POLICIES THAT MATTER OR ARE FORGETTABLE

An evaluation of paddy policies in Sri Lanka: 1998 to 2018

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FOREWORD

Rice is a strategic commodity in Sri Lanka since overall economic growth and political stability of the country depend on an adequate, affordable and stable supply of this staple crop. Numerous changes in policy regimes over several decades in fact indicate that these have remained serious challenges notwithstanding improvements in productivity. The latest policy shift privileging organic fertilizers, which could also be seen as an initial step in a move towards more sustainable and ecological agricultural systems, has obviously brought in fresh challenges to the overall equation. All the more reason, then, for a review of policies pertaining to paddy cultivation.

The study assesses the effectiveness and impact of government policy instruments implemented between 1998 and 2018 in relation to paddy production. It considers policies that cover irrigation, fertilizer subsidies, climate change adaptation, research and development, paddy marketing and trade. The findings of the study suggest that policies implemented during the period have induced a lower farm gate and domestic market price, thereby discouraging commodity production. Better access to information and mechanisms to contend with rainfall variability are also important policy implications.

I believe that the findings and recommendations of the study can help frame the policy-making framework at the national level and indeed set priorities for the years ahead.
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EXECUTIVE SUMMARY

The main objective of this study is to evaluate the impact of government policies on paddy production in Sri Lanka from 1998 to 2018. The study collected secondary data of all paddy growing areas to identify the effect of agricultural policies implemented during the last two decades.

The primary data was collected from the Kurunegala District in December 2019 using a structured questionnaire. Kurunegala was purposively selected since this district represents paddy production under major and minor irrigation well as rain fed cultivation. The sample was drawn from individual farmers who cultivated in the 2017/2018 *Maha* season and accordingly 155 of them were surveyed during the study period.

Policy-induced effects were estimated using indices such as via market price differential (MPD), producer support estimates (PSE), consumer support estimates (CSE) and market price support estimates (MPS).

The policy framework related to paddy cultivation concerns itself with a myriad of factors. They include irrigation, diversification, land, fertilizer, subsidies, climate change adaptation policies, research, marketing and trade. Paddy production has been increasing at an average around 4.08 percent annually since 1998 with improved access to inputs such as fertilizers and seeds through government policies. However, during the period under consideration there was no statistically significant difference, indicating that the increase in paddy production has been marginal over the years. Import remained insignificant compared to local production during this period. The average nominal price of rice varied with a standard deviation of 0.101 and coefficient of variance of 0.908 when considering Samba rice, standard deviation of 0.087 and coefficient of variance of 0.912 for Nadu rice indicating that state intervention has not mitigated price fluctuation.

Price variation by district remained the same indicating that there is no significant geographical variation in prices. The margins between retail price and guaranteed price were 1.26 and 1.52 on average for Nadu and Samba rice respectively. This indicates that it is possible to increase the farm gate price in order to encourage production quantities by maintaining the same consumer utility levels. Producer Support Estimates (PSE) and Market Price Support (MPS) estimates were negative, demonstrating that policy instruments induce a lower farm gate and domestic market price thereby discouraging commodity production. The Nominal Rate of Assistance (NRA) has a positive relationship with the paddy yield. Thus, if the NRA far paddy increases in a particular year (with more subsidization or less taxation) the

yield increases in the following year, provided other variables remain constant. Furthermore, improved access to information has the positive effect on yield and climate variables, with rainfall especially having a significant effect on paddy yield. This highlights the need for more climate resilience policies to increase the paddy production. Yield is positively affected when markets are better developed and there is access to information. Moreover, it was found that farmers are aware of policy changes, as the majority (63.9%) knew about guaranteed price schemes and nearly half of the farmers were aware of insurance schemes for paddy cultivation.

Agricultural policies which move away from market-distorting measures and blanket income transfers, with a focus towards strategic investments, can help deliver sustainable productivity growth and enhance climate resilience. This results in increased income opportunities for farm households and mitigates farmer migration. These need to be considered when developing policy instruments, since the prevailing policy regime induces a low farm gate price thereby discouraging commodity production. To this end, policy makers should reduce the use of market price support with a view to its eventual elimination, as market price support seldom reaches the intended beneficiaries. Moreover, climate risk management policies which assist farmers and enhance their capacity are strongly recommended, especially considering rainfall variability.

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ABBREVIATIONS

ASC	Agrarian Service Centers
BPH	Brown Plant Hopper
CIF	Cost, Insurance & Freight Price
CSE	Consumer Support Estimates
GDP	Gross Domestic Production
GPS	Guaranteed Price Scheme
GSSE	General Service Support Estimate
IFS	Integrated Financing Strategy
MOP	Murate of Potash
MPS	Market Price Support
NAP	National Action Programme
NAR	Nominal Rate of Assistance
OAP	Overarching Agriculture Policy
PMB	Paddy Marketing Board
PSE	Producer Support Estimates
QR	Quantitative Restrictions
R & D	Research and Development
SD	Standard Deviation
TSE	Total Support Estimate
TSP	Triple Super Phosphate

CHAPTER ONE

Introduction

Rice, the staple food of Sri Lankans with a per capita consumption of around 100 kg per year, provides 42% of the total calorie and 34% of the total protein requirement of an average individual. An average consumer spends `13% of the total food expenditure on rice (Central bank of Sri Lanka, 2020). In the year 2017, paddy production contributed 10% to the agricultural GDP and 0.7% to the total GDP (Central Bank of Sri Lanka, 2019). In addition, rice accounts for 34% of the land under agriculture (Department of Agriculture, 2021) and provides livelihood for nearly 1.8 million farmers (Henegedara, 2002 and Department of Agriculture, 2021) in Sri Lanka. More than 30% of the total labour force directly or indirectly depends on paddy farming (Weerahewa *et al.*, 2010). However, the majority of paddy farmers (more than 75%) are small holders with a land area of less than one hectare and only around 3% of them cultivate areas larger than two hectares (Department of Census and Statistics, 2002). Therefore, due to the significance of the paddy sector, successive governments since independence have taken several measures to enhance paddy production in the country.

1.1 Government Interventions

Post-independence Sri Lanka is marked by the design and implementation of various policies targeting agricultural development with achievement of self-sufficiency in rice being the most significant. The changes in supply or the production of food, realized in the market place through price volatility, is also an issue that had to be addressed. Although price volatility is a normal feature of markets due to seasonality of production cycles and discontinuity of supply in the face of continuing demand, a greater uncertainty due to a rapidly changing economic and natural environment, contributes to and magnifies the phenomenon (Tothova, 2011). Food price volatility is one of the major concerns for policy makers and development practitioners world-wide (Banerjee and Duflo, 2007) and Sri Lankan governments have also implemented various policies to address this issue. The logic is about protecting farmers during the glut seasons and protecting consumers in deficit seasons by implementing price controls (Weerahewa, 2006). However, Government policies have exacerbated food insecurity with ad hoc policy changes of import duties and non-tariff barriers (Vision; 2025, 2015).

According to the literature, Sri Lanka maintains a high level of self-sufficiency in rice, at a cost to the economy (Thiruchelvum, 2005). Meanwhile, the recent government programme of achieving rice self-sufficiency seems to be highly cost ineffective, since the government spends between 1.4 and 2.4 LKR per acre to increase farm income by only one rupee per acre (World Bank, 2013).

1.2 The Effect and Impact of Government Policies

According to the literature government policies around the world have mixed effects on agricultural production. A study by Chandio *et al.,* (2016) revealed that crop area, fertilizer consumption and a sugarcane support price have had a positive and significant effect on agricultural production in the Sindh Province of Pakistan, whereas the effect of government expenditure on irrigation and research was found to be negative in promoting agricultural production. In the same study he emphasis that the insufficient contribution of agricultural research and irrigation expenditure by the respective government had caused the negative effect.

A study conducted by Paul *et al.,*(1999) revealed that income support and supply management or production control programmes were important and that they did change the land use pattern from 1974 to 1995 in the United States of America. However, supply management policies such as acreage reduction programmes have offset the effect, they argue. Further, income supports through target price or deficiency payment system were found to have provided economic incentives for producers to participate in annual farm programmes, thereby influencing farmers' planting decisions. The changes in policies historically have altered the role of farmers' response to farm programme resulting in price determination in agricultural produce. In addition, a study by Schnepf, 2006 stated that various crop-specific subsidies, price and income support provided under government programmes had played an important role in producer planting decisions by altering the relative profitability of different crops in different regions. The degree of influence of government programmes varied greatly from commodity to commodity. However, in general, government programmes increased the incentives to produce the crop receiving support. As a result, the supply of government-supported crops available to the market tended to be larger than the supply actually demanded by the market under normal supply and demand conditions that would prevail in the absence of government programmes.

Past studies revealed that notwithstanding policies targeting self-sufficiency, annual imports of milled rice have fluctuated between 20,000 and 600,000 tones between the years 2012 to 2016 (FAO/WFP, 2017).

Meanwhile the cost of the fertilizer subsidy cost increased from 68.19 million USD in 2005 to 191.96 Million USD in 2019 (National Fertilizer Secretariat, various years). This accounts for 3.3% of agriculture GDP and 1.2% of the total government expenditure on average (Central Bank of Sri Lanka, 2020). Moreover, from 2012 onwards, the subsidy as a percentage of market price exceeded by ninety percent (90%) for all three major fertilizers. In addition, the fertilizer subsidy continues to drive up the recurrent expenses, particularly in the wake of high global oil prices, which pushes up the market price of fertilizers (Central Bank of Sri Lanka, 2014). However, the fertilizer subsidy has been politically a more litigious agricultural policy in Sri Lanka for more than five decades.

In Sri Lanka, a comprehensive body of literature is available on the macroeconomic policy reforms and development of the agricultural sector since 1950. Among these are the works of Fanner (1957), Karunatilaka (1971) Wickremaratne (1977), Goonaratna and Wesumperuma (1984), Rasaputra, Tilakaratne and Fernando (1986), Bhalla (1991), Kelegarna (1991), Dunham (1993), Lakshman (1994) and Lakshman and Tisdell (2000). Apart from these, the available studies on agricultural policy reforms could be sorted under two categories;

1. Descriptive analysis of agricultural policy reforms and trends (Chandrapala, 1986; Abeyratne, 1991; Dunham, 1992)
2. Analytical studies focusing on specific sectors, policies and issues (Sirisena, 1986; Gunawardana and Somaratne, 2000)

Since these studies deal mainly with the implications of macro policy reforms, a comprehensive economic analysis of agricultural policies with regard to paddy production was yet to be undertaken (Henegedara, 2002). Hence, this study focuses on reviewing trends in paddy (rice) production in Sri Lanka, paying special attention to policy reforms implemented from 1998 to 2018.

1.3   Problem Statement

Successive post-independence governments have taken several measures to enhance paddy production in the country, as rice being the staple food of Sri Lanka. They include guaranteed price schemes, fertilizer subsidies, policies related to irrigation and trade. The intention was to make the country self-sufficient in several food crops including rice and to stabilize prices in the open market.

However, as noted earlier, such policies have exacerbated food insecurity with ad hoc policy changes of import duties and non-tariff barriers. Further,

Sri Lanka maintains a high level of self-sufficiency in rice at a cost to the economy where government spends between 1.4 and 2.4 LKR per acre to increase farm income by only one rupee per acre. Policies such as fertilizer subsidy policy of Sri Lanka have created a great financial burden to the government budget which accounts for 4.4% of agriculture GDP and 2% of the total government expenditure as averaged in the year 2014. During the period 2005-2014, the total government expenditure on the fertilizer subsidy increased to LKR. 238.3 billion (Central Bank of Sri Lanka, 2014). However, statistics on paddy reveal that the development of irrigation and agricultural infrastructure and the implementing of price and trade policies had a positive impact on increasing the total extent, yield and crop production. On the other hand, input costs also increased over time, gradually eroding net returns.

While a comprehensive economic analysis has not been done on agricultural policies, research efforts on effect and impact of agricultural policies since 1998 have also been limited. Research in this area is clearly important; the United Nations General Assembly in 2015 noted that agricultural policies have better potential to help address food security challenges with respect to the Sustainable Development Goals (SDGs).

Therefore, country-specific studies are needed to assess outcomes of particular government interventions since every policy reform which can have both positive and adverse impacts depending on the economy and the characteristics of the population segment (Ranathunga, 2016).

1.4   Objectives

1.4.1   Main Objective

To evaluate the impact of government policies on paddy production in Sri Lanka

1.4.2   Specific Objectives

1. To identify policies implemented in relation to the paddy sector during last two decades: 1998 to 2018.
2. To assess effectiveness and impact of agricultural policies on paddy cultivation and production.

1.5   Organization of the Report

This report consists of eight chapters. The introductory chapter gives the background and objectives of the study. The second chapter reviews the

literature on policy evaluation. The next discusses the conceptual framework. The fourth provides the research methodology and details study locations. A comprehensive review of agricultural policies implemented in Sri Lanka is presented in Chapter Five. The next two present and discuss the results. The final chapter contains the conclusion and recommendations.

CHAPTER TWO

Literature Review

2.1   Introduction

The findings and recommendations of previous research studies are summarized in this chapter. The relevant research gaps are discussed subsequently.

2.1.1   Defining Policies

Policy can be defined as a 'purposive course of action followed by an actor or a set of actors '(Anderson, 1975; ETF, 2013). In theoretical terms, it is a process with distinctive differentiated stages, each with an activity that enables the next stage, the results of which feed back into the process (Lasswell, 1963). These stages aim to address an issue (programme, problem) in a systematic way by defining it, developing solutions, implementing the solutions and evaluating the results (Anderson, 1975; Nakamura, 1987; Tewdwr-Jones, 2002). This process-oriented view implies that the notion of policy goes beyond planning and commitments in laws and strategies to include the implementation of plans and the evaluation of results. In this sense, public policies are one of the main means through which order is established in societies and systems are governed (ETF, 2013).

All governments since independence have placed an emphasis on increasing paddy production in order to achieve self-sufficiency. Therefore, a large amount of investments was geared towards the improvement of the paddy sector such as large-scale irrigation projects, land development and settlement schemes, free provision of irrigation water, fertilizer subsidies and guaranteed prices. These have improved paddy cultivation in the country and by 2004 the country achieved a 90% level of self-sufficiency (Weerahewa, 2004).

2.2   Review of Previous Research Studies

A growing number of studies have described the evolution of food policies in Sri Lanka at different time periods. Edirisinghe (1987) provides a detailed overview on the food stamp programme of the country, implemented between 1978 and 1989. Weerahewa (2004) assessed the impact of different types of government policies (pertaining to the domestic and

external sectors) on the status of food security in the country, with particular emphasis on the paddy/rice sector.

Though paddy and rice marketing are a crucial aspect, relatively few studies have been carried out to assess marketing efficiencies. While some argued that it is competitive (Harrison, 1995; Ellis et *al.,* 1997), others found that it is characterized by oligopolistic buyers (Dharmaratne and Hathurusinghe, 1999). The degree of protection given to the rice industry was evaluated by Abeyratne *et al.,* (1993) and Epaarachchi *et al.,* (2002) using nominal and effective rates of protection, and by Ekanayake (2006) using a partial Equilibrium model. They reveal that producers are protected at the expense of consumers. Further, Bogahawatte (1983), found that the increase in paddy production due to increase in guaranteed prices results in a 47% growth in long run paddy purchases. Gunawardena and Oczkowski (1992) also state that the continuation of the guaranteed price scheme appears to play a positive role in providing incentives to producers.

Further, according to the literature, rice pricing and marketing policies can be expected to have significant effects on both farmers and consumers. Consequently, taxpayers are affected to the extent that these policies involve a transfer of funds from the national treasury to producers and consumers. Ultimately the resulting net gains or losses to society depends on the net effects on the producers, consumers and taxpayers (Shand, 2002). For example, as noted by Weerahewa (2004), Sri Lankan rice producers are relatively inefficient therefore consumers will gain, and producers will lose. This is also consistent with the conclusions of Gunawardena and Quilkey (1987) while economists have offered hypotheses to the effect that agricultural pricing and marketing policies in less developed countries favour consumers at the expense of farmers (Shand, 2002). However, Weerahewa (2004), points out that consumers may not reap the gains from rice-trade liberalization if the market is imperfect.

Some of the past literature also provides considerable evidence related to the effects of rice marketing policies in Sri Lanka. For instance, Gunewardena and Quilkey (1987) studied the welfare effects of rice marketing policies in Sri Lanka within a comparatively static partial equilibrium framework and this enabled measurement of the welfare effects separately for the concessional (subsidized) market, open market and the "arbitrage market". The last refers to the selling of subsidized rice in the open market by some consumers thereby resulting in a reduction in the economic loss due to price distortions in the open market. In this study, the outcomes of policy interventions were compared with a hypothetical situation where Sri Lanka would be a net importer of rice under conditions

of free (international) trade in rice at world prices. The results revealed that rice pricing and marketing policies in Sri Lanka have favoured consumers and had an unfavourable effect on the welfare of farmers since 1952. Moreover, the unfavourable effect has been greater for small farmers than for large farmers. However, because all farmers received benefits in their capacity as consumers in the concessional market, it may well be that the eventual welfare losses of farmers were reduced. In addition, it was found that the maintenance of domestic rice prices below the world market price resulted in substantial losses of production to the economy over time.

At the onset of open economic policies, Sri Lanka was about ninety percent (90%) self-sufficient in rice. As noted by Weerahewa (2006), the open economic policies for the paddy and rice sectors in the post liberalization period have been mainly limited to marketing and distribution while the trade policy has been rather ad-hoc protecting the producers during glut seasons and consumers during the deficit seasons. Weerahewa, (2006) investigated household welfare impacts of alternative liberal and protectionist policies related to the rice sector using a general equilibrium model. The results of the study revealed that liberal policies would increase economic efficiency and household welfare across provinces. It has also been concluded that import bans on rice and global liberalization of rice that increases the import price not only reduce overall efficiency of the economy, but also reduce household welfare even in some of the poorer agricultural provinces such as North Central and Uva (Weerahewa, 2006).

2.3   Effects of Agricultural Policies

According to the past literature, the guaranteed prices for paddy and trade policy reforms were factors that influenced an increase in the total extent of paddy cultivation. Though the average usage of fertilizer increased in the past, the total amount of chemical fertilizer used fluctuated during the 1985-1999 period with sharp drops recorded in 1989, 1991 and in 1996. As a result of production subsidies, credit policies and technology development programmes, the use of new improved varieties has increased significantly during the 1979 - 1999 period. With respect to the use of farm power, there has been an increase of tractors and a corresponding decline in the use of buffaloes during the period. The extent of chemicals used has fluctuated over the consecutive period indicates an upward trend, but the extent of hand weeding remained without any significant change (Thenuwara, 2009).

Policy reforms relating to the paddy farming sector have had a tremendous effect in increasing total production and productivity. However, the increased production has not been sufficient to improve the self-sufficiency ratio and thus to enhance the food security of the nation. Thenuwara, in this

same study, found out that 16% of the domestic rice requirement was still met through imports. He suggested that interventions are necessary to avoid the distortions and the difficulties arising from the policies already introduced. Some definite policies and programme need to be implemented regarding infrastructure development, research and development, producer subsidies and technology development if the problems and difficulties presently being faced by the paddy farmers in Sri Lanka are to be satisfactorily resolved (Thenuwara, 2009).

Paddy statistics have revealed that the development of irrigation and agricultural infrastructure and the implementing of price and trade policies had a positive impact on increasing the total extent, yield and production. Input costs also have increased gradually eroding net returns. Also, at the turn of the millennium, a decline in the cropping intensity and the self-sufficiency ratio needed to be addressed by policy makers (Henegedara, 2002).

2.4   Research Gap

A comprehensive body of literature is available on macro-economic policy reforms and development in the agricultural sector since 1950. In this respect, a growing number of studies have described the evolution of food policies related to paddy sector in Sri Lanka in different periods. Edirisinghe (1987) provides a detailed overview on the food stamp programme of the country, implemented between 1978 and 1989, and has evaluated its effects. Ellis *et al.,* (1997) reviewed food price policies in Sri Lanka focusing on the role of the state in promoting price stability and equity during the 1980–95 period. A study by Weerahewa *et al.* 2018 presents the nutrition policies of the country during the 1978–2007 period. Henegedara (2002) and Weerahewa (2004) provide a detailed description on policy framework of the paddy/rice sector in Sri Lanka highlighting the trade of rice and the marketing of paddy and rice. Bandara and Jayasuriya (2007), in their work on agricultural distortions, produce an overview of food price policies until 2007. More recently, Sanderatne and Alwis (2014) specify the political economic arguments in food policy formulation and implementation in Sri Lanka. Weerahewa *et al.,* (2016) in their research documents the food policy framework covering the year 1942 to 2017 offering political context, policy objectives, and policy instruments.

Since these studies dealt mainly with the implications of macro policy reforms, a comprehensive economic analysis of agricultural policies regarding paddy cultivation is yet to be undertaken.

CHAPTER THREE

Conceptual Framework

This study attempts to evaluate the impact of government policies on paddy production in Sri Lanka during 1998 to 2018. According to the literature, agricultural production is determined by input factors, climatic shocks, government interventions and macro-economic factors as noted below.

3.1   Input Use

Poudel *et al.,* (2010) used a Cobb-Douglas form to estimate the crop production function and resource use condition of organic cultivation in different farm sizes and altitude categories in the hill region of Nepal. They conclude that the labour used, and the level of organic fertilizer application significantly affects crop production. A study by Bhujel and Ghimire (2006) found that even though fertilizer use has no significant effect on crop production in the Morang district in Nepal, labour does. In addition, production variability can arise due to changes in input supply and variations in the area planted (Haile *et al.*, 2013).

3.2   Climatic Shocks

Market prices are the outcome of the interplay between demand and supply. By nature, the production of agricultural commodities is dependent on external circumstances such as weather and the conditions of the soil. In addition, Bloom and Sachs (1998) argue that natural conditions such as low soil fertility and irregular rainfall further contribute to lower price elasticity of supply, especially in case of severe drought. Furthermore, yield variability because of weather-related shocks (drought, high temperature, flood) is considered as the main cause for production shortfalls (Haile *et al.*, 2013).

3.3   Macroeconomic Factors

Several research studies suggest that an unstable political environment adversely influences food supply via production inefficiencies and reduced competitiveness (Knack and Keefer, 1995 Knack and Keefer, 1997; Hall and Jones, 1997 and 1999). Further, apart from their own production, most countries are not immune to supply shocks from their neighbouring countries through imports (Shively, 1996).

3.4   Government Interventions

According to Magrini *et al.*, (2016), farmers producing staple food crops react to real price signals, even if with a limited intensity. Moreover, the same study suggests that direct price incentives arising from border protection and government intervention in domestic markets and price shocks at the border are more important than macroeconomic policies in influencing farmers 'decisions. Firstly, policies related to production can have indirect impacts on market prices. Production subsidies, for example, can set sub-optimal incentives to farmers, distort input allocation, and may lead to inefficient supply levels for different crops. Secondly, trade policies can directly affect commodity prices in the form of taxes. Also, export bans could stabilize domestic prices and help prevent supply shortages. Price stabilisation policies also affects market prices (Demeke *et al.*, 2009)

This study hypothesizes that climatic shocks are exogenous and that government interventions indirectly affects input use at the farm level which in turn will alter the paddy production quantities. Some government interventions may influence the structural and technological changes in the paddy sector while others could directly alter the paddy production quantities.
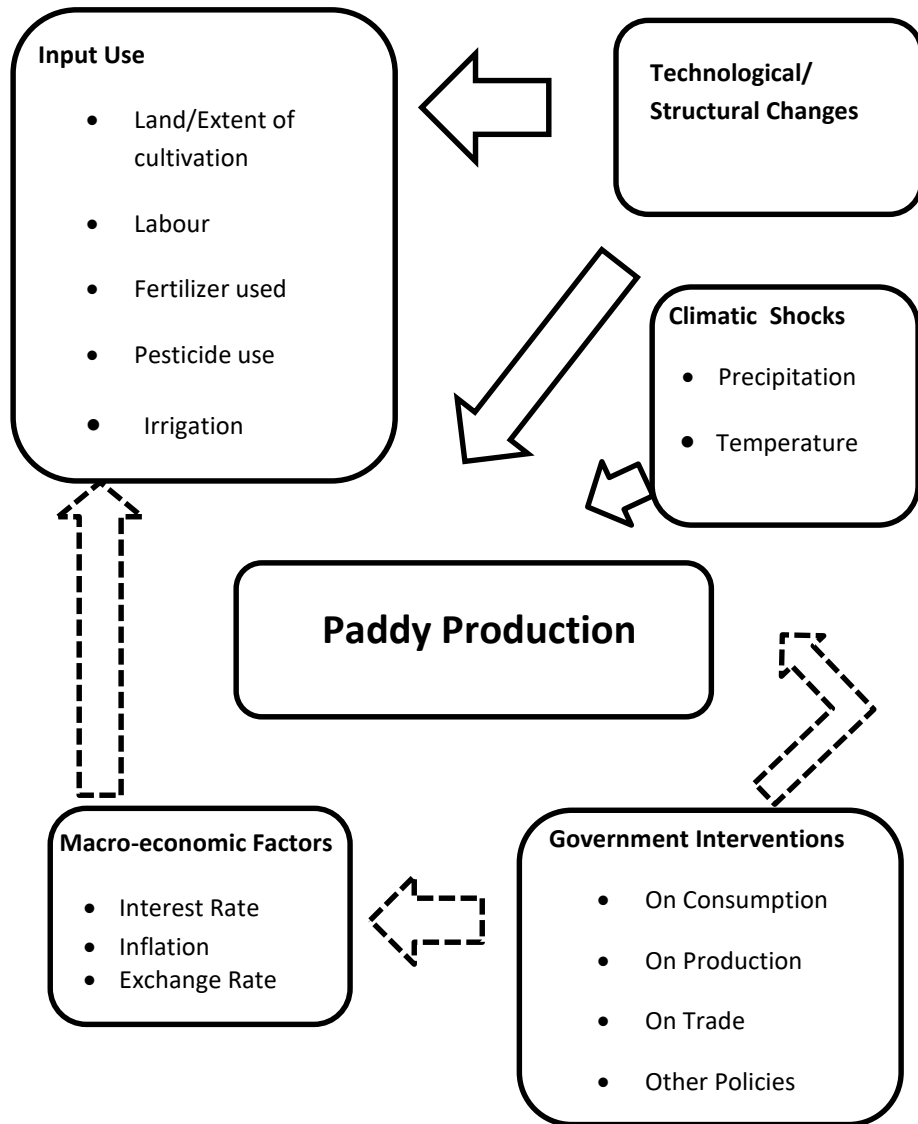
Figure 3.1: Conceptual Frame Work

CHAPTER FOUR

Methodology

4.1   Operationalizing Variables in Objectives

Objective 1:   To identify policies implemented in relation to the paddy sector during last two decades: 1998 to 2018

A comprehensive review was conducted in order to identify the policies implemented during last two decades in relation to paddy cultivation and production.

Objective 2:   To assess effectiveness and impact of agricultural policies on paddy cultivation and production

A descriptive analysis with formulated indexes and a trend analysis were done in order to identify how policy and sector performance have changed over time and to obtain the impact of these.

4.2   Analysis

Objective 2:   To assess effectiveness and impact of agricultural policies on paddy cultivation and production

A descriptive analysis using tables and charts with formulated indexes was used to assess the influence of government policies related to paddy production. Long term averages of percentages and ratios of the estimates were obtained and policy support to agriculture analyzed.

Table 4.1: **Variables Used for Assessing the Effectiveness of Government Policies**

Variable	Meaning	Measuring
Producer Support Estimate (PSE)	The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agricultural production of paddy.	PSE includes market price support, budgetary payments and budget revenue foregone
Market Price Support (MPS)	The annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of paddy, measured at the farm gate level.	MPS includes taxes, import subsides, levy on imports etc.
Consumer Support Estimate (CSE)	The annual monetary value of gross transfers from (to) consumers of paddy, measured at the farm gate level, arising from policy measures that support paddy production. If negative, the CSE measures the burden (implicit tax) on consumers through market price support (higher prices)	The CSE includes policies where ceiling prices, taxes, consumer support programmes etc.
General Services Support Estimate (GSSE)	The annual monetary value of gross transfers arising from policy measures that create enabling conditions for the primary agricultural sector through development	The GSSE includes policies where primary agriculture is the main beneficiary but does not include any payments to individual

	of private or public services, institutions and infrastructure, regardless of their objectives and impacts on farm production and income, or consumption of farm products.	producers. GSSE transfers do not directly alter producer receipts or costs or consumption expenditures.
Total Support Estimate (TSE)	The annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support agriculture, net of the associated budgetary receipts.	The TSE measured the total monetary value of all gross transfers.

Source: Trade and Agriculture Directorate OECD's Producer Support Estimate and Related Indicators of Agricultural Support, Concepts, Calculations, Interpretation and Use (The PSE Manual), (2016)

4.3   Study Location

Secondary data of all paddy growing areas in Sri Lanka was collected to identify the impact of agricultural policies implemented during the last two decades. Primary data was collected from farmers in the Kurunegala District using a structured questionnaire. Kurunegala was selected for the primary data collection as the district represents major irrigation, minor irrigation as well as rain fed for paddy production.

4.4   Data Collection Method

The study was based on both primary and secondary data.

4.4.1   Primary Data Collection

The primary data required for qualitative and quantitative analysis of the study were gathered through the field survey conducted in December 2019. A structured questionnaire was used for data collection.

4.4.1.1 Sample Selection

Individual farmers who cultivated in the 2017/2018 *Maha* season constituted the sampling unit. A total of one hundred and fifty-five (155) farmers were surveyed during the study period. The Stratified Random Sampling Technique was employed in selecting the farm households.

Detailed information about DS divisions selected for the study and the distribution of sample is given in Table 4.2

Table 4.2: Sampling Method

Rice Growing System	Selected DS	Selected ASC Area	Total No of Farm Households Surveyed
Major Irrigated	Galgamuwa	Galgamuwa	20
	Nikaweratiya	Nikaweratiya	16
Minor Irrigated	Mahawa	Mahawa	22
	Paduwasnuwara	Kanogama	20
		Rambe	24
Rain-fed	Polpithigama	Moragollagama	24
	Pannala	Hamangalla	17
	Narammala	Narammala	12
Total			**155**

Source: Authors own work

4.4.2   Secondary Data Collection

The period covered in this research is from 1998 to 2018. The analysis was done on an aggregate country level as well as at the district level. An overview of the variables from external sources and the sources of secondary data obtained are provided below. All variables stipulated below are time series ranging within 1998-2018.

4.4.2.1 Data and Data Sources

Yield: Yield is used as a measure for productivity or land use efficiency. For the regression analysis, yield is measured in Kilograms per hectare (Kg/Ha) as per data available at the Department of Census and Statistics, Sri Lanka.

NRA: The Nominal Rate of Assistance was used (NRA) as a measure of agricultural price distortion. NRA measures the gap between current domestic prices and free-market prices (border price). It is defined as the percentage change in gross return to farmers compared to the gross return to farmers without government intervention (Anderson and Nelgen, 2013).

The domestic market price data for the period of 1998 to 2018 was gathered from Department of Census and Statistics, Sri Lanka and the Hector Kobbekaduwa Agrarian Research and Training Institute, Sri Lanka. The border price of imported rice was collected from the FAOSTAT Data base.

Capital: Gross fixed capital stock in agriculture was collected from the FAO data base. The gross fixed capital stock is the value of assets held by a farmer. Assets are valued at nominal prices and are the sum of physical assets (land development, livestock, machinery and equipment, and structures for livestock). The variable is divided by the rural population to obtain a per capita measure given the assumption that the rural population is equal to the total farmer households since the majority of farmers live in rural settings. The study makes this assumption due to data limitation on farm households. The rural population was calculated by multiplying mid-year population by percentage of rural population in the most recent survey done by Department of Census and Statistics (2012). The mid-year population data was gathered from Central Bank Reports of Central Bank, Sri Lanka (Rural Population = Mid-year population* percentage of rural population)

Land: The land area was calculated as arable land plus permanent crops per capita from FAO data base.

Rainfall: Yearly rainfall data (in millimeters) was used and was gathered from the Central Bank Report.

Temperature: Average temperature during the period 1998 to 2018 was used, the data being obtained from the Central Bank Report.

Roads: Data on overall infrastructure quality is not available, but the length of the road network is used instead as a proxy using data in the Central Bank Report. The length of the total road network is used as a measure for infrastructure with the assumption that if the road network is more advanced, farmers will have more access to markets which may have yield-increasing effects.

Telephone: Data on information access is not available, but the number of telephone lines is used as a proxy instead, again using Central Bank data. This variable serves as a measure of access to information, which, as explained in the theoretical framework, is expected to affect yield.

Policy variability: A policy variability is captured by taking the five year rolling relative standard deviation of NRA. This implies that the policy

variability for one year is calculated by taking the relative standard deviation (or coefficient of variation) of the previous five years.

Income: GDP per capita in the years 1998 to 2018 were taken from Central Bank Reports.

Economic growth: Annual GDP growth in percentages was also obtained from Central Bank Reports.

Population: Population is used as a proxy for food self-sufficiency, because the larger the population, the more food a country needs to produce. Countries with larger populations are less likely to be food self-sufficient. The relevant data was obtained from Central Bank reports.

Structural change: The share of the rural population of total population was used as the proxy for structural changes.

Food self sufficiency ratio: cereal self-sufficiency data was taken from the FAOSTAT data base.

4.5 Analysis

The methods of analysis and diagnostic statistical tests are discussed in this section. Multicollinearity, heteroskedasticity and autocorrelation are tested for both the equations.

The levels and composition of agricultural support with respect to the implementation of policy reforms is analyzed in this evaluation. In the analysis "support" is understood as gross transfers to agriculture from consumers and taxpayers, arising from governments' policies that support agriculture. In addition to budgetary expenditure, support includes other estimated transfers which do not require actual monetary disbursements (e.g. credit concessions). The indicators reflect the provision of support, or the level of effort made by governments, as implied by agricultural policies. In the analysis it was hypothesized that agricultural policies may provide direct payments to farmers. They may maintain domestic agricultural prices above those at the country's border or grant tax and credit concessions to farmers. Support is not only comprised of budgetary payments that appear in government accounts, but also includes support of market prices, as well as other concessions that are not necessarily monetary in character. The common element to all these policies is that they generate transfers to agriculture.

The concept of "transfer" presumes both a source of the transfer and the existence of a recipient. In the present methodology, agriculture is generally regarded as a supported sector which is identify as paddy and being the main recipient of policy transfers. Consumers of agricultural commodities and taxpayers represent the two sources of transfers, for example the economic groups bearing the cost of agricultural support. The term "agriculture" designates primary agricultural producers as an economic group. In this research the data considered on transfers was limited to the paddy sector**,** while other transfers to agricultural sector were ignored. Agricultural producers are viewed from two perspectives – as individual entrepreneurs and collectively (as a sector).

General policy measures available throughout the entire economy are not considered in the estimation of agricultural support, even if such measures create policy transfers to/from agriculture. Thus, a situation of zero support to agriculture would occur when there are only general economy-wide policies in place with no policies specifically altering the economic conditions for agriculture.

Transfers generated by agricultural policies are measured in gross terms. Policy transfers can be defined in gross or net terms, for example as revenue (gross receipts) or income (revenue less costs) generated by a policy measure. The phrase gross transfers in the definitions emphasizes that no adjustment is made in the indicators for costs incurred by producers in order to receive the support, for example costs to meet compliance conditions attached to certain payments or tax claw backs. Policy transfers to individual producers are measured at the farm gate level, which follows from the objective to measure support only to primary producers of agricultural commodities. Consequently, the word "consumer" in the definitions and methodology is understood as those who consume agricultural commodities.

4.5.1   Estimating Policy Transfers: Price Transfers

The key theoretical assumption underlying the estimation of support is that agricultural markets are competitive. The characteristics of competitive markets, such as perfect information, homogeneity of products traded and free entry and exit, imply price arbitrage. Market agents exploit and gain from price differences across markets. Theoretically, price arbitrage works to dissipate price wedges between domestic and world market, so that there is a stable tendency of domestic prices to align with external prices when expressed in a common currency unit. In this context, a persistent price differential between the domestic and external markets is the result

of government interventions. As such, this price differential becomes a key parameter for estimating transfers arising from government's price policies. A variety of government policy measures may affect the domestic market price of a commodity, including measures imposed at the border, such as tariffs and export subsidization, as well as quotas on imports or exports. Domestic market interventions may include direct price administration and public stockholding. All these policy interventions alter the domestic market price of a commodity compared to its border price (The PSE Manual, 2016)

This policy-induced price difference is denoted as the Market Price Differential (MPD)

Where:
MPD = DP-BP
MPD - Market Price Differential
DP - Domestic market Price
BP - Border Price

In calculating the Market Price Differential, it was assumed that the absolute price gap measured at a higher level of the processing chain is the same as which occurs at the farm gate.

MPD is positive when the policy induces a higher domestic market price, thereby supporting commodity production. It is negative when the policy induces a lower domestic market price, thereby discouraging commodity production.

Policies that change the market price for a commodity include, but are not limited to, the following:
- Import measures – for example tariffs, levies, import quotas, tariff quotas and licensing requirements.
- Export measures – enhancing exports, for example export subsidies, export credits and foreign food aid. Limiting exports, ex. quantitative restrictions, licensing, export bans and export taxes.
- Domestic price support measures – for example production quotas, administered prices and intervention purchases, including for domestic food aid, public stockholding and market withdrawals.

Policies affecting market prices are typically implemented by governments in order to increase the price received by producers of a commodity. All other things being equal, such policies will lead to a positive MPD. The MPD is interpreted as a static measure of the additional price received by producers resulting from agricultural policies in a given year. It is the extra

cost paid by consumers and in some cases also by all tax payers, resulting from policies that provide market price support to agricultural production.

4.5.2   Market Price Support (MPS)

The Market Price Support (MPS) for a commodity is estimated by adding together transfers to producers from consumers and tax payers, alternatively found by multiplying the quantity of production by the MPD.

MPS **=** MPD * QP
Where,
MPS - Market Price Support
MPD - Market Price Differential
QP - Quantity of Production

4.5.3   Price Transfers from Consumers/Consumer Support Estimate (CSE)

Price Transfers from Consumers (PTC) for a commodity are estimated by adding together transfers from consumers to producers and transfers from consumers to other recipients. Alternatively, this can be found by multiplying the quantity of consumption by the MPD.

PTC = MPD* QC
Where,
PTC - Price Transfers from Consumers
MPD - Market Price Differential
QC -Quantity of consumption

Price Transfers from Consumers (PTC) are defined as 'the annual monetary value of gross transfers from (to) consumers of agricultural products, measured at the farm gate level, arising from policy measures that support agriculture by creating a gap between domestic market prices and border prices of specific agricultural commodities.' In this case, PTC is given a negative sign because these transfers represent an implicit tax on consumers (The PSE Manual, 2016).

4.5.4   General Service Support Estimates

General Services Support Estimate (GSSE): The annual monetary value of gross transfers arising from policy measures that create enabling conditions for the primary agricultural sector through the development of private or public services, institutions and infrastructure regardless of their objectives and impact on farm production and income, or consumption of farm products. It includes policies where primary agriculture is the main

beneficiary, but does not include any payments to individual producers. GSSE transfers do not directly alter producer receipts or costs, or consumption expenditures (The PSE Manual, 2016)**.** The GSSE measures the value of transfers provided through policies that support producers collectively rather than as individual producers.

4.5.5   Model Specification

The relationships between the different variables are modelled in a linear panel model. Policy variability, roads and telephone are expected to have an interaction effect with NRA. It is expected that the effect of NRA on yield depends on the extent to which pricing policy varies, markets are developed, and rural areas have access to (price) information. Together with NRA, these variables are lagged by one year, as investment decisions of farmers will be based on the previous year. Yield and per capita land are logged because of non-normality. Roads and telephone are already logged. Interaction effects are difficult to interpret, especially when there are multiple interaction effects in one equation. Hence, to get interpretable results, the models are estimated with one interaction effect at a time. Different model specifications are also tested, ranging from very simple to more complex models. The equation estimated is as follows.

$$Log\ paddy\ production_{i,t} = \beta_0 + \beta_1 NRA_{i,t-1} + \beta_2 Capi_t + \beta_3 \log land_{1,t} + \beta_4 Rain_{i,t} + \beta_5 Tem_{i,t} + \beta_6 policy_{i,t-1} + \beta_7 Roads_{i,t-1} + \beta_8 Tel_{i,t-1} + \varepsilon$$

Where
Paddy Production $_{i,t}$: All island paddy production in t^{th} year
$NRA_{i,t-1}$: Lag value of Nominal Rate of Assistance (NRA)
$Capi_t$: Capital to rural population ratio in t^{th} year
$Land_{i,t}$: Total arable land availability in t^{th} year
$Rain_{i,t}$: Average rainfall in t^{th} year
$Policy_{i,t-1}$: Rolling five year standard deviation of NRA
$Roads_{i,t-1}$: Length of roads in Km in t^{th} year
$Tel_{i,t-1}$: telephone penetration in t^{th} year

The second model is designed to identify the variable which may have effect on NRA. The model is as follows:

$$NRA_{i,t} = \beta_o + \beta_1 \log GDP\ percap_{i,t-1} + \beta_2 \log structural_{i,t-1} + \beta_3 \log Popu_{i,t-1} + \beta_4 Foodself_{i,t-1} + \varepsilon$$

Where,
$NRA_{,t-1}$: Nominal Rate of Assistant
GDP $percap_{,t-1}$: GDP per capita
$Structural_{,t-1}$: Structural Changes
$Popul_{,t-1}$: Midyear population
Food $self_{,t-1}$: Food self-sufficiency ratio

CHAPTER FIVE

Review of Agricultural Policies in Sri Lanka

5.1   Agriculture Policies in Sri Lanka

The agriculture policy of Sri Lanka has been an important to producers, consumers and to the whole economy in the country. Hence, an introduction and regulation of agricultural policies is significant as policies are the courses of actions chosen by government towards an aspect of the overall economy (Cafeiro, 2003). Consequently, it is an essential to have policies in order to secure a sustainable long-term growth in the sector (Epaarachchi, 2002) as well as the country.

In 1948, at the time of regaining independence, Sri Lankan agricultural sector predominantly consisted of two sectors; an export agricultural sector and a subsistence agricultural sector. Since independence every government attempted to develop the domestic agricultural sector through the development of agricultural infrastructure to improve irrigation facilities, apart from putting in place institutions for the delivery of credit, inputs and extension services**. Further, as pointed out by Shand (2002), the major focus of agricultural policy was to achieve self-sufficiency in food, mainly rice. When considering agricultural policies, production and marketing policies are the key drivers towards enhancing the performance of the sector.

Past literature also reveals that policies such as the fertilizer subsidy, irrigation schemes, practices on seeds and planting materials, agro chemicals and extension were the most common production policies that have implemented to fine tune the paddy production sector, while guaranteed purchasing price was the most stable policy in paddy marketing (Henegedara, 2002; Shand, 2002).

5.2   Agricultural Policy Reforms

Agricultural development in Sri Lanka has been overwhelmingly influenced by the concern for supporting the rice production sector. After gaining independence in 1948, successive governments in Sri Lanka have implemented several policies and programmes for the rice sector to increase production, to reduce reliance on imports and to maintain the nutritional intake of the population (Gunawardena and Quilkey, 1988 cited in Shand, 2002). Furthermore, these policies and programmes have included:

- On the production side: irrigation schemes and land resettlement projects, research and extension programmes, provision of subsidized credit and fertilizer, crop insurance, and implementation of a guaranteed price scheme
- On the consumer side: provision of rice to consumers at subsidized prices under rationing and food stamp schemes (Gunawardena and Quilkey 1987).

As stated by Henegedara (2002), since 1948, domestic agricultural policies were also adjusted in line with macro-economic policy reforms. Consequently, policies followed during 1948-1970 focused mainly on increasing rice production through expanding the area cultivated and improving productivity. The Six-Year Development Plan (1951 -1957), the Six-Year Programme of Investment (1954-1959) and the Ten-Year Development Plan (1959-1968) emphasized the need to enhance the efficiency of the non-plantation sector (Athukorala and Jayasooriya, 1994). Programmes during the 1948-1970 period centered around five activities (Chandrapala, 1986) to;

1. Increase the extent of paddy land cultivated by the development of irrigation infrastructure and land settlement programme;
2. Increase production and productivity through research and improved production technology;
3. Develop institutions for farmers such as the establishment of cultivation committees and rural banks etc.;
4. Change land and land tenure policies and
5. Provide subsidies for production inputs and credit facilities.

These policies were continued during the 1970-1977 period with greater emphasis on farm support services such as credit, marketing and crop insurance. Rural banks, the Paddy Marketing Board and the Crop Insurance Board were established during the period. Programme for the development of irrigation, research and extension services, land settlements and rural institutions, were also implemented. These were in line with the import substitution policies of the government during this period.

In keeping with the liberal economic policies post-1977, agricultural policy reforms were intended to achieve four objectives (National Agriculture, Food and Nutrition Strategy, Ministry of Finance and Planning, 1984).

1. Achievement of self-sufficiency in basic foods - rice, milk, sugar, fish and pulses.

2. Expansion of exports to increase the contribution of agriculture to the balance of payments.
3. The creation of new employment opportunities and the consequent enhancement of incomes in the rural sector.
4. The improvement of the nutritional status of the people.

At present there are several sectoral and sub-sectoral policy and strategy documents covering agricultural activities. These include the National Agriculture Policy, which was introduced in 2007 by the Ministry of Agriculture with the key aims of assuring food security, ensuring environmental sustainability and developing economic opportunity. Other key policy documents include the National Land Use Policy (2007), National Plantation Industry Policy Framework (2006), National Livestock Policy (2006), Sri Lanka Rubber Industry Master Plan 2017-2026 (2017), National Fisheries and Aquaculture Policy (2018), National Policy and Strategy on Cleaner Production for the Agriculture Sector (2012), and National Agricultural Research Policy and Strategy 2018-2027 (2018). While several of the existing policy documents need to be update, they are still relevant in guiding government interventions in the sector and relevant sub-sectors (Overarching Agriculture Policy (Draft) August 2019).

Sirisena (1986) and Abeyratne (1991) have categorized the agricultural policy reforms over the years under the following seven areas:

1. Development of irrigation and agricultural infrastructure
2. Guaranteed price schemes
3. Production subsidies
4. Research and development
5. Trade policy reforms
6. Institutional development programmes
7. Agricultural credit programmes

5.3   Paddy Production Policies

5.3.1   Development of Irrigation and Agricultural Infrastructure

The establishment of settlements in remote rural areas was one of the main strategies to develop irrigation and agricultural infrastructure in Sri Lanka (Senakaarachchi, 1996). The history of land settlement goes back to British colonial times (1928) and these programme were initiated as the main instrument of developing remote rural areas of the dry zone in Sri Lanka (Fanner, 1957). The policy of establishing agricultural settlements was aimed at ensuring self-sufficiency in the peasant agriculture sector (Senakaarachchi, 1995) and therefore more weight was given to increasing

agricultural production through irrigation infrastructure development and land settlements. Land settlements were carried out with a view to achieving five main objectives (Henegedara, 2002).

1. Provision of land and a means of livelihood for marginalized communities
2. Dispersal of population from the highly congested wet zone areas to the sparsely populated dry zone
3. Development of areas with a potential for agricultural production by restoring already existing irrigation schemes or through new ones
4. Development of domestic agriculture by expanding the extent under paddy and other field crops
5. Reduction of regional disparities in rural areas

5.3.1.1 Irrigation Policy

Since the pre-independence era public investments on irrigation infrastructure have played a significant role in agricultural policy successive governments of Sri Lanka invested in large scale irrigation projects over many decades and these have been the main thrust of irrigation policy culminating in the Accelerated Mahaweli Development Programme (AMDP) (Shand, 2002).

As stated by Abayawardana *et al.,* (2006) policies in the irrigation sector can be categorized into five major areas: institutional, irrigation system management, operation and maintenance, water allocation and irrigation financing. However, there has been no policy on water allocation from major water courses or water bodies for various purposes.

Subsequent governments have identified the need for a comprehensive policy revision in the water sector and have attempted to develop a new set of policies. The National Water Policy of 2000 aimed at transferring the management of irrigation works to farmer organizations (Thibbotuwawa and Hirimuthugodage, 2015). Even though, the introduction of irrigation charges had been proposed several times it was not successfully implemented due to several socio-political issues in Sri Lanka (Thibbotuwawa and Hirimuthugodage, 2015). According to the World Bank (2003), the inherent bureaucratic inefficiency of government institutions that are responsible for collection and utilization of irrigation charges has also partly contributed to the failure of this initiative.

The National Water Policy of 2000

In year 2000 two major policy documents were developed: "National Water Resources Policy and Institutional Arrangement" and the "National Water Resources Authority Bill."

Consequently, the National Water Resources Policy was approved by the Cabinet of Ministers in March 2000. This approved policy stated that "all water including surface and groundwater will be owned by the state and managed by the government in partnership with users on behalf of all Sri Lankans." It was severely contested as being contrary to Common Law principles. It was argued that if this policy was approved, the government could transfer ownership to anybody, making water a market commodity (Thibbotuwawa and Hirimuthugodage, 2015).

Further, a National Water Resources Act was drafted which sought to establish a National water resource authority (NWRA) and set up formalized River Basin Committees for the allocation of water rights, among other functions. However, to date this has not been passed into law which could have enabled policy instruments to be implemented.

5.3.1.2 Land Policies

Evolution of land policy in Sri Lanka can be discussed under two major periods:
   I.   Pre-independence land policy
   II.   Post-independence land policy

The first commenced with The Crown Land Encroachment Ordinance of 1840, which was preceded by the Waste Lands Ordinance of 1897, which was amended and debated in the House of Lords in 1899. This allowed acquisition of common property land to the state and the development of plantation. Land Commission of 1927 and Land Development Ordinance of 1935 allowed alienation of state land to landless peasants. The second period comprised of land settlement and irrigation development the Land Reform Law of 1972.

The Land Development Ordinance (1935), State Land Ordinance (1947), Forest Ordinance (Amendment) (2009), and Soil Conservation (Amendment) Act (1996), are some important legislative measures introduced in the country for sustainable land management. However, land fragmentation has subdivided agricultural lands to economically unviable levels. Scarcity of land suitable for commercial operations has affected

modernization in agriculture. The current actions for curbing land degradation are elaborated in the NAP for Combating Land Degradation in Sri Lanka, 2015-2024 (Overarching Agriculture Policy, 2019).

Further, successive governments of Sri Lanka have introduced some important legislative measures to ensure sustainable land management in the country. The National Land Use Policy (2007) and National Land Use Planning Bill (2014) have addressed the issues related to protected areas, misuse of land, underutilized and unused land, and land use conflicts (Overarching Agriculture Policy, 2019).

The major goal of the National Land Use Policy (2007) is rational utilization of lands as a resource, in the national interest, in order to ensure food security, a high quality of life, equity and ecological sustainability. Out of 16 policy objectives there are three that are significantly oriented towards agriculture:

- Prioritize agriculturally oriented uses relevant to the strengthening of national economy in order to ensure present and future food security
- Protect, conserve, and manage all sources of water on state as well as private lands
- Minimize fragmentation of agricultural lands

Sri Lanka has prepared a National Action Programme (NAP) for combating land degradation for the period 2015-2024 and an Integrated Financing Strategy (IFS) for sustainable land management in 2014 with the support of international organizations. The current actions for curbing land degradation are elaborated in the National Action Programme (NAP) for Combating Land Degradation in Sri Lanka, 2015-2024 (Overarching Agriculture Policy, 2019) The NAP is a comprehensive policy document which included actions for curbing land degradation in Sri Lanka and identified 25 programmes to be implemented during a ten-year period from 2014 to 2024. Consequently, the IFS for Sustainable Land Management, also produced in 2014, identified financing opportunities to implement the programmes identified in the NAP.

5.3.2   Production Subsidies

Every successive government in Sri Lanka has provided production subsidies to protect and encourage small scale producers (Henegedara, 2002). As stated by Abeyratne (1991), there are various production incentives in the form of low prices, low interest rates, loans and trade incentives. There

were two main input subsidies given to farmers; the fertilizer subsidy and the irrigation subsidy (Henegedara, 2002).

5.3.2.1 Fertilizer Subsidy

As in many developing countries, fertilizer subsidies represent a major component of agricultural policy in Sri Lanka. This is particularly true of the paddy sector. Rice being the staple food of the inhabitants in Sri Lanka, successive governments have provided significant fertilizer subsidies for paddy with the primary aim of increasing the production.

The Government of Sri Lanka established a price subsidy for fertilizer for the first time in 1962, at the onset of Green Revolution. The main objective of the subsidy scheme was to make fertilizer available as cheaply as possible in order to encourage its wider use. A lower fertilizer price reduces cost of production and increases demand for fertilizer and for other inputs depending on the elasticity of substitution, income effect and elasticity of supply of other inputs. Given adequate availability of inputs to meet the increased demand and the effective use of the inputs by farmers, the food production was bound to increase (Ekanayake, 2006). The fertilizer subsidy scheme underwent various amendments and revisions under various governments as shown in Table 5.3. The evolution of the fertilizer subsidy scheme can be traced in terms of the following seven distinct phases.

1.   Period Ⅰ – Subsidy provided for three main fertilizers (1962-1989)
2.   Period Ⅱ – Removal of subsidy (1990-1994)
3.   Period Ⅲ – Subsidy provided for three main fertilizers (1994-1996)
4.   Period Ⅳ – Subsidy provided only for Urea (1997-2005)
5.   Period Ⅴ – Subsidy provided for three main fertilizers (2005-2015)
6.   Period Ⅵ – Subsidy was converted to money allowance (2016 *Yala* Season – 2017/2018 *Maha* Season)
7.   Period Ⅶ –Money allowance was converted to subsidy (2018)

**Table 5.3: The Chronology of the Fertilizer Subsidy Programmes in
Sri Lanka**

Year	Policy
1962	A fertilizer subsidy programme for paddy was introduced with a fixed subsidy rate.
1971	Importation of fertilizer became a monopoly of the Ceylon Fertilizer Corporation, and importation of fertilizer by the private sector was banned.
1975	The fertilizer subsidy programme was expanded to cover all crops.
1977	Private sector companies were allowed to import fertilizer.
1978	A uniform subsidy rate was introduced (50 percent of the cost, insurance, and freight (CIF) price), and responsibility for administering the subsidy programME was given to the National Fertilizer Secretariat.
1979	Subsidy rates were revised to 85% for urea and 75% percent for other fertilizers.
1988	Subsidy rates were reduced, and the subsidy for Sulphate of Ammonia (SA) and Rock Phosphate (RP) was eliminated.
1990	The subsidy was completely removed.
1994	The subsidy for urea, SA, MOP, and TSP was reintroduced with a fixed fertilizer price.
1996	The subsidy for SA was eliminated.
1997	The subsidy was limited to urea.
2005	The subsidy was limited to the main fertilizers for paddy (Nitrogen, Phosphate, and Phosphorus) in their straight form but not as mixtures.
2006	Tea, rubber, and coconut smallholder farmers (with less than five acres of land) became eligible for the fertilizer subsidy.
2009	The fertilizer subsidy policy was coupled with a paddy procurement policy, which required farmers to supply a fixed portion of paddy to the government at a pre-specified price below the market price.

2011	The fertilizer subsidy was extended to all crops. Accordingly, a 50 Kg bag of unmixed fertilizer was sold at a subsidized price of LKR. 1,200.00 and a 50 Kg bag of mixed fertilizer was sold at a subsidized price of LKR. 1,300.00
2014	LKR. 350.00 per 50 Kg bag and LKR. 150.00 for insurance scheme.
2016	Circular No.2016NFS/FCG (1) was issued to grant a maximum cash grant of LKR. 25,000.00 per hectare for a maximum of two hectares per year in place of the fertilizer subsidy for paddy farmers.
2018	Money Allowance was transferred to fertilizer subsidy.

Source: Ekanayake (2006), National Fertilizer Secretariat (Various Years) and Central Bank
Annual Reports (Various Issues)
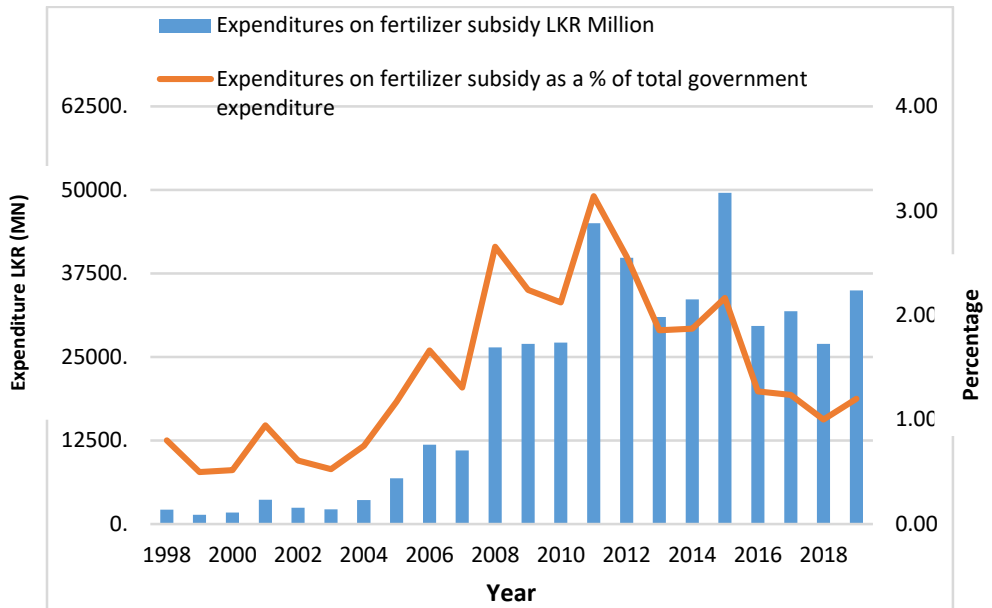
Source: Central Bank Annual Report (Various Years), Ministry of Finance, http://www.treasury.gov.lk/data-statistics-published-by-ministry-of-finance, access on 2020.01.08

Figure 5.1: Expenditures on the Fertilizer Subsidy and Total Government Expenditures (1998-2019)

5.3.4   Research and Development

5.3.4.1 New Varietal Development

Research and Development (R&D) on improved high yielding varieties came to be stressed with the launch of the Green Revolution in the mid-1960s (Henegedara, 2002). The adoption of high yielding varieties increased from seventy one percent (71%) in (1972) to ninety percent (90%) in 1997 (Dhanapala 1977 cited in Henegedara, 2002). New seed varieties have shown a greater yield response to fertilizer use, method of cultivation for an example transplanting and broadcasting and the use of weedicides, pesticides and fungicides (Henegedara, 2002). Table 5.2 shows the significance of the new varieties which were developed between 1998 and 2018.

Table 5.2: New Varieties 1998-2018

Year	Varieties	Significance
1998	Bg 357	Resistant to biotic and abiotic stress, High yield
	At 5 (Lanka Samurdhi)	High yield
	Bg 2039	Specific adaptability to agro ecological condition in wet zone of Sri Lanka
	BG 2426	High yield
1999	BG 2426-2	Island wide cultivation
	BG 2039	Suitable for low country and mid country wet zone
	BG 1611	Resistant to all economically important pest and disease
2000	BW 328-1	Tolerance to iron toxicity
	BW 328-2	
	LD 96-152,LD 355,LD-356	High yield

	BG 305, BG-358, BG-359, BG - 360	High yield, Suitable for commercial cultivation
2001	At 353, At -354	Adaptable to acid sulphate condition
2002	BG- 328-1	High yield
	At 95-4-3	Commercial cultivation
2003	BW 267-3, BG 3031, BG -3000, BG 357,BG379-2,BG450	High yield
	BW 99-987	Resistant to leaf and neck blaster
	BW 484	Iron toxicity tolerate
	PG 96-741	For flood and saline condition
2004	At 570	Resistant to major pest and disease
	At 582	Resistant to major pest and disease and lodging
	At 306	Resistant to major pest and disease and lodging
	Bw 363	Resistant to gall midge, BPH disease blast and Bacterial leaf blight
2005	BG 407 H	High yield
	Bg 454	Resistant to gall midge
	Bg 406	Good for Northern Region
	At 307	High yield
2006	Bg 3-180, Bg 2R	Resistant to rice blast and brown plant hopper
	Bg 2893	Resistant to rice blast, gall midge and brown plant hopper
2007	BW 364	Adaptable to iron toxicity
2008	Bg 403, Bg 379-2, Bg 450,Bg 454, Bg 406	Produced under the seed certification standards

2010	Bw 363, Bw 361, Bg 359, Bw 272-6b, Bw 364	High yield
2011	BW 367	Potential yield, resistant to Iron toxicity, lodging and neck blast disease
	Ld 368	Resistant to bacterial leaf blight, leaf blast,neck blast, gall midge and brown plant hopper, grain discoloration doesn't occur
2012	BW 367	High yield, Resistant to iron toxicity, lodging and neck blast
	Ld 368	Resistant to leaf blast, neck blast, gall midge and brown plant hopper, no grain discolouration
	Bg 369	Suitable to saline affected areas
	Bg -3R	Resistant to major pest and disease
	Ld 368	High yield, Resistant to leaf blast and neck blast, no grain discolouration
2013	Bg 370	Tolerant to major pest and disease, lodging
	Bg 96-741	Tolerant to flash flood
	Bg 4-91	Tolerant to salinity
	At 309	Resistant to lodging, pest and disease, lodging, suitable to rice based product and biscuit
2014	Bg 251GSR	Resistant to major pests (Brown plant hopper and Gall midge), diseases and lodging.
	Bg 310	Tolerant to salinity. Suitable for saline areas
	Bg 455	Moderately tolerant to submergence and suitable for flood prone areas
	At 373	Good cooking quality and appearance

	Bg 251GSR	Resistant to major pests (Brown plant hopper and Gall midge), diseases and lodging.
2015	At 311	Resistant to lodging and moderately resistant to rice leaf blast disease, brown plant hopper and rice gall midge
2016	Bg 252	Resistant to brown plant hopper and Gall midge, rice blast
	Ld 253	Resistant to brown plant hopper and Gall midge, rice blast. No grain discolouration.
	Bg 374	Resistant to major pest and disease

Source: Department of Agriculture: Performance report, Various years

5.3.5   Institutional Development Programmes

Following policy reforms implemented, the agricultural delivery system also improved consequent to the institutional mechanism of the state services being improved and the participation of beneficiary groups (Henegedara, 2002). Agrarian Service Centers (ASCs) were established in 1971 to provide farm support services such as extension, credit and marketing through the Department of Agrarian Services, the Department of Agriculture, the Paddy Marketing Board and the Agricultural Development Authority.

5.3.6   Agricultural Credit Programmes

Agricultural credit plays a major role as a financial input in cultivation. Hence, it is another important policy measure with potentially high benefits for small farmer-based agriculture (Shand, 2002). Access to credit is regarded as one of the key elements in raising agricultural productivity (Anyiro and Oriaku, 2011). Consequently, adequate and timely availability of credit is considered essential. With the introduction of credit facilities for the agriculture sector since 1947, the government has been trying to develop and expand its availability (Bandara *et al.,* 2007). Agricultural credit policy was primarily intended to reduce rural indebtedness and it was also aimed at promoting formal credit supply through the banking sector in rural areas (Henegedara, 2002). The Agricultural and Credit Cooperation (Amendment) Act No 5 of 1970 sought to regulate the functions of agricultural and industrial credit.

5.4   Paddy Marketing Policies

5.4.1   Guaranteed Price Schemes

Guaranteed Price Scheme (GPS) is the most stable policy with regard to paddy marketing. The GPS was started in the late 1940s and continues to this day. It was estimated that all paddy growers (approximately 1.8 million farm families) would directly benefit from the scheme. Further, it has functioned as the main price mechanism for the purchase of paddy (Henegedara, 2002). During the period 1970-1977, the GPS was used solely as a mechanism for supplying the rice rationing scheme. After 1978, the major objective of this scheme has been to provide a minimum price insurance to farmers.

The amount purchased by the GPS depended on the volume of production, availability of other food commodities, personal consumption needs and the price in the open market. The operation of the GPS over the past fifty years may be divided into four stages (Sirisena, 1986).

1. The initial stage (1948-1956): The GPS was able to collect a very small share of the market surplus due to market imperfections and lack of credit facilities.
2. The second stage (1956-1971): The market share of GPS was improved since credit facilities were provided through cooperative societies in 1961. During this period the GPS was always higher than the open market prices and therefore the quantity purchased under GPS was higher.
3. The third stage (1972-1977): The Paddy Marketing Board (PMB) was established in 1972 in order to implement GPS. The Paddy Marketing Act No. 14 of 1971 gave wide powers to the PMB to purchase paddy.
4. In the post 1977 period, the monopoly of the PMB was abolished and the GPS was implemented as a floor price. The criteria followed for determining GPS were mainly based on local rice production rather than in a consideration of other important factors like the volume of paddy purchased under GPS, cost of production of rice and the import price for purchasing the same amount of rice.

However, a restrictive import price has had a greater impact. Government intervention in paddy marketing was greatly reduced with only a small proportion of the paddy output purchased (Shand, 2002). In the context of an unsuccessful guaranteed price the Central Bank initiated a forward contract mechanism for agricultural produce under the 'Govi Sahanaya Scheme' in a few districts in year1999.

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Forward contracts allow farmers and traders to enter into agreements for the purchase of pre-determined quantities of produce at pre-determined prices on a future date. Forward contracts facilitate farmers to reduce fixed marketing risks and realize less unstable prices. They will also benefit traders and consumers with stable supplies and prices (Central Bank , 1999). During the 2000/2001 *Maha* harvest the Co-operative Wholesale Establishment (CWE) and the co-operative societies purchased considerable amounts of paddy this is due to the fact that the drop in paddy production, coupled with the restrictions imposed on the import of rice helped the farmers to dispose of their paddy at remunerative prices.

In 2006, Sri Lanka Agricultural Products Marketing Authority was established under the Companies Registration Act to purchase paddy trough Co-operative Wholesale Establishments, Co-operative Network and farmer organization. The mechanism adopted sought to purchase paddy from five cultivation zones handled by five managers and supervised by five assistant commissioners. However, the exercise was not successful due to non-availability of enough staff (Paddy Marketing Board, 2021).

5.4.2   Agricultural Trade Policy Reforms

The trade policy pursued on rice can be best described as ad hoc as it is characterized by protecting farmers during glut seasons and consumers during deficit seasons (Weerahewa, 2004). Further, as noted by Weerahewa (2004), rice-trade policy has not been very stable in Sri Lanka. The main objective has been to protect the paddy producer through trade policy, although at times tariff concessions were given to lower the rice price to relieve the pressure on consumers (Weerahewa, 2004). In order to achieve several objectives of the liberal policy reforms introduced since 1977, the tariff system was changed by introducing some quantitative restrictions (QRs) on imports. Thus, most QRs on imports were replaced in 1988 by introducing a six-band duty system ranging from zero percent tariff for essential consumer items to 500% tariff for luxury items respectively. This system was altered in 1992 and a three-band structure was introduced with rates of 10, 20 and 45 per cent in order to relax the rigidity and correct the distortions in the domestic agricultural sector (Presidential Tariff Commission on Trade and Tariff). The introduction of the three-band tariff structure in 1992 helped reduce market distortions in the non-plantation sector (Gunawardena and Somaratna, 1999). However, the official import duty rates imposed on rice were changed from time to time with changes in local production and under internal political pressures (Henegedara, 2002).

As noted by Henegedara (2002), the tariff on the import of rice was 25% in 1980 and it remained so until 1989. The rate was reduced to 8% in 1990 for

two years. It was however increased from 12% to 16% in 1992 and again to 35% or LKR. 7/kg in 1994. Nevertheless, it was reduced to zero in the 1995/96 *Maha* and the 1997 *Yala* seasons due to severe drought and the resultant low production. The tariff was increased again to 35 per cent in 1998 with another 4.5% charge as the national security levy. It however dropped to 10% in 1999 and increased to 35% in January 2000.

In July 2000, a licensing scheme was re-imposed on the import of rice and this continued until 22nd of November 2001. The government once again intervened in the market and allowed the private sector and the CWE to import 60,000 MT of rice on a duty-free basis. This decision was taken due to escalating rice prices in the market that were caused by shortfalls in paddy production. With respect to imports, the CWE was allowed to import 30,000 MT of rice, while the balance was equally distributed among 15 private sector importers. However, only the private sector importers had imported the full quota of 30,000 MT of rice while the CWE had imported only a portion of the allocated quantity before 10th of December 2001. After the 10th of December to 31st of December 2001 period was over, the duty rate applicable for importing rice was changed from duty free to 50% of the normal duty.

The ad Valorem import duty was changed to a specific duty of LKR 7.00 per kilogram with effect from 21st of January 2002. However, the CWE was allowed to import at a reduced duty of LKR 4.00 per kilogram. The specific duty was reduced to LKR 5.00 per kilogram with effect from November 2002 (Central Bank Annual Report, various years).

In 2014, the government initiated several measures to control the increase in rice prices including the reduction of tariff on rice imports and the maintenance of a buffer stock of rice under the Department of the Food Commissioner. Accordingly, the effective rate of tariff on imported varieties of rice was reduced from LKR. 25.00 per kilogram to LKR. 1.00 per kilogram in 2014 and as a result total rice imports increased to 600,000 MT during 2014, which is considerably higher than the 23,000 MT imported during 2013. Imports of rice supplemented the domestic supply of rice available for household consumption and industrial use (Central Bank Annual Report, 2014).

The government took steps to reduce taxes for imported rice, with a view to preventing the escalation in prices, in addition to enforcing a maximum retail price for selected varieties of rice. The tax reduction was implemented by removing the existing taxes, which were in effect since November 2016 and by introducing a Special Commodity Levy (SCL) of LKR.15.00 per kilogram for imported rice. The government further reduced the SCL on

imported rice to LKR. 5.00, with effect from 27th of January 2017. The SCL imposed on imported rice was further reduced to 25% kilogram with effect from 27th of July 2017 and this reduction of tax was effective since 30th of April 2018. Moreover, in order to address rising prices of all rice varieties in spite of higher imports, the government imposed a maximum retail price for local and imported rice varieties, with effect from 17th of February 2017, which was subsequently removed on 16th of August 2017 but reintroduced for Nadu on 26th of December 2017 (Central Bank Annual Report, 2017).

In conclusion, government interventions towards improving agriculture and food production have focused on investments in several areas including irrigation, research and development, training, education, and dissemination of knowledge.

Irrigation development, initially undertaken with the reconstruction and rehabilitation of ancient tank networks, have transformed towards major river and catchment management schemes with land development for rice cultivation as the primary motive. The fertilizer subsidy scheme, introduced in 1962, was intended to increase productivity and support adoption of modern high-yielding rice varieties and other food crops.

In general, the thrust of policy in recent years have been a departure from the import substitution policies and strategy of the 1970s. In the 1970s and subsequent years import substitution policies supported domestic food production through producer support programmes such as state procurement, guaranteed price schemes, quantitative restrictions on imports, tariff adjustments, state marketing boards, and concessionary comprehensive rural credit and crop insurance schemes.

The government continues to provide subsidized fertilizer, free irrigation water, publicly funded research and extension services, marketing infrastructure, and price guarantees for paddy.

CHAPTER SIX

An Evaluation of Government Policies

6.1 Paddy Sector Performance

Sri Lanka's paddy production has been increasing on average at about 4.08 percent annually since 1998 with up and downs, sustained by improved access to inputs such as fertilizers and seeds, as well as better irrigation and credit coverage. As per Figure 6.1, the years 2001, 2004, 2007, 2009, 2011, 2014 and 2017 showed negative growth rates when compared to the previous year. The year 2018 had the highest growth rate during the 1998 to 2018 period. As shown in Figure 6.1, paddy production increased over the years with the increasing trend.
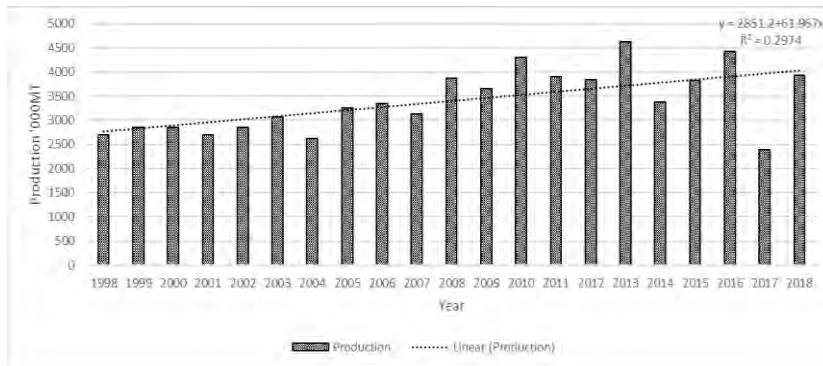
Source: Paddy statistics, Various years

Figure 6.1: Paddy Production Trend over the Years Since 1998 to 2018
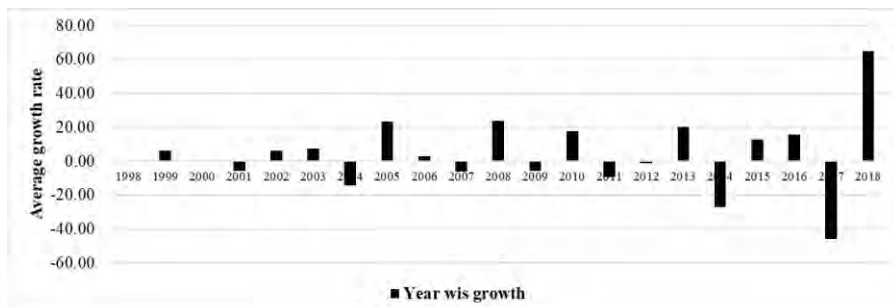
Source: Paddy statistics, Various years

Figure 6.2: Paddy Production Growth (1998 to 2018)
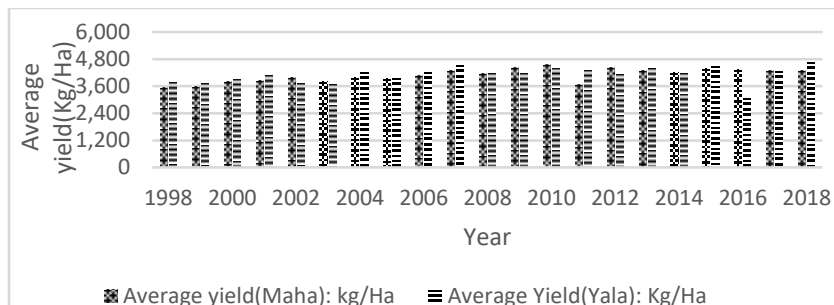
Source: Paddy statistics, Various years

Figure 6.3: Average Paddy Productivity by Seasons (*Yala* and *Maha*), 1998 to2018

According to the ANOVA paddy production during the study period has no statistically significant differences among **y**ears. As such paddy production shows a statistically constant value over the study period. Further, over the past several decades, agricultural policies have sought to achieve food security, often interpreted in Sri Lanka as self-sufficiency: seeking to ensure that farmers receive remunerative prices, while at the same time safeguarding the interest of consumers by making food available at affordable prices. However, government policies have exacerbated food insecurity with ad hoc policy changes of import duties and non-tariff barriers (Vision 2025, 2015).

From the "food security" point of view, the performance of this sector has been moderate. The historical data show that the total production of paddy over this period has increased with a slight positive trend (Mean = 1,719,883.72 Metric Tons and SD = 564,365.9404 Metric Tons) (Figure 6.1). However, the year-wise increase of paddy production remained statistically insignificant and is characterized by year-wise fluctuations (CV = 0.32).

In considering the import performance (Figure 6.4) of rice/paddy, the highest import was reported in the year 2017. The imports are insignificant (0.018) when compared to the local production during the study period with an average annual import of 205,508.44 Metric Tons.
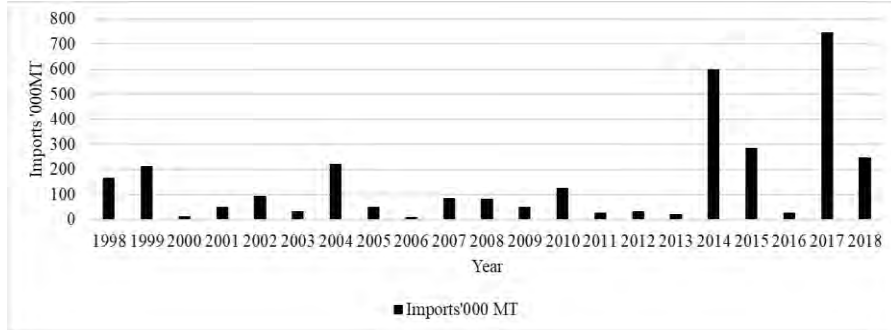
Source: Paddy statistics, Various years

Figure 6.4: Rice Imports to the Country (1998 to 2018)

According to descriptive statistics, the average productivity of paddy cultivation was 8.01 per acre in irrigated paddy cultivation and 1.43 per acre in rain fed paddy cultivation (CV= 0.19 in irrigated paddy, 0.82 in rain fed paddy). Machinery usage is given as expenditure on machinery and average machinery cost was LKR 13,839.71 for irrigated paddy cultivation and 11,584.61 for rain fed paddy cultivation per acre with a coefficient of variation 0.18 for irrigated paddy cultivation and 0.20 for rain fed paddy cultivation, indicating huge variation in the investments on machinery in paddy production in Sri Lanka. Seed is the most basic input in production and seed paddy rate has been found to vary among observations with an average seed cost rate of LKR 3006.61 per acre for irrigated paddy cultivation and LKR 2,730.33 per acre for rain fed paddy cultivation (CV= 0.15 for irrigated paddy cultivation and 0.23 for rain fed paddy cultivation). Labour in paddy cultivation is recognized as a combination of family and hired labour. On average a paddy producer employs 20 days for both irrigated and rain fed paddy cultivation (CV=2.87) during a given season.

6.2   Paddy /Rice Marketing Policies

6.2.1   Price Variability by Years

Pricing policies mainly focus on maintaining the rice price at a stable level throughout the year as well as across the years. However, as Table 6.1 shows, the nominal price of rice varies across the years with a standard deviation of 0.101 and a coefficient of variance of 0.908 for Samba rice and a 0.087 standard deviation and 0.912 coefficient of variance for Nadu rice indicating that despite many interventions, price fluctuation is common. However, throughout the year price variation by districts remain the same indicating that there is no significant geographical variation in prices.

Table 6.1: Nominal Price Variation in Samba and Nadu Rice (1998 to 2018)

	Samba	Nadu
Average	0.111	0.096
Standard deviation	0.101	0.087
Coefficient of variance	0.908	0.912

Source: Authors' own calculations
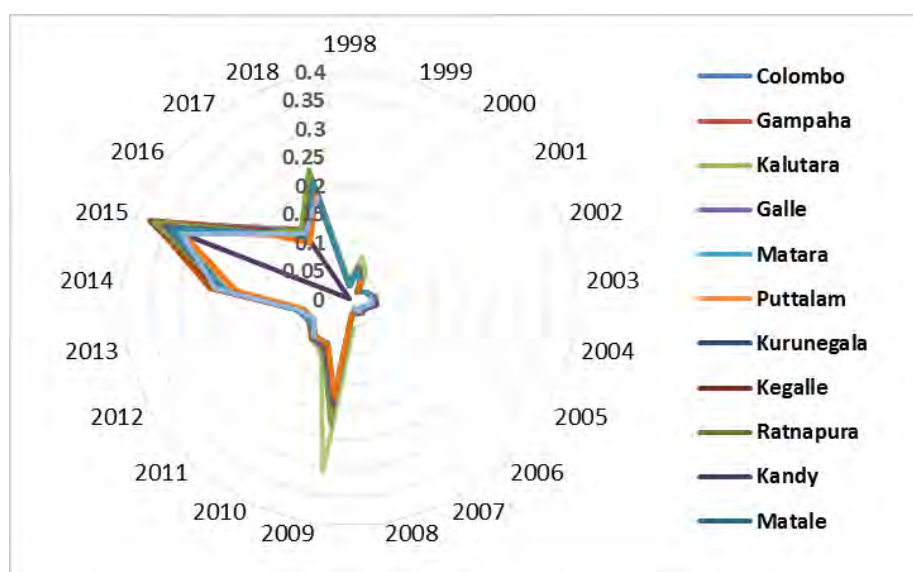
Source: Central Bank of Sri Lanka, Various years

Figure 6.5: Nominal Price Variation by Districts

Figure 6.6 shows an increasing trend of the guaranteed price and the retail price of the main two rice varieties consumed in Sri Lanka, long seed rice *(Nadu)* and small seed rice *(Samba)*. The data shows that the margins between retail price and the guaranteed price have the values 1.26 and 1.52 on average for *Nadu* and *Samba* respectively (Table 6.2). This indicates that there is a possibility of increasing the farm gate price in order to encourage production quantities by maintaining the same consumer utility levels as retail price and the guaranteed price have nearly one-fold margin.

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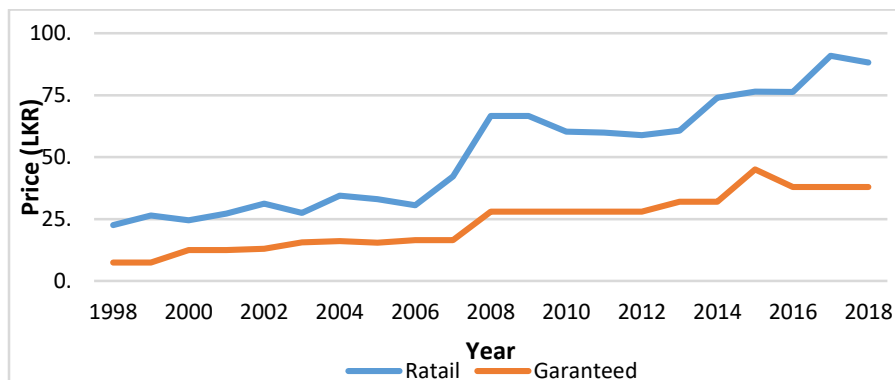
Source: Authors' own work

Figure 6.6: Retail Price and the Guaranteed Price - Nadu (Long seed paddy) and Samba (small seed paddy)

Table 6.2:   Price Margins between Retail Price and the Guaranteed Price of Long Seed Rice-*Nadu* and Small Seed Rice - *Samba*

Variable	Mean	Std. dev.	Min.	Max.
Nadu	1.26	0.41	0.70	2.57
Samba	1.52	0.53	0.78	3.21

Source: Authors' own calculation

6.3   Government Expenditure Analysis

6.3.1   Composition of Government Spending, 1998 to 2018
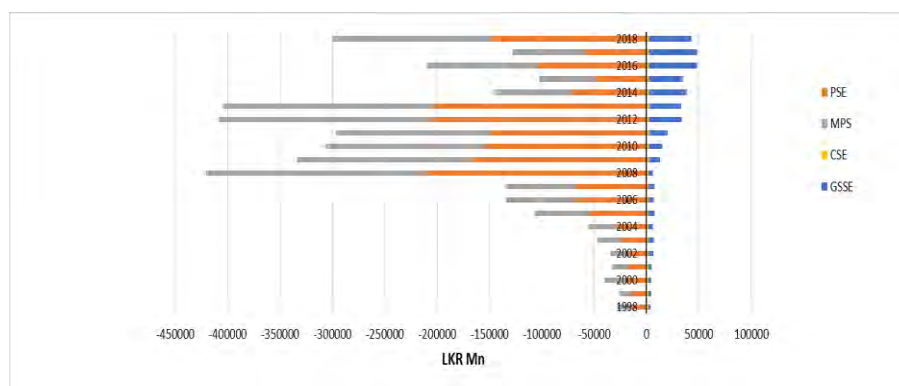
Source: Authors' own calculations

Figure 6.7: Composition of Government Spending, PSE, MPS, CSE and GSSE: 1998 to 2018

Policy instruments have been varied along the years as discussed in the previous chapter, reflecting changes in domestic political and economic settings and, progressively, developments in the international economic arena. Despite this diversity, policy measures applied in a country within a certain period of time can be brought together and expressed in terms of one or several simple numbers called support indicators which are comparable across time. Furthermore, such support indicators can be used to monitor and evaluate the developments of agricultural policies. Table 7 provides the statistics on the indicators developed in this study.

Table 6.3: Indicators for Composition of Government Spending

Statistics	PSE[1]	MPS[2]	CSE[3]	GSSE[4]	TSE[5]
Mean (LKR Mn)	-87436.4	-88478.6	2109.437	16702.2	-157103
Variance	4.91E+09	4.86E+09	24805.36	2.59E+08	1.8E+10
Minimum (LKR Mn)	-210478	-210478	1807.19	2279.25	-414692
Maximum (LKR Mn)	-13006.4	-13006.4	2269.33	46291.41	-21654

Note: PSE[1] - Producer Support Estimates, MPS[2]- Market Price Support, CSE[3]- Consumer Support Estimates, GSSE[4]- General Service Support Estimate, TSE[5]-Total Support Estimates
Source: Authors' own calculations

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According to the analysis, Producer Support Estimates (PSE) and Market Price Support (MPS) having a negative sign which indicates that the government policy instruments prevailing in Sri Lanka during the period 1998-2018 induced a lower domestic market price, thereby discouraging commodity production. Policies which alter the domestic market price affect both producers and consumers of a commodity, but they can also involve transfers to or from the government budget and therefore have implications for taxpayers as well.

Most commonly, policies affecting market prices are implemented by governments in order to increase the price received by producers of a commodity. All other things being equal, such policies will lead to a positive *MPD*. However, Sri Lanka has maintained a domestic market price below the world market price. This is due to the government policy on ceiling prices. In Sri Lanka rice price as well as farm gate price is politically sensitive. Since successive governments had heavy government intervention in order to maintain the consumer price, has ultimately discouraged commodity production. The comparatively low open market price of rice has increased consumer utility hindering the producers' earning capacity which ultimately created a situation where rice producers are slowly migrating out from rice cultivation.

6.4   Estimates of the Effect of Government Policy (1998 to 2018)

6.4.1   Summary Statistics

The summary statistics are given in Table 6.4. Each variable was tested and adjusted for multicollinearity and heteroscedasticity before being utilizing for the regression analysis. According to Table 6.4, the mean value of production is 1,726,143 MT per year with a standard deviation (SD) of 569,694 MT. In considering the Nominal Rate of Assistance (NRA), the average is 0.1479 which indicates that Sri Lanka is more protectionist in nature with regard to rice.

The policy variability is in fact the standard deviation of NRA, calculated as a five year rolling standard deviation (as explained in the variable descriptions) in order to identify the changes in policies over five-year time periods. The average value of the mid-year population is 19,975,476 during the year 1998 to 2018.

Table 6.4: Summary Statistics for Crop-specific Variables

Variables	Mean	Standard Deviation	Minimum	Maximum
Production/year (MT)	1,726,143	569,694	909,000	2,903,000
NRA	0.1479	0.2730	-0.3100	0.6545
Temperature(Cº)	26.70	0.27	26.12	27.21
Policy variability(5 year rolling SD of NRA)	0.1483	0.0567	0.0718	0.2656
Roads(Km)	27,461	2945	20,761	31,398
Telephone penetration	12,762,251	10,935,848	433,811	30,807,137
GDP per capita	0.0021	0.0005	0.0014	0.0036
Population	19,975,476	1,065,974	17,735,000	21,670,000
Structural Changes	0.7802	0.0268	0.7220	0.8000
Food self sufficiency	0.30	0.05	0.25	0.40

Source: Authors' own calculations

The results of the estimation of the regression analysis indicate that the model specified explains 46.20 percent of the variability as per the R-square value.

0

Table 6.5: Estimates of the Regression Analysis

Description	B	t-value	Sig.	SD	95% CI
Constant	18.768	0.656	0.517	28.625	(-39.469) – 77.005
Ln Capital/rural population	-0.525	-1.132	0.266	0.464	(1.469) -0.419
ln land	1.359	0.590	0.559	2.304	(-3.327) -6.046
Rainfall	0.004**	3.412	0.002	0.001	0.001- 0.006
Mean temperature	-0.261	-1.198	0.240	0.218	(-0.705) -0.183
Ln policy variability (5 year rolling SD of NRA)	-0.042	-0.256	0.801	0.164	(-0.375) -0.291
NRA	0.756*	1.778	0.085	0.425	(-0.109) -1.621
ln roads	-2.052	-1.182	0.246	1.736	(-5.584) -1.481
ln telephone	0.443*	1.978	0.056	0.224	(-0.013) -0.009

R squre: 0.462
Adjusted R^2: 0.331
Note: ** significant at 0.05 significant level, *significant at 0.100 significant level 0.1
Source: Authors 'own calculation

Paddy production is significantly affected by the NRA. The NRA had a positive relationship with paddy yield, indicating that if the nominal rate of assistance to the crop increases in one year (more subsidization or less taxation), production will increase in the following year, keeping the other variables in the model constant. According to the analysis when NRA goes up by one unit the paddy production increases by 0.756**.**

The other variables in this model which are significant are rainfall and telephone penetration. The total telephone penetration is having significant effect on the production. This implies that greater access to information has a positive effect on production. However, the magnitude of the effect is

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small, as a 1% increase in telephone penetration or access to information leads to a 0.443% increase in production, keeping other variables constant. Rainfall is significant according to the analysis. This highlighted the need for more climate resilience policies to increase the paddy production**.**

The model looks at the variability of the NRA on policy and whether high variability can decrease the effect of NRA. When the interaction effect of NRA and the policy variability of the NRA is added to the model, this gives significant effects. It is expected that the effect of NRA on production depends on how much the NRA has varied during the previous years. The higher the variability of policy, the less impact NRA will have on farming decisions, as farmers cannot count on stable policy and thus it is less likely that farm plans would be altered on account of policy changes. However, for paddy policy, the variability of NRA is insignificant, which indicates that the farmer decision on cultivation or production is not significantly influenced by policy decisions being changed, particularly in relation to the previous year's policies. This may be since in Sri Lanka paddy is mainly cultivated in lowlands where none of the other crops could be cultivated. Hence, the cultivation decisions of farmers are not significantly affected by the changing policies.

Road length and telephone penetration are included in the regression model. The aim of this is to see how infrastructure and information access affect yield and how these variables affect the impact of NRA on yield. The results show significant effects form telephone penetration which was used as a proxy for information access.

For paddy, the direct and interaction effects are all significant and the signs are as expected. The direct effects are positive, indicating that when NRA is zero, production is positively affected when markets are better developed and there is access to information. The analysis indicates that there is no interaction effect or direct effect for roads, indicating that a more developed infrastructure does not increases the effect of NRA.

Table 6.6: Estimates of Regression Analysis on NRA

Description	B	t-value	Sig.	SD	95% CI
Constant	-14.103	-5.63	0.000	2.505	(-19.179) -(-9.027)
ln_GDP per capita	-0.02	-0.459	0.649	0.044	(-0.110) -0.069
ln_Structural change	-5.038	-5.529	0.000	0.911	(-3.192) - (-0.442)
Population	2.41E-07	4.162	0.000	0.000	0.000
ln_food self sufficiency	2.323	8.062	0.000	0.288	1.739 -2.906

R squre: 0.785
Adjusted R^2: 0.762
Note: *** significant at 0.000 significant level, ** significant at 0.05 significant level, *significant at 0.100 significant level 0.1
Source: Authors 'own calculation

In this analysis population is used as a proxy for protectionist policies of the country as we expect the anti-trade bias to be larger for countries with a larger population to feed. The anti-trade bias is large when import competing commodities are subsidized, and export commodities are taxed. Drawing from the theory on price distortions, we expect the rural share of the population to have a negative effect, as traditionally countries with a smaller rural population will subsidize agriculture more. According to the analysis, rural population, which is proxy for protectionist policies and the level of food self-sufficiency have significant effects on NRA.

CHAPTER SEVEN

Farmer Perception on Agricultural Policies

A structured questionnaire survey was conducted among one hundred and fifty-five farmers from September to December 2019 to evaluate farmer perceptions on agricultural policies. The descriptive statistical results revealed that most of the farmers are cultivating under minor irrigation schemes. The percentage of minor irrigated farmers accounted for 42.6 percent of the surveyed population while those under rain fed and major irrigation schemes accounted for 34.2 percent and 23.2 percent respectively.

7.1   Socio-Economic Characteristics

The survey revealed that 80.6 percent of the sample were males. According to the result presented in Table 7.1, the majority (57.4%) of the population was between the age of forty-five and sixty-five years. This indicates that the majority of farmers fall into the economically productive age group. However, it also indicated that a considerable percentage (22%) of people in the age group 25-45 years are not engaged in farming.

Table 7.1: Socio- Economic Characteristics of the Farming Community

Variables	Frequency	Percentage
Gender		
Male	125	80.6
Female	30	19.4
Total	155	100
Age categories		
25-45 years	35	22.6
45-65 years	89	57.4
65 years and over	31	20.0
Total	155	100
Formal education		
No formal education	0	0
1-5 Years	15	9.7
6 -11 Years	46	29.7
11-13 Years	58	37.4
13 years and above	36	23.2
Total	155	100
Average monthly income (LKR)		
0-15,000	91	58.7
15,000- 30,000	45	29
>30,000	19	12.3
Total	155	100

Source: Authors' own calculation

The result revealed that the majority of the population (58.7 %) is earning less than 15,000.00 LKR per month as household earning and another 29 percent earns 15,000.00 to 30,000.00 LKR per month. However, the great majority of farmers' monthly earnings are far below the average household income level of the country. This indicates that the purchasing power and the ability to deploy earnings as capital investments is far below the normal average of the rest of the population.

7.2   Farming Characteristics

Half of the farmers have considerable farming experience of twenty to forty years. Around twenty percent of farmers have less than twenty years of farming experience while twenty percent of farmers have more than twenty years of farming experience. The great majority (81.9%) of farmers cultivate for consumption and income generation through sales. Transferable land ownership is the most prevalent land ownership type (63.9 %).

Table 7.2: Farming Characteristics

Variables	Frequency	Percentage
Farming Experience (years)		
1-20 years	43	27.7
20-40 years	81	52.3
40 years or above	31	20
Total	**155**	**100**
Purpose of cultivation		
Home consumption only	27	17.4
Consumption & income generation through sales	127	81.9
Income generation through sales only	1	0.6
Total	**155**	**100**
Ownership		
Transferable land ownership	99	63.9
Ande	28	18.1
Transferable land ownership & *Ande*	25	16.1
Other	3	1.9
Total	**155**	**100**

Source: Authors' own calculation

7.3   Farmer Perception on Agricultural Policies

Farmer perceptions on agricultural policies were tested by using proxies for awareness of guaranteed price and insurance schemes. Accordingly, the majority (63.9 %) of the farmers were found to be aware of the guaranteed price schemes implemented by the government and nearly half of the population were aware of the insurance schemes relevant to paddy cultivation.

Table 7.3:   Farmer Awareness on Policy Changes and Membership in FOs

Variable	Frequency	Percentage
Awareness on guaranteed price given by the government in the season		
Aware on policy changes	99	63.9
Not aware on policy changes	56	36.1
Awareness on insurance schemes on paddy		
Aware on policy changes	78	50.3
Not aware on policy changes	77	49.7
Membership in FOs		
Member	154	99.4
No membership	1	0.6

Source: Authors' own calculation

Only 1.3 percent farmers have any kind of insurance scheme so far. Furthermore, 99.4 percent of farmers have membership in farmer organizations which indicates a general readiness for collective effort.

CHAPTER EIGHT

Conclusions and Recommendations

8.1   Conclusions

- Policies related to paddy production could be categorized under irrigation, fertilizer subsidies, irrigation development, climate change adaptation, research and development, paddy marketing and trade.

- Paddy production has been increasing on average at about 4.08 percent annually since 1998 with ups and downs, with the improved access to inputs such as fertilizers and seeds through government policies.

- However, variations in paddy production during the study period has shown no statistically significant differences over the years. This means that the increase in paddy production has been marginal over the years. Rice imports have been insignificant when compared to the local production during the study period.

- The nominal price varies with a standard deviation of 0.101 and coefficient of variance of 0.908 for *Samba* rice and a 0.087 standard deviation and 0.912 coefficient of variance for *Nadu.* This indicates that although the government has implemented many interventions, price fluctuation is inevitable due to an oligopolistic market structure.

- Price variation by districts remain the same indicating that there is no significant geographical variation on prices. The margins between retail price and the guaranteed price have the value of 1.26 and 1.52 on average for *Nadu* and *Samba* respectively. This indicates that it is possible to increase the farm gate price in order to encourage production by maintaining the same consumer utility levels.

- Producer Support Estimates (PSE) and Market Price Support (MPS) Estimates have a negative sign which indicates that the government policy instruments prevailing in Sri Lanka induces a lower farm gate and domestic market price, thereby discouraging commodity production.

- The Nominal Rate of Assistance (NRA) has a positive relationship with paddy production, meaning that if the NRA increases in a single year (more subsidization or less taxation) production increases in the following year, keeping the other variables constant**.**

- In addition, greater access to information has the positive effect on production and climate variables, especially rainfall, has a significant effect on paddy yield which highlights the need for more climate resilience policies as to increase paddy production. Paddy production is positively affected when markets are better developed and there is greater access to information.

- The majority (63.9%) of the farmers are aware about the guaranteed price schemes of the government and nearly half of the population are aware of the insurance schemes relevant to the sector. This indicates that farmers are aware about policy changes. Nevertheless, effectiveness is not satisfactory.

8.2   Recommendations

Agricultural policies which move away from market-distorting measures and blanket income transfers are recommended with a focus on strategic investments that can help deliver sustainable productivity growth and increased climate resilience, thereby increasing income opportunities for farm households and reducing farmer migration. To this end, policy makers should reduce the use of market price support with a view to its eventual elimination as market price support seldom reach the intended beneficiaries, disconnects farmers from market developments and is highly production- and trade-distorting.

Ensure that risk management policies, including compulsory crop insurance and focus on helping farmers to cope with climate change. Policy instruments that assist and enhance farmers' capacity on adaptation to climate change, especially rainfall variability is recommended.

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Appendix

Table 1:   Expenditures on the Fertilizer Subsidy and Total Government Expenditures (2000-2019)

Year	Expenditures on fertilizer subsidy LKR Million	Total government expenditures LKR Million	Expenditures on fertilizer subsidy as a % of total government expenditure
1998	2152	268179	0.80
1999	1390	279159	0.50
2000	1,733	335,823	0.52
2001	3,650	386,518	0.94
2002	2,448	402,989	0.61
2003	2,191	417,671	0.52
2004	3,572	476,905	0.75
2005	6,846	584,783	1.17
2006	11,867	713,646	1.66
2007	11,000	841,604	1.31
2008	26,450	996,126	2.66
2009	26,935	1,201,927	2.24
2010	27,157	1,280,205	2.12
2011	44,992	1,433,182	3.14
2012	39,859	1,556,499	2.56
2013	30,972	1,669,396	1.86
2014	33,591	1,795,865	1.87
2015	49571	2,290,394	2.16
2016	29633	2,333,883	1.27
2017	31827	2,573,056	1.24
2018	26948	2,693,228	1.00
2019	34966	2,915,291	1.20

Source: Central Bank Annual Report (Various Years), Ministry of Finance, http:// www.
treasury.gov.lk/data-statistics-published-by-ministry-of-finance – Access pm 2020/08/01

Table 2: Credit granted for paddy

Cultivation Year	Credit Granted for Paddy(LKR millions)
1998	340
1999	318
2000	374
2001	517
2002	591
2003	893
2004	1031
2005	1364
2006	990
2007	1030
2008	1645
2009	1918
2010	2541
2011	4298
2012	5537
2013	5427
2014	4761
2015	5582
2016	6384
2017	5562
2018	6879
2019	7301

Source: Central Bank Annual Report (Various Years)