimation of value addition by chain actors
- Calculation of market margins
- Contribution analysis

1.8.4.1 Gross Margin Calculations

Total Fixed Cost (TFC), Total Variable Cost (TVC), break-even price and break-even quantity were used to calculate Gross Margins (GM) and equations were used in the analysis are as follows;

$$GM = TR - TVC$$

Where; GM – Gross Margin

TR – Total Revenue

TVC – Total Variable Cost

Since the breakeven price is an approximation of the cost of production, it can be used to determine the accuracy of the calculations by comparing with the published data.

1.8.4.2 Producer Share

Producer Share in consumer rupees (PS) was calculated as:

$$PS = (PP|CR) * 100$$

Where *PP* is the price received by the farmer, and *CR* is the retail price (consumer price).

1.8.4.3 Estimation of Value Addition

The share of the value created at each point in the Value Chain was calculated by using the following equation.

$$\begin{aligned} & \text{Value Addition (\%)} \\ &= \frac{(\text{Selling price (SP)} - \text{Purchased Price})}{\text{Purchased price}} \times 100 \end{aligned}$$

1.8.4.4 Market Margins

In analysing the marketing margins, the Concurrent Margin Method was used. As described by Singh (1998) the method is a static analysis of the distributive margin usually adopted to calculate the price spread in one market town by considering differences between prices prevailing at successive stages of marketing at a given point of time.

The model is defined as thus;

$$M_t = P_{t,L} - P_{t,L-1} \text{ where;}$$

M_t = Marketing margin between market level (L) and its preceding level (L-1) at time (t)

$P_{t,L}$ = Price at market level (L) at time (t)

$P_{t,L-1}$ = Price at market level (L-1) at time (t)

Where marketing margins at different levels of the marketing chain are compared, Guvheya et al. (1998) emphasize the use of consumer price as the common denominator for all margins.

The two indices that were used in this study are Total Gross Marketing Margin (TGMM) and Producers' Gross Marketing Margin (GMMp). Asper Scott (1995), Gross Marketing Margin is the difference between consumer's price and farmer's price. TGMM and GMMp were calculated as;

$$TGMM = \frac{\text{Consumer price} - \text{farmers price}}{\text{Consumer price}} \times 100$$

and

$$GMMP = \frac{\text{Price paid by the consumer} - \text{Gross market margin}}{\text{Price paid by the consumer}} \times 100$$

1.8.4.5 Contribution Analysis

The share of the value created in the Value Chain, expressed in terms of different price points is explained by Contribution analysis/margin analysis. Value Chains have different major trading channels where each trading channel creates value for its stakeholders and the contribution analysis is based on the price margin that each stakeholder gets, which allows us to recognize the most befitting trading channel for the farmer. A simple illustration of contribution analysis is given in Figure 1.5.

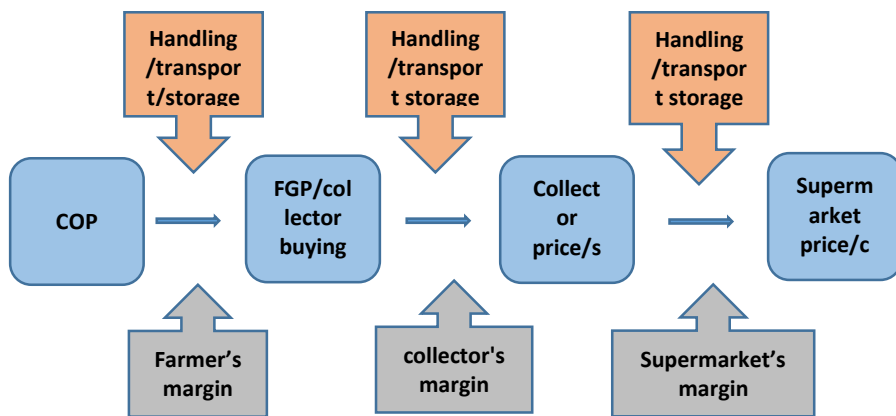


Figure 1. 5: Simple Illustration of Price Margins

These margins /share of the value created in each segment of the Value Chain could be expressed as a percentage of a Total Margin and it could be used to compare different Value Chains in order to identify the most suitable Value Chain for farmers which allows them to obtain maximum profit from the product.

1.9 Variables and Output Indicators Used in the Study

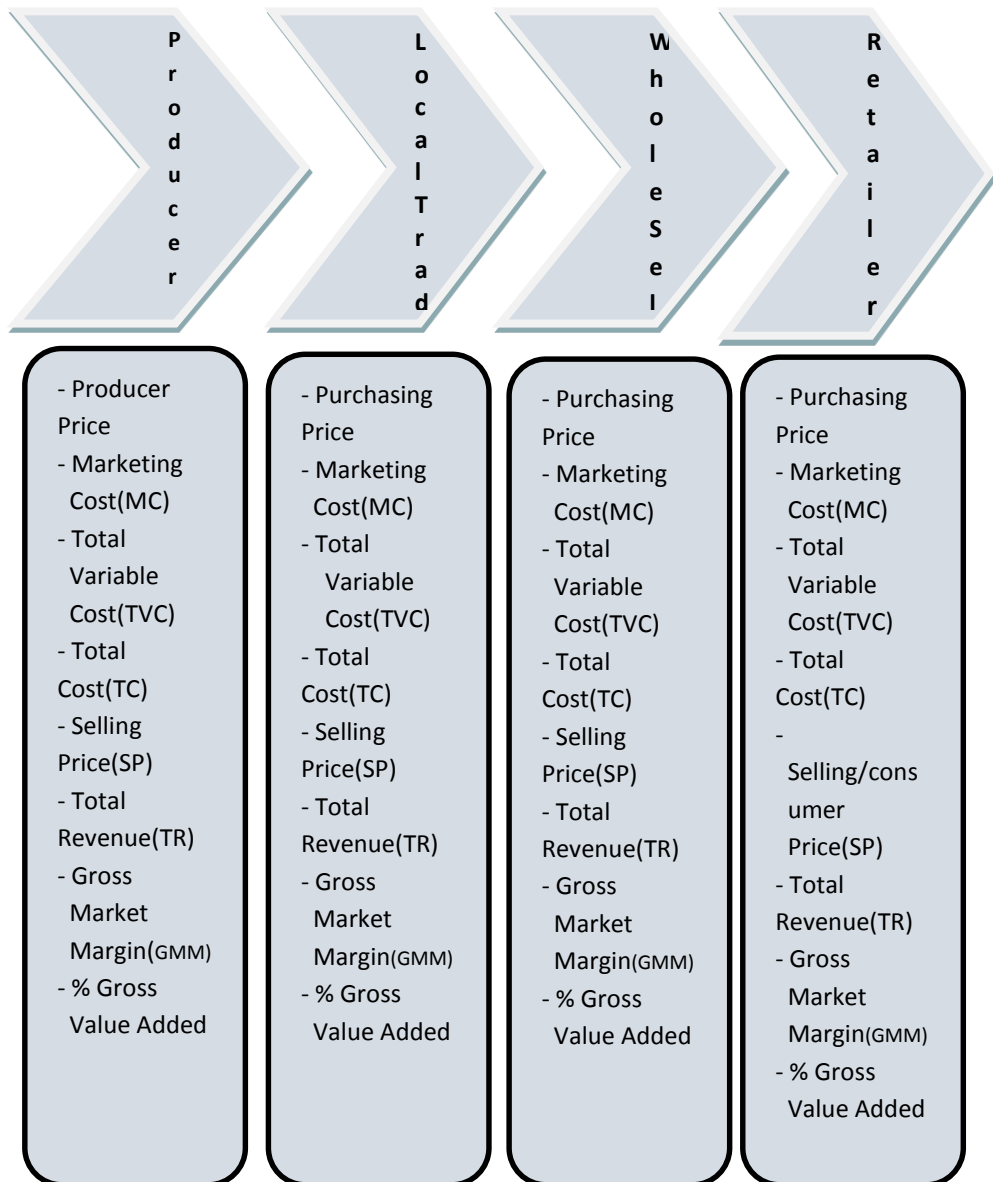


Figure 1. 6: Variables and Output Indicators

Objective 3: To identify key systemic constraints and opportunities prevailing in potato value chains

Qualitative data analysis tools were carried out on potato Value Chain in order to identify constraints and opportunities in the Value Chain.

Objective 4: To suggest actions and policy recommendations to improve the Value Chains in order to up lift the potato cultivation in Sri Lanka

Suggestions and recommendations to improve the potato Value Chains in order to uplift the potato production and improve the living standards of Value Chain actors were made based on the analysis.

1.10 Limitations of the Study

Initially it was designed to conduct a detailed Value Chain Analysis of potatoes by collecting primary data from all the Value Chain actors through a questionnaire survey, in-depth interviews, key informant discussions, and case studies. Accordingly, a set of attributes and variables were designed to obtain comprehensive information.

However, the farmer survey was conducted over the phone and the sample size was limited to 60. However, the questionnaire survey for other Value Chain actors could not be conducted as anticipated given the imposition of travel restrictions and lockdowns. Only a limited number of interviews were conducted with selected Value Chain actors and the authors were unable to conduct the consumer survey. Owing to the outbreak of COVID-19 pandemic and travel restrictions, there was an inability to collect other in-depth data, particularly information needed for economic analysis. This was the major limitation of the study which has affected the quality, output and the achieving of originally designed objectives of the study.

CHAPTER TWO

Review of Literature

2.1 Introduction

This chapter aims at reviewing previous studies related to the study and the literature pertaining to Value Chain Analysis in the international and local contexts.

2.2 Theoretical Literature

A Value Chain is referred to as the full range of activities that are required to bring a product or a service from conception, through the different phases of production, to delivery to the final consumer and disposal after final use (Kaplinsky and Morris, 2001). It helps to identify challenges faced by different actors along the Value Chain and opportunities to help overcome challenges to help the development of a Value Chain.

According to the United Nations Industrial Development Organization (UNIDO, 2019), Value Chain is the entire range of activities that are undertaken to bring a product from the input supply stage through the various phases of handling, processing, storage, packing to its final market destination, including its disposal after use. As the product moves successively through the various stages, transaction occurs between stakeholders and value is added. Therefore, a Value Chain is a system of interdependent activities.

In a typical agricultural Value Chain, farm production, marketing and activities of support services are identified as activities where the actors including input suppliers, farmers, processors, transporters, collectors, wholesalers, retailers and the final consumers are typically found. These operators in the chain are linked by a series of trade relationships that take the product from producers to final consumers (Tadesse and Bakala, 2018).

The primary goal of the Value Chain Analysis is to characterize, describe, and comprehend the Chain in order to evaluate its efficiency. There is, however, a downside prescriptive dimension - the analysis can also be used to provide recommendations and can be utilized to encourage better performance through suitable governmental policies and private firm policies that are appropriate strategies. A framework for better understanding the linkages

between producers, exporters, and global markets is provided by Value Chain Analysis. This framework is centered on the difficulties of competing in the market. Hence, it clarifies the interrelationships between many Value Chain actors and emphasizes how the benefits accrue (FAO, 2010). Food and Agricultural Organization (FAO) further mentioned that in practice, Value Chain Analysis can encompass a wide range of chain difficulties, including market access issues for small producers, relative merits of different products, and so on. As far as contractual relationships of various types of businesses are concerned, there are power and benefits along the dissemination of the Value Chain. Value is created by building on the knowledge that has been gathered. The results of the chain analysis can then be used to promote methods to improve the performance of the supply chain by improving business development, increasing the quality and safety of food or enhancing competitive performance.

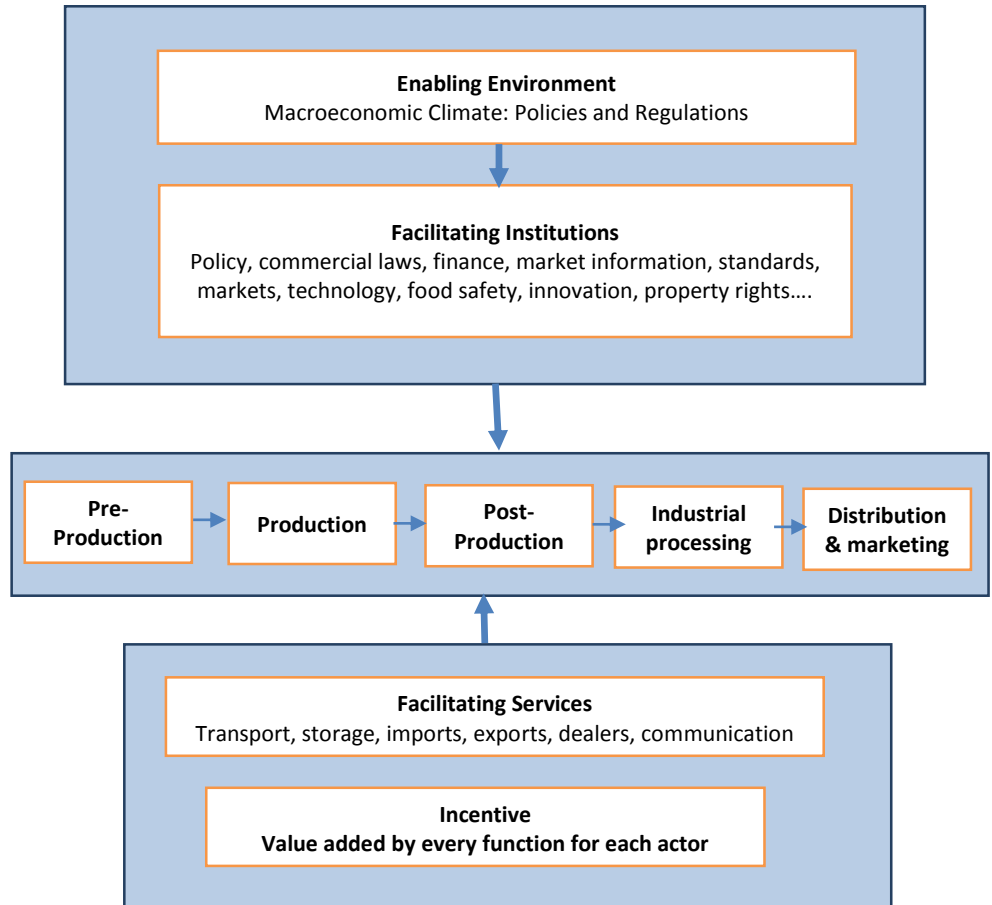
The generic agricultural value chains in developing countries is illustrated in Figure 2.1.

Value Chain Analysis is a useful analytical tool that helps account for and present the value created in a product or service as it is transformed from raw inputs to a final product consumed by end-users. Further, it helps identify chain actors at each stage, their functions and relationships, value-adding activities, flow of goods, information and finance through various stages of the chain. Also, it supports identifying problems and opportunities to improve the performance of the chain.

An approach used in Value Chain Analysis depends on the research question (Kaplinsky and Morris, 2001). Accordingly, four aspects of Value-Chain Analysis have been applied in agriculture:

- i. Value Chain mapping: a Value-Chain Analysis systematically maps the actors participating in the production, distribution, processing, marketing and consumption of a particular product (or products). This mapping assesses the characteristics of actors, profit and cost structures, flows of goods throughout the chain, employment characteristics, destination and volumes of domestic and foreign sales.
- ii. Identifying the distribution of benefits of actors in the chain: Through the analysis of margins and profits within the chain, one can determine who benefits from participation in the chain and which actors could benefit from increased support or organization. This is particularly important in the context of developing countries

(in agriculture in particular), given the fact that particularly poor are vulnerable to the process of globalization.



Source: Adopted from UNIDO, 2009

Figure 2. 1: A Generic Value Chain

- iii. Examining the role of upgrading within the chain: Upgrading can involve improvements in quality and product design that enable producers to gain higher value or diversify the product lines served. An analysis of the upgrading process includes an assessment of the profitability of actors within the chain as well as information on constraints that are currently present. Issues in governance play a key role in defining how such upgrading occurs. In addition, the structure of regulations, entry barriers, trade restrictions, and standards can further shape and influence the environment in

which upgrading can take place. Possible forms of upgrading are inclusive of process upgrading, product upgrading and function upgrading.

- iv. Role of governance in the Value-Chain: Governance in a Value-Chain refers to the structure of relationships and coordination mechanisms that exist between actors in the Value-Chain. Governance is important from a policy perspective by identifying the institutional arrangements that may need to be targeted to improve capabilities in the Value-Chain, remedy distributional distortions, and increase value-added in the sector.

2.3 Review of Empirical Literature

Within the Sri Lankan context, Value Chain research related to potato is scanty. Most literature and research in the past have focused on production and productivity and some on marketing.

As per Sathiamoorthy et al. (1985), potato cultivation has become a high profit crop in Sri Lanka. The major limiting factor is the supply of good seed tubers which are free from major diseases. Further, they have identified weather, poor storage conditions, diseases and availability of good seeds as major problems associated with potato production in Sri Lanka. Another research study done by Priyadarshana et al. (2015), has identified that the import of potatoes is the major problem encountered by local farmers. The quantity of imports during the last 30 years had increased considerably. However, imports have rapidly increased during the last ten years from 1997 to 2012. This was mainly due to the removal of import restrictions on potatoes under the liberalization of agricultural markets. They have further mentioned that the value of the imports and unit prices of potatoes (CIF) significantly increased, while the rising trend of quantities, CIF prices and total values have continued in the past few years. Therefore, an increasing trend of all these import variables causes difficulties to the local potato production and the marketing system.

Mohamed et al. (2020) revealed that low farm gate prices, pest and disease attacks, high cost of farm inputs are the major challenges faced by Sri Lankan potato farmers. Further, they have stated that the importation of seed potatoes was the key influential factor for the increase of input price. This study has recommended to improve better coordination among stakeholders in the industry and to direct farmers to follow proper cultivation and harvesting techniques.

The potato Value Chain conducted in Bhutan (Joshi and Gurung, 2009) analyzed the context of potato production, mapped chain actors, factors affecting Value Chain and chain relationships. A case study of the potato Value Chain conducted in Kenya has shown that contract farming can be used to reduce transaction costs and risks and to improve the organization and governance of Value Chains by creating stable business relationships (Kirumba et al., 2004). The study also indicated that potato Value Chain is constrained by a multitude of market and institutional failures. The potato chain in Kenya is fragmented by little cooperation and integration, role of cartels, high transaction costs, deep mistrust, price inefficiencies and quality losses.

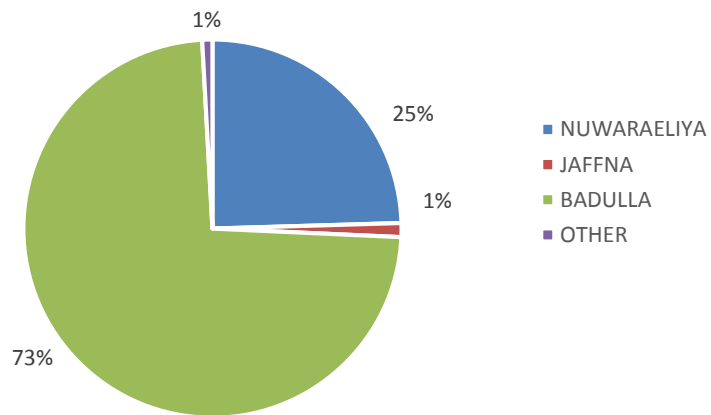
According to a report compiled by Emanu and Nigussie (2011) on potato Value Chain Analysis and Development, a plethora of factors such as fertility of land, planting materials, know-how, productive plantation, harvesting technology, packaging, fertilizer utilization, farm devices, quality control, cleaning and grading, branding, safe transport, and retail marketing was identified as decisive in shaping the competitiveness in agricultural and agro-industrial products in Ethiopia. The report further discusses how these factors affect the development of the potato Value Chain.

CHAPTER THREE

Overview of the Potato Sector in Sri Lanka

3.1 Major Growing Areas of Potato in Sri Lanka

Badulla and Nuwara Eliya districts are the major potato growing districts in Sri Lanka. During the last twenty years, about 73 percent of the total cultivated extent of Badulla was allocated to potato cultivation and in Nuwara Eliya potato cultivation accounted to 25 percent of the total land extent. Jaffna is the other district where the potato is grown in lesser extents during *Maha* season. The cultivation has dropped to only 1 percent in the recent years. In Badulla district, potato is cultivated in paddy fields (lowlands) and on highlands during *Yala* and *Maha* seasons respectively. Welimada and Uva Paranagama are the main potato growing areas in Badulla district. In Nuwara Eliya potato is cultivated in two major seasons, *Maha* and *Yala* in Lindula, Thalawakele, Kandapola, Ragala and Pattipola.



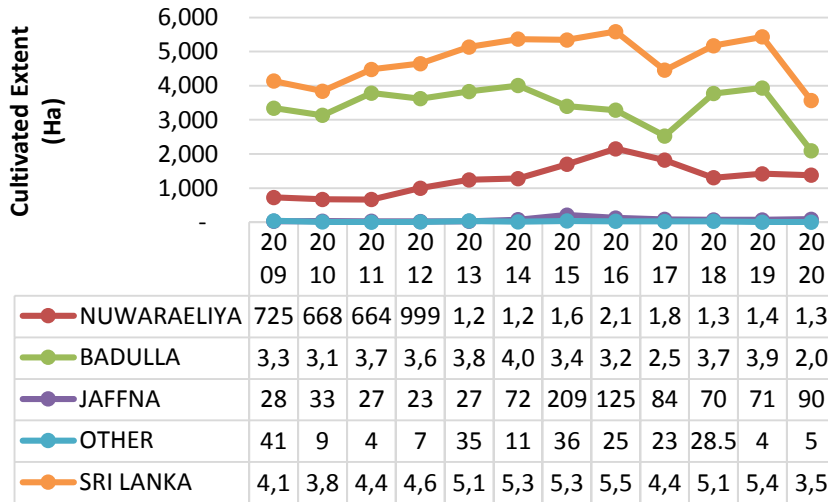
Source: Department of Census and Statistics – 2021

Figure 3.1: Average Extent of Potato Cultivation in Major Producing Districts (2000-2020)

3.2 Extent under Cultivation

Extent under potato cultivation reflects an increasing trend starting from 3843 ha in 2010 which reached a peak of 5587 ha by 2016. A sudden decline was observed in 2017 but an increase was recorded in 2018. Another sharp decline was observed in 2020 particularly due to the sudden drop in the

cultivated extent of Badulla district. The highest extent was recorded in 2016 (5587 ha) whereas the lowest of 3843 ha was recorded in the year 2010 during the period under consideration. Over the period, the extent cultivated in Badulla district showed a slightly decreasing trend while an increasing trend was observed in Nuwara Eliya district, which impacted considerably to the overall increasing trend.

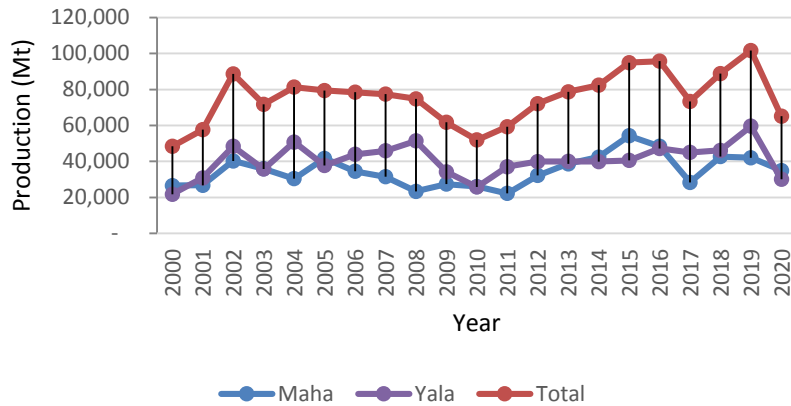


Source: Department of Census and Statistics – 2021

Figure 3.2: Cultivated Extent of Potato in Major Producing Districts (2009-2020)

3.3 Production of Potato

As illustrated in Figure 3.3, potato production has increased from 2000 to 2002 and has shown a decreasing trend thereafter until 2010. According to the literature the reasons for this decline were adverse weather conditions, shortage of quality seed potatoes and high prices of imported seed potatoes during the said period. However, an increasing trend was recorded from 2011 to 2016 mainly with the sharp increase in the production in *Maha* season. Even though a sudden decline was observed in 2017 it was started to climb again in 2018.

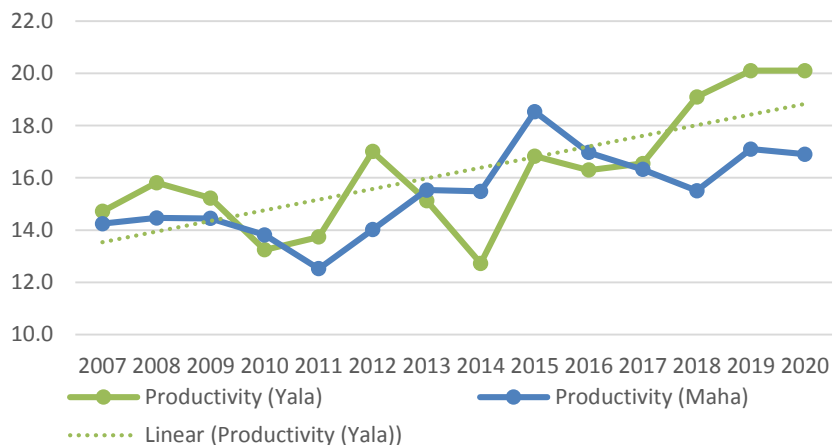


Source: Department of Census and Statistics – 2021

Figure 3.3 Production of Potato (2000-2020)

3.4 Productivity of Potato

The variation in the productivity of potatoes in both seasons during the considered period is shown in Figure 3.4. Even though the graph shows a fluctuating pattern the trend line prove that the productivity has shown an increasing trend over the period in both seasons. During the *Yala* season the lowest productivity of 12.7 Mt/ha in 2014 while it reaches its peak of 20.1 Mt/ha in 2019 and in 2020. The highest yield of 18.5 Mt/ha was recorded in 2015 in *Maha* season it has dropped to 12.5Mt/ha in 2011.

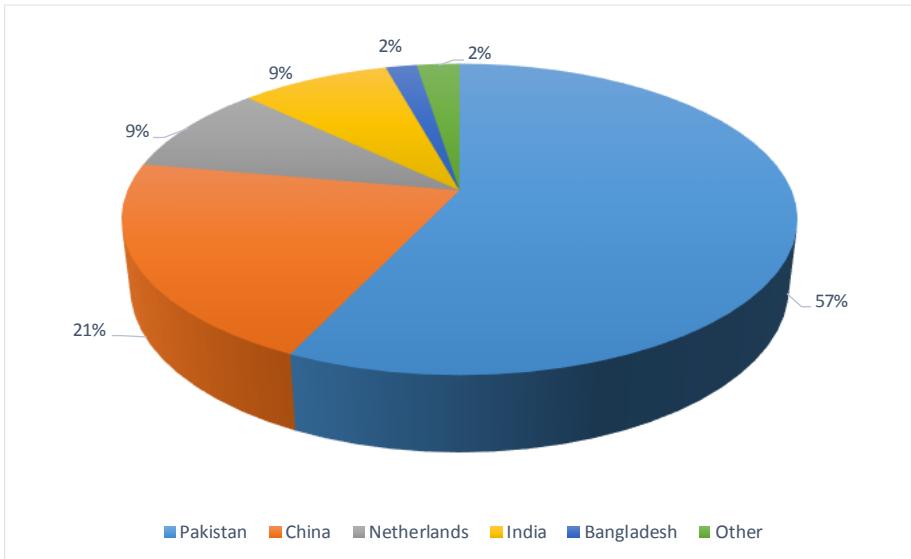


Source: Department of Census and Statistics – 2021

Figure 3.4: Productivity changes in Potato (2000-2020)

3.5 Imports of Potato

In order to meet the growing demand, the country must import potatoes throughout the year specially during the off producing periods. In that regard, importing potatoes have become crucial during the months of January, June and July. Owing to the similarity of the Indian potato varieties to that of the local products and the low price, imported Indian potatoes catalyzes the competitiveness of the market. The government has provided a price protection in form of an import duty as an important measure to protect local producers. In 2020 main proportion (57%) of the imports had arrived from Pakistan followed by China (21%). Further, about nine percent has come both from India and Netherlands where only two percent of the imports were from Bangladesh.

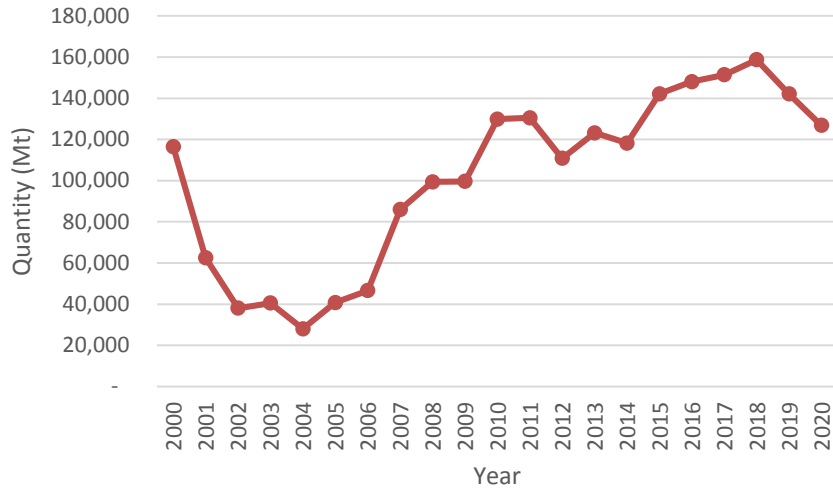


Source: Sri Lanka Customs, 2021

Figure 3.5: Imports of Potato based on Countries of Imports in 2020

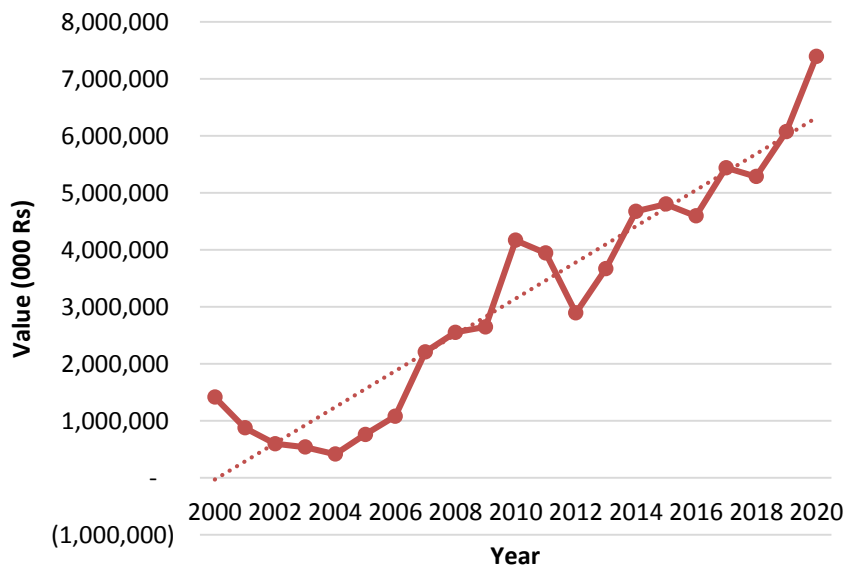
The quantity and value of imports during the period from 2000 to 2018 is shown in Figures 3.6 and 3.7. These graphs clearly show that both quantity and value of imports have shown an increasing trend after 2004 where both values have decreased from 2000 to 2004. During the period the import quantity has reached its maximum value in 2018 while the value of imports has recorded its maximum in 2017.

In 2018 imports accounted for 64% of the total potato requirement of the country.



Source: Sri Lanka Customs

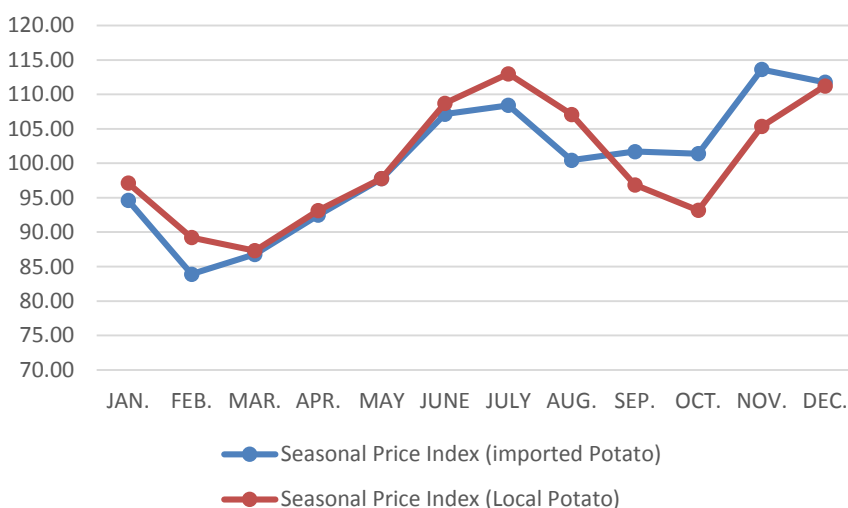
Figure 3.6: Quantity of Imports of Potato during 2000-2020



Source: Sri Lanka Customs

Figure 3.7: Value of Imports of Potato during 2000-2020

Prices of potato at the wholesale level are mainly determined by the market forces. The price of imported potato is mainly determined by the Cost, insurance, and freight (CIF) price, import duty and the quantity of imports. Fourth Cross Street in Pettah is the main price determination point of imported potatoes, while the price of local potatoes during the local production period is determined by the Nuwara Eliya DEC and Bandarawela wholesale market. As Potato is a seasonal crop, price fluctuations are prosaic within the year which follows a pattern of increasing prices during the off-season and decreasing prices during the harvesting season. As described by the seasonal price index, main price peaks are observed during the period of June to August and months of November and December. In the meantime, prices drop to their minimum during the months of September to October and February to May due to peak producing seasons both in Badulla and Nuwara Eliya. Variation in seasonal price indices of both local and imported potatoes follows an almost similar pattern throughout the year.



Source: Data Management Division/HARTI, 2020

Figure 3.8: Seasonal Price Indices of Local and Imported Potato (2006-2018)

3.6 Imports of Seed Potato

The quantity and the value of potato seed imports during the period of 2000 to 2020 are given in the Table 3.1. Even though the imports of seed potatoes show a fluctuating pattern, both Figures depict an overall decrease over the

time. A sharp decline was observed after 2005 where the highest quantity of seed imports was recorded in 2005 as 5718 Mt. However, irrespective of the decline in both Figures, value and quantity CIF price of seed potato has continuously increased over the time.

Table 3.1: Quantity, Value and Price of Imported Seed Potato

Year	Quantity (mt)	Value (Rs '000)	CIF Price (Rs/kg)
2000	2,794	101,226	36.23
2001	6,725	335,635	49.91
2002	7,029	418,243	59.50
2003	5,031	346,835	68.94
2004	3,724	281,955	75.71
2005	5,718	355,630	62.19
2006	2,248	185,041	82.31
2007	1,782	198,812	111.57
2008	1,208	131,958	109.24
2009	1,010	106,391	105.34
2010	1,014	94,555	93.25
2011	1,097	116,620	106.31
2012	1,926	236,326	122.70
2013	1,464	201,380	137.55
2014	1,817	236,425	130.12
2015	2,485	318,042	127.98
2016	1,841	241,043	130.93
2017	1,611	236,074	146.54
2018	1,602	250,669	156.47
2019	1,801	312,735	173.65
2020*	2,712	521,498	192.29

* Provisional data

Source: Sri Lanka Customs

3.7 Government Policies on Potato

Government policy towards the potato sub-sector varied widely over the years due to the pressure from different groups including growers, consumers, policy makers and other interested groups. In comparison to other potato producing countries, productivity levels are low and on the

other hand the cost of production is much higher in Sri Lanka, owing to poor quality inputs specially seeds and high cost of inputs, low level of technological innovation, lack of mechanization, inappropriate cultivation and harvesting practices. Therefore, the government has taken several measures to improve the productivity of the crop and to lower the production cost through improving research and extension and by providing incentives and subsidies. With the intention of safeguarding producers, the government imposed high duty on potato imports in some periods while in some periods the government make decisions to relax the duty in order to maintain a more liberalized market to ease consumers. Hence, tariff and non-tariff policies are the main tools that are used to improve the production.

Obtaining a license for the importation of potatoes was mandatory prior to 1996. However, during mid-1996, the said policy was discontinued with the liberalization of importing of potatoes. Afterwards the government imposed a customs duty on import of potatoes, and the amount of duty was altered changed from time to time. Tariff changes on import of potato from 2010 to 2020 is given in the table 3.2.

Table 3.2: Tax Revisions on Import of Potatoes (2010-2020)

Date	Revision
30.10.2010	Special commodity Levy (SCL) on the importation of potatoes was reduced from Rs. 30 per kg to Rs. 10 per kg
10.09.2010	SCL on the importation of potatoes was increased from Rs. 10 per kg to Rs. 30 per kg for another three months
27.08.2010	A surcharge of Rs. 20 per kg was imposed on potatoes until 09 September 2010
10.12.2011	The SCL on the importation of potatoes was reduced to Rs.20 per kg from Rs.35 per kg for a period of four months
03.05.2011	The SCL on the importation of potatoes was increased from Rs.20 per kg to Rs.30 per kg for a period of four months
03.05.2011	The SCL on the importation of potatoes was increased from Rs.20 per kg to Rs.30 per kg for a period of four months
20.11.2011	The Special Commodity Levy (SCL) on importation of potatoes was increased from Rs.10 per kg to Rs.20 per kg for a period of three months

08.12.2012	SCL on the importation of potatoes was reduced to Rs. 15/kg from Rs. 50/kg
18.09.2012	SCL on the importation of potatoes was increased to Rs. 50/kg from Rs. 30/kg
13.08.2012	SCL on the importation of potatoes was increased to Rs. 30/kg from Rs. 10/kg
14.07.2012	SCL on the importation of potatoes was reduced to Rs. 10/kg from Rs. 30/kg for a period of three months.
02.03.2012	The SCL on the importation of potatoes was increased to Rs. 30 per kg from Rs. 20 per kg
17.11.2013	SCL on the importation of potatoes was reduced to Rs. 10 per kg from Rs. 40 per kg for a period of four months
23.08.2013	SCL on the importation of potatoes was increased to Rs. 40 per kg from Rs. 25 per kg for a period of four months
03.05.2013	SCL on the importation of potatoes was increased to Rs. 25 per kg from Rs. 15 per kg for a period of four months
13.12.2014	SCL on the importation of potatoes was decreased to Rs. 10 per kg from Rs. 20 per kg for a period of three months
02.12.2014	SCL on the importation of potatoes was decreased to Rs. 20 per kg from Rs. 40 per kg for a period of four month
23.08.2014	SCL on the importation of potatoes was increased to Rs. 40 per kg from Rs. 15 per kg for a period of four months
15.08.2014	SCL on the importation of potatoes was increased to Rs. 15 per kg from Rs. 5 per kg for a period of four months
16.07.2014	SCL on the importation of potatoes was reduced to Rs. 5 per kg from Rs. 15 per kg for a period of three months
22.05.2014	SCL on the importation of potatoes was reduced from Rs. 25 per kg to Rs. 15 per kg for a period of seven months
07.02.2014	SCL on the importation of potatoes was increased to Rs. 25 per kg from Rs. 10 per kg for a period of five months
21.11.2015	SCL on the importation of potatoes was decreased to Rs. 15 per kg from Rs. 40 per kg for a period of six months
08.09.2015	SCL on the importation of potatoes was increased to Rs. 40 per kg from Rs. 30 per kg for a period of six month
06.06.2015	SCL on the importation of potatoes was decreased to Rs. 30 per kg from Rs. 55 per kg for a period of three months.
24.04.2015	SCL on the importation of potatoes was increased to Rs. 55 per kg from Rs. 40 per kg for a period of four months

15.02.2015	SCL on the importation of potatoes was increased to Rs. 40 per kg from Rs. 10 per kg for a period of four months
25.08.2016	SCL on the importation of potatoes was increased to Rs. 40 per kg from Rs. 35 per kg for a period of six months
01.03.2016	SCL on the importation of potatoes was increased to Rs. 35 per kg from Rs. 15 per kg for a period of four months.
14.07.2016	MRP value of potatoes (imported) at Rs. 120 per kg
09.11.2017	SCL on the importation of potatoes was decreased Potatoes from Rs. 40 per kg to Rs. 1 per kg
27.01.2017	MRP of Potatoes (imported) was reduced from Rs. 120 to Rs. 115 per kg
03.12.2018	SCL on the importation of potatoes was decreased to Rs. 20 per kg from Rs. 40 per kg for a period of three month
02.05.2018	SCL on the importation of potatoes was decreased to Rs. 20 per kg from Rs. 40 per kg for a period of three month
24.02.2018	SCL on the importation of potatoes was increased to Rs. 30 per kg from Rs. 1 per kg until 31 March 2018
25.12.2019	Decreased to Rs. 25 per kg from Rs. 50 per kg for a period of 31 days
25.01.2020	of 31 days
08.02.2019	Increased to Rs. 50 per kg from Rs. 20 per kg for a period of three months
15.08.2020	SCL was increased to Rs. 55 per kg from Rs. 50 per kg for a period of four months (Extraordinary Gazette Notification No. 2188/50).
27.03.2020	Imposition of SCL of Rs. 25 per kg was extended for a period of three months (Extraordinary Gazette Notification No. 2168/7).
25.02.2020	SCL of Rs. 25 per kg was extended for a period of 31 days
25.01.2020	SCL of Rs. 25 per kg was extended for a period of 31 days

Source: CBSL Annual Reports

In order to safeguard potato producers, the government has taken measures to increase the import tax of potato specially during the harvesting periods of local potatoes in most of the years. Monthly changes in tax on imported potato for the period of 2010 to 2020 are given in the table 3.3.

Table 3.3: Monthly Tax of Imported Potatoes (Rs/kg)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
2010	10.11	10.15	10.08	10.06	10.14	10.08	25.42	13.14	30.28	30.31	10.06	10.10	12.42
2011	10.18	13.10	20.38	20.31	30.11	30.47	30.17	32.75	35.03	34.99	35.05	22.84	23.77
2012	20.13	20.26	29.88	30.54	30.38	30.60	18.41	18.31	32.75	50.04	50.22	19.98	24.27
2013	3.85	15.00	15.16	15.00	24.63	25.00	25.04	26.48	39.30	38.66	18.52	10.06	17.77
2014	10.07	18.44	25.26	25.30	22.08	15.07	7.59	7.18	40.08	40.00	40.38	14.08	14.45
2015	10.03	18.34	40.18	41.43	55.11	32.50	30.03	30.06	34.53	40.03	28.23	15.03	27.00
2016	15.03	15.02	34.07	35.05	35.16	35.18	35.61	36.01	40.17	40.20	40.25	40.26	31.47
2017	40.16	40.16	40.15	40.16	40.27	40.25	40.21	40.21	40.44	40.19	6.29	1.20	32.61
2018	1.16	2.49	50.16	30.13	39.75	40.17	40.18	40.19	40.17	40.16	40.21	20.69	26.55
2019	21.22	36.72	50.16	50.16	50.04	50.23	50.37	50.14	50.29	50.35	50.27	41.29	44.02

Source: Sri Lanka Customs, 2020

CHAPTER FOUR

Value Chain Analysis of Potato

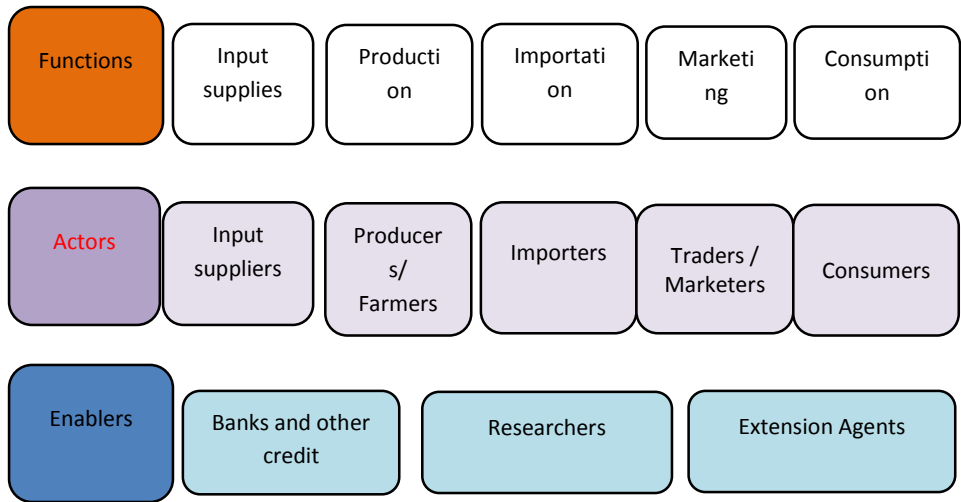
4.1 Introduction

Value Chain mapping was used to identify potato Value Chains existing in the study area. Value Chain mapping enables the understanding of the flow of the product from conception to end consumer through various actors. It also facilitates the identification of diverse actors who are participated directly or indirectly in the potato Value Chain and to comprehend their roles and linkages. Direct actors are commercially involved in the chain (input suppliers, producers, commission agents, wholesalers, retailers, consumers) and indirect actors provide financial or non-financial services or support for the functioning of Value Chain (banks and other credit institutions, researchers, extension agents).

4.2 Potato Value Chain Map in the Study Area

The findings of the study indicate that the key processes and key actors/players in the potato Value Chain in both Nuwara Eliya and Badulla are almost similar. Input supplies, production, importation, marketing and consumption were identified as key processes in the potato Value Chain while input suppliers, farmers/producers, marketers/traders (commission agents, wholesalers, retailers), and consumers were identified as key actors. The basic Value Chain for potatoes in the studied areas can be generally illustrated as follows;

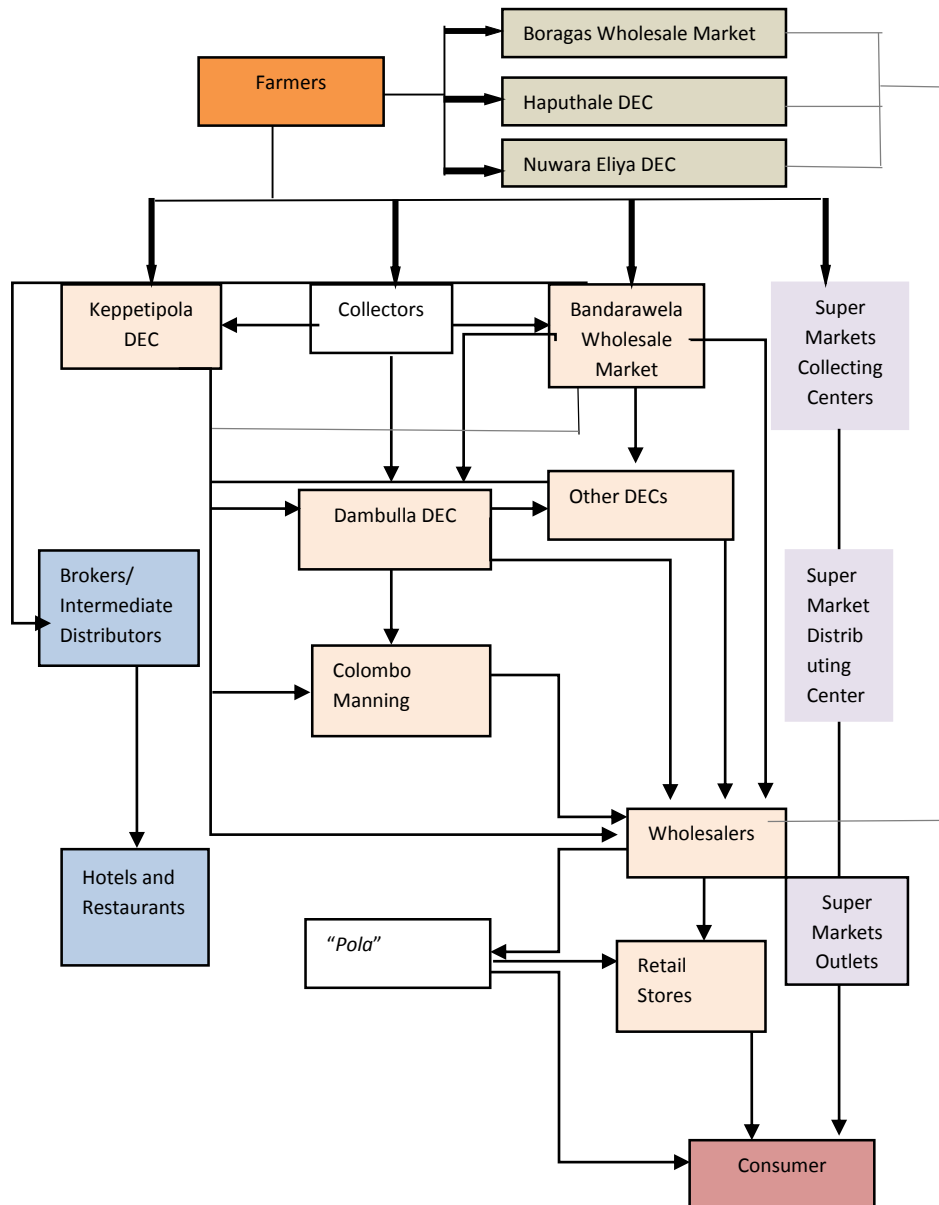
As revealed by the information gathered from the stakeholders in study areas several Value Chains that deviated from the common illustration could be identified. Accordingly, slight differences could be observed in each chain. Within those identified Value Chains there are a number of distribution channels/marketing channels which transfer the ownership of goods from the point of production, the farmer to the point of consumption, the consumer. Figures 4.2 and 4.3 present different channels in two main areas where the study was carried out.



Source: Authors' compilation base on HARTI survey data, 2021

Figure 4.1: Common Illustration of Three Categories of Potato Value Chains in Study Areas

4.3 Marketing Channels of Potato Supplies from Badulla



Source: Authors' compilation base on HARTI survey data, 2021

Figure 4.2: Marketing Channels of Potato Supplies from Badulla

Figure 4.2 illustrates all identified distribution channels of potato from farmer to consumer in study areas within the Badulla district. Main flows of

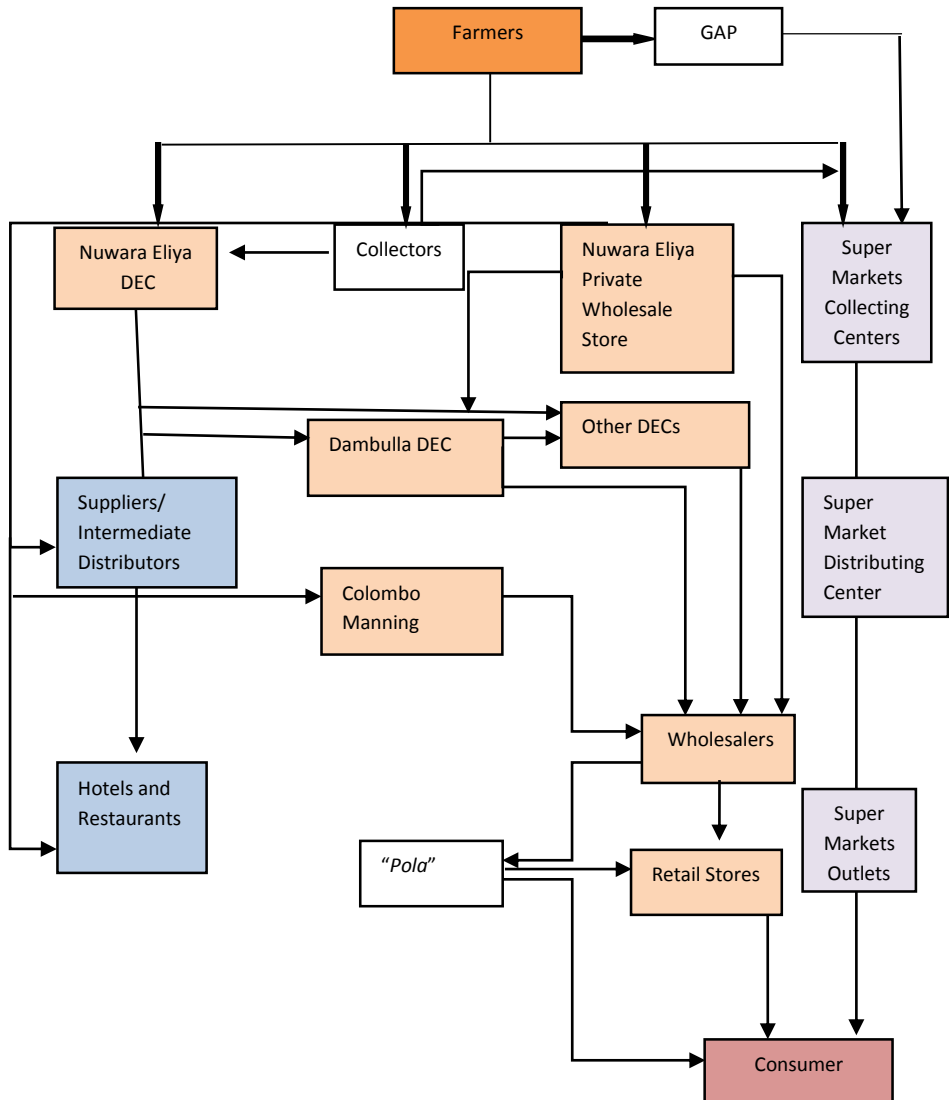
the potato are illustrated in bold arrows and arrows with dashes reflect non-frequent flows.

A major proportion of the product usually goes from farmer fields either to the Keppetipola DEC (Dedicated Economic Centre) or to the Bandarawela Wholesale Market. The remaining portion of the product goes to various other markets such as Boragas wholesale market, Haputhale DEC and Nuwara Eliya DEC mainly depending on the proximity of the market to the farmer field. The product is then distributed island-wide from those centres, specially to Dambulla and other DECs located throughout the country and to the Colombo Manning market. In addition, potato is distributed to other wholesale markets in the country. Wholesalers from all over the country buy potatoes from the Colombo Manning Market and from the DECs, where they are distributed among retailers in their respective areas. The end user of this Value Chain is the consumer who buys potatoes from retail shops or from the village markets called “pola”.

The second channel identified in the area was trading of the product through collectors. In this channel, farmers sell their product to the village level collectors who came to the farmers’ field and then the collectors sell them at Keppetipola DEC or at Bandarawela wholesale market.

Some farmers in the area sell their product directly to the collecting centres of supermarkets such as Cargills and Keels. In addition, some of the collectors who collect the product from farmers sell them to the collecting centres of supermarkets. Potato collected by the regional collecting centres are then transported to the main collection/distribution centre in Colombo and from there the product is distributed among all the supermarket outlets located all over the country.

4.4 Marketing Channels of Potato Supplies from Nuwara Eliyas



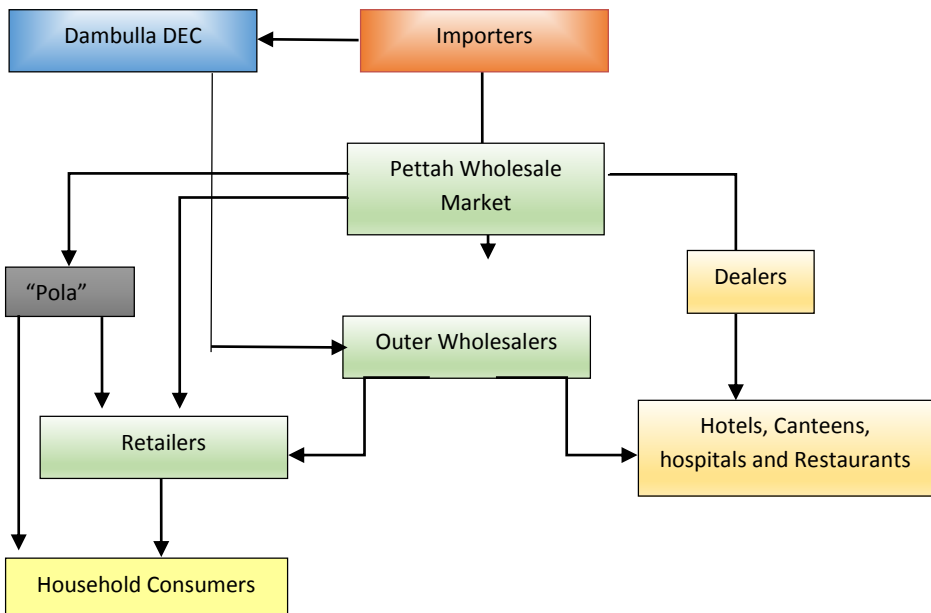
Source: HARTI Survey Data, 2021

Figure 4.3: Marketing Channels of Potato Supplies from Nuwara Eliya

As shown in Figure 4.3, several marketing channels could be identified within the study areas of the district of Nuwara Eliya, which is akin to the channels in Badulla except for few deviations. In the potato growing areas in Nuwara Eliya district a major proportion of the product usually goes either to the Nuwara Eliya DEC or to the private wholesale store located in the city.

The potatoes are then distributed all over the country through the same marketing channels as depicted in the previous section i.e marketing channels of Badulla district. It was observed that in both the districts, collectors and supermarkets are the two channels of potato distribution.

4.5 Marketing Channels of Imported Potato



Source: HARTI Survey Data, 2021

Figure 4.4: Marketing Channels of Imported Potato

Sri Lanka is importing potatoes throughout the year from various countries including Pakistan, India, China, Bangladesh and Netherlands. Among them the main supplier is Pakistan. During the potato harvesting season in Pakistan (from December to March) fresh potatoes are imported and chilled potatoes stored in cold storages are imported during the rest of the period of the year. Importing chilled potatoes increase the wastage as the product get shrunk or get cracked due to sudden temperature changes when they are exposed to the room temperature. Imports of potatoes from other countries are confined to certain months of the year. As Indian varieties are more similar to local varieties, potatoes are imported from India with the rise of the prices of local potatoes.

Marketing channels of imported potatoes from the point of importing to the country, to the hands of the consumer are shown in Figure 4.4. A major portion of imported potatoes usually goes from importer to the wholesale market at Pettah. Wholesalers in the Pettah market have wide range of customer base including wholesalers in other areas of the country, retailers, traders in “sathipola”, hotels, restaurants, canteens, and hostels. Therefore, the potatoes are distributed all over the country through these trading channels until they reach to the consumer.

Apart from that another trading channel which transports potatoes directly from importer to Dambulla DEC and then distributed them among wholesalers in the other parts of the country could also be identified. As recognized by the study there are some importers in Dambulla area and they transport imported potatoes directly to the Dambulla DEC.

4.6 Functioning of a Wholesale Market in Pettah

The said wholesale market is located in the 4th Cross Street in Pettah and there are number of wholesale shops along this street which are engaging in trading of imported products such as potato, big onion, garlic and chilli. Traders in these shops act as intermediaries between the importer and the wholesaler of these product and they charge a commission for their mediation function. The products come to the market every day and shop owners sell product to buyers at the prevailing market price on that day and keep three percent of the amount received as their commission. During the interview, some of the traders stated that the commission changes from 3 percent to 2.5 percent when prices increase. During this process transport cost and the labour cost for loading and unloading are borne by the importer on one end and buyer in the other end. The wholesalers in the Pettah market trade local potatoes during the season and the commission they are paying for local potatoes varies between five percent to six percent. However, the demand arises from hotels, restaurants and canteens is higher for imported potatoes over the local potatoes since the price of imported potatoes is lower than the local potato. Consumer demand, however, is generally low due to the consumer perception about the quality of imported potatoes.

4.7 Primary Actors in the Potato Value Chain

The primary actors in potato Value Chain in the country are seed and other input suppliers, farmers, traders and consumers. As product moves along

different Value Chain routes each actor adds value. Functions performed by potato Value Chain are described below.

4.7.1 Input Suppliers

There are many actors engaged directly or indirectly in agricultural input supply in the study area. These include government seed farms, Agrarian Service Centers, private traders and farmers. These input suppliers provide potato seeds, fertilizers as well as other pesticides and agrochemicals. Seed, fertilizer and agrochemicals could be identified as main inputs in potato cultivation.

4.7.1.1 Seed Supply

Potato producers use seeds from different sources including government seed farms, Agrarian Service Centers, local seed farmers, agents of private companies, private retail shops and own seeds. As elaborated in the Table 5, the majority of producers obtained potato seed from private retail shops and from an agent of a private company (62%) and 18 farmers (30% of the sample) have obtained a part of the seed required from Seetha Eliya seed farm and total requirement was fulfilled by another source. Twelve percent of farmers used seeds obtained from commercial farmers and eight percent used their own seeds. Regardless of high prices 92% of the farmers used imported seed potatoes where only 8% used local seed varieties because of the ability of imported seeds to give higher yields and the inability of the government seed production programme to cater to the overall seed requirement of the farmers. Imported seed variety named Granola was the mostly used variety by farmers in both districts. Around 78 percent of sample farmers used Granola variety during the considered season in the study.

Table 4. 1 Source of Seed Potatoes of Sample Farmers

Seed Source	Frequency	Percentage
Private retail shops	22	37
Agent of a private company	15	25
Government seed farm	18	30
Commercial farmers	7	12
Own seeds	5	8
Total	67	112*

* Multiple responses were observed
Source: HARTI survey data, 2021

4.7.1.2 Fertilizer and Agrochemicals

The use of chemical fertilizer and other agrochemicals for the purpose of pest control is increasing as farmers intensify production and expand cultivation into areas and planting seasons beyond the traditional range of the crop.

As revealed by farmers, fertilizers are added thrice to potatoes during the land preparation, then after about 20 days of the first application and at the time of earthing up. Since the crop is more prone to pest and diseases, use of pest control methods are much higher among potato farmers. Majority of farmers in the study area were purchasing fertilizer and agrochemicals from nearby retail shops.

4.7.2 Producers

Potato growers are among the main actors who perform most of the Value Chain functions right from farm inputs preparation on their farms (I,e seed potato producing farmers) or procurement of the inputs from other sources to marketing. The major Value Chain functions that potato growers perform include land preparation, planting, fertilization, weeding, pest and disease controlling, harvesting and transporting.

4.7.2.1 Demographic Characteristics of Potato Farmers

From the total number of farmers in the sample, farming is the main mode of income generation of 95%. Potato was the main crop grown by 92% of farmers among those who cultivated potato. As depicted in the table 6, majority (67%) of the farmers have more than twenty years of experience in potato production and only seven percent had less than ten years of experience.

Table 4.2: Experience in Potato Cultivation of Farmers

Experience (years)	Frequency	Percentage
<10	4	7
10-20	16	26
>20	40	67
	60	100

Source: HARTI survey data, 2021

The total land area utilized for crop cultivation in the study area was around 145.32 ha where about 55 percent from the total land area was devoted to potato cultivation. The percentage was 54 percent and 58 percent in Nuwara Eliya and Badulla districts respectively.

Table 4.3: Land Allocated for Potato Cultivation (Yala)

Extent Cultivated (ha)	Badulla	Nuwara Eliya	Total
Total (ha)	42.57	102.75	145.32
Potato (ha)	24.57	55.25	79.82
Potato %	57.72	53.77	54.93

Source: HARTI survey data, 2021

Table 4 4: Average Yield of Potato (Yala)

District	Average Yield (kg/Ac)
Badulla	5573
Nuwara Eliya	8710
Overall	7141

Source: HARTI survey data, 2021

Table 4.4 illustrates the average yield of potatoes during the 2020 *Yala* season and the average yield of Nuwara Eliya and Badulla are 8,710 kg/ac and 5,573 kg/ac respectively and these are mostly in line with the national average of 8,134 kg/ac in the *Yala*2020.

4.7.2.2 Seasons of Cultivation

Most farmers produce potatoes twice a year mainly due to bimodal rainfall patterns in the area. In Nuwara Eliya, potatoes are cultivated from early January to mid-April and the duration of the second season is from September to December. Second season in Nuwara Eliya is relatively shorter than the first season. In Badulla, the main season starts from June to September. The peak harvest is recorded from August to September. The first season commences from October to early February. This production season is also termed as “kandukannaya” and the cultivation is mainly practised in higher elevations. Thus, there were some slight and trivial cropping pattern differences within the DS divisions in the same district.

District	Season	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Badulla	<i>Yala</i>												
	<i>Maha</i>												
Nuwara Eliya	<i>Yala</i>												
	<i>Maha</i>												

Figure 4.5: Cropping Pattern for Potato in Badulla and Nuwara Eliya Districts

4.7.3 Traders

In this study traders refers to commission agents in DEC's and other wholesale markets, collectors, wholesalers and retailers.

4.7.3.1 Commission agents

Commission agents in DEC's and other wholesale markets play a crucial role in potato marketing system by facilitating a link between potato producers and other actors. They act as middlemen within the potato Value Chain who expedite to sell harvest purchased from farmers to a third party with a commission where the commission varies with the amount of the traded product (Table 4.5). The commission agents have shops in DEC's and have long term contacts with both buyers and farmers. The selling price is determined by considering several factors including, the size of tubers, market demand and amount of the supply. The selling price is varied daily. The shopkeepers keep their commission and pay dues to the farmers at the time of selling the product to the buyer. Buyers pay the shopkeeper the same amount on the same day or later as agreed by the two parties.

Table 4.5: Commission Taken by Commission Agents in Various Markets

Price of the Product (Rs/kg)	Commission (Rs)		
	Keppetipola DEC	Bandarawela Wholesale Market	Nuwara Eliya DEC
Upto 99	3	3	Commission agents in Nuwara Eliya district keep a price of 2kg for 50kg of the product traded
100-199	5	5	
200-299	10	10	
>300	15	20	

Source: HARTI Survey Data, 2021

Commission Agents play an important role in creating a link between farmers and other stakeholders of the Value Chain, thus enhancing the otherwise limited market accession of farmers. Further, they play a diversified role in controlling and fixing prices of potatoes, which goes beyond mere facilitation of communication within the chain.

4.7.3.2 Transporters

Transporters buy potatoes from farmers at the DEC of Keppetipola, Nuwara Eliya, and Bandarawela wholesale market and then distribute among the wholesalers island-wide, especially to Colombo Manning market and to other DEC including Dambulla DEC. As per the orders received from farmers, they deliver the product. In addition, they sell products to retailers and to “sathipola” located all over the country.

4.7.3.3 Wholesalers

In potato marketing channel, Wholesalers also play a significant role as other actors. Wholesalers in the Colombo Manning Market buy potatoes from transporters who bring products from Nuwara Eliya and Bandarawela areas. They buy potatoes at the existing price in the market and keep ten percent of the amount traded as their commission. They sell their product mainly to retailers and other buyers of the Colombo Manning Market including suppliers to hotels and restaurants, suppliers who undertake orders of retail shops and markets, large scale tender holders (eg: to hospitals, army forces, police), people who operate hostels and canteens and small-scale street vendors. Suppliers who undertake orders from hotels and restaurants normally have an agreement with the wholesalers to buy the exact amount daily either at the agreed price or at the agreed commission.

4.7.3.4 Retailers

Retailers sell potato in small quantities as per the requirement of the consumer. Retailer activities in potato marketing system include buying, transporting to retail areas, and selling to consumers. They are key actors and act as the last link between producers and consumers. Many retailers purchase potatoes directly from wholesalers in Manning Market or in DEC or from transporters. Some retailers in potato producing areas buy potatoes directly from producers. Majority of them are having their own retail shops while some are selling products in markets (pola) or in small stoles set along streets. A considerable wastage could be observed as consumers are at their

liberty to sort goods in most retail outlets. Supermarket outlets act as another important retailer in the potato marketing channel and as described in the previous section they have their own supply channels.

4.7.4 Importers

Like all the other actors, importers play a key role in the potato marketing channel and they import potatoes mainly from Pakistan, India and China while small amounts are imported from countries such as Bangladesh and Netherlands. During the import process they must bear the costs of CIF prices of the product, custom duty, clearing charges, documentation fees and demurrage fees. Further, the government tax for special commodity levy is added as a cost to the importer. Imported potatoes are then distributed among the wholesalers in the Pettah market through their agents and transported directly to the Dambulla DEC.

4.7.5 Consumers

As the progress of Sri Lanka's processing industry moves at a snail's pace, consumers are the end user of the channel. Mainly households, hotels, restaurants, canteens, and government hospitals can be identified as consumers. According to the information collected during the study, consumer demand for local potatoes is much higher than the demand for imported potatoes. Most of the households in rural area buy potatoes from nearby retail shops and households in urban areas usually buy potatoes either from retail outlets or from supermarket outlets. As pointed out by some farmers, potatoes damaged during harvesting are sold to nearby hotels and restaurants at low prices.

4.8 Value Chain Governance

The dominant Value Chain actors play the role of facilitation and they determine the flow of commodities and the level of prices. They govern the Value Chain and most other chain actors subscribe to the rules set in the marketing process. According to the information received during the field visits of the study, commission agents in the DECs and in the main wholesale markets in major producing areas could be identified as key Value Chain governors. They have sufficient information on the supply of potatoes and the direction of the chain flowing along the marketing channels and markets in different parts of the country. They also undertake the task of setting prices. The commission agents are well networked, and they exchange information on prices, local supply situation and the prospects of harvest in

their area. Then they agree on the price at which the buyer is willing to take the price so that the seller determines the farmers' price considering his profit margins.

Owing to lack of coordination and organization, smallholder farmers do not possess a bargaining power within the chain. Hence, they hardly negotiate the price. The Value Chain governance is similar in both Nuwara Eliya and Badulla.

CHAPTER FIVE

Economic Analysis of Potato Value Chain

This chapter describes the economic aspect of the potato Value Chain. Further, it describes the distribution of benefits of actors in the chain. This involves analyzing the margins and profits within the chain and thus determining who benefits from participating in the chain and who would need support to improve performance and gains.

5.1 Cost of Production

Cost of Production (COP) acts as an important determinant of the market value of the product and mainly COP is consisted of expenditure on inputs. Since potato is one of the crops that use inputs more intensively, it requires high investment during the cropping season. However, farmers get higher net returns from the crop indicating the potential for expanding the cultivation.

As revealed in table 5.1, the production cost is comparatively higher in Badulla district (Rs. 84.46/kg) in comparison to Nuwara Eliya (Rs. 71.29/kg). In both districts the cost for seed alone accounts for more than 45 percent of the total cost (48.76% and 47.72% in Nuwara Eliya and Badulla districts respectively) since most farmers in both districts have relied on imported seed potatoes with higher prices.

Cultivation of potato requires a larger labour force for crop management and manual harvesting. Hence, labour cost accounts for more than 20 percent of the total cost of cultivation in both districts (22% and 25% in Badulla and Nuwara Eliya respectively), followed by a fertilizer cost (9.83% and 9.81% in Nuwara Eliya and Badulla districts respectively). Seed, fertilizer and agrochemicals together account for more than 60 percent of the total cost of cultivation. Since potato producers in Sri Lanka must depend mostly on expensive imported inputs such as seeds, fertilizer and agrochemicals, the cost of production is higher compare to the COP values of other potato producing countries.

Table 5.1: Cost of Production of Potato, Yala 2020

Component	Overall		Badulla		Nuwara Eliya	
	(Rs)	%	(Rs)	%	(Rs)	%
Land Preparation (machinery & weedicides)	53,546.67	9.81	43,730.00	9.29	63,363.33	10.21
Fertilizer Application-Rs	53,622.58	9.82	46,196.50	9.81	61,048.67	9.83
Pest & Disease	27,209.21	4.99	24,005.08	5.10	30,413.33	4.90
Seed Cost	263,678.33	48.31	224,633.33	47.72	302,723.33	48.76
Weed Control(weedicides)	1,990.83	0.36	2,121.67	0.45	1,860.00	0.30
Irrigation (machinery & Fuel)	7,254.67	1.33	6,132.67	1.30	8,376.67	1.35
Total Labour Cost	99,128.33	18.16	75,890.00	16.12	122,366.67	19.71
Sub Total	506,430.63		422,709.25		590,152.00	
Harvesting						
Labour Cost	28,811.67	5.28	27,396.67	5.82	30,226.67	4.87
Packaging	7,300.00	1.34	14,600.00	3.10	0.00	0.00
Transport	3,237.50	0.59	5,991.67	1.27	483.33	0.08
Sub Total	39,349.17		47,988.33		30,710.00	
Cost of Cultivation(Rs/ac)	545,779.79		470,697.58		620,862.00	
Yield and returns						
Average Yield (kg/ac)	7,141.43		5,573.33		8,709.53	
Price of Produce (Rs/kg)	142.50		134.00		151.00	
Gross Income (Rs/ac)	1,017,653.78		746,826.22		1,315,139.03	
Profit (Rs/ac)	471,873.99		276,128.64		694,277.03	
Per unit cost (Rs/kg)	76.42		84.46		71.29	

Source: Author's calculation, HARTI Survey data, 2021

5.2 Value Addition Along Potato Value Chain

Each potato Value Chain actor adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through transporting to other places. Value Addition is the difference in sale price and cost of inputs at each stage of the chain (Benyam and Bakala, 2018).

Table 5.2: Contribution of Chain Actors to the Total Value Addition of Potato

District	COP	Farmgate price	Value Addition at Producer Level	As a % of total Value Addition	Wholesale Price	Value Addition at Wholesaler Level	As a % of Total Value Addition	Retail Price	Value Addition at Retailer Level	As a % of total Value Addition
Badulla	65	134	69	54	157	23	18	192	35	28
N Eliya	86	151	65	46	178	27	19	226	48	34

Source: HARTI Survey data, 2021 and Data Management Division, HARTI

Potato producers in Badulla district added 54 percent of the total value of potatoes, while in Nuwara Eliya district producers contributed 46 percent to the total value of potatoes. Wholesalers add 23 and 27 percent to the total value in Badulla and Nuwara Eliya district respectively. Contribution of retailers are 28 and 34 in Badulla and Nuwara Eliya districts respectively.

5.3 Gross Margin Analysis

Gross Margin of a farm is the difference between its gross income and its variable cost. In this study Gross Margin Analysis was conducted for potato farmers to analyze the Cost of Production, revenue and profits, break-even prices and break-even quantities.

Table 5.3: Gross Margin Analysis for Potato Farmers (2020 Yala Season)

Revenue and Cost	Nuwara Eliya	Badulla
Output (kg/acre)	8,709.53	5,573.33
Average Price (Rs/kg)	127.83	121.83
Total Revenue (TR or Gross output)	1,113,339.22	678,998.79
Total Variable Cost (TVC)	620,862.00	470,697.58
Gross Margins (TR-TVC)	492,477.22	208,301.21
Break-even Price (TVC/Production)	71.29	84.46
Break-even Quantity (TVC/Price)	4,856.93	3,863.56

Source: Author's Calculation, HARTI Survey data, 2021

The average price received by farmers in Nuwara Eliya and Badulla districts were Rs.127.83/kg and Rs.121.83/kg respectively in 2020 *Yala* season. The total revenue per one-acre land in Nuwara Eliya was Rs. 1,113,339/- and Rs. 678,998/- in Badulla. Therefore, the average gross margin per acre was Rs. 492,477/- and Rs. 208,301/- in Nuwara Eliya and Badulla respectively. The average yield of potato in Nuwara Eliya was 8,709 kg/ac while it was 5,573 kg/ac in Badulla. Break-even price was Rs.71.29/kg/ac in Nuwara Eliya and Rs.84.46 kg/ac in Badulla. The Break-even quantity on average was 4,857 kg/ac in Nuwara Eliya and 3,864 kg/ac in Badulla.

5.4 Market Margin Analysis of Potato

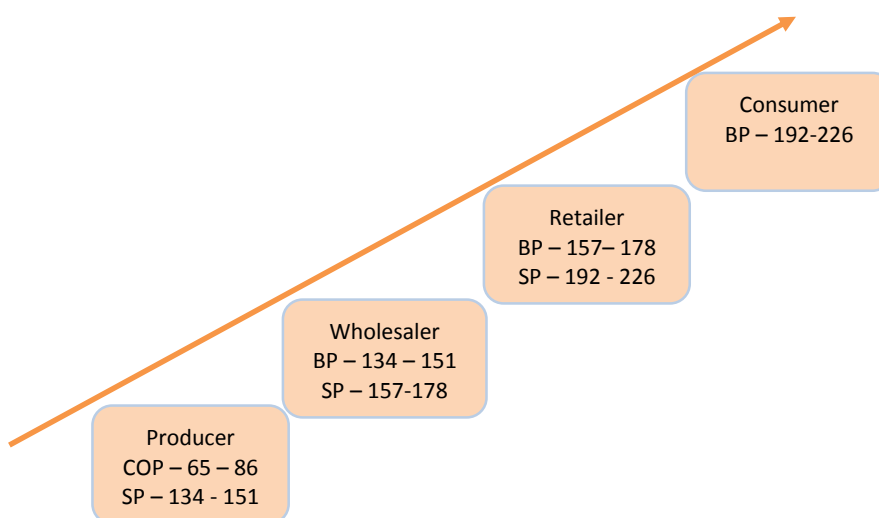
The cost involved in moving the product from the point of production to the point of consumption is referred to as the Total Marketing. Further, the cost of performing various marketing functions is involved in moving the produce from the point of production to the consumer. In marketing of agricultural commodities, the difference between the price paid by the consumer and price received by the producer for an equivalent quantity of the produce is known as the price spread or the marketing margin.

In this study, marketing cost and margins incurred by farmers was calculated based on the data collected through farmer survey. However, it was unable to conduct a market survey to collect data from other Value Chain actors due to the limitations faced because of COVID 19 restrictions. Therefore, only the price flow of the product was calculated from farmer to consumer using the market prices collected from HARTI.

Table 5. 4 Marketing Margin of a Potato Farmer

Cost and Margins	Cost and Margins (Rs/kg)	
	Nuwara Eliya	Badulla
COP	71.29	84.46
Wastage	1.28	1.22
Marketing cost (loading, transporting)	0.07	2.86
Farm gate price	127.83	121.83
Farmers net margin	55.19	33.29

Source: Author’s calculation, HARTI Survey Data, 2021



Source: Author’s Calculation, HARTI Survey Data, 2021

Figure 5. 1 Price Flow of Potato (Farmer to Consumer)

As depicted in Figure 5.1, consumers have purchased potatoes from the retailer at a price of Rs. 192-226/kg during the survey where farmers sell their product to wholesalers in the area for Rs. 134-151/kg.

The price margins of different chain actors vary with the distance from the producing area to the area of the retailer. Changes in margin values occur mainly due to increasing prices with the added transport costs. Variations in margins of Value Chain actors in several areas of the country is shown in the table 5.5.

Table 5.5: Price Margin for Potato 2021 (Average price from September to November)

Cost of Production	Farm gate Price	Farmer Margin (Farm gate-COP)	Wholesale/ DEC Market Price	Price Margin (wholesale – Farm gate)	Retail Market Price	Price Margin (Retail – Farm gate)
Potato Badulla (Rs 65)	Potato Welimada- (Rs 134)	Badulla (Rs 69)	DEC-Keppetipola (Rs 143)	Rs 9	Pettah (Rs 177)	Rs 43
			Badulla (Rs 145)	Rs 11	Dehiattakandiya (Rs 179)	Rs 45
			DEC-Dambulla (Rs 146)	Rs 12	Anuradhapura (Rs 179)	Rs 45
			Pettah (Rs 146)	Rs 12	Thotalaga (Rs 180)	Rs 46
			Kurunegala (Rs 148)	Rs 14	Kadawatha (Rs 182)	Rs 48
			Embilipitiya (Rs 150)	Rs 16	Dematagoda (Rs 185)	Rs 51
			Thambuththe gama (Rs 151)	Rs 17	Kiribathgoda (Rs 185)	Rs 51
			Kilinochchi (Rs 151)	Rs 17	Thabuththegama (Rs 188)	RS 54
			Kandy (Rs 153)	Rs 19	Dambulla (Rs 189)	Rs 55
			Dehiattakandiya (Rs 153)	Rs 19	Keppetipola (Rs 190)	Rs 56
			Anuradhapura (Rs 153)	Rs 19	Hambanthota (Rs 191)	Rs 57
			Kaluthara (Rs 153)	Rs 19	Nugegoda (Rs 191)	Rs 57
			Hambanthota (Rs 156)	Rs 22	Kilinochchi (Rs 192)	Rs 58
			Mullativu (Rs 157)	Rs 23	Puttalam (Rs 193)	Rs 59
Puttalam (Rs 159)	Rs 25	Meegoda (Rs 195)	Rs 61			

			DEC – Meegoda (Rs 160)	Rs 26	Polonnaruwa (Rs 195)	Rs 61
			Ampara (Rs 195)	Rs 61	Embilipitiya (Rs 195)	Rs 61
			Matara (Rs 200)	Rs 66	Kurunegala (Rs 198)	Rs 64
					Kaluthara (Rs 198)	Rs 64
					Ampara (Rs 203)	Rs 69
					Matara (Rs 209)	Rs 75
					Kandy (Rs 210)	Rs 76
					Kegalle (Rs217)	Rs 83
Potato Nuwara Eliya (RS 86)	Potato Nuwara Eliya (Rs 151)	Rs 65	DEC- Nuwara Eliya (Rs 162)	Rs 11	Kilinochchi (Rs 203)	Rs 52
			Thambuththe gama (Rs 165)	Rs 14	Hambanthota (Rs 210)	Rs 59
			Pettah (Rs 168)	Rs 17	Anuradhapura (Rs 211)	Rs 60
			Anuradhapura (Rs 173)	Rs 22	Pettah (Rs 214)	Rs 63
			Kandy (Rs 173)	Rs 22	Embilipitiya (Rs 214)	Rs 63
			Hambanthota (Rs 173)	Rs 22	Polonnaruwa (Rs 216)	Rs 65
			Kilinochchi (Rs 175)	Rs 24	Thotalaga (Rs 220)	Rs 69
			DEC – Meegoda (Rs 175)	Rs 24	Thabuththegama (Rs 221)	Rs 70
			Matara (Rs 183)	Rs 32	Dehiattakandiya (Rs 223)	Rs 72
			Hanguranketha (Rs 183)	Rs 32	Dematagoda (Rs 223)	Rs 72
			Puttalam (Rs 187)	Rs 36	Kiribathgoda (Rs 224)	Rs 73
			Ampara (Rs 193)	Rs 42	Nugegoda (Rs 224)	Rs 73
			Polonnaruwa (Rs 198)	Rs 47	Kadawatha (Rs 226)	Rs 75

		DEC- Dambulla (Only Nov Rs 235)	Rs 47 (Only Nov)	Kegalle (Rs 227)	Rs 76
				Matara (Rs 231)	Rs 80
				Kurunegala (Rs 232)	Rs 81
				Meegoda (Rs 233)	Rs 82
				Ampara (Rs 234)	Rs 83
				Puttalam (Rs 243)	Rs 92
				Kandy (Rs 246)	Rs 95
				Kaluthara (Rs 261)	Rs 110
				Dambulla (Only Nov - Rs 277)	Rs 89 (Only Nov)

Note: Values in the parentheses are average market prices from September to November, 2021

Source: Data Management Division, HARTI

Table 5.6: Producer's Share of the Potato Value Chain

	Nuwara Eliya	Badulla
Farm gate Price (Rs)	188.40	175.64
Consumer Price (Rs)	251.49	203.89
Producer Share (Producer Price/Consumer Price) *100	74.91	86.14

Source: Author's calculation, HARTI Survey Data, 2021

The producer in Badulla district has received more share from the total price added along the potato value chain than the farmer in Nuwara Eliya where the value of share is 74.91 percent in Nuwara Eliya and it is 86.14 percent in Badulla.

CHAPTER SIX

Challenges, Constraints and Opportunities in the Potato Value Chain

This chapter is allocated to discuss issues that are identified along the Value Chain and challenges faced by Value Chain actors which were identified by the study.

6.1 Key Challenges

Potato has a potential to play a broad role in the Sri Lankan food system and therefore it is important to establish an efficient Value Chain. In achieving this the number of challenges facing the development of the potato Value Chain in the country must be resolved. Main challenges faced by Value Chain actors could be categorized into the following areas.

6.1.1 Production Process

The average yield of potato is far too low for small scale potato farmers in the country. Main underline factor is the inadequacy of quality seeds at an affordable price and therefore, measures should be taken to provide them with quality seeds. Advancement of technology, crop management practices such as fertilizer use, irrigation, pest and disease management, transport and infrastructure are required for farmers to gain the benefits of utilizing quality seeds.

6.1.2 Marketing Process

Technology dissemination system of the country is mainly focused on the production process. Owing to that, farmers are typically not innovative in marketing their products. On the other hand, smallholder farmers often lack market knowledge or do not have access to market information needed to negotiate prices with buyers. To strengthen the bargaining power and to share expertise, formation of producer groups is essential.

6.1.3 Support of Public and Private Sectors

Providing more policy support to the potato sub-sector by allocating more public investments and make suitable environment to seek substantial levels of private investment is important, for the development of the sector.

Such investments could be allocated for infrastructural development, seed production programmes, and awareness programmes that are geared towards strengthening the Value Chain.

6.2 Constraints facing Potato Value Chain Actors

A number of issues in potato Value Chains were identified through the farmer survey, key informant interviews and personal observation. These are listed in Figure 6.1.

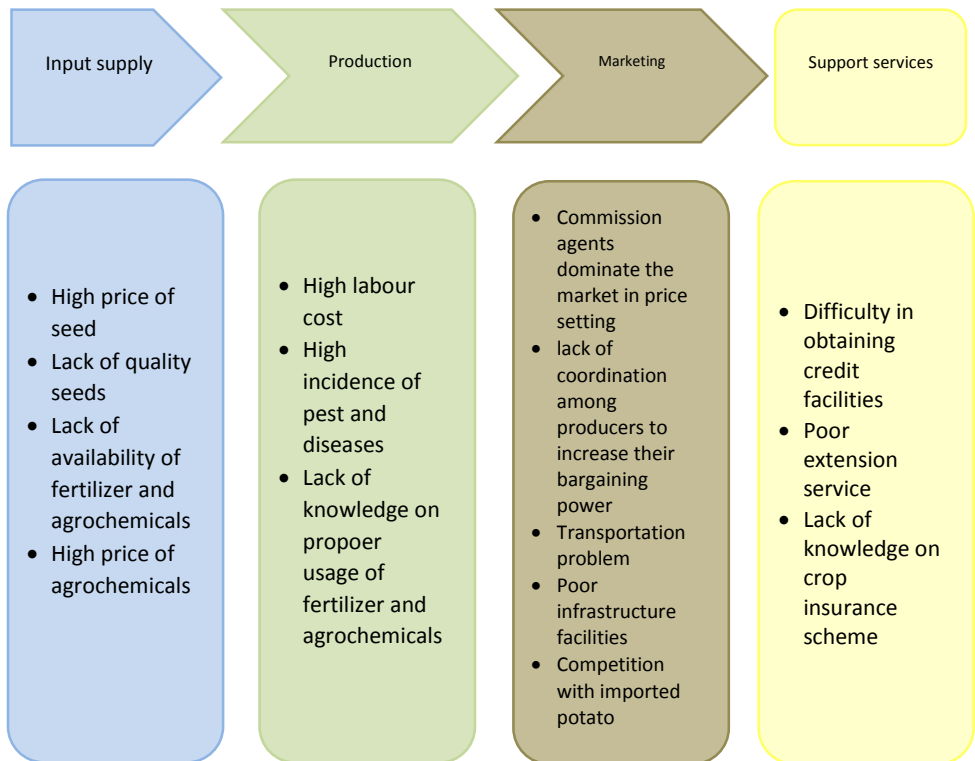


Figure 6.1: Constraints Along with Potato Value Chain Actors

The most prevalent issue raised by almost all potato farmers is the lack of adequate amount of fertilizer and agrochemicals due to the government one-off policy decision of banning chemical fertilizer and agrochemicals. With this sudden decision farmers have to face severe difficulties in managing their crops. Since potato is highly dependent on chemical fertilizer, most of the farmers said that they are not able to continue their cultivation. Further, farmers claimed that they were unaware of the

agricultural practices associated with the use of organic fertilizers. They also complained the lack of assistance received from relevant authorities on instructions related to the application of organic fertilizers and purchase points. On the other hand, there is a tendency to increase prices of fertilizer and agrochemicals and the issuing of poor-quality products to the market.

Table 6. 1 Problems Faced by Potato Farmers

	Problem	Badulla		Nuwara Eliya		Total	
		No	%	No	%	No	%
1	Lack of adequate amount of fertilizer and agro-chemicals	30	100	30	100	60	100
2	Issues related to seed potato (High price, lack of local seeds, poor quality)	30	100	30	100	60	100
3	Not receiving the fair price	11	37	4	13	15	25
4	Pest and diseases	14	47	1	3	15	25
5	High labour cost	12	40	1	3	13	22
6	Poor extension services	8	27	4	13	12	20
7	Poor access to credit facilities	10	33		9	10	17
8	Transport Problem/Poor infrastructure	5	17	4	13	9	15
9	Other	3	10	5	17	8	13

Note: Multiple responses were observed

Source: HARTI Survey data, 2021

Issues in seed potato are the most prolonged issue faced by potato farmers and this has been manifested in different forms: high prices of imported seeds, inadequate supply of local varieties, poor quality, untimely supply and delay in supply. Seed potato is the main input accounting to more than 50 percent of the Cost of Production of potato. At present Research Divisions (Seetha Eliya and Bandarawela), government seed farms (Seetha Eliya, Meepilimana, Piduruthalagala, Udaradella, Kandapola, Bopaththalawa) and private sector contract growers together supply only around 8-10 percent of the seed requirement. Therefore, the majority of farmers rely on imported seed potatoes with higher price. Thus, the seed cost accounts for more than half of the cost of cultivation. According to Kuruppu et al. (2020), seed cost of rest of the Other Field Crops (OFCs) is lower than that of potato, thus causing lower cost of cultivation. In most cases seeds used for the first cultivation season were certified and verified

as quality seeds and farmers use the smaller tubers of that harvest as seed potatoes for the second and subsequent cultivation seasons. This leads to a lower yield during these seasons due to the usage of poor-quality seed potatoes.

Most of the activities related to potato production in the country are more labour intensive and therefore the high labour cost acts as a major constraint to the farmers. For activities such as land preparation, weed management, crop establishment, fertilizer application, crop management, application of agrochemicals to control pest and diseases and harvesting more labour is required. In most cases use of machinery is restricted in potato producing areas due to the topographical conditions of the area. The labour cost act as the second major contributory factor to the total Cost of Production.

As revealed by farmers during the farmer survey, high incidence of pest and diseases is another main problem faced by them. Potato early blight, late blight, and bacterial wilt were common diseases reported in both areas while mite and whitefly attacks were the common pest attack faced by many farmers. The damage caused by pests and diseases poses adverse impacts on the yield of the crop and curtails the maximum yield of potatoes. This will lead to the reduction of the income of farmers with the reducing of the yield in one hand and by increasing cost of production by other hand due to high cost of agrochemicals which were used to control pest and diseases.

Considering the marketing issues faced by potato farmers in general, most of them reported that they did not receive a fair price for their products. It was observed only individual marketing was practised, and cooperative and collective marketing was not observed in the study area. Owing to poor coordination between farmers, they lack the bargaining power to negotiate prices. On the other hand, farmers sell their product immediately after harvesting irrespective of the price of the product since they have to repay the loans they have obtained for the cultivation. Therefore, they sell their product at the price which have decided by the commission agents in DECs and other main wholesale markets in the area. The problem of market access was critical during the peak season of production due to large forces of supply that often leads to reduction in the price of the commodity.

Issues related to transportation are the other problem that was faced by farmers as well as other chain actors. Farmers encounter a myriad of difficulties when transporting the products to the market owing to poor

infrastructure facilities and the high cost of transportation leading to the deduction of profit margins.

Competing role of low-priced imports in the market is another challenge faced by local producers. Potatoes imported to the country throughout the year are sold at lower prices in the market and local producers cannot compete with them given the higher Cost of Production of local potatoes.

The other major problem encountered by potato farmers is inadequate accessibility to credit facilities. Financial Assistance was a major constraint and most of the farmers did not have access to flexible and affordable facilities during the production cycle. Local banks are often reluctant to deal with agricultural credit because of inherent risk and prospects of loss of investments. On the other hand, farmers face a number of difficulties in obtaining loans from banks. They must find personal guarantors or property (deed of a land) as a loan security. In addition, delays in releasing the loan to the applicant, not granting the loan to the amount requested and difficulty in repaying the loans are the hardships associated with agricultural credits.

Another main grievance raised by the farmers is poor extension service. The relationship between the extension personnel and potato farmers is very weak and officers hardly visit farmers to provide consultations.

6.3 Opportunities for Strengthening the Potato Value Chain

- Improving the seed system
To improve the seed system, the government seed production programme needs to be more strengthened with the participation of the private sector wherever possible and seeds produced through this programme should be available to farmers at an economical price.
In addition, farmers need to be aware on improving positive on-farm selection that helps them to keep clean seed longer. Further effort should be made to link the informal seed system with the formal seed system so that the benefits of good quality seed can percolate down to the farming community.
- Strengthening the potato production system
The potato production system can be strengthened through high yielding, pest and disease resistance quality seed varieties. Such varieties can generate higher yield under proper management practices and provide additional marketable qualities that enable producers to obtain higher prices.

- **Strengthening Marketing Systems**
To strengthen the marketing system proper and strong linkages should be created among the actors of the chain in the sense of technology and institutional innovations. Further, it is vital to improve the market access for smallholders by enabling them to get access for market information such as prices. In addition, establishing better access to markets, including supermarkets, hotels, restaurants and airlines could be done.
- **Empowering Farmers**
It is essential to empower farmers to organize into groups, in order to enhance bargaining power in negotiating prices and accessing credit facilities.

CHAPTER SEVEN

Summary and Recommendations

7.1 Summary

Potato Value Chains which were identified by the study are almost similar in both Nuwara Eliya and Badulla districts. Key processes identified were input supplies, production, importation, marketing and consumption while input suppliers, farmers/producers, marketers/traders (commission agents, wholesalers, retailers), and consumers were identified as key actors of the potato Value Chain. People or institutes that provide financial or non-financial services or support for the functioning of the Value Chain such as banks and other credit institutions, researchers, and extension agents were identified as indirect actors of the chain.

Several marketing channels which transfer the ownership of goods from producer to the consumer were observed in both areas. In Badulla district, majority of farmers sell their products at Keppetipola DEC or at Bandarawela wholesale market. Then the product is distributed mainly to Dambulla and other DEC's located all over the country and to the Colombo manning market. Wholesalers buy potatoes from manning market and from DEC's and then distributed among retailers in their areas and consumers buy potatoes from retailers.

Another channel identified in the area was trading the product through collectors. In this channel, farmers sell their product to the village level collectors who come to the farmers' field and then the collectors sell them at Keppetipola DEC or at Bandarawela wholesale market.

Some farmers in the area sell their product directly to the collecting centres of supermarkets. In addition, some of the collectors who collect the product from farmers sell them to supermarkets collecting centres. Potatoes collected by the regional collecting centres are then transported to the main collection/distribution centre in Colombo and from there the product is distributed among all the supermarket outlets located all over the country. In Nuwara Eliya district a major proportion of the product usually goes either to the Nuwara Eliya DEC or to the private wholesale store located in the city. The potato is then distributed all over the country through the same marketing channels as in Badulla district. The other two channels observed were more similar to the marketing channels in Badulla district.

The other important marketing channel observed was the distribution of imported potatoes from importer to the consumer. The country is importing potato throughout the year where the main supplier is Pakistan. Imports from other countries including India, China, Bangladesh and Netherlands are confined to certain months of the year. Indian potatoes come to the market especially when the price of local potatoes goes up.

Traders in the Pettah market act as intermediaries between the importer, wholesaler and other buyers, where they charge a three percent (from the value traded) commission for their function as a mediator. From the pettah market potatoes are distributed all over the country through several actors including wholesalers, retailers, traders in "sathipola", hotels, restaurants, canteens, and hostels until they reach to the consumer.

There is a higher demand for imported potatoes from hotels, restaurants and canteens owing to its low price than local products. Consumer demand, however, is generally low for imported potatoes due to the consumer perception about the quality of imported potatoes.

Another trading channel transports potatoes directly from importer to Dambulla DEC and then distributed among wholesalers in the other parts of the country.

The main primary actors identified in the potato Value Chain were seed and other input suppliers, farmers, traders and consumers. As products move along different Value Chain routes, value is added by each actor. Government seed farms, Agrarian Service Centers, private traders and farmers who supply potato seeds, fertilizers as well as other pesticides and agrochemicals act as main input suppliers.

A majority (62%) of farmers used seeds obtained from private retail shops and from an agent of a private company while 30 percent of the farmers have obtained a portion of the seed requirement from Seetha Eliya seed farm.

About 92 percent of farmers have used imported seed potatoes where only eight percent have used local seed varieties.

Potato crop is usually fertilized three times and the use of chemical control method is much higher since the crop is more prone to pests and diseases.

Potato was the main crop of 92% of farmers among those who cultivated potato and 67 percent of farmers have more than twenty years of experience in potato production.

The average yields of potato were 8710 kg/ac and 5573 kg/ac in Nuwara Eliya and Badulla districts respectively.

Commission agents in DECs and other wholesale markets, collectors, wholesalers and retailers were identified as traders and among them commission agents in DECs and other wholesale markets play crucial role in potato marketing system by facilitating a link between potato producers and other actors. They act as middlemen in the potato Value Chain who expedite to sell the harvest purchased from farmers to a third party with a commission. They play an important role in linking up farmers to the market and other stakeholders of the commodity chain since the possibility of market accession of farmers is limited. Further, they play a key role in controlling and fixing prices of potatoes, expanding their services beyond mere facilitation.

Transporters are the other actors in the chain who distribute the product from DECs to wholesalers island-wide especially to Colombo Manning Market. In addition to the wholesalers they sell products to retailers and to “Sathipola” located all over the country.

Wholesaler; the next segment of the chain buys products from transporters at the existing price in the market on the same day and keeps ten percent of the amount traded as their commission. Retailers are the main buyers of wholesalers and in addition they sell products to suppliers who supply potatoes to hotels and restaurants and to large scale tender holders.

Retailers sell potatoes in small quantities as per the requirement of the consumer. They engage in purchasing, transporting and selling of products, whilst running their own retail shops. Some are selling products in markets (Pola) or in small stoles set along streets. Supermarket outlets act as another important retailer in the potato marketing channel.

Within the marketing channel of imported potatoes, importer has to bear the costs such as CIF prices, custom duty, clearing charges, documentation fees, demurrage fees and tax on special commodity levy. Imported potatoes are distributed among the wholesalers in the Pettah market through their agents.

Consumers are the final segment of the channel while households, hotels, restaurants, canteens, and hospitals are identified as potato consumers.

Within the potato Value Chain, commission agents in the DEC's and in the main wholesale markets in major producing areas are the key Value Chain governors. They have enough information about the supply flows and set prices accordingly. Since the smallholder farmers are not organized and are not governing the Value Chain, they do not possess the bargaining power required to negotiate prices.

The Cost of Production of potato amongst the farmers in Badulla district was estimated as Rs. 84.4623/kg and it was Rs. 71.29/kg in Nuwara Eliya district.

In both districts the cost for seed alone accounts for more than 45 percent of the total cost (48.76% and 47.72% in Nuwara Eliya and Badulla districts respectively).

Labour cost contributes to more than 20 percent of the total cost of cultivation in both districts followed by a fertilizer cost (9.83% and 9.81% in Nuwara Eliya and Badulla districts respectively).

Seed, fertilizer and agrochemicals together account for more than 60 percent of the total cost of cultivation.

To the total value addition producers in Badulla district added 54 percent while producers in Nuwara Eliya contributed 46 percent. This was 23 and 27 percent for wholesalers and 28 and 34 percent for retailers in Badulla and Nuwara Eliya district respectively.

The average price received by farmers in Nuwara Eliya and Badulla districts was Rs.127.83/kg and Rs.121.83/kg respectively in 2020 *Yala* season.

The total revenue per one-acre land in Nuwara Eliya was Rs. 1,113,339/- and Rs. 678,998/- in Badulla.

The average gross margin per acre was Rs. 492,477/- and Rs. 208,301/- in Nuwara Eliya and Badulla respectively.

The average yield of potato in Nuwara Eliya was 8,709 kg/ac while it was 5,573 kg/ac in Badulla.

The Break-even price was Rs.71.29/kg/ac in Nuwara Eliya and Rs.84.46 kg/ac in Badulla where the break-even quantity on average was 4,857 kg/ac in Nuwara Eliya and 3,864 kg/ac in Badulla.

The farmer's net margin was Rs.55.19/kg in Nuwara Eliya and Rs.33.29/kg for farmers in Badulla district.

During the surveyed period consumers have purchased potatoes from retailer at the price of Rs. 192-226/kg, where farmers sell their product to wholesalers in the area for Rs. 134-151/kg.

With the added cost for transportation, the price margins of different actors vary with the distance from the producing area to the area of the retailer. Comparing the producer share, farmers in Badulla district received 74.91 percent while the value of the share received by Nuwara Eliya farmers was 74.91 percent.

The key challenges faced by potato farmers could be described under three broader areas; i.e. Challenges related to the production process, challenges related to the marketing process and support of public and private sector related challenges.

Most prominent production related challenge is the low average yield due to lack of quality seed in adequate quantities at an affordable price. For farmers to take advantage of using good quality seeds, improvements in technology, crop management practices and infrastructure should be enhanced.

Since the extension service of the country is mainly focused on the production, there is a lacuna of market knowledge provided to farmers where they are unable to access market information to negotiate prices with buyers.

For the potato sub-sector to thrive, it is important to provide more policy support by allocating more public investment and make suitable environment to seek substantial levels of private investment.

Lack of adequate amount of fertilizer and agrochemicals due to the government's one-off policy decision of banning chemical fertilizer and agrochemicals, issues related to seed potato, high labour cost, poor extension services, poor access to credit facilities, competition with low-

priced imports, issues related to transportation and poor infrastructure were identified as major constraints facing potato Value Chain actors. Improving the seed system by strengthening the government seed production programme, strengthening the marketing system by creating strong linkages among the chain actors, and empowering farmers to organize into groups for enabling them to increase bargaining power are the key opportunities that were identified to develop the potato Value Chain.

7.2 Recommendations

In making policy decisions it is vital to consider mechanisms that protect the local smallholder producers within the potato Value Chain. Considering challenges faced by the Value Chain actors that were identified in the study, following recommendations are suggested.

- 1. Strengthening the government seed production programme in order to provide farmers with high quality seed potatoes at an affordable price in a timely manner**

Since potato is largely a profit-oriented crop farmers seek high net returns from their harvest. However, the profit is lessened by high Cost of Production and low yield. The main reason for this has been identified as the inferior quality and high cost of seeds. Therefore, providing farmers with high quality seed potatoes at a fair price is of paramount importance. This could be achieved by making a local seed production programme stronger with the involvement of commercial level farmers.

- 2. Having realized the importance of potato in relation to Food Security and poverty alleviation, a mechanism that safeguard the unique role played by smallholders in the potato Value Chain should be considered in the policies.**

Potato plays a dual role as a nutrient rich crop and as a valuable source of income for farm families. Increasing the production of such crops can reduce both food insecurity and poverty. Therefore, it is essential to create a favourable environment for Value Chain to operate efficiently. To do so, policy intervention is required to find solutions for constraints, create opportunities, improve productivity and reduce risks in the farming systems.

- 3. Expand and improve the current extension system in order to bridge the knowledge gap existing in the potato subsector.**

In compare to other potato producing countries yield in Sri Lanka is relatively low and higher yield gap could be observed. In order to narrowing this yield gap, potato producers need to be better informed about existing technologies to improve their performances. For this purpose, extension system needs to be broadened and this requires keeping extension services up to date with the latest technologies. At the same time, it is required to identify ways and means to disseminate information to farmers. To fulfil this requirement regular and appropriate training should be provided to the extension service staff.

4. Existing crop insurance scheme needs to be expanded to facilitate potato farmers in order to reduce the risk associated with yield loss due to various unexpected calamities.
5. Promote the development and use of local seed potato varieties that will give higher yield, resistant to common pest and diseases and perform well under adverse conditions.

Majority of potato farmers rely on imported seed potatoes even with the higher prices due to the unavailability of local variety which can perform better than imported varieties. Therefore, it is imperative to develop a local seed variety which can cater the demand of local producers. Varietal development programmes should be aimed not only at yield maximization but also to focus on qualities of tolerant to adverse climatic conditions, resistant to pest and diseases, respond well under low fertility conditions.

6. Encourage producers to promote cooperative activities in order to reduce transaction cost, enjoy the advantages of easy access to credit, collective marketing, economy of scale and to gain bargaining power.

By organizing small scale producers into larger producer groups entire value chain can benefit in various ways. Marketability of the product can be improved by the pooling of production, enabling farmers to create larger potato batches for sale in the target market. Further, by organizing into a larger group the bargaining of the farmers could be enhanced and also it helps them to apply for credit facilities as a group.

Research and development facilities should be improved, and the local farmers should be made aware of the importance of using such

facilities. Then the quality of the seeds, cultivation methods and the marketing systems can be developed

The long-term and solid potato import policy should be implemented to safeguard the local producers rather making ad-hoc changes in tariff rates.

Due to the absence of a long-term potato import policy farmers are discouraged to engaged in potato production since they must compete with cheaper imports in the market.

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