# TERMS OF TRADE IN PADDY PRODUCTION SECTOR IN SRI LANKA

Chatura Sewwandi Wijetunga

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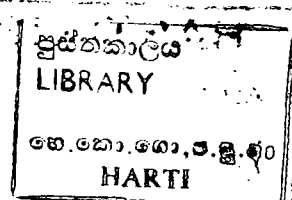
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# FOREWORD

The basic purpose of agricultural Terms of Trade analysis is to understand the movements of prices of various commodities sold and purchased by the agricultural sector and to assess the changes in purchasing power of a unit of agricultural commodities over a period of time. Although Terms of Trade in agriculture have been extensively studied by both academics and policy makers in other countries like India, Sri Lanka has not paid much attention to this aspect. In order to fill this information gap the HARTI has conducted a study on Terms of Trade in Paddy Production Sector as an initial step. This research report analyses the changing pattern of Terms of Trade in paddy sector during the last decade.

The study has revealed that, Terms of Trade in paddy sub sector had declined from 1990 to 2007 resulting in decline of living standards of paddy farmers. However, Terms of Trade had increased in 2008 as farmers had received higher prices for paddy during that year. This had resulted in improvement of farmers living standards. Moreover, price of paddy in relation to price of fertilizer has increased almost five times during the study period of 1990-2008 as a result of the subsidy programme. The information available in this report will be useful to policy makers, researchers and others who are interested in the development of agriculture sector. This study as a whole will undoubtedly be a launching pad for future researchers to conduct further research on the broader theme of Terms of Trade.

I congratulate the author, Miss M.W.A.C.S. Wijetunga for undertaking this valuable piece of research which provides much insight on a hitherto unexplored aspect of agriculture sector in Sri Lanka.

**Lalith Kantha Jayasekara**
**Director**

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# ACKNOWLEDGEMENTS

# EXECUTIVE SUMMARY

This study has been undertaken with a view to gain insights on prices received for final product and prices paid for inputs (or terms of trade) to ascertain the extent of changes in the paddy farming sector in Sri Lanka during the period 1990-2008. The producer price index of paddy is divided by composite input index to find the Parity Indices/terms of trade of paddy. The investigation is based on the hypothesis that terms of trade in paddy sub sector had deteriorated over the past decades.

Farmers received considerably low paddy prices during the peak *Maha* harvesting period specially in Anuradhapura and Polonnaruwa districts compared to *Yala* harvesting season. Producer price index had reached a value of 400 in 2008 and it was a four-fold increase over the base year, 1990. Labour index had increased by seven folds over that in the base year, 1990. Fertilizer price at the farm level had significantly declined (Rs.7/kg) to that of the base year index value. This is due to heavy subsidization of fertilizer. Agro chemical cost had increased by six-folds while machinery cost index had increased by six-folds compared to the base year value.

Parity ratios of paddy with inputs (except fertilizer) had declined until 2007 and in 2008 all the parity ratios had increased due to significant increase of producer price. Parity ratio of paddy with respect to fertilizer had drastically increased during the study period with heavy subsidy given to farmers. This ratio had increased to 4.94 in 2008. Terms of trade calculated using composite index of inputs had deteriorated during the period of investigation irrespective of some positive signals in 2008. Although both producer prices and the input prices have increased during the period, producer prices are not commensurate with the rate of input prices increases. Therefore, it has resulted in a decline of the terms of trade in the paddy sector. In 2008, this had positively increased because farmers had received higher prices for paddy. It was found that terms of trade in the *Maha* harvesting season is slightly lower than in the *Yala* harvesting season. Terms of trade in 2008 reached 0.79 in the *Maha* season (69% increase) and 0.72 in the *Yala* season (37% increase) which were the highest recorded terms of trade values after 1992 and 1993 respectively. But unfortunately the terms of trade value never exceed the base year value or at least did not reach that value so far. Hence terms of trade is unfavourable and farmers have been adversely affected in terms of profitability. Parity ratios of paddy with consumer goods namely, bread, milk powder and kerosene oil also had deteriorated during the study period which shows a decline of purchasing power and living standards of the paddy farmers. Price index of bread has risen by 5 folds while the milk powder and kerosene oil has risen by 7 and 10 folds respectively when compared to the base year, 1990. The upsurge in crude oil prices in international markets was the major cause of the overall price increases during the recent past.

Some important implications have come to light in this study. Continuous rise of production cost, low paddy prices and a significant increase in the prices of consumer goods have made terms of trade unfavourable to the paddy farmers. This in turn has led them to move away from paddy cultivation. Commercial paddy cultivated areas were

moving towards mechanization due to labour shortages. Labour shortages have resulted in higher wages in the sector.

The study findings suggest that labour saving mechanisms should be introduced in paddy cultivation as a solution to the problem of labour shortage and accompanying high wage rates. Government should encourage the private sector investment in the commercial cultivation of paddy in the country. In addition, local paddy farmers should be encouraged by helping them to explore new markets to sell their products at reasonable prices at the peak periods of production. In order to improve the terms of trade in paddy sector sale of paddy by farmers direct to millers, improvement of the quality of paddy and holding stocks without selling at the peak harvesting period in order to sell at a later period are necessary.

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# CHAPTER ONE

## Introduction

### 1.1    Study Background

Paddy farming sector in Sri Lanka has been experiencing highly volatile price regimes both in terms of output and inputs. The prices of inputs have been increasing at a fast rate throughout the past 15-20 years. It is also generally observed that, profitability has not been commensurate with the farm gate price increases of paddy in most recent years.

The prices of both inputs and outputs have their impact on the profitability of the crop. The changing ratio of input output prices over time has made the farmers more price conscious in taking decisions in the allocation of productive resources among various crop components. Therefore, it is of vital importance to study the input output price ratio for different inputs used in paddy farming. More inputs have been used after the green revolution and input prices have been on the increase with the higher demand.

Terms of trade is a common measure that is used to understand the performance of international trade. It is also used as a proxy for comparing relative prices of various goods. Thus if the price of consumer goods or industrial products has gone up against the agricultural products, it implies that the terms of trade of agricultural products have declined against the consumer goods or industrial goods. Thus reduction of terms of trade of farmers is a typical issue in the rural agricultural sector that leads to increase poverty and indebtedness. The real impact of variations of relative prices of agricultural goods and subsequent income against the prices of farm inputs would essentially affect the livelihood of the farming community. Terms of trade is important in formulating price policies and the development programmes. Monitoring the changes in terms of trade and effective policy measures are important for more efficient use of agricultural resources and raising the overall production and productivity.

Anyhow, it may not always necessarily be true that favourable terms of trade by implication ensure high profitability and unfavourable terms of trade imply loss of profitability to farmers. A reduction or relatively low increase in prices of agricultural products, as a consequence of reduction in the cost of production due to better and more productive technology does not result in the decrease of profitability of the farmers (Documentation, Indian Journal of Agricultural Economics, Vol. 53 No.1, 1998).

Decline of farm income of paddy dominated small farming sector is very significant and is associated with high cost of production, size of small land holdings and unfavorable terms of trade for agricultural products. Even though per capita monthly income of the country has increased from Rs. 881 in 1980/81 to Rs. 26,286 (in nominal terms) in 2006/07 (Central Bank, 2008) average annual farm income of small paddy holdings in major irrigated areas including imputed cost remained around Rs. 62,410 per hectare in 2008 (DOA, 2008).

One of the other notable features prevalent in the smallholdings farming sector in Sri Lanka is the heavy dependency on imported farm inputs such as machinery, chemicals and fertilizer. It is argued that, although the government has spent large amounts on fertilizer subsidy, paddy production cost has been ever increasing over the period with the increasing input costs. On the other hand paddy farmers did not receive a reasonable price at the farm level to cover the cost of production. Both these factors have caused low profitability in paddy sector. In this context this study is focused on examining the terms of trade in the paddy farming sector.

## 1.2    Objectives

In this study, the performance of input prices, retail prices of selected food commodities (bread and milk powder) and intermediate goods (Kerosene oil) as well as prices of paddy are examined in detail with a view to ascertaining the extent of the terms of trade/price parity ratio of the paddy farmers.

More specifically this study seeks to:

i.    examine the trends that underline the movements of price of paddy, the price of inputs and the retail prices of selected consumer goods in Sri Lanka during the period 1990-2008;

ii.   ascertain the behavioural pattern of prices of paddy in comparison with the prices of inputs and other consumer goods in terms of trade/ parity price ratios; and

iii.  study the implications of changes of price movements on the paddy farmer's economy.

## 1.3    Report Organization

This report is organized under seven chapters. The first chapter gives the background to the study, and objectives. The second chapter is devoted to concepts and empirical review of terms of trade. The third chapter is focused on methodology used to examine the parity ratios/terms of trade. The fourth chapter deals with patterns of price movements in paddy, price volatility in paddy and changes of producer price index in paddy sector. The fifth chapter focuses on trends and patterns of input prices of paddy and changes in retail price movements of selected consumer goods. The next chapter which is the most important part of this study deals with the interrelationship of both producer prices and input prices in paddy in relation to terms of trade indices, and price parity ratios of paddy compared to selected consumer goods. The final chapter contains the summary of key findings, conclusions and recommendations for improvement of the paddy sector in Sri Lanka.

# CHAPTER TWO

## Review of Literature

### 2.1 Evolution and Concepts of Terms of Trade

The concept of terms of trade was historically developed in the context of the theory of international trade. The index of net terms of trade in the international trade employs unit value index of exports expressed as percent of unit value index of imports.

1. Index of Net Terms of Trade = $\dfrac{\text{Unit Value Index of Exports}}{\text{Unit Value Index of Imports}} \times 100$

The concept of terms of trade was later extended to monitor the unit value of prices of commodity exchanged between agricultural and non agricultural sectors in the domestic trade. Most of the work in this regard initially considered terms of trade and expressed as a ratio of the index of wholesale prices of agricultural commodities to those of non agricultural products expressed in percentage terms.

2. Index of Terms of Trade = $\dfrac{\text{Index of Wholesale Prices of Agricultural Commodities}}{\text{Index of Wholesale Prices of Manufactured Products}} \times 100$

The terms of trade is based on ratio of prices received for farm products and prices paid for farm inputs. However, to observe the changes in the terms of trade between agricultural and non agricultural sectors, all items of prices paid for final consumption, production, inputs and capital investments become relevant and should be considered.

The concept of income terms of trade as being used by some researchers in India is basically the product of the ratio of indices of prices received to indices of prices paid and the quantity of marketed surplus exported to the other sector. The index of income terms of trade for the agricultural sector is calculated by multiplying the ratio of indices of prices received by the agriculture sector for its products to indices of prices paid by the index of quantity of marketed surplus.

The other approach being used in the compilation of index of income terms of trade is multiplication of the ratio of indices of prices received by the agricultural sector to indices of prices paid by it, by the index of productivity per hectare in agriculture. But this shows only the growth of income per hectare in agriculture. The relative position of the increase in the income of the agriculture to the non agriculture sectors are not indicated.

An appropriate approach being used in the compilation of index of income terms of trade would be the consideration of the net barter terms of trade or change in relative prices of agricultural and non agricultural sectors, the quantity exported/ imported from both the sectors and changes in population engaged in two sectors.

The terms of trade index (or the parity index) requires consideration of a year (or a period) during which the relative price position was considered satisfactory from the farmers' and others' point of view. The effort is then to maintain this parity or terms of trade, in order to protect the farmer's real income position, and also to give incentives for production.

According to the Commission for Agricultural Costs and Prices (CACP), a barter terms of trade index is a weighted price ratio of a basket of 21 agricultural commodities sold to a basket of 32 commodities purchased by agricultural households (17 for consumption purposes, 7 for farm inputs, and 8 for farm investment) (Kahlon and Tyagi, 1980). The index is only available at the national level. An alternative terms of trade index that can be computed for individual states is the ratio between agricultural and non-agricultural GDP deflators. This index is often called the 'gross' terms of trade. In principle, the gross terms of trade is better because it measures the relative returns to investment resources in the two sectors, and increases in productivity in both sectors.

Index Terms of trade is expressed in percentage terms as the ratio of index of prices received for farm products and indices of prices paid for final domestic consumption, farm inputs and capital investment in agriculture. The index of prices paid includes seeds, fertilizers, pesticides, insecticides, and agricultural wages for hired labours. The index of prices paid for intermediate consumption would be useful for examining the of cost of cultivation/production of crops. It would help in examining its impact on the increase in overall cost of cultivation in paddy sector.

The FAO has noted that the terms of trade based on ratio of prices received for farm products and prices paid for farm inputs serve the limited objective of indicating the relative production profitability of the times. These are also called Parity Index of prices received for output and paid for farm inputs.

## 2.2    Empirical Review

Dar (1968) has studied the causes of changes in domestic terms of trade in Indian economy. The objectives of the study were to determine the movements in prices of various commodities and thereby measure the extent of change in the terms of trade between the agricultural and industrial sectors in India and to evaluate the effects of various real and monetary factors on the prices of different commodities. The income elasticity of demand estimates are taken from cross-section data and they are used as prior estimates for determining price relationship from time series data. To determine the movement of terms of trade, both regression and non parametric methods have been applied. He has concluded that terms of trade have moved towards the agricultural sector in the period under consideration and the main reason for this movement, however was that the industrial raw material crops, which carry a heavy weight in the index as well as fruit and vegetables and milk and ghee, moved up in the price much more rapidly than food grain prices. The agricultural commodities for

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which price trend were upward most sharply were those with relatively high income elasticities of demand.

Another study carried out by Hayes (1975), regarding the terms of trade has mentioned that there is a continuous and inexorable declining trend of terms of trade of primary commodities. The main objective of his study was to find measures to raise the standard of living of the poorest people of the world most whom are producers of primary commodities or at least live in economies which are highly dependent on the export of primary commodities. Other objectives were to study the need of developing countries progressively to increase the external purchasing power of their foreign exchange receipts and the need to overcome the adverse effects of large short term fluctuations in the prices of primary commodities. He has further explained that large fluctuations in prices of earnings from primary commodities create an additional obstacle to development.

Hazel et al. (1995) has analyzed the relative contributions of terms of trade and non price variables in explaining agricultural growth in recent decades in India using time series data. Agricultural growth is largely explained by expansion of irrigation, (which in the model is also a proxy for High Yielding Varieties and other capital investments), and, until the 1970s, by increases in the net cultivated area. Agricultural output is inelastic, and is becoming increasingly more so over time. The terms of trade was not an important factor in explaining past growth. Even during the late 1960s and early 1970s when the terms of trade improved by 18 percent for agriculture they only accounted for 15 percent of the growth in output. Increases in agricultural output are also found to worsen the terms of trade for agriculture, despite government attempts to control prices. The results highlight the importance of further investments in agricultural research, extension, irrigation and other supply-enhancing inputs if the ongoing policy reforms in India are to translate into more rapid and sustained agricultural growth.

Some studies have been concerned about the influence of changing terms of trade noticed during the post reforms period in India on private agricultural investment. Shetty (1990), Patnaik (1987) and Mallick (1993) have indicated adverse agricultural terms of trade to be one of the reasons for the declining private investments in agriculture. Rao (1993, 1994) and Rao and Storm (1998) have indicated that hikes in terms of trade could lead to a shrinkage of public investments in large irrigation projects, rural electrification, transport, storage, agricultural research and extension programmes through fiscal squeezes in the government budget. The direction of causality may imply that rising agricultural terms of trade reduce the government's share of agricultural investment by eroding its fiscal base and enhancing the expenditures. Roy and Pal (2002) have estimated a simultaneous equation model on the basis of pooled cross-section state level and time series data during 1970-71 and 1998-99. They have found a positive relationship between terms of trade and private investments in agriculture. It may be noted that Desai and Namboodiri (1997) have observed that improvements in terms of trade have a net impact that reduces the government expenditure in agriculture.

Rath (1985) has stated that the barter terms of trade are not a safe guide to changing real income position of the farmers, because it does not encompass the technological changes in agriculture affecting per acre yields, the changing crop mix in farms and

the changing size of holdings. The income terms of trade can be expected to catch the first two of these three factors.

Rupasena *et al* (2007) have studied the behaviours of price of rice in comparison with the prices of inputs and other commodity prices to understand the terms of trade in rice sector in Sri Lanka. In computing parity price between output and input prices, fertilizer and labour were selected as inputs. In computing parity price between output and consumer products prices of milk powder, soap and kerosene oil were selected. They concluded that, during the pre-liberalization period the parity ratios had increased, but had continuously declined during the post liberalization period.

According to Dev (2007) terms of trade for agriculture had improved in the post-liberalization period due to reduction in protective measures to industry and increase in procumbent prices. During 1998 to 2004, however, there were four points decline in the agricultural terms of trade although it was still favourable to agriculture as compared to non-agriculture. However in spite of favourable terms of trade, growth rate in agriculture was not higher in the 1990s and beyond.

# CHAPTER THREE

## Methodology and Data

The investigation is based on the hypothesis that terms of trade in paddy had declined over the past years.

The analysis is based on the basic data available in the Department of Agriculture, Department of Census and Statistics and Hector Kobbekaduwa Agrarian Research and Training Institute. The study is focused on the period of 1990-2008 and four paddy producing districts namely, Polonnaruwa, Anuradhapura, Hambantota and Kurunegala which are selected on the basis of the availability of data during the period. These four districts contribute to nearly 40% of the total annual paddy production in Sri Lanka. In these selected districts, paddy cultivation is mostly practiced under irrigation.

Total cost incurred in paddy cultivation is divided into 3 main components namely, labour, material and power. Power cost includes cost of draught power for land preparation, irrigation etc, while material cost includes seed, fertilizer, pesticides and other materials. In the recent past labour, machinery and agro chemical costs have risen up sharply due to increased demand. Input indices are calculated by using 1990 as the base year. Then these indices are converted to weighted indices by using their share to the total cost of production. Weights are assigned because the importance of these inputs vary from item to item, and differ in measurements. Weighted Index values of these farm inputs are taken to calculate composite index of inputs. Instead of taking the prices of machinery and agro chemicals, their costs are taken to calculate composite index of inputs as these two inputs cannot be separated and taken as unit prices (Rs./Ac). Anyhow it is evident that labour weights have shrunk in late 2000 when compared to those of the early 1990s. This is because gradual expansion of the use of machinery in large paddy producing areas such as Hambantota. But fertilizer costs in paddy farms have dropped in recent years due to the fertilizer subsidy programme launched by the government.

Different Weights assigned to the different inputs are given below.

**Table 3.1: Average Weights given to Different Inputs used
in Paddy Cultivation**

| District | Inputs | Weight Assign in *Maha* Season |
|---|---|---|
| Polonnaruwa | Labour | 48 |
| | Seeds | 5 |
| | Fertilizer | 14 |
| | Agro chemical | 8 |
| | Machinery | 26 |
| Anuradhapura | Labour | 50 |
| | Seeds | 6 |
| | Fertilizer | 13 |
| | Agro chemical | 6 |
| | Machinery | 24 |
| Kurunegala | Labour | 51 |
| | Seeds | 6 |
| | Fertilizer | 14 |
| | Agro chemical | 7 |
| | Machinery | 22 |
| Hambantota | Labour | 46 |
| | Seeds | 8 |
| | Fertilizer | 12 |
| | Agro chemical | 9 |
| | Machinery | 24 |

Source: Cost of Cultivation, Department of Agriculture (1990-2008)
Note: Weights are based on Total Cost of Production in Paddy

In the study, price environment of paddy has been critically examined under three main areas namely, producer prices of paddy, input prices of paddy and interrelationship between these two. Price indices are compiled in order to understand the behaviour of producer price of rice in relation to its input prices. In compiling price parity indices, the producer price indices are worked out by taking the paddy prices at the harvesting time for each selected district during the year.

Producer Price Index= (100/ Base Year Producer Price)*Producer Price at the
                                    Year consideration
Then the input price indices are worked out by taking the seasonal average prices.

Input Price Index=100/Input price (base year)*Input price (selected year)

Accordingly;
Wage Rate Index=100/ Wage Rate of Base Year*Wage Rate of the Selected Year
Seed Paddy Price Index=100/ Seeds Price of Base Year*Seeds Price of Selected Year
Fertilizer Price Index=100/Fertilizer Price of Base Year*Fertilizer Price of selected Year
Machinery cost Index=100/ Machinery Cost of Base year* Machinery Cost of
                                    Selected Year
Agro chemical Cost Index=100/ Agro chemical Cost of Base
                                    Year*Agro chemical cost of Selected Year

The year 1990 is selected as the base year and all the indices are calculated based on this year's price. These indices are converted to the weighted indices by using their share to the total cost of production of paddy. The percentage of the cost of each input with respect to total value of all the inputs was used as weight for each input for compiling the index of prices paid by the farmers. Due to non availability of input cost relevant to each *Yala* and *Maha* season in each selected district in the initial period of the study, input prices are not calculated for the two seasons separately. Hence, annual general prices are taken into the calculations. Then these weighted indices are used to calculate composite index of inputs.

Composite Index of Inputs= (Wage Rate Index*Weight assigned to the Wage rate) + (Seed Paddy Price Index* Weight assigned to the Seed Paddy) + (Fertilizer Price Index* Weight assigned to the Fertilizer Price) + (Agro chemical Cost Index* Weight assigned to the Agro chemical Cost)+(Machinery cost Index * Weight assigned to the machinery cost)

The producer price index of paddy is divided by composite input index to get the parity indices/Terms of Trade of paddy. This can be expressed mathematically as follows.

Terms of Trade/Parity Index for Inputs=Paddy Price Index/Composite Index of Inputs

Also the Parity ratios of paddy with each input were calculated separately. In computing parity price ratios between prices of output and consumer goods such as milk powder, bread and kerosene oil were selected as consumer products, because these are essential items used daily in farming community.

Bread Price Index= 100/Price of Bread in Base year*Price of Bread in selected year
Milk powder Price Index=100/Price of Milk powder in Base year*Price of in   Milk powder selected year
Kerosene Price Index=100/ Price of kerosene oil in Base year*Price of kerosene oil in selected year

Then Price Parity Indices are calculated for each commodity by dividing paddy price index from selected commodity price index.

Price Parity Index (Bread) = Paddy Price Index/ Bread Price Index
Price Parity Index (Milk powder) = Paddy Price Index/ Milk powder Price Index
Price Parity Index (Kerosene oil) = Paddy Price Index/ Kerosene oil Price Index

T test results have been used to check whether there is significant difference between *Maha* season and *Yala* season producer prices as expressed by farmers.

$H_0$: There is no producer price difference in *Maha* and *Yala* seasons. Hence; $P_1=P_2$
$H_1$: There is significant price difference between *Maha* and Yala seasons. $P_1 \neq P_2$

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Nominal values were converted to the real values using GDP deflator index (Details are given in Appendix 13).

Real Price = (Nominal Price/GDP deflator index)*100

# CHAPTER FOUR

## Trends and Patterns of Producer Price Behaviour in Paddy Sector

### 4.1    Introduction

The first part of this chapter deals with producer price of paddy and it reveals the price levels, trends in paddy price changes in different markets, pattern of price variation and price volatility. Next part is focused on developing the producer price indices and their trends.

### 4.2    Pattern of Producer Price Movements

Producer price of paddy has changed over the months of the year. November-February belong to *Maha* season off peak and May, June, September and October months belong to *Yala* off season. Paddy farmers get their harvests during February-April months at the *Maha* season and July-August in *Yala* seasons. It is known that generally farmers receive lower prices at harvesting periods and prices were high during off harvesting seasons. This was statistically tested by using paired T test. According to the test, there were significant price difference between peak *Maha* harvesting and off *Maha* harvesting seasons in all the four districts namely Anuradhapura, Polonnaruwa, Kurunegala and Hambantota ($P$ value < 0.05). Figure 4.1 explains the monthly producer price changes of paddy in Anuradhapura during the period of 1990-2008 (Details are given in the Appendix 1A, 1B, 1C, 1D).

**Figure 4.1: Monthly Producer Price Movements of Paddy in Anuradhapura District, January 1990 - December 2008 (Nominal and Real Price)**
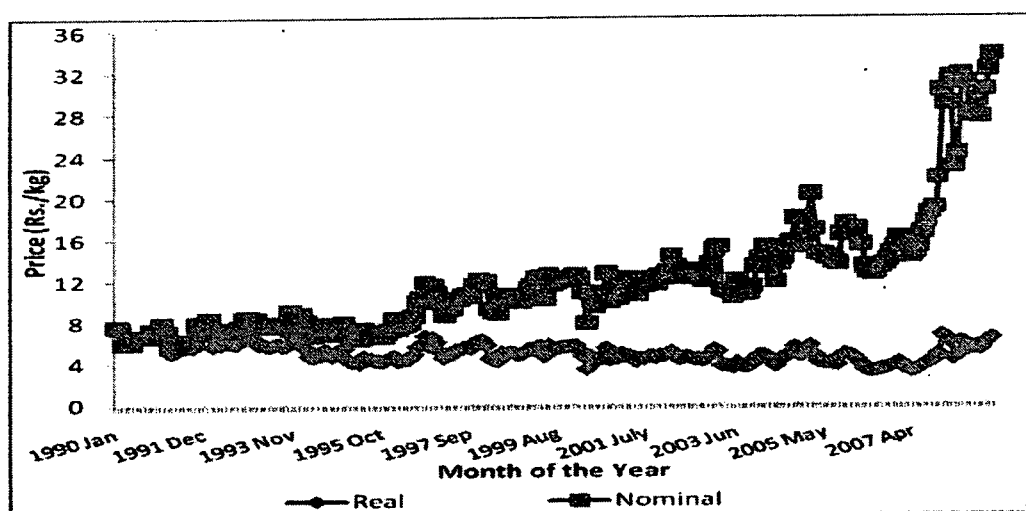


Source: Statistical Abstract, Department of Census and Statistics (1990-2008)

Figure 4.1 indicate that, nominal producer price of paddy has moved in the upward direction over the study period but there are ad-hoc changes. During the phase (1990-1995) paddy prices were stagnant. During 1996-2001 period, creeping rise of prices could be seen. During the period of 2002-2005, prices had moved both upwards as well as downwards. In the period 2006-2008, paddy prices had sharply increased

creating a favourable price environment to paddy farmers. However, as in real price, producer prices of paddy has been sluggish and shown an irregular pattern. Prices had declined specially in March and April in most of the years. That was due to large stocks of paddy from the *Maha* season had come to the market during this period.

Figure 4.2 shows the monthly behavioural pattern of producer prices in the Anuradhapura district during the past five years. As could be seen, until 2007, there was no huge price variation during all the months of the year. Anyhow, at the end of 2007 and in 2008 farmers had received reasonably higher prices for their output. In 2008 paddy prices had risen by more than 50% compared to 2007. 2007 *Maha* season paddy supply was low in the domestic market and there was speedy intervention by the government to control prices at reasonable level. In order to do so, the government lifted customs duty on rice imports (Central Bank Annual Report, 2008) in the context of an international food crisis. Producer prices had normally increased at the end of the year and these high prices prevailed till the beginning of the next year.

**Figure 4.2: Monthly Changes of Producer Prices of Paddy in Anuradhapura; 2004-2008 (Real Price)**
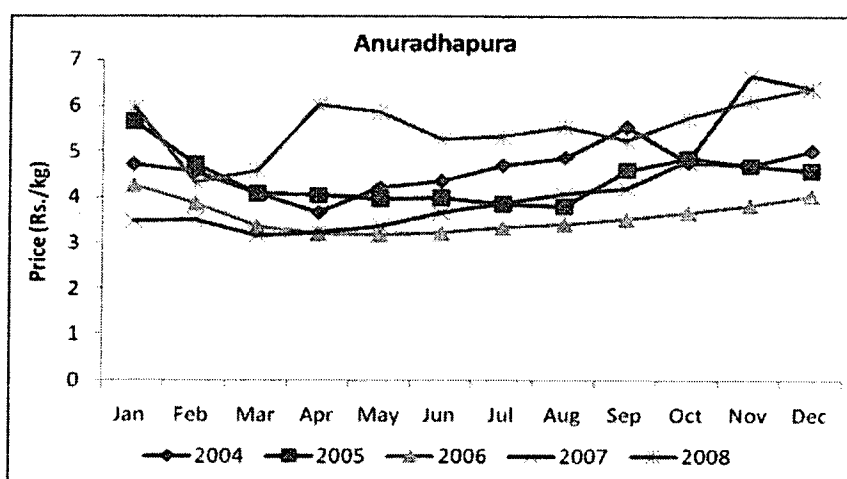


Source: Statistical Abstracts, Department of Census and Statistics (1990-2008)

Generally, *Maha* season prices were below the *Yala* season prices. Farmers experience lower prices during the *Maha* harvesting season specially during the March-April period in Anuradhapura. This has been tested by using paired T test and real producer prices. Results indicate that there is significant difference in the producer prices of *Maha* season with producer prices of *Yala* season in Anuradhapura, and Polonnaruwa) ($P$ value < 0.05). However in Hambantota and Kurunegala districts there are no significant producer price difference between *Maha* and *Yala* season ($P$ value > 0.05).

In Polonnaruwa district, producer price reduction during February-April within the *Maha* harvesting season.is more than 80%. During these 19 years, only in two *Yala* harvesting seasons, farmer had received lower prices than during the other months of the year (Details are given in Appendix 2). In the Hambantota district, price decline during the *Maha* harvesting season was about 70% and it was 20-30% during *Yala* harvesting season.

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## Market Integration

The degree of inter-relationships between price movements in two markets is called market integration. In other words, in an integrated market, price of homogeneous commodity at spatially separated locations should tend to move together indicating efficient spread of price information and inter linkages of markets. Therefore, market integration signifies the extent to which price movements in one market are related to those in other markets. In a competitive market structure prices in spatially separated markets are expected to move in unison in response to stimuli from changing demand, supply and other economic forces (Alam et.al, 2001). Correlation coefficients were used to explain the market integration by Alam et.al (2001) and Dev (2007).

Correlation coefficients are shown in Table 4.1. High correlation coefficients values indicate that the markets were significantly correlated in respect of their producer price changes. Correlation values are almost similar in every two sets of districts. There is no great isolation between markets. That indicates that the price movements between markets were strongly associated.

### Table 4.1: Correlation Coefficients of Real Paddy Price in Selected Districts during 1990-2008

| District | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota |
|---|---|---|---|---|
| Anuradhapura | 0 | 0.93 | 0.92 | 0.87 |
| Polonnaruwa | 0.93 | 0 | 0.92 | 0.84 |
| Kurunegala | 0.92 | 0.92 | 0 | 0.88 |
| Hambantota | 0.87 | 0.84 | 0.88 | 0 |

## 4.3 Producer Price Volatility in Paddy Sector

Price volatility in paddy sector is measured using Coefficient of Variation (CV). This indicates the relative magnitude of variation. According to the Table 4.2, the highest price variability had occurred during the 2005-2008 period in all the districts. This is because high producer prices prevailed in 2007. Also price variation had marginally changed within the *Maha* harvesting season as well as during *Yala* harvesting season of the year.

### Table 4.2: Annual Variation of Paddy Prices in Selected Districts: 1990-2008

| Period | Co-efficient of Variation (CV) | | | |
|---|---|---|---|---|
| | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota |
| 1990-94 | 12.93 | 15.37 | 13.26 | 11.63 |
| 1995-99 | 12.96 | 14.72 | 15.86 | 13.27 |
| 2000-04 | 10.85 | 11.21 | 13.05 | 12.31 |
| 2005-08 | 22.90 | 24.98 | 23.95 | 24.38 |

Source: Statistical Abstracts, Department of Census and Statistics (1990-2008)
Note: CV=SD/Mean*100

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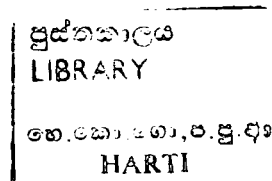
## 4. 4    Changes of Producer Price Index in Paddy Sector

As shown in Figure 4.3, the highest producer price indices were recorded in 1996, 1999, 2001, 2004 and 2008 *Maha* season and 1996, 1999, 2004, 2007 and 2008 *Yala* season. Price increase in 1996 was owing to supply shortage as a result of low production. Hence farmers had received attractive prices. The farm-gate price of paddy remained attractive throughout the year 2004 due to shortfall in supply as a result of the low production and low imports of rice. Paddy prices had increased sharply due to global food crisis at the end of the 2007. In 2008 farmers received highest paddy price in history and this was the highest boost of growth in recent times. There was nearly 60% growth in 2008 when compared to growth in year 2007. Producer price index had increased up to the level of 456 (in *Maha* season) and this is over four fold intensification compared to the base year, 1990 (Details are given in Appendix 3).

**Figure 4.3: Changes of Producer Price Index of Paddy: 1990-2008**
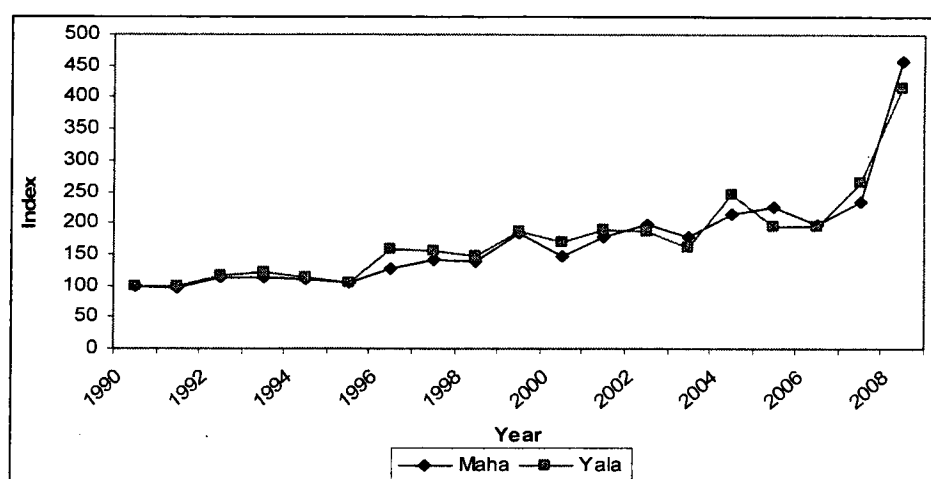


Source: Statistical Abstracts, Department of Census and Statistics (1990-2008)

In 2000 producer price index had decreased significantly in all the districts due to low prices resulting from ad-hoc duty reductions and reluctance of the paddy millers and stockists to purchase and stock paddy on a large scale after 1999/2000 *Maha* season (Annual Report of the Central Bank, 2000). Information on exaggerated output than actual production in 2003 had led to adverse expectations of the prices. In 2006, there was a significant drop of the producer prices of paddy due to higher paddy production recorded in the *Maha* season of the same year.

**Table 4.3: Total Tax Incidence in Importation of Rice; 1995-2008**

| Period | Total tax % | Period | Total tax % |
|---|---|---|---|
| Jan1,95-Feb 7,95 | 65.70 | Jan 01,01-Jan 20, 02 | 61.99 |
| Feb 8,95-Apr 14,96 | 44.61 | Jan 21,02-April 30,02 | 53.34 |
| Apr 15,96-Jan 30,97 | 7.60 | May 01,02-Nov 05,02 | 44.79 |
| Jan 31,97-Nov 20,97 | 44.58 | Nov 06,02-Mar 04, 03 | 24.00 |
| Nov 21,97-Jan 31,98 | 7.62 | Mar 05, 03-Aug 20,03 | 22.00 |
| Feb 1,98-Nov 5,98 | 44.55 | Aug. 21,03-Oct 04,04 | 25.00 |
| Nov 6,98-Oct 23,99 | 46.28 | Oct 05, 04-Nov 18,04 | 1.00 |
| Oct 24,99-Dec 31,99 | 19.55 | Nov 19, 04-Dec 29,04 | 1.50 |
| Jan 1,00-May10,00 | 46.26 | Dec 30, 04-Jan 15,05 | 1.50 |
| May 11,00-Jul 16,00 | 48.00 | Jan 16, 05-Dec 31, 05 | 25.56 |
| Jul 17,00- Feb 20,01 | 47.93 | Jan 01, 06-Jan 30, 06 | 20.74 |
| Feb21,01- Mar 31,01 | 62.00 | Jan 31, 06-Sep 16, 06 | 48.79 |
| Apr1,01- Oct 11,01 | 63.68 | Sep 17, 06-Oct 14, 07 | 39.42 |
| Oct 12 ,01- Nov21,01 | 61.96 | Oct 15, 07-Dec 31, 07 | 3.00 |
| Nov 22,01-Dec 8,01 | 11.12 | Jan 01, 08-Aug 25, 08 | 6.39 |
| Dec 9,01-Dec 31,01 | 36.07 | | |

Source: Sri Lanka Customs and Annual Reports, Central bank of Sri Lanka
Note: Total Tax Calculations based on Author's Bsc Thesis, Taxation of Sri
Lanka's Food Commodity Imports and Their Impacts on Domestic Markets

Pearson correlation value of total tax incidence and producer price is -0.434. Therefore there is negative weak correlation between tax incidence and producer price. This is a significant difference ($P$ value $<0.05$).

# CHAPTER FIVE

## Pattern of Price Movements of Inputs in Paddy Sector and Selected Consumer Goods

### 5.1    Introduction

The input costs can be viewed at two main levels: farm level and the level of the society. The farm level cost will determine the level of income of those involved in paddy cultivation. On the other hand, a study of production cost at society level, will give a macro picture on resource allocation in paddy vis-à-vis other sectors of the economy.

In this chapter input prices of paddy and prices of consumer goods are analyzed by developing the price indices for major inputs: labour, seed paddy, fertilizer, machinery and agro chemicals and consumer goods such as bread, milk powder and kerosene oil (intermediate goods). Due to difficulties of analyzing prices of various consumer goods, the above were selected as most essential consumer items.

### 5.2    Wage Rates

Wage rate for paddy in all selected districts has shown less than Rs. 100 per person a day (in nominal wage) during the 1990-1992, except in the Hambantota district in 1992. Thereafter, in 1994 and 1995 wage rate had increased at a sharper rate by more than 15%. This change was around 6-9% in 2003-2004, but afterwards it had increased by more than 10%. Nominal price of average wage rate had increased up to Rs. 481 in 2007 from Rs. 65 in 1990 (Figure 5.1). From the selected districts of paddy cultivation, highest wage rate was recorded in Hambantota district in 2008 and it was Rs. 550. Labour shortage is due to young persons moving away from agriculture causing a sharp reduction in the labour supply in paddy sub sector in recent years.

**Figure 5.1: Movements of Nominal Wages in Paddy Cultivation (Average wages of Anuradhapura, Polonnaruwa, Kurunegala and Hambantota Districts) ; 1990-2008**
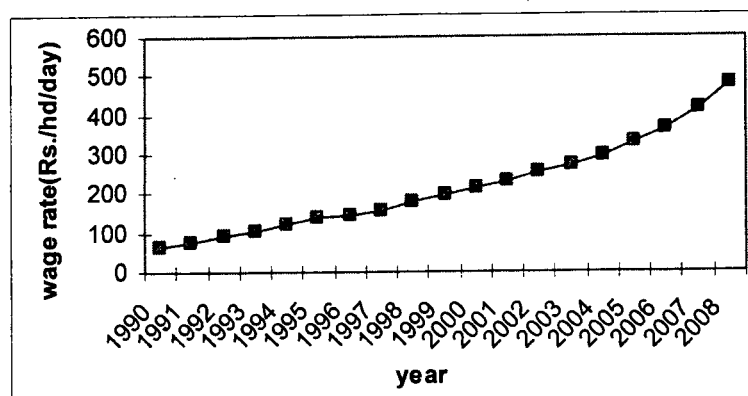


Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

Changes in number of man days per acre of paddy cultivation is given in the Table 5.1. As explained in this table, man days per acre had declined significantly from 42 to 31 within the 12 year period. This is 24% decline compared with 1996. As a result of mechanized harvesting lower man days for an acre was reported in Hambantota in 2008 compared to the other selected districts. This was 19 man days per acre of land. This had reduced labour cost share significantly in Hambantota compared to the other districts. However, reduction in labour cost in Hambantota, had been put back by power cost keeping the overall cost at comparable level with all other selected districts.

**Table 5.1: Changes of Number of Man days in Paddy Cultivation In Selected Districts (Man-days per Acre of Land)**

| District | 1996 | 2000 | 2008 |
|----------|------|------|------|
| Anuradhapura | 40 | 32 | 32 |
| Polonnaruwa | 42 | 33 | 31 |
| Hambantota | NA | 36 | 19 |
| Kurunegala | 43 | 40 | 32 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons,
Department of Agriculture, 1990-2008

Labour index has been calculated for the study period using 1990 as the base year value. As shown by the Table 5.2, labour index had increased from 100 (1990) to range of 600 (Hambantota)-900 (Kurunegala) in 2008. This is an average eight-folds rise (More details are given in the Appendix 5). Although Hambantota district had recorded as highest price charger for labour in 2008 its index value becomes lowest among all the districts. This is due to highest wage rate in Hambantota in the base year compared to other districts. Kurunegala district shows the highest wage rate index because the base year value is lowest compared with the other districts.

**Table 5.2: Wage Rate Index; 1990-2008**

| Year | Polonnaruwa | Anuradhapura | Kurunegala | Hambantota | Average |
|------|-------------|--------------|------------|------------|---------|
| 1990 | 100 | 100 | 100 | 100 | 100 |
| 2008 | 710 | 790 | 949 | 632 | 770 |

Source: Cost of Cultivation, Department of Agriculture

## 5. 3    Seed Paddy Prices

Seed paddy prices had continuously increased during the past two decades. It had increased at a higher rate in 1991 and 1992. In 1996, seed paddy price had increased by 11%. But there was below 5% intensification after 2005. Seed paddy price had increased from Rs. 9/kg in 1990 to Rs. 35/kg in 2008 which is 16% (per year) increase.

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**Figure 5.2: Movements of Seed Paddy Price
(Nominal Price); 1990-2008**
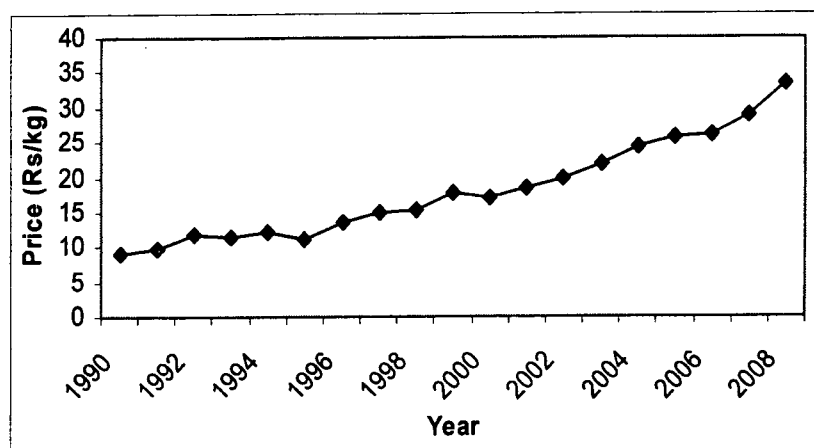


Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of
Agriculture, 1990-2008

As shown by Table 5.3 seed paddy price index had increased more than 3 folds in
2008 compared to the base period (Details are given in Appendix 6). Index value of
seed paddy did not exhibit sharper increase in comparison to the index value of labour
during the past few years. It was a 10% rise when compared to the previous year.

**Table 5.3: Seed Paddy Price Index; 1990-2008**

| Year | Polonnaruwa | Anuradhapura | Kurunegala | Hambantota | Average |
|------|-------------|--------------|------------|------------|---------|
| 1990 | 100 | 100 | 100 | 100 | 100 |
| 2008 | 341 | 438 | 365 | 368 | 378 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture,
1990-2008

## 5. 4    Retail Prices of Fertilizer at the Farm Level

Against labour, seeds and other inputs of paddy cultivation, chemical fertilizer
became most important after its introduction to the country in 1950. The government
of Sri Lanka has been subsidizing fertilizer for more than four decades. Because of
the importance of fertilizers in increasing paddy production, government intervention
through introduction of fertilizer subsidy programme was started in 1962. This
intervention made fertilizer available at an affordable price to the farmer. In 1990 the
government completely removed the fertilizer subsidy, as it was a heavy burden on its
budget. But fertilizer subsidy scheme was reintroduced in 1994. As shown in
Annexure 7, up to 2001 average price of 1kg of fertilizer was around Rs. 10-12 and in
2003 this price was rapidly increased to Rs.19/kg. But again in 2006, due to the
government decision to reintroduce the subsidy scheme for all types of fertilizer by
fixing their selling price, average price went down to Rs. 9/kg and under the Mahinda
Chinthana Programme and this was further reduced to Rs. 7/kg in 2007.

**Figure 5.3: Changes in Retail Prices of Fertilizer in Paddy
(Farm Level); 1990-2008**
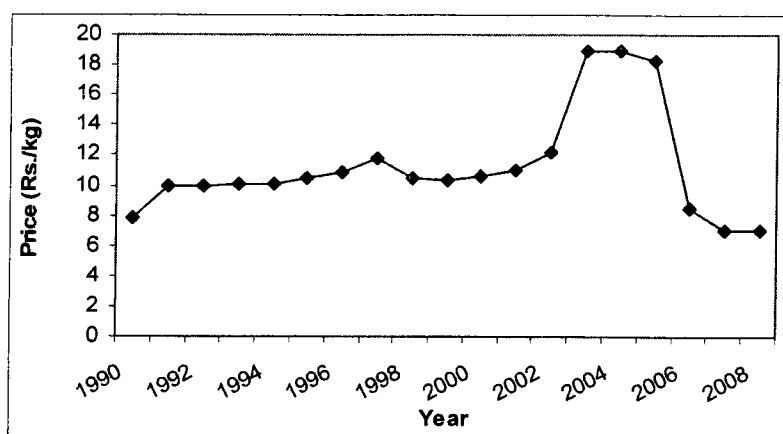


Source: Cost of Cultivation for *Maha* and *Yala* Seasons,
Department of Agriculture, 1990-2008

With regard to the other input indices, it is to be noted that fertilizer price index fell below 100 in 2007. The fertilizer price index distinctly showed a lowered value though it has fluctuated from year to year. The highest percentage increase was recorded in the year 2003. It reached the maximum index value in 2004. Since then, there was a considerable decline of the index value by more than 50% notably in 2006 compared to the 2005 value. This continuous decline of fertilizer index value was due to the government policy of issuing fertilizer at a subsidized price. In 2007 and 2008, the index value of fertilizer had reached that of the base year value of 100. This had created favorable conditions to farmers because they had to pay lesser amounts of money than the market value to purchase fertilizer. Anyhow, this subsidy has become a burden on the government budget.

**5. 5 Machinery and Agro Chemical Cost**

Machinery and agro chemicals are other major inputs in paddy cultivation. Cost of these two inputs had also remarkably increased during the past 20 years. Land preparation (ploughing and leveling), harvesting, threshing and winnowing are the main operations which can be mechanized. Share of machinery cost to the total cost increased from 20% in 1990 to 30% in 2008 and average cost during the past two decades was nearly 25% of the total cost of production of paddy. In Hambantota 58% used combine harvesters while in Kurunegala it was only 2% (Cost of Cultivation, 2008 *Maha*). Agro chemical cost accounted for nearly 10% of the total cultivation cost of paddy.

**Figure 5.4: Movements of Machinery and Agro-chemical Cost in Paddy Cultivation (Nominal price) in the Anuradhapura District;1990-2008**
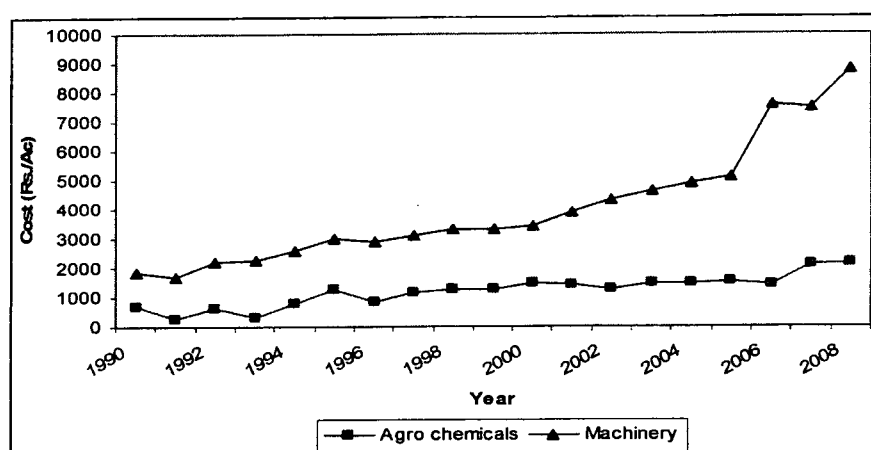
Source: Cost of Cultivation for *Maha* and *Yala* Seasons, Department of Agriculture, 1990-2008

The index value of machinery also increased over the past few years and it has continuously. The highest percentage increase was recorded in 2006 which was 46% above the price in 2005. In that year index value increased to the value of 546. As given in the Table 5.4, machinery cost has reached the maximum value in 2008 and it has risen seven folds compare to the base year (Details given in the Appendix 8).

**Table 5.4: Machinery Cost Index; 1990-2008**

| Year | Polonnaruwa | Anuradhapura | Kurunegala | Hambantota | Average |
|---|---|---|---|---|---|
| 1990 | 100 | 100 | 100 | 100 | 100 |
| 2008 | 483 | 553 | 795 | 819 | 662 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

There is extensive use of agro chemicals in the agriculture sector. Paddy farmers also adopted a wider use of agrochemicals. Hence, the prices of agro chemicals have increased over the past few years followed by increase of index value of agro chemicals. Highest percentage increase was recorded in 1997 compared to the 1996 value and significant reduction of 16 % could be seen in year 1998. Again, annual percentage change of index value has risen except in 2003. In 2008 there was seven folds increase compared to the base year (Appendix 9). This was a 26 % enhancement over the 2007 index value.

After bringing the different measurable input items to the same index value those are added to calculate the composite index of inputs (Details given in Appendix 11).

## 5. 6    Changes in Prices of Selected Consumer Goods

Price movements of consumer goods have been studied in this section. Due to difficulties in studying all consumer goods bread, milk powder and kerosene oil were

selected, as these are the essential consumer items for which the farmers entirely depend on the market.

**Table 5.5: Movements of Nominal Prices of Selected Consumer Goods;**
**1990-2008**

| Year | Bread Rs./450g) | Annual % Change | Milk Powder (Rs.400 g) | Annual % Change | Kerosene oil (Rs. Ltr) | Annual % Change |
|------|-----------------|-----------------|------------------------|-----------------|------------------------|-----------------|
| 1990 | 5.03 | 0 | 40.94 | 0 | 7.65 | 0 |
| 1991 | 4.51 | -10.34 | 40.80 | -0.34 | 9.42 | 23.14 |
| 1992 | 4.50 | -0.22 | 48.38 | 18.58 | 9.73 | 3.29 |
| 1993 | 4.86 | 8.00 | 57.18 | 18.19 | 11.08 | 13.87 |
| 1994 | 4.77 | -1.85 | 57.56 | 0.66 | 12.01 | 8.39 |
| 1995 | 3.79 | -20.55 | 60.64 | 5.35 | 11.47 | -4.50 |
| 1996 | 5.99 | 58.05 | 79.14 | 30.51 | 10.93 | -4.71 |
| 1997 | 7.87 | 31.39 | 80.00 | 1.09 | 11.58 | 5.95 |
| 1998 | 8.50 | 8.01 | 80.00 | 0.00 | 11.36 | -1.90 |
| 1999 | 8.50 | 0.00 | 82.49 | 3.11 | 11.49 | 1.14 |
| 2000 | 8.34 | -1.88 | 90.56 | 9.78 | 25.33 | 120.45 |
| 2001 | 9.42 | 12.95 | 113.76 | 25.62 | 19.63 | -22.50 |
| 2002 | 11.67 | 23.89 | 117.89 | 3.63 | 21.02 | 7.08 |
| 2003 | 13.97 | 19.71 | 121.73 | 3.26 | 25.04 | 19.12 |
| 2004 | 14.55 | 4.15 | 134.26 | 10.29 | 26.36 | 5.27 |
| 2005 | 16.43 | 12.92 | 146.88 | 9.40 | 29.90 | 13.43 |
| 2006 | 18.87 | 14.85 | 154.00 | 4.85 | 40.58 | 35.72 |
| 2007 | 27.20 | 44.14 | 181.00 | 17.53 | 48.00 | 18.28 |
| 2008 | NA | NA | 275.00 | 51.93 | 78.00 | 62.50 |

Source: Statistical Abstract, Department of Census and Statistics

Prices of all the three commodities have increased during the past two decades. Price of bread had decreased by 10% in 1991 due to reduction of prices of wheat flour in that year. Again in 1995, the price of bread had declined by 21% while a marked increase of 58% was recorded in 1996 owing to supply shortage of domestic consumer items and corrective upward adjustments of prices of wheat flour. In 1997 price increase of 31% could be seen. Then there were incessant price increases during the 2001-2008 period while there was 44% rise of bread prices in 2007 due to high international price of wheat flour.

Price of milk powder has increased continuously during the studied period. In 1996 price increased by 30% due to increased import costs. In 2001 price had increased by 26%. The highest price increase could be seen in 2008 and it was 52% increase compared to the previous year due to rapid fluctuations in the international commodity prices.

Price of kerosene oil had increased by 23% in 1991 compared to the previous year. There was continuous increase of prices until 1995. The incredible increase of 120% was recoded in year 1999 and this was due to the rupee depreciation against the US dollar. Again in 2000 price of kerosene had decreased by 22% but gradually it had increased again. There was a 36% price increase in 2006 due to high international prices passed on to the domestic market. In 2008, 62% price increase of kerosene oil

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was observed corresponding to the world market price increases. The domestic fuel prices were adjusted upward and were raised by 57% respectively by May 2008 compared to the prices that prevailed in May 2007.

Index values of the above consumer goods are shown in Table 5.6. Accordingly, index value of bread had risen five folds compared to the base year of 1990. At the same time index values of milk powder and kerosene oil had increased 7 folds and 10 folds respectively.

**Table 5.6: Price Indices of Selected Food Commodities; 1990-2008**

| Year | Bread | Annual % Change | Milk powder | Annual % Change | Kerosene oil | Annual % Change |
|------|-------|------|-------|------|------|------|
| 1990 | 100.00 | 0.00 | 100.00 | 0.00 | 100.00 | 0.00 |
| 1991 | 89.66 | -10.34 | 99.66 | -0.34 | 123.14 | 23.14 |
| 1992 | 89.46 | -0.22 | 118.17 | 18.58 | 127.19 | 3.29 |
| 1993 | 96.62 | 8.00 | 139.67 | 18.19 | 144.84 | 13.87 |
| 1994 | 94.83 | -1.85 | 140.60 | 0.66 | 156.99 | 8.39 |
| 1995 | 75.35 | -20.55 | 148.12 | 5.35 | 149.93 | -4.50 |
| 1996 | 119.09 | 58.05 | 193.31 | 30.51 | 142.88 | -4.71 |
| 1997 | 156.46 | 31.39 | 195.41 | 1.09 | 151.37 | 5.95 |
| 1998 | 168.99 | 8.01 | 195.41 | 0.00 | 148.50 | -1.90 |
| 1999 | 168.99 | 0.00 | 201.49 | 3.11 | 150.20 | 1.14 |
| 2000 | 165.81 | -1.88 | 221.20 | 9.78 | 331.11 | 120.45 |
| 2001 | 187.28 | 12.95 | 277.87 | 25.62 | 256.60 | -22.50 |
| 2002 | 232.01 | 23.89 | 287.96 | 3.63 | 274.77 | 7.08 |
| 2003 | 277.73 | 19.71 | 297.34 | 3.26 | 327.32 | 19.12 |
| 2004 | 289.26 | 4.15 | 327.94 | 10.29 | 344.58 | 5.27 |
| 2005 | 326.64 | 12.92 | 358.77 | 9.40 | 390.85 | 13.43 |
| 2006 | 375.15 | 14.85 | 376.16 | 4.85 | 530.46 | 35.72 |
| 2007 | 540.76 | 44.14 | 442.11 | 17.53 | 627.45 | 18.28 |
| 2008 | NA | NA | 671.71 | 51.93 | 1019.61 | 62.50 |

Source: Statistical Abstract, Department of Census and Statistics

# CHAPTER SIX

## Terms of Trade in the Paddy Sector

### 6.1 Introduction

The terms of trade of paddy were studied by using the concept, output-input parity. Therefore, this chapter is focused on relationship of input prices over output prices in the paddy sector. The basic purpose of paddy sector analysis is to understand the movements of prices of various commodities sold and purchased by the agricultural sector and to assess the changes in purchasing power of a unit of agricultural commodities over a period of time and thereby to understand terms of trade in the paddy sector.

### 6.2 Parity Ratios of Paddy

**Table 6.1: Parity Ratios of Paddy in *Maha* Seasons; 1990-2008**

| Price Ratio | 1990 | 1995 | 2000 | 2005 | 2008 |
|---|---|---|---|---|---|
| a) With inputs | | | | | |
| Fertilizer | 1.00 | 0.77 | 1.05 | 1.80 | 4.94 |
| Labour | 1.00 | 0.47 | 0.43 | 0.43 | 0.59 |
| Seeds | 1.00 | 0.73 | 0.73 | 0.78 | 1.20 |
| Machinery | 1.00 | 0.61 | 0.63 | 0.60 | 0.69 |
| Agro chemical | 1.00 | 0.52 | 0.43 | 0.60 | 0.72 |
| b) With consumer goods | | | | | |
| Bread | 1.00 | 1.38 | 0.88 | 0.69 | |
| Milk powder | 1.00 | 0.70 | 0.66 | 0.63 | 0.68 |
| Kerosene oil | 1.00 | 0.69 | 0.44 | 0.58 | 0.45 |

Source: Cost of Cultivation, Department of Agriculture and Statistical Abstract,
Department of Census and Statistics (1990-2008)

As indicated in Table 6.1 the highest price ratio of paddy was in fertilizer. The significant rise in price ratios of paddy with fertilizer was due to the fertilizer subsidy received by farmers. The fall in price ratios with other inputs was due to the rise in input prices at much higher rates than the producer price of paddy. However in 2008 parity ratios of paddy with all inputs had increased with the rise of producer price. Parity ratios of paddy with the consumer goods have continuously declined due to their prices increases.

### 6.3 Inter-relationship of Producer Prices and Input Prices in Paddy

After studying the behavioural pattern of producer prices and input prices of paddy separately, it is important to study the inter-relation of these two factors together. Therefore, this section of the report attempts to reveal that relationship, measured in terms of trade. Figure 6.1 shows the movements of these two indices during the period 1990-2008 on the same graph.

**Figure 6.1: Changes in Producer Price Index (*Maha* Season) and Composite Index of Inputs**

$$y = 22.65x + 62.15$$
$$R^2 = 0.97$$

$$y = 11.70x + 57.06$$
$$R^2 = 0.66$$

Index — Year

—◆— composite index of inputs
—■— Producer price index
——— Linear (composite index of inputs)
——— Linear (Producer price index)
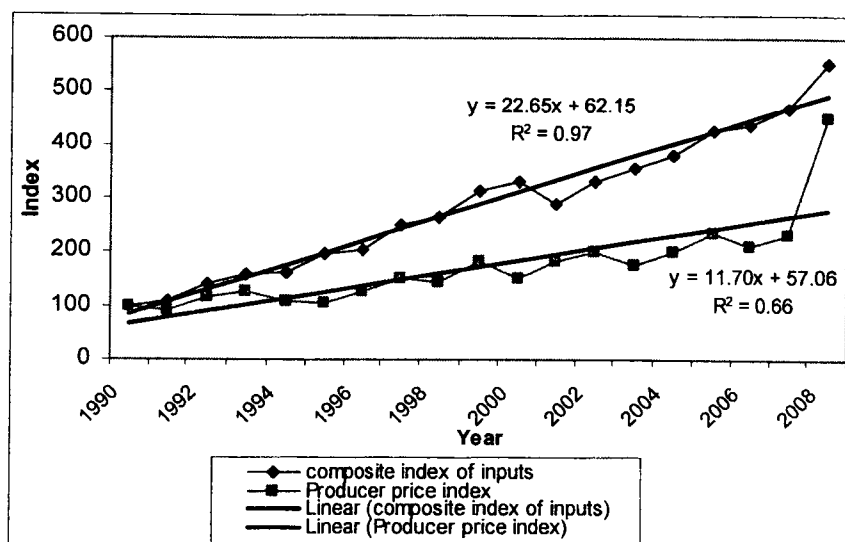
Source: Statistical Abstract, Department of Census and Statistics

The above figure clearly shows that both producer prices and input prices of paddy have increased over the period. Slope of the producer price index is 50 per cent less than the slope of the composite index of inputs. Therefore, it is clear that input prices are drastically increased at a higher rate than the increase of producer prices.

Finally this study attempts to find the terms of trade in paddy sector by using the ratios of composite input price index to the output price index. Table 6.1 shows the changing pattern of terms of trade (compared to input prices) in Sri Lanka under *Maha*, and *Yala* harvesting seasons as well as the changes in terms of trade value when considered the annual average paddy prices during the recent past. Terms of trade values highlight that, there had been irregular movements during the last two decades. Generally lower terms of trade values have been recorded in *Maha* harvesting season because farmers had received lower prices during this period. Terms of trade has shown irregular movements during the last two decades and marginal decline especially in *Maha* harvesting season.

**Table 6.2: Terms of Trade in Sri Lanka under Different Scenarios**

| Year | Annual Average | Annual % change | Maha | Annual % change | Yala | Annual % change |
|------|------|------|------|------|------|------|
| 1990 | 1.00 | 0 | 1.00 | 0 | 1.00 | 0 |
| 1991 | 0.87 | -13 | 0.83 | -17 | 0.85 | -15 |
| 1992 | 0.82 | -6 | 0.80 | -3 | 0.82 | -3 |
| 1993 | 0.77 | -6 | 0.75 | -6 | 0.80 | -3 |
| 1994 | 0.66 | -14 | 0.67 | -11 | 0.68 | -14 |
| 1995 | 0.56 | -16 | 0.56 | -16 | 0.56 | -18 |
| 1996 | 0.74 | 32 | 0.65 | 17 | 0.82 | 46 |
| 1997 | 0.68 | -8 | 0.64 | -2 | 0.70 | -15 |
| 1998 | 0.61 | -11 | 0.58 | -9 | 0.61 | -12 |
| 1999 | 0.70 | 15 | 0.71 | 23 | 0.71 | 16 |
| 2000 | 0.55 | -22 | 0.52 | -27 | 0.61 | -15 |
| 2001 | 0.63 | 14 | 0.62 | 18 | 0.66 | 8 |
| 2002 | 0.60 | -5 | 0.62 | 0 | 0.58 | -12 |
| 2003 | 0.50 | -16 | 0.51 | -17 | 0.47 | -19 |
| 2004 | 0.62 | 23 | 0.57 | 11 | 0.66 | 40 |
| 2005 | 0.55 | -12 | 0.55 | -3 | 0.47 | -28 |
| 2006 | 0.44 | -20 | 0.44 | -21 | 0.43 | -9 |
| 2007 | 0.54 | 25 | 0.46 | 6 | 0.52 | 21 |
| 2008 | 0.74 | 35 | 0.79 | 69 | 0.72 | 37 |
| Mean | 0.66 | | 0.65 | | 0.67 | |
| SD | 0.14 | | 0.14 | | 0.15 | |
| CV | 20.96 | | 21.66 | | 22.25 | |

Source: Cost of Cultivation, Department of Agriculture and Statistical Abstract, Department of Census and Statistics (1990-2008)

In *Yala* season terms of trade values had been fairly favourable to the farmers. The annual average value of terms of trade shows an irregular movement which decline from 1 (1990) to 0.74 in 2008. Highest cutback in change of terms of trade had been recorded in *Maha* season. Anyhow, terms of trade had not been favorable to the farmers in any year after 1990. In 1996 terms of trade values had increased by 17% in *Maha* season and 46 % in *Yala* season owing to 21% and 52% increase in paddy prices respectively. In 1999 due to the favourable paddy prices terms of trade values had increased by 23% (*Maha*) and 16% (*Yala*). In 2000 it has decreased significantly due to high cost of production and lower farm gate prices. Then in 2003 terms of trade in both *Maha* and *Yala* seasons declined respectively by 17% and 19%. In the 2004 *Yala* season there was an outstanding growth of terms of trade value due to attractive farm gate prices throughout the year. It had severely declined in the same season of the next year due to decline of paddy prices by 21%. The lowest value of terms of trade can be seen in 2006 due to heavy cost of production and decline of paddy prices by 12% in *Maha* season. Again in 2008 terms of trade values had been favourable and increased to the values of 0.79 (*Maha*) and 0.72 (*Yala*) due to increase of paddy prices by 95% and 57% respectively.

Anyway, terms of trade value has not exceeded or at least not reached the value of 1 after the 1990 (Base year) although in the year 2008 it had indicated some favourable trend. This means, farmers had still not received favourable output prices commensurate with the ever increasing input prices.

**Figure 6.2: Terms of Trade in Paddy; 1990-2008**
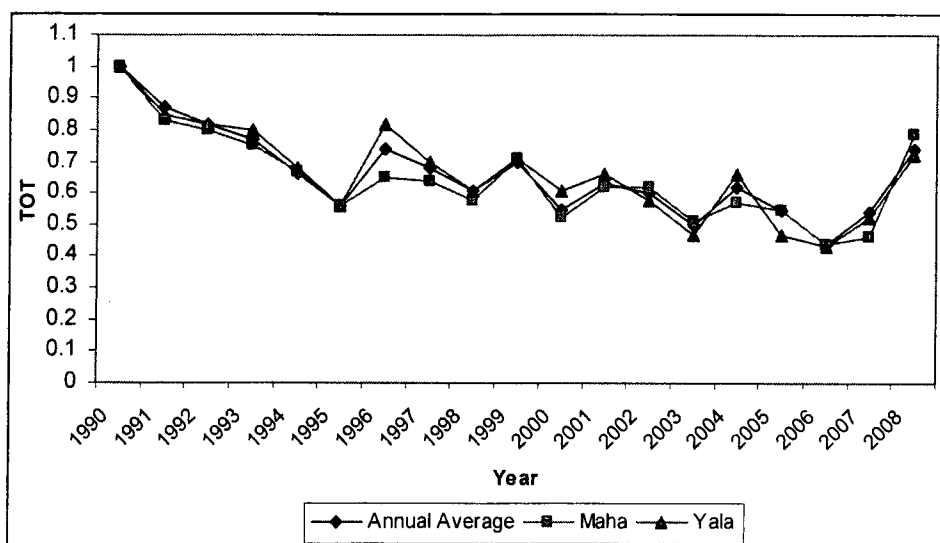


Source: Cost of Cultivation, Department of Agriculture (1990-2008)

As explained in Table 6.3 there is no noteworthy change in the values of terms of trade in four selected districts except in some exceptional circumstances in Kurunegala specially in 2008 *Maha* harvesting season. In 2008 *Maha* harvesting season, highest terms of trade value was recorded in Polonnaruwa (0.92) district while the lowest was recorded in Kurunegala district (0.59). Both Anuradhapura and Hambantota districts show the same value of 0.82 duringthat season.

**Table 6.3: Change of Terms of Trade in Different Districts in**
***Maha* and *Yala* ; 1990-2008**

| Year | Anuradhapura | | Polonnaruwa | | Kurunegala | | Hambantota | |
|---|---|---|---|---|---|---|---|---|
| | *Maha* | *Yala* | *Maha* | *Yala* | *Maha* | *Yala* | *Maha* | *Yala* |
| 1990 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1991 | 0.84 | 0.87 | 0.84 | 0.85 | 0.76 | 0.78 | 0.87 | 0.92 |
| 1992 | 0.82 | 0.77 | 0.87 | 0.82 | 0.67 | 0.74 | 0.84 | 0.96 |
| 1993 | 0.80 | 0.74 | 0.79 | 0.81 | 0.59 | 0.68 | 0.84 | 0.95 |
| 1994 | 0.68 | 0.69 | 0.70 | 0.72 | 0.52 | 0.56 | 0.75 | 0.76 |
| 1995 | 0.54 | 0.53 | 0.55 | 0.53 | 0.44 | 0.46 | 0.69 | 0.73 |
| 1996 | 0.62 | 0.75 | 0.67 | 0.82 | 0.50 | 0.69 | 0.83 | 1.01 |
| 1997 | 0.60 | 0.64 | 0.71 | 0.75 | 0.45 | 0.58 | 0.78 | 0.81 |
| 1998 | 0.55 | 0.60 | 0.64 | 0.67 | 0.44 | 0.46 | 0.69 | 0.73 |
| 1999 | 0.58 | 0.57 | 0.81 | 0.80 | 0.53 | 0.58 | 0.93 | 0.89 |
| 2000 | 0.46 | 0.52 | 0.55 | 0.73 | 0.41 | 0.55 | 0.68 | 0.62 |
| 2001 | 0.63 | 0.63 | 0.66 | 0.65 | 0.47 | 0.58 | 0.73 | 0.76 |
| 2002 | 0.61 | 0.56 | 0.65 | 0.62 | 0.43 | 0.43 | 0.80 | 0.70 |
| 2003 | 0.50 | 0.45 | 0.55 | 0.50 | 0.38 | 0.35 | 0.63 | 0.57 |
| 2004 | 0.53 | 0.61 | 0.61 | 0.66 | 0.44 | 0.53 | 0.71 | 0.82 |
| 2005 | 0.55 | 0.48 | 0.55 | 0.48 | 0.42 | 0.38 | 0.69 | 0.54 |
| 2006 | 0.48 | 0.46 | 0.50 | 0.50 | 0.34 | 0.36 | 0.44 | 0.39 |
| 2007 | 0.50 | 0.58 | 0.53 | 0.58 | 0.33 | 0.45 | 0.49 | 0.48 |
| 2008 | 0.82 | 0.78 | 0.92 | 0.82 | 0.59 | 0.54 | 0.82 | 0.72 |

Source: Cost of Cultivation, Department of Agriculture and Statistical Abstract,
Department of Census and Statistic (1990-2008)

Table 6.4 explains some of the important years of changes of terms of trade in *Maha* harvesting season and % contribution made by producer price index and composite input index .

According to Table 6.4, there was 23% increase of terms of trade in *Maha* harvesting season in paddy during 1999 compared to that of the previous year. This was mainly due to the producer price increases. In the year 1999, highest percentage of terms of trade increase could be seen in Hambantota due to 44% increase in the producer price while lowest terms of trade increase was in Kurunegala due to producer price increase only by 27%.

In 2000, Terms of Trade had decreased by 27%. Although annual percentage change of composite input index had increased compared to the previous year, producer price index had decreased at a much higher rate, which had caused a decrease in the terms of trade significantly.

**Table 6.4: Annual Percentage Change of Producer Price,
Composite Index of Inputs and Terms of Trade in
Selected Years (*Maha* Season)**

| 1999 | % change compared to 1998 | | |
| | Producer price index | Composite input index | TOT |
|---|---|---|---|
| Polonnaruwa | 34 | 5 | 28 |
| Hambantota | 44 | 7 | 34 |
| Kurunegala | 27 | 5 | 21 |

| 2000 | % change compared to 1999 | | |
| | Producer price index | Composite input index | TOT |
|---|---|---|---|
| Polonnaruwa | -33 | 10 | -33 |
| Anuradhapura | -21 | 5 | -21 |
| Hambantota | -27 | 6 | -27 |
| Kurunegala | -23 | 4 | -23 |

| 2003 | % change compared to 2002 | | |
| | Producer price index | Composite input index | TOT |
|---|---|---|---|
| Polonnaruwa | -6 | 11 | -15 |
| Anuradhapura | -12 | 8 | -18 |
| Hambantota | -15 | 8 | -21 |
| Kurunegala | -7 | 5 | -11 |

| 2004 | % change compared to 2003 | | |
| | Producer price index | Composite input index | TOT |
|---|---|---|---|
| Polonnaruwa | 18 | 7 | 10 |
| Anuradhapura | 13 | 6 | 7 |
| Hambantota | 23 | 10 | 12 |
| Kurunegala | 25 | 9 | 15 |

| 2008 | % change compared to 2007 | | |
| | Producer price index | Composite input index | TOT |
|---|---|---|---|
| Polonnaruwa | 98 | 14 | 73 |
| Anuradhapura | 93 | 18 | 63 |
| Hambantota | 88 | 14 | 66 |
| Kurunegala | 101 | 14 | 77 |

In the year 2003, farmers were vulnerable to unfavourable terms of trade. Terms of trade had declined in all four districts by more than 10% compared to the previous year. Highest reduction was recorded in Hambantota due to the highest cutback in the producer prices. In 2003, unfavourable terms of trade was not only due to lower farm gate prices received by farmers but also due to price increases of inputs.

In the year 2004, though the input prices had increased, the rate of increase in the farm gate prices had contributed to an increase in the terms of trade. Highest producer price increase was recorded in Kurunegala resulting in the highest increase of the terms of trade in that district.

The year 2008 was the most favourable year for the paddy farmers in the recent past which had caused increase of producer prices over the increase of input prices. Therefore, in 2008 terms of trade had risen by more than 60% over the previous year and thereby the living standards of paddy farmers had increased satisfactorily.

According to the above figures, it is distinctly clear that terms of trade had highly fluctuated over the past two decades. But there was no favourable increase as farmers' input prices had drastically increased during the recent past than increase of producer prices.

In terms of trade analysis, not only the price environment but also some other factors such as price ratios, overall production, imports, technology and cost of production have also taken into account to analyze whether in the recent past farmers had been affected favourably or adversely.

## 6.4 Changes of Price Parity Ratio in Comparison with the Selected Food Items

### 6.4.1 Price Parity Ratios in *Maha* Season

As indicated by the Figure 6.3 price parity ratio compared to bread was significantly favourable during the period 1990-1996 and the parity ratios were higher than one (1) during this period. Highest parity was recorded in 1995 and it reached the value of 1.38. This was due to the price of bread had declined by 21% compared to the 6% decline in paddy prices. After 1996 parity ratios had declined below one except in the year 1999. During 1999, producer price increase of 33% had caused this favourable change. Lowest parity ratio was recoded in 2007 and parity ratio had declined to 0.43 due to 44% increase in the price of bread than the price increase in paddy.

Parity price ratio of milk powder had declined continuously although there had been some favourable signs in 1999. Anyhow, in 1999 parity price had not reached at least the value of 1. This favourable change in 1999 was due to 33% increase in paddy prices. In 2008 parity ratio had increased by 28% against the 52% increase in milk powder prices. Paddy prices increase by 95% had caused this favourable parity ratio in 2008 *Maha* season.

Price parity ratio when compared to kerosene had declined during the period under consideration although there had been some favourable signals in 1999. In 1999 this positive increase was due to 33% increase in paddy prices. In 2000 parity ratio had declined to 0.44 by 64% compared to the same season of the previous year due to 120% price increase in kerosene oil. Lowest parity ratio was recorded in 2006-2007 period due to kerosene price increases. In 2008 parity ratio had increased by 20% against the significant price escalation of kerosene in the international market. Anyhow, paddy price increase by 95% had caused the parity ratio increases in 2008.

**Figure 6.3: Price Parity Ratios of Selected Consumer Goods**
**(*Maha* Season); 1990-2008**
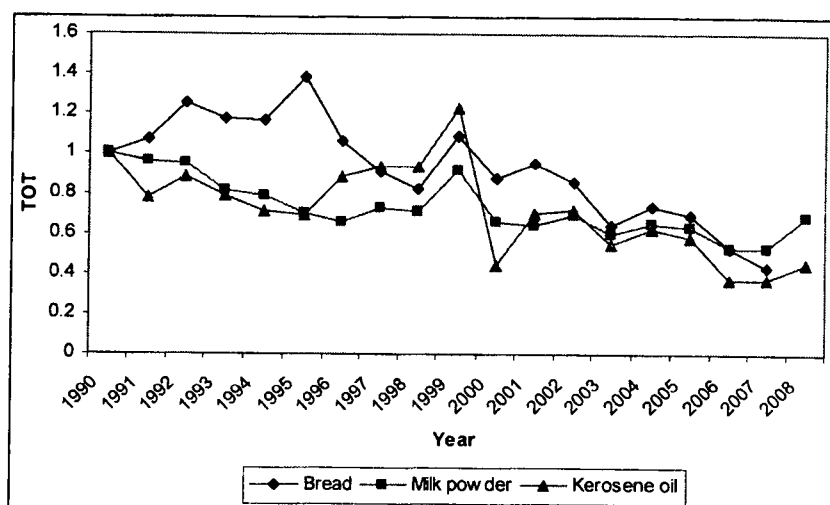


Source: Statistical Abstract, Department of Census and Statistics (1990-2008)

## 6.4.2   Price Parity Ratios in *Yala* Season

As could be seen in the Figure 6.4, except in 1998, parity ratio compared to the prices of bread was above 1 during the period of 1990-2001. The highest price parity ratio was recorded in 1995 which was 1.39 followed by the value of 1.34 in 1996. In 1995 the highest parity ratio was recorded due to 21% reduction in the price of bread compared to the previous year. After 2001 price parity ratio had significantly dropped and in 2002 remarkable decline was due to increase price of bread by 24% and reduction of paddy price by 21%. Due to increase of prices of wheat flour in the world market the increase was passed on to the domestic economy. This has caused the parity ratio decline below 1. Hence there had been a noteworthy decline of purchasing power of the paddy farmers.

**Figure 6.4: Price Parity Ratios of Selected Consumer Goods**
**(*Yala* Season); 1990-2008**
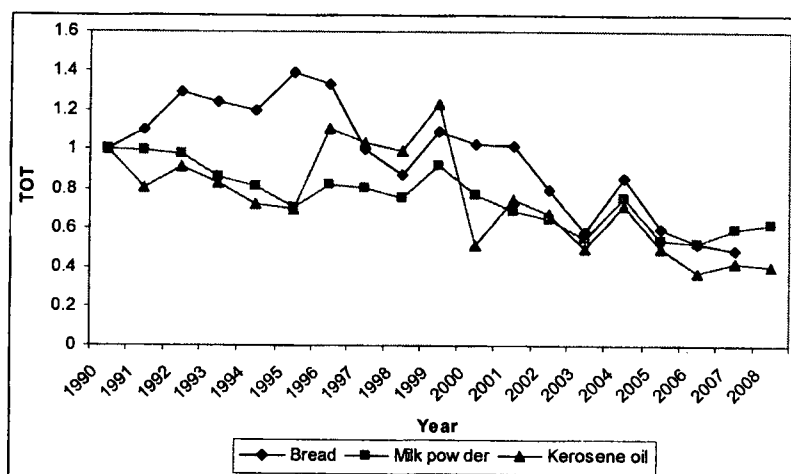


Source: Statistical Abstracts, Department of Census and Statistics (1990-2008)

Price parity ratio compared to milk powder had continuously declined until the year 1995 and then had increased by 17% in the year1996. This was due to producer price increase in 1996 by 52%. Anyhow, during 1996, milk powder prices had increased by 30%. During the period 1997-98 parity price ratios were reduced and in 1999 they had risen up again to the value of 0.92. From the year 2000 this had declined continuously except 38% increase in 2004. This was due to paddy price increase by 52% compared to the previous year *Yala* season. In 2008 due to  higher prices in international market domestic price of milk powder had increased by 52%.  Price party ratio had marginally increased by 3% due to the favourable paddy prices in the season.

There were ad-hoc changes in the price parity ratios compared to kerosene oil. In 1991, it had declined by 20% due to 26% reduction of paddy prices. After that it had declined continuously and again had increased to the value of 1.11 in 1996 due to 52% increase of paddy prices. The highest parity ratio was recorded in 1999. Then there was an obvious decline in 2000 due to 120% price increase in kerosene oil. At the same time paddy prices also had declined by 58%. These two unfavorable price movements had caused  such a decline in the parity ratio. The lowest parity ratio could be seen in 2006 and the value is 0.37. This was due to 35% price increase in kerosene oil. In 2008, parity ratio of 0.41 was recoded due to high international price.

# CHAPTER SEVEN

## Findings, Conclusions and Recommendations

### 7.1    Findings

The analysis of main implications resulting from changes in prices that had occurred in the paddy sector is the main focus of this section. Accordingly, the issues arising from the previous analysis, their implications on the paddy sector and some thoughts for the future are presented in this chapter.

#### 1. Irregular paddy price movements

During the harvesting season producer prices are drastically reduced when compared to those of the other months of the year. This situation is worst during the *Maha* harvesting season. More than 70% price reduction occurs during the months of February-March peak harvesting season. Producer prices in the *Maha* season fluctuate significantly compared to the producer prices in the *Yala* season in Anuradhapura and Polonnaruwa. Paddy prices had increased very slowly during the period 1990-2005. However, towards the end of 2007, farm gate prices of paddy had risen at a faster rate with the global food crisis. Paddy prices in selected markets namely Anuradhapura, Polonnaruwa, Kurunegala and Hambantota were not considerably different during the period under discussion. Similar correlation values within each two markets, reveal that market integration can be expected.

#### 2. Producer price index had increased four folds

Producer price index had increased only four folds compared to that of the base year (1990). Both producer prices as well as input prices are significantly important in determining the terms of trade in paddy. Anyhow, producer prices of paddy had not increased commensurate with the level of rise in the prices of inputs. This had resulted in a down turn in profitability and terms of trade in the paddy sub sector during the period under consideration. Because of the increase in input costs and as the profit margins are not commensurate with the increase of total production costs, returns from paddy farming had declined over the last several years. This trend will have adverse implications on farmers who continue to concentrate on paddy farming.

#### 3. Input prices of paddy had hugely increased

Input prices had drastically increased in recent times. This increase is twice the producer price increases. Labour prices had considerably increased due to shortage of labour in paddy cultivation. The youth were unwilling to be engaged in agriculture because of low profitability as well as due to their attitudes. During the recent past, machinery cost and agro chemical cost had drastically increased. The use of agro chemicals had became popular with the introduction of new high yielding varieties which were susceptible to various pests and diseases. Manual labour had been replaced by machine power at a higher cost especially in the Hambantota district. Anyhow, reduction in labor cost in Hambantota had been put back by power cost keeping the overall cost at comparable levels with all other selected districts. Share of machinery cost to the total cost increase from 20% in 1990 to 30% in 2008 and

average cost during the past two decades were nearly 25% of the total cost of production of paddy. In Hambantota 58% had used combine harvesters. Fertilizer prices had declined during the recent years which is favourable to the farmers. But a high subsidy is borne by the government leading to extreme budgetary constraints.

## 4. Uneven changes in Terms of Trade

There are no substantial changes in the terms of trade within the selected districts when inputs were taken into calculation of parity ratios. The indices of terms of trade were adverse to the extent that they became unfavourable to the agricultural sector and results suggest that terms of trade of the paddy sector had declined over the years. Index of paid prices had increased sharply in 2000 relative to the index of prices received and as a result the index of terms of trade moved much to the disadvantage of agriculture sector. During 2007 however, the increase in the index of prices received by agricultural sector was higher than the increase in the index of prices paid by the sector resulting in a marginal increase in the index of terms of trade. According to Rupasena (2008), in the pre-liberalization period, the parity ratios had increased but they had continuously declined during the post-liberalization period. These results are also in line with the findings of this study. However in his study he has calculated the parity ratios of rice with inputs (fertilizer and labour) and with consumer goods (soap, milk powder and kerosene oil). He has not constructed the composite input index to obtain the terms of trade using the ratios of indices of inputs and outputs used in paddy cultivation.

## 5. Positive signals of Terms of Trade in the economy of paddy farmers economy in 2008

Parity ratios of paddy were calculated individually with the inputs used for cultivation and these ratios (except with fertilizer) had declined until 2008. Parity ratios of paddy with fertilizer had increased during the entire period of investigation due to fertilizer subsidy given to the [paddy farmers. Terms of trade in 2008 had risen to 0.79 in *Maha* season and 0.72 in *Yala* season when compared to the base year, 1990 had and shown some positive signals of terms of trade values with attractive paddy prices in that year. However, the terms of trade with inputs had not increased up to the levels of the base year during the period under consideration. Thus the paddy farmers had unfavorably affected. Producer price is the key factor which contribute to increased terms of trade in recent years. With the ever-increasing cost of production in paddy farming, and low and unfavourable paddy prices, it is not profitable to remain in this sector. This is one factor that had caused young generation to turn away from paddy farming.

## 6. Reduction of purchasing power of the paddy farmers

Price parity ratio compared to prices of consumer goods were calculated in order to determine the terms of trade in paddy farming. The analysis reveals that prices of consumer goods such as bread, milk powder and kerosene oil had drastically increased during the most recent years. This imply that farmers were vulnerable to the higher consumer prices. They had received a low income from the paddy farming. Although, paddy prices had increased at the end of 2007 at a higher rate they had not compensated the price increase in consumer goods. Therefore, there is always a big gap between these two price levels and this had caused a reduction in purchasing power of the farmers.

7. Parity price ratios related to consumer goods swing down

Prices index of bread had raised 5 folds while the milk powder and kerosene oil had risen by 7 and 10 folds respectively when compared to the base year-1990. The upsurge in crude oil prices in international markets was the major driving force in increase of the overall price levels during the recent past. When the prices of consumer goods are considered in order to calculate the parity ratios in paddy sector, it is observed that the values had also gradually declined during the recent past with the increasing food prices. Although, the parity price was higher than 1 during 1990-2001 period parity ratio had gradually gone down thereafter indicating a decline of the purchasing power of the farmers. This value had declined to 0.43 (*Maha*) and 0.49 (*Yala*) from 1990. Price parity ratio compared to milk powder had continuously declined until the year 1995 and then had increased by 17% in the 1996. This was due to producer price increases in 1996 by 52%. Subsequently this party ratio also had moved down. There were unfavourable terms of trade when compared to prices of kerosene oil owing to the recent high prices in the world market. The value had declined from 1 to 0.44 (*Maha*) and 0.41 (*Yala*). The highest party ratio in 2008 when compared to the three consumer goods can be seen in the prices of milk powder (0.50).

## 7.2    Conclusion

This study shows that terms of trade in the paddy sub sector had deteriorated during the period under discussion both in terms of inputs and comparable prices in consumer goods. This had resulted in decline of living standards and wellbeing of the farmers. Anyhow, some positive signals could be seen in 2008. The significant drop in the terms of trade of paddy had been due to the rise in input costs at higher rates than the producer price of paddy. The end result is the reduction in paddy farmers' profits and hence their well-being over a period of time.

## 7.3    Recommendations

The indices of the terms of trade and parity indices reveal that improvement in the terms of trade in favour of agriculture is a recent phenomenon which need to be sustained. The terms of trade as measured on the basis of relative movements of the trends in prices of paddy sold and purchased by the sector is an important but not the sole indicator of economic well-being of the sector.

Besides prices, extent of fluctuations of the farmers' production may be equally important for the producers. Upgrading of technology which increases the productivity of land and other resources plays a much more positive role in raising farm production and income than merely increasing the prices of agricultural products. High prices or favourable terms of trade without technology improvements have only a limited impact on agricultural production. Moreover, diversification of agriculture would generate greater farm incomes. It is also essential that rise of prices in items such as chemical fertilizer and machinery be kept under check.

Agriculture should be made a profitable enterprise so that farmers are induced to make further investments. Profitability of agriculture can be increased, if there is enough increase in productivity and the terms of trade remain at a favourable level to

the farmers. In order to improve the terms of trade in paddy sector sale of paddy direct to millers, improvement of the quality of paddy and holding stock to sell later, without selling at the peak harvesting period are necessary.

The study findings suggest that labour saving mechanisms should be introduced in paddy cultivation as a solution to the labour shortage problem and accompanying high wage rates. Government should encourage the private sector investment in the commercial cultivation of paddy in the country and local paddy farmers should be encouraged by helping them to explore new markets to sell their products at reasonable prices at the time of heavy production.

It is better to keep buffer stocks which will be enough at least for 2-3 months of the year. These buffer stocks should be maintained in paddy producing areas by the government and these stocks should be used before the end of each season and stocks should be refilled from time to time. If government is able to maintain a buffer stock of paddy, it would help farmers as well as consumers. While encouraging the private millers to compete with the government paddy prices, a strong market should be built up and this would help to protect the consumers. It would also help paddy farmers to receive higher market prices.

With the support of the government, a strong paddy price network should be established. Paddy cultivated areas, producing areas, expected paddy production, paddy stocks, market capacity, market prices of paddy should be included in the price network. These data of paddy demand and supply could be utilized to forecast price environment to both producers consumers.

Creating a favourable price framework for farmers is important and it should be continuously up-grading. There should also be an increased investment in agriculture. Generally stable terms of trade has resulted in a sustained rate of growth in production in the agriculture sector. Results of research by Misra and Hazell (1996), Misra (1998) and Gulati and Bathla (2001) indicate that a favourable terms of trade had helped to raise private investment in agriculture in India.

Although changes in programmes and policies can lead to more efficient use of agricultural resources and the raising of the overall production and productivity, actual behavior would depend upon the extent of improvement in terms of trade in favour of agriculture as also on the response of the farmers to price increase. In this context it would be important to monitor the changes in terms of trade so that effective policy measures, if needed can be taken to ensure that the farmers benefit from new economic policies. Therefore, government should consider terms of trade as one of the factors for formulating its recommendations on a price policy for agriculture commodities when decisions are taken on agriculture.

## 7.4 Future Research

Terms of trade is one of the factors that should be taken in to account while formulating recommendations on the price policy for agriculture commodities. Therefore, it is worthwhile to study the terms of trade in the whole agriculture sector and impact of changing terms of trade on the private component of agriculture investment.

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**Appendix 1 A:  Producer Price of Paddy in Anuradhapura (Rs./kg); 1990-2008**

| Year | Jan. | Feb | Mar. | Apr. | May | Jun | Jul | Aug | Sep. | Oct | Nov | Dec | Annual | | | Seasonal-Maha | | | Seasonal-Yala | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | mean | SD | CV | mean | SD | CV | mean | SD | CV |
| 1990 | 7.67 | 7.57 | 6.02 | 6.38 | 6.12 | 6.63 | 6.64 | 6.72 | 6.66 | 7.30 | 7.20 | 6.71 | 6.80 | 0.53 | 7.799 | 6.2 | 0.53 | 8.556 | 6.68 | 0.53 | 7.941 |
| 1991 | 7.98 | 7.15 | 5.67 | 5.70 | 6.11 | 6.19 | 6.33 | 6.33 | 6.28 | 7.95 | 7.91 | 8.05 | 6.80 | 0.938 | 13.79 | 5.685 | 0.938 | 16.5 | 6.33 | 0.938 | 14.82 |
| 1992 | 8.39 | 6.99 | 7.28 | 7.19 | 7.47 | 7.47 | 7.38 | 7.23 | 7.60 | 8.44 | 8.47 | 8.15 | 7.67 | 0.538 | 7.019 | 7.235 | 0.538 | 7.442 | 7.305 | 0.538 | 7.371 |
| 1993 | 8.39 | 7.86 | 7.91 | 7.67 | 7.67 | 7.83 | 8.01 | 7.70 | 7.74 | 9.15 | 8.48 | 8.86 | 8.11 | 0.499 | 6.16 | 7.79 | 0.499 | 6.409 | 7.855 | 0.499 | 6.356 |
| 1994 | 8.86 | 8.15 | 6.97 | 6.80 | 7.07 | 7.10 | 7.91 | 7.19 | 6.95 | 7.67 | 7.79 | 8.05 | 7.54 | 0.629 | 8.336 | 6.885 | 0.629 | 9.132 | 7.55 | 0.629 | 8.328 |
| 1995 | 7.00 | 6.60 | 6.75 | 6.46 | 7.46 | 6.98 | 7.12 | 6.78 | 6.81 | 6.63 | 7.00 | 7.30 | 6.91 | 0.294 | 4.253 | 6.605 | 0.294 | 4.447 | 6.95 | 0.294 | 4.227 |
| 1996 | 8.42 | 7.52 | 7.73 | 7.87 | 7.98 | 8.70 | 10.05 | 10.39 | 11.89 | 10.08 | 11.59 | 10.85 | 9.42 | 1.569 | 16.65 | 7.8 | 1.569 | 20.12 | 10.22 | 1.569 | 15.35 |
| 1997 | 9.98 | 8.78 | 9.42 | 9.41 | 10.30 | 10.25 | 10.67 | 10.79 | 10.54 | 11.66 | 12.09 | 12.04 | 10.49 | 1.046 | 9.972 | 9.415 | 1.046 | 11.11 | 10.73 | 1.046 | 9.752 |
| 1998 | 12.02 | 9.37 | 9.11 | 8.92 | 10.67 | 10.16 | 10.64 | 10.55 | 10.10 | 10.10 | 10.70 | 11.34 | 10.31 | 0.894 | 8.678 | 9.015 | 0.894 | 9.921 | 10.6 | 0.894 | 8.442 |
| 1999 | 11.60 | 12.27 | 12.39 | 10.25 | 12.58 | 11.62 | 11.91 | 12.07 | 12.25 | 12.23 | 12.38 | 12.55 | 12.01 | 0.64 | 5.328 | 11.32 | 0.64 | 5.652 | 11.99 | 0.64 | 5.336 |
| 2000 | 12.25 | 10.93 | 7.94 | 10.83 | 9.54 | 10.50 | 10.43 | 12.75 | 10.06 | 10.48 | 10.38 | 11.59 | 10.64 | 1.245 | 11.7 | 9.385 | 1.245 | 13.27 | 11.59 | 1.245 | 10.75 |
| 2001 | 12.19 | 12.26 | 11.98 | 10.75 | 11.68 | 11.53 | 12.09 | 12.24 | 11.77 | 12.49 | 12.24 | 12.88 | 12.01 | 0.538 | 4.477 | 11.37 | 0.538 | 4.731 | 12.17 | 0.538 | 4.42 |
| 2002 | 14.44 | 13.37 | 12.38 | 12.71 | 13.02 | 12.76 | 12.25 | 12.54 | 11.99 | 12.25 | 13.65 | 15.00 | 13.03 | 0.93 | 7.134 | 12.55 | 0.93 | 7.41 | 12.4 | 0.93 | 7.5 |
| 2003 | 15.26 | 11.15 | 11.08 | 10.95 | 10.45 | 12.05 | 11.01 | 10.71 | 10.87 | 11.42 | 13.38 | 14.10 | 11.87 | 1.539 | 12.97 | 11.02 | 1.539 | 13.98 | 10.86 | 1.539 | 14.18 |
| 2004 | 15.32 | 14.79 | 13.23 | 11.88 | 13.64 | 14.14 | 15.23 | 15.80 | 18.01 | 15.47 | 15.25 | 16.30 | 14.92 | 1.574 | 10.55 | 12.56 | 1.574 | 12.54 | 15.52 | 1.574 | 10.15 |
| 2005 | 20.33 | 16.96 | 14.62 | 14.52 | 14.22 | 14.31 | 13.82 | 13.63 | 16.47 | 17.47 | 16.82 | 16.44 | 15.80 | 1.976 | 12.5 | 14.57 | 1.976 | 13.56 | 13.73 | 1.976 | 14.39 |
| 2006 | 16.99 | 15.45 | 13.36 | 12.79 | 12.67 | 12.82 | 13.32 | 13.61 | 14.01 | 14.63 | 15.28 | 16.09 | 14.25 | 1.425 | 9.999 | 13.08 | 1.425 | 10.9 | 13.47 | 1.425 | 10.58 |
| 2007 | 15.82 | 15.94 | 14.38 | 14.69 | 15.35 | 16.63 | 17.63 | 18.49 | 19.04 | 21.83 | 30.29 | 29.05 | 19.10 | 5.367 | 28.11 | 14.54 | 5.367 | 36.92 | 18.06 | 5.367 | 29.72 |
| 2008 | 31.63 | 22.92 | 24.25 | 31.84 | 31.05 | 27.88 | 28.21 | 29.36 | 27.72 | 30.37 | 32.33 | 33.77 | 29.28 | 3.264 | 11.15 | 28.05 | 3.264 | 11.64 | 28.79 | 3.264 | 11.34 |

Source: Statistical Abstract, Department of Census and Statistics

# Appendix 1 B: Producer Price of Paddy in Polonnaruwa (Rs./Kg); 1990-2008

| Year | Jan. | Feb | Mar. | Apr. | May | Jun. | Jul. | Aug | Sep. | Oct | Nov | Dec | Annual | | | Seasonal-Maha | | | Seasonal-Yala | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | mean | SD | CV | mean | SD | CV | mean | SD | CV |
| 1990 | 7.76 | 8.82 | 6.70 | 6.07 | 6.76 | 7.23 | 7.45 | 6.20 | 6.09 | 6.60 | 8.31 | 7.87 | 7.16 | 0.90 | 12.62 | 6.39 | 0.90 | 14.14 | 6.83 | 0.90 | 13.23 |
| 1991 | 8.35 | 7.19 | 6.10 | 5.56 | 5.97 | 6.02 | 6.34 | 6.27 | 6.36 | 7.78 | 8.21 | 8.02 | 6.85 | 1.00 | 14.59 | 5.83 | 1.00 | 17.13 | 6.31 | 1.00 | 15.84 |
| 1992 | 7.67 | 7.08 | 6.95 | 7.09 | 7.68 | 7.72 | 7.23 | 6.95 | 7.84 | 7.88 | 8.49 | 8.48 | 7.59 | 0.54 | 7.15 | 7.02 | 0.54 | 7.73 | 7.09 | 0.54 | 7.65 |
| 1993 | 8.37 | 6.90 | 6.77 | 6.74 | 7.28 | 7.63 | 7.66 | 7.16 | 7.94 | 8.23 | 8.74 | 8.89 | 7.69 | 0.75 | 9.75 | 6.76 | 0.75 | 11.10 | 7.41 | 0.75 | 10.12 |
| 1994 | 8.94 | 7.86 | 7.06 | 6.77 | 6.84 | 6.96 | 7.76 | 7.29 | 6.86 | 7.64 | 7.95 | 8.62 | 7.55 | 0.72 | 9.48 | 6.92 | 0.72 | 10.35 | 7.53 | 0.72 | 9.51 |
| 1995 | 7.68 | 7.08 | 6.38 | 6.67 | 6.76 | 6.77 | 6.99 | 6.39 | 6.72 | 6.61 | 7.39 | 8.24 | 6.97 | 0.55 | 7.92 | 6.53 | 0.55 | 8.47 | 6.69 | 0.55 | 8.26 |
| 1996 | 7.73 | 8.21 | 7.65 | 8.20 | 8.34 | 9.56 | 10.43 | 10.14 | 10.78 | 10.51 | 11.59 | 11.27 | 9.53 | 1.44 | 15.06 | 7.93 | 1.44 | 18.12 | 10.29 | 1.44 | 13.96 |
| 1997 | 10.44 | 8.75 | 8.70 | 9.17 | 9.53 | 8.88 | 9.80 | 10.44 | 10.96 | 12.16 | 13.18 | 10.89 | 10.24 | 1.40 | 13.69 | 8.94 | 1.40 | 15.70 | 10.12 | 1.40 | 13.86 |
| 1998 | | 8.17 | 9.11 | 8.10 | 9.55 | 9.31 | 9.77 | 9.52 | 9.00 | 9.09 | 10.30 | 12.14 | 9.46 | 1.10 | 11.58 | 8.61 | 1.10 | 12.73 | 9.65 | 1.10 | 11.36 |
| 1999 | 13.76 | 11.23 | 11.73 | 11.37 | 12.88 | 12.33 | 12.19 | 12.18 | 12.46 | 12.63 | 12.52 | 12.41 | 12.31 | 0.68 | 5.49 | 11.55 | 0.68 | 5.85 | 12.19 | 0.68 | 5.55 |
| 2000 | 11.96 | 8.75 | 8.32 | 8.75 | 9.03 | 9.41 | 11.35 | 13.00 | 10.91 | 10.77 | 11.50 | 12.42 | 10.51 | 1.60 | 15.24 | 8.54 | 1.60 | 18.78 | 12.18 | 1.60 | 13.16 |
| 2001 | 13.34 | 12.84 | 12.00 | 10.73 | 11.15 | 11.86 | 11.94 | 12.25 | 11.87 | 12.00 | 13.17 | 13.80 | 12.25 | 0.90 | 7.31 | 11.37 | 0.90 | 7.88 | 12.10 | 0.90 | 7.40 |
| 2002 | 15.00 | 15.06 | 10.96 | 13.03 | 13.60 | 13.28 | 12.20 | 12.34 | 11.43 | 12.25 | 12.96 | 13.49 | 12.97 | 1.25 | 9.64 | 12.00 | 1.25 | 10.42 | 12.27 | 1.25 | 10.18 |
| 2003 | 12.81 | 12.19 | 11.28 | 11.20 | 11.49 | 11.64 | 11.42 | 10.38 | 11.78 | 11.58 | 12.62 | 14.04 | 11.87 | 0.94 | 7.94 | 11.24 | 0.94 | 8.38 | 10.90 | 0.94 | 8.64 |
| 2004 | 14.69 | 14.90 | 13.04 | 13.46 | 13.98 | 13.89 | 14.94 | 16.00 | 17.32 | 16.67 | 19.06 | 19.06 | 15.58 | 2.06 | 13.21 | 13.25 | 2.06 | 15.54 | 15.47 | 2.06 | 13.31 |
| 2005 | 19.00 | 18.00 | 13.35 | 13.58 | 13.31 | 13.29 | 12.37 | 12.75 | 18.09 | 18.09 | 18.10 | 18.62 | 15.71 | 2.75 | 17.51 | 13.47 | 2.75 | 20.43 | 12.56 | 2.75 | 21.90 |
| 2006 | 17.90 | 13.80 | 12.89 | 13.04 | 12.49 | 12.88 | 14.50 | 13.33 | 13.76 | 14.99 | 14.56 | 15.08 | 14.10 | 1.48 | 10.48 | 12.97 | 1.48 | 11.40 | 13.92 | 1.48 | 10.62 |
| 2007 | 16.12 | 16.11 | 15.70 | 15.16 | 15.93 | 16.68 | 17.25 | 18.52 | 20.78 | 22.36 | 32.40 | 29.52 | 19.71 | 5.71 | 28.98 | 15.43 | 5.71 | 37.02 | 17.89 | 5.71 | 31.94 |
| 2008 | 31.11 | 25.04 | 25.57 | 35.61 | 32.81 | 31.67 | 28.57 | 29.76 | 27.70 | 30.09 | 32.21 | 33.83 | 30.33 | 3.21 | 10.58 | 30.59 | 3.21 | 10.49 | 29.17 | 3.21 | 11.00 |

Source: Statistical Abstract, Department of Census and Statistics

## Appendix 1 C: Producer Price of Paddy in Kurunegala (Rs./Kg); 1990-2008

| Year | Jan. | Feb | Mar. | Apr. | May | Jun | Jul | Aug | Sep. | Oct | Nov | Dec | Annual | | | Seasonal-Maha | | | Seasonal-Yala | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | mean | SD | CV | mean | SD | CV | mean | SD | CV |
| 1990 | 8.80 | 7.71 | 6.86 | 6.68 | 5.84 | 6.66 | 6.63 | 6.28 | 6.92 | 7.31 | 7.88 | 7.43 | 7.08 | 0.80 | 11.23 | 6.77 | 0.80 | 11.75 | 6.46 | 0.80 | 12.32 |
| 1991 | 7.94 | 6.44 | 6.69 | 6.66 | 6.72 | 6.70 | 6.50 | 6.53 | 6.76 | 7.67 | 8.12 | 8.13 | 7.07 | 0.68 | 9.56 | 6.68 | 0.68 | 10.12 | 6.52 | 0.68 | 10.37 |
| 1992 | 9.24 | 8.05 | 7.47 | 7.24 | 8.09 | 7.97 | 7.87 | 7.69 | 7.96 | 8.51 | 9.09 | 9.01 | 8.18 | 0.65 | 7.90 | 7.36 | 0.65 | 8.78 | 7.78 | 0.65 | 8.30 |
| 1993 | 8.82 | 7.80 | 7.19 | 7.43 | 8.26 | 8.25 | 8.29 | 7.95 | 8.26 | 8.42 | 8.86 | 9.01 | 8.21 | 0.55 | 6.75 | 7.31 | 0.55 | 7.58 | 8.12 | 0.55 | 6.82 |
| 1994 | 8.54 | 7.91 | 7.59 | 7.16 | 6.78 | 7.46 | 7.61 | 7.44 | 7.28 | 7.35 | 8.03 | 8.16 | 7.61 | 0.48 | 6.33 | 7.38 | 0.48 | 6.53 | 7.53 | 0.48 | 6.40 |
| 1995 | 7.65 | 7.47 | 6.50 | 6.89 | 6.88 | 7.19 | 6.66 | 6.55 | 6.52 | 6.60 | 7.15 | 7.67 | 6.98 | 0.44 | 6.31 | 6.70 | 0.44 | 6.57 | 6.61 | 0.44 | 6.66 |
| 1996 | 8.04 | 8.31 | 8.11 | 8.15 | 8.50 | 9.88 | 10.56 | 10.97 | 11.76 | 11.88 | 12.45 | 12.19 | 10.07 | 1.77 | 17.62 | 8.13 | 1.77 | 21.81 | 10.77 | 1.77 | 16.47 |
| 1997 | 9.78 | 8.43 | 8.60 | 8.98 | 9.34 | 9.67 | 10.19 | 11.41 | 10.85 | 11.93 | 11.73 | 12.43 | 10.28 | 1.37 | 13.28 | 8.79 | 1.37 | 15.53 | 10.80 | 1.37 | 12.64 |
| 1998 | 10.59 | 9.37 | 9.18 | 8.90 | 9.52 | 9.56 | 8.95 | 8.96 | 9.12 | 9.17 | 10.37 | 10.38 | 9.51 | 0.61 | 6.38 | 9.04 | 0.61 | 6.71 | 8.96 | 0.61 | 6.78 |
| 1999 | 10.50 | 15.00 | 11.18 | 11.80 | 13.24 | 12.84 | 12.24 | 11.57 | 11.73 | 12.27 | 12.88 | 12.82 | 12.34 | 1.15 | 9.36 | 11.49 | 1.15 | 10.05 | 11.91 | 1.15 | 9.70 |
| 2000 | 11.98 | 9.86 | 9.18 | 9.31 | 9.25 | 8.85 | 11.50 | 12.00 | 9.95 | 10.04 | 11.65 | 11.74 | 10.44 | 1.23 | 11.77 | 9.25 | 1.23 | 13.30 | 11.75 | 1.23 | 10.46 |
| 2001 | 14.00 | 12.00 | 11.75 | 11.50 | 11.69 | 12.40 | 14.18 | 13.11 | 13.18 | 12.69 | 13.13 | 13.07 | 12.73 | 0.88 | 6.92 | 11.63 | 0.88 | 7.58 | 13.65 | 0.88 | 6.46 |
| 2002 | 13.79 | 14.23 | 12.30 | 12.96 | 12.70 | 13.41 | 12.13 | 12.22 | 14.91 | 12.98 | 12.98 | 13.61 | 13.19 | 0.85 | 6.41 | 12.63 | 0.85 | 6.69 | 12.18 | 0.85 | 6.94 |
| 2003 | 13.08 | 11.96 | 11.63 | 11.82 | 12.48 | 12.21 | 10.61 | 10.03 | 10.71 | 11.35 | 13.13 | 14.80 | 11.98 | 1.30 | 10.86 | 11.73 | 1.30 | 11.10 | 10.32 | 1.30 | 12.61 |
| 2004 | 17.35 | 15.67 | 14.07 | 15.37 | 15.07 | 15.54 | 17.01 | 17.21 | 17.71 | 18.13 | 21.69 | 19.19 | 17.00 | 2.08 | 12.24 | 14.72 | 2.08 | 14.13 | 17.11 | 2.08 | 12.16 |
| 2005 | 19.74 | 16.60 | 15.62 | 14.90 | 14.74 | 15.66 | 13.18 | 13.00 | 15.53 | 15.53 | 17.25 | 17.91 | 15.81 | 1.90 | 12.00 | 15.26 | 1.90 | 12.43 | 13.09 | 1.90 | 14.49 |
| 2006 | 16.70 | 13.83 | 13.11 | 12.90 | 13.00 | 12.50 | 13.41 | 13.42 | 13.40 | 14.25 | 15.82 | 16.92 | 14.11 | 1.52 | 10.77 | 13.01 | 1.52 | 11.68 | 13.42 | 1.52 | 11.32 |
| 2007 | 17.53 | 15.92 | 14.71 | 14.25 | 16.03 | 16.86 | 18.01 | 19.13 | 19.76 | 22.51 | 28.84 | 30.51 | 19.51 | 5.28 | 27.05 | 14.48 | 5.28 | 36.43 | 18.57 | 5.28 | 28.41 |
| 2008 | 33.75 | 25.06 | 25.77 | 32.56 | 32.19 | 33.95 | 23.09 | 28.20 | 28.46 | 31.47 | 32.40 | 34.44 | 30.11 | 3.86 | 12.83 | 29.17 | 3.86 | 13.25 | 25.65 | 3.86 | 15.06 |

Source: Statistical Abstract, Department of Census and Statistics

# Appendix 1 D:  Producer Price of Paddy in H.Jambantota (Rs./Kg); 1990-2008

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug | Sep. | Oct | Nov | Dec | Annual | | | Seasonal-Maha | | | Seasonal-Yala | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | mean | SD | CV | mean | SD | CV | mean | SD | CV |
| 1990 | 7.67 | 6.80 | 6.74 | 7.01 | 6.89 | 7.30 | 7.04 | 7.22 | 6.76 | 7.46 | 7.47 | 6.76 | 7.09 | 0.32 | 4.56 | 6.88 | 0.32 | 4.71 | 7.13 | 0.32 | 4.54 |
| 1991 | 9.06 | 9.08 | 7.18 | 6.78 | 6.94 | 6.98 | 7.81 | 7.48 | 7.50 | 7.52 | 7.76 | 7.91 | 7.67 | 0.75 | 9.74 | 6.98 | 0.75 | 10.70 | 7.65 | 0.75 | 9.77 |
| 1992 | 10.06 | 7.76 | 7.13 | 8.56 | 9.64 | 8.39 | 9.58 | 9.00 | 9.42 | 9.58 | 9.58 | 9.58 | 9.02 | 0.89 | 9.83 | 7.85 | 0.89 | 11.30 | 9.29 | 0.89 | 9.54 |
| 1993 | 8.62 | 8.19 | 8.13 | 7.57 | 9.46 | 8.17 | 9.58 | 8.96 | 9.34 | 8.43 | 9.76 | 9.78 | 8.83 | 0.75 | 8.45 | 7.85 | 0.75 | 9.51 | 9.27 | 0.75 | 8.05 |
| 1994 | 9.12 | 8.57 | 7.91 | 7.88 | 8.06 | 8.96 | 8.49 | 7.99 | 7.71 | 8.26 | 8.41 | 8.74 | 8.34 | 0.45 | 5.40 | 7.90 | 0.45 | 5.71 | 8.24 | 0.45 | 5.47 |
| 1995 | 9.36 | 9.58 | 7.48 | 7.53 | 7.57 | 8.50 | 8.55 | 7.79 | 7.53 | 7.93 | 9.19 | 9.40 | 8.37 | 0.83 | 9.93 | 7.51 | 0.83 | 11.08 | 8.17 | 0.83 | 10.17 |
| 1996 | 9.71 | 9.40 | 8.66 | 10.03 | 9.98 | 10.00 | 10.84 | 12.94 | 13.14 | 12.51 | 13.20 | 13.27 | 11.14 | 1.73 | 15.57 | 9.35 | 1.73 | 18.56 | 11.89 | 1.73 | 14.59 |
| 1997 | 13.42 | 10.05 | 9.76 | 10.04 | 10.31 | 10.47 | 10.63 | 10.74 | 11.67 | 11.92 | 13.87 | 13.30 | 11.35 | 1.46 | 12.89 | 9.90 | 1.46 | 14.78 | 10.69 | 1.46 | 13.69 |
| 1998 | 13.59 | 10.83 | 9.97 | 9.68 | 10.44 | 11.61 | 11.50 | 10.00 | 11.06 | 12.23 | 13.30 | 13.84 | 11.50 | 1.46 | 12.65 | 9.83 | 1.46 | 14.81 | 10.75 | 1.46 | 13.54 |
| 1999 | 13.12 | 13.22 | 13.32 | 15.03 | 13.96 | 13.17 | 14.22 | 14.08 | 13.43 | 13.40 | 12.90 | 14.00 | 13.65 | 0.61 | 4.48 | 14.18 | 0.61 | 4.31 | 14.15 | 2.43 | 17.16 |
| 2000 | 12.75 | 11.33 | 10.71 | 11.36 | 11.00 | 10.35 | 10.10 | 10.60 | 10.87 | 10.40 | 11.65 | 12.90 | 11.17 | 0.90 | 8.03 | 11.04 | 0.90 | 8.13 | 10.35 | 0.90 | 8.66 |
| 2001 | 12.62 | 12.94 | 12.61 | 12.46 | 12.67 | 13.12 | 13.50 | 13.75 | 13.81 | 14.50 | 16.75 | 16.00 | 13.73 | 1.39 | 10.10 | 12.54 | 1.39 | 11.06 | 13.63 | 1.39 | 10.18 |
| 2002 | 16.60 | 15.00 | 15.73 | 14.00 | 13.65 | 13.50 | 13.75 | 13.10 | 14.71 | 13.50 | 14.77 | | 14.39 | 1.08 | 7.50 | 14.87 | 1.08 | 7.26 | 13.43 | 1.08 | 8.04 |
| 2003 | 16.33 | 14.83 | 13.08 | 12.13 | 12.75 | 12.10 | 12.20 | 11.38 | 12.05 | 12.15 | 13.00 | 15.50 | 13.13 | 1.57 | 11.94 | 12.61 | 1.57 | 12.44 | 11.79 | 1.57 | 13.29 |
| 2004 | 16.00 | 15.83 | 15.00 | 16.10 | 17.00 | 17.50 | 19.67 | 17.90 | 17.90 | 17.75 | 21.40 | 21.43 | 17.79 | 2.09 | 11.77 | 15.55 | 2.09 | 13.47 | 18.79 | 2.09 | 11.15 |
| 2005 | 23.00 | 18.88 | 16.70 | 15.55 | 15.11 | 14.43 | 14.08 | 12.47 | 13.44 | 14.41 | 14.82 | 15.23 | 15.68 | 2.82 | 17.96 | 16.13 | 2.82 | 17.46 | 13.28 | 2.82 | 21.21 |
| 2006 | 14.47 | 13.54 | 13.16 | 12.93 | 12.47 | 12.39 | 12.50 | 11.87 | 12.70 | 13.29 | 14.90 | 16.57 | 13.40 | 1.32 | 9.88 | 13.05 | 1.32 | 10.15 | 12.19 | 1.32 | 10.87 |
| 2007 | 18.13 | 18.23 | 18.32 | 15.70 | 15.68 | 20.62 | 17.28 | 17.28 | 19.22 | 20.59 | 25.64 | 24.60 | 19.27 | 3.15 | 16.36 | 17.01 | 3.15 | 18.54 | 17.28 | 3.15 | 18.25 |
| 2008 | 31.33 | 26.72 | 30.42 | 33.60 | 33.50 | 36.12 | 29.55 | 29.03 | 27.78 | 30.00 | 32.00 | 33.33 | 31.12 | 2.72 | 8.75 | 32.01 | 2.72 | 8.51 | 29.29 | 2.72 | 9.30 |

Source: Statistical Abstract, Department of Census and Statistics

## Appendix 2: Lowest Farm-gate Price Received for Paddy in Selected Districts (Rs./kg); 1990-2008

| Year | Anuradhapura | | Polonnaruwa | | Kurunegala | | Hambantota | |
|------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|
| | Price | Month | Price | Month | Price | Month | Price | Month |
| 1990 | 6.02 | March | 6.07 | April | 5.84 | May | 6.74 | March |
| 1991 | 5.67 | March | 5.56 | April | 6.44 | February | 6.78 | April |
| 1992 | 6.99 | February | 6.95 | March | 7.24 | April | 7.13 | March |
| 1993 | 7.67 | April | 6.74 | April | 7.19 | March | 7.57 | April |
| 1994 | 6.80 | April | 6.77 | April | 6.78 | May | 7.71 | September |
| 1995 | 6.46 | April | 6.38 | March | 6.50 | March | 7.48 | March |
| 1996 | 7.52 | February | 7.65 | March | 8.04 | June | 8.66 | March |
| 1997 | 8.78 | February | 8.70 | March | 8.43 | February | 9.76 | March |
| 1998 | 8.92 | April | 8.10 | April | 8.90 | April | 9.68 | April |
| 1999 | 10.25 | April | 11.23 | February | 10.50 | June | 12.90 | November |
| 2000 | 7.94 | March | 8.32 | March | 8.85 | June | 10.10 | July |
| 2001 | 10.75 | April | 10.73 | April | 11.50 | April | 12.46 | April |
| 2002 | 11.99 | September | 10.96 | March | 12.13 | July | 13.10 | August |
| 2003 | 10.45 | May | 10.38 | August | 10.03 | August | 11.38 | August |
| 2004 | 11.88 | April | 13.04 | March | 14.07 | March | 15.00 | March |
| 2005 | 13.63 | August | 12.37 | July | 13.00 | August | 12.47 | August |
| 2006 | 12.67 | May | 12.49 | May | 12.50 | June | 11.87 | August |
| 2007 | 14.38 | March | 15.16 | April | 14.25 | April | 15.68 | May |
| 2008 | 22.92 | February | 25.04 | February | 23.09 | July | 26.72 | February |

Source: Statistical Abstract, Department of Census and Statistics

## Appendix 3 A: Producer Price Index of Paddy (Maha) – Base Year 1990=100

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average | Annual Change (%) |
|------|--------------|-------------|------------|------------|---------|-------------------|
| 1990 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 0.00 |
| 1991 | 91.69 | 91.31 | 98.60 | 101.53 | 95.78 | -4.22 |
| 1992 | 116.69 | 109.95 | 108.64 | 114.11 | 112.35 | 17.30 |
| 1993 | 125.65 | 105.79 | 107.98 | 114.18 | 113.40 | 0.94 |
| 1994 | 111.05 | 108.30 | 108.94 | 114.84 | 110.78 | -2.31 |
| 1995 | 106.53 | 102.19 | 98.89 | 109.16 | 104.20 | -5.94 |
| 1996 | 125.81 | 124.12 | 120.09 | 135.93 | 126.49 | 21.39 |
| 1997 | 151.85 | 139.94 | 129.84 | 144.00 | 141.41 | 11.80 |
| 1998 | 145.40 | 134.77 | 133.53 | 142.91 | 139.15 | -1.59 |
| 1999 | 182.58 | 180.89 | 169.72 | 206.18 | 184.84 | 32.83 |
| 2000 | 151.37 | 133.67 | 136.56 | 160.51 | 145.53 | -21.27 |
| 2001 | 183.31 | 178.00 | 171.71 | 182.33 | 178.84 | 22.89 |
| 2002 | 202.34 | 187.86 | 186.56 | 216.22 | 198.24 | 10.85 |
| 2003 | 177.66 | 176.04 | 173.19 | 183.35 | 177.56 | -10.43 |
| 2004 | 202.50 | 207.52 | 217.43 | 226.18 | 213.41 | 20.19 |
| 2005 | 235.00 | 210.88 | 225.41 | 234.55 | 226.46 | 6.12 |
| 2006 | 210.89 | 203.05 | 192.10 | 189.75 | 198.95 | -12.15 |
| 2007 | 234.44 | 241.66 | 213.88 | 247.42 | 234.35 | 17.80 |
| 2008 | 452.34 | 479.09 | 430.80 | 465.60 | 456.96 | 94.99 |

Source: Calculations based on Producer Price Data obtained from Statistical Abstract, Department of Census and Statistics

## Appendix 3 B:  Producer Price Index of Paddy *(Yala)* – Base Year 1990=100

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average | Annual Change (%) |
|------|-------------|-------------|------------|------------|---------|-------------------|
| 1990 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 0.00 |
| 1991 | 94.76 | 92.38 | 100.93 | 107.22 | 98.82 | -1.18 |
| 1992 | 109.36 | 103.88 | 120.53 | 130.29 | 116.02 | 17.40 |
| 1993 | 117.59 | 108.57 | 125.79 | 130.01 | 120.49 | 3.86 |
| 1994 | 113.02 | 110.26 | 116.58 | 115.57 | 113.86 | -5.51 |
| 1995 | 104.04 | 98.02 | 102.32 | 114.59 | 104.74 | -8.00 |
| 1996 | 152.99 | 150.70 | 166.77 | 166.76 | 159.31 | 52.09 |
| 1997 | 160.63 | 148.28 | 167.31 | 149.86 | 156.52 | -1.75 |
| 1998 | 158.61 | 141.32 | 138.73 | 150.77 | 147.36 | -5.85 |
| 1999 | 179.49 | 178.53 | 184.43 | 198.46 | 185.23 | 25.70 |
| 2000 | 173.50 | 178.39 | 182.03 | 145.16 | 169.77 | -8.35 |
| 2001 | 182.11 | 177.22 | 211.39 | 191.09 | 190.45 | 12.18 |
| 2002 | 185.55 | 179.78 | 188.61 | 188.29 | 185.56 | -2.57 |
| 2003 | 162.57 | 159.71 | 159.88 | 165.36 | 161.88 | -12.76 |
| 2004 | 232.26 | 226.67 | 265.07 | 263.46 | 246.86 | 52.50 |
| 2005 | 205.46 | 184.03 | 202.79 | 186.19 | 194.62 | -21.16 |
| 2006 | 201.57 | 203.88 | 207.82 | 170.90 | 196.04 | 0.73 |
| 2007 | 270.36 | 262.05 | 287.68 | 242.36 | 265.61 | 35.49 |
| 2008 | 430.91 | 427.33 | 397.29 | 410.80 | 416.58 | 56.84 |

Source: Calculations based on Producer Price Data obtained from Statistical Abstract, Department
of Census and Statistics

## Appendix 3 C:  Producer Price Index of Paddy (Average)-Base Year 1990=100

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average | Annual Change (%) |
|------|-------------|-------------|------------|------------|---------|-------------------|
| 1990 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 0.00 |
| 1991 | 100.04 | 95.70 | 99.84 | 108.08 | 100.91 | 0.91 |
| 1992 | 112.79 | 106.06 | 115.52 | 127.21 | 115.39 | 14.35 |
| 1993 | 119.17 | 107.51 | 115.93 | 124.52 | 116.78 | 1.20 |
| 1994 | 110.89 | 105.46 | 107.42 | 117.60 | 110.34 | -5.51 |
| 1995 | 101.56 | 97.46 | 98.51 | 117.96 | 103.87 | -5.87 |
| 1996 | 138.53 | 133.25 | 142.12 | 157.05 | 142.74 | 37.42 |
| 1997 | 154.29 | 143.14 | 145.11 | 159.99 | 150.63 | 5.53 |
| 1998 | 151.53 | 132.22 | 134.20 | 162.18 | 145.03 | -3.72 |
| 1999 | 176.55 | 172.01 | 174.20 | 192.49 | 178.81 | 23.29 |
| 2000 | 156.43 | 146.95 | 147.42 | 157.45 | 152.06 | -14.96 |
| 2001 | 176.55 | 171.15 | 179.65 | 193.53 | 180.22 | 18.52 |
| 2002 | 191.57 | 181.23 | 186.14 | 202.89 | 190.46 | 5.68 |
| 2003 | 174.50 | 165.89 | 169.19 | 185.03 | 173.65 | -8.82 |
| 2004 | 219.38 | 217.81 | 240.01 | 250.80 | 232.00 | 33.60 |
| 2005 | 232.31 | 219.60 | 223.13 | 221.01 | 224.01 | -3.44 |
| 2006 | 209.53 | 197.09 | 199.13 | 188.90 | 198.66 | -11.32 |
| 2007 | 280.74 | 275.48 | 275.36 | 271.72 | 275.83 | 38.84 |
| 2008 | 430.45 | 423.91 | 425.11 | 438.65 | 429.53 | 55.72 |

Source: Calculations based on Producer Price Data obtained from Statistical Abstract, Department
of Census and Statistics

## Appendix 4: Wage Rate Changes in Paddy Cultivation (Rs./man days):1990-2008

| Year | Polonnaruwa | Anuradhapura | Hambantota | Kurunegala | Average | % change |
|------|-------------|--------------|------------|------------|---------|----------|
| 1990 | 68 | 59 | 87 | 45 | 65 | 0 |
| 1991 | 77 | 66 | 100 | 59 | 75 | 17 |
| 1992 | 92 | 86 | 120 | 80 | 95 | 25 |
| 1993 | 96 | 101 | 122 | 88 | 102 | 7 |
| 1994 | 114 | 117 | 145 | 105 | 120 | 18 |
| 1995 | 149 | 138 | 147 | 119 | 138 | 15 |
| 1996 | 147 | 139 | 153 | 135 | 143 | 4 |
| 1997 | 158 | 151 | 169 | 152 | 157 | 10 |
| 1998 | 175 | 170 | 205 | 171 | 180 | 14 |
| 1999 | 188 | 194 | 230 | 179 | 198 | 10 |
| 2000 | 212 | 208 | 242 | 183 | 211 | 7 |
| 2001 | 239 | 222 | 256 | 203 | 230 | 9 |
| 2002 | 255 | 253 | 263 | 252 | 256 | 11 |
| 2003 | 270 | 263 | 284 | 263 | 270 | 6 |
| 2004 | 301 | 282 | 313 | 281 | 294 | 9 |
| 2005 | 333 | 323 | 344 | 304 | 326 | 11 |
| 2006 | 356 | 352 | 399 | 337 | 361 | 11 |
| 2007 | 410 | 380 | 491 | 380 | 415 | 15 |
| 2008 | 479 | 466 | 550 | 427 | 481 | 16 |

Source: Cost of Cultivation, Department of Agriculture

## Appendix 5: Wage Rate Index; 1990-2008

| Year | Polonnaruwa | Anuradhapura | Kurunegala | Hambantota | Average |
|------|-------------|--------------|------------|------------|---------|
| 1990 | 100 | 100 | 100 | 100 | 100 |
| 1991 | 113 | 112 | 130 | 115 | 118 |
| 1992 | 135 | 146 | 178 | 138 | 149 |
| 1993 | 141 | 170 | 194 | 140 | 162 |
| 1994 | 167 | 198 | 232 | 166 | 191 |
| 1995 | 219 | 234 | 264 | 169 | 222 |
| 1996 | 216 | 236 | 299 | 176 | 232 |
| 1997 | 232 | 256 | 338 | 194 | 255 |
| 1998 | 257 | 287 | 379 | 236 | 290 |
| 1999 | 276 | 329 | 397 | 264 | 316 |
| 2000 | 312 | 353 | 406 | 278 | 337 |
| 2001 | 351 | 376 | 451 | 294 | 368 |
| 2002 | 375 | 429 | 560 | 302 | 417 |
| 2003 | 396 | 446 | 584 | 326 | 438 |
| 2004 | 442 | 478 | 623 | 360 | 476 |
| 2005 | 490 | 547 | 676 | 395 | 527 |
| 2006 | 523 | 596 | 748 | 459 | 581 |
| 2007 | 603 | 643 | 843 | 564 | 663 |
| 2008 | 710 | 790 | 949 | 632 | 770 |

Source: Calculations based on data obtained from Cost of Cultivation, Department of Agriculture

## Appendix 6: Changes in Seed Paddy Price (Rs./kg) : 1990-2008

| Year | Polonnaruwa | Anuradhapura | Hambantota | Kurunegala | Average | % change |
|------|-------------|--------------|------------|------------|---------|----------|
| 1990 | 10 | 8 | 8 | 10 | 9 | 0 |
| 1991 | 9 | 9 | 9 | 12 | 10 | 12 |
| 1992 | 12 | 13 | 11 | 11 | 12 | 12 |
| 1993 | 12 | 11 | 11 | 12 | 11 | 8 |
| 1994 | 12 | 13 | 12 | 12 | 12 | 9 |
| 1995 | 12 | 12 | 13 | 7 | 11 | 8 |
| 1996 | 14 | 14 | 14 | 13 | 14 | 11 |
| 1997 | 15 | 14 | 16 | 15 | 15 | 8 |
| 1998 | 16 | 15 | 16 | 14 | 15 | 7 |
| 1999 | 19 | 18 | 18 | 16 | 18 | 8 |
| 2000 | 17 | 17 | 17 | 16 | 17 | 5 |
| 2001 | 19 | 19 | 17 | 19 | 18 | 6 |
| 2002 | 20 | 19 | 19 | 21 | 20 | 6 |
| 2003 | 22 | 22 | 21 | 23 | 22 | 6 |
| 2004 | 25 | 25 | 23 | 25 | 24 | 5 |
| 2005 | 27 | 25 | 25 | 27 | 26 | 4 |
| 2006 | 27 | 27 | 23 | 27 | 26 | 4 |
| 2007 | 33 | 30 | 25 | 28 | 29 | 4 |
| 2008 | 33 | 35 | 31 | 35 | 34 | 4 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

## Appendix 7: Changes in Retail Prices of Fertilizer at Farm Level: 1990-2008

| Year | Polonnaruwa | Anuradhapura | Hambantota | Kurunegala | Average | % change |
|------|-------------|--------------|------------|------------|---------|----------|
| 1990 | 7 | 7 | 10 | 7 | 8 | 0 |
| 1991 | 10 | 10 | 11 | 11 | 10 | 29 |
| 1992 | 10 | 10 | 10 | 10 | 10 | 0 |
| 1993 | 11 | 10 | 10 | 10 | 10 | 1 |
| 1994 | 10 | 10 | 11 | 10 | 10 | 0 |
| 1995 | 10 | 10 | 11 | 11 | 11 | 4 |
| 1996 | 11 | 11 | 11 | 11 | 11 | 4 |
| 1997 | 12 | 12 | 12 | 12 | 12 | 8 |
| 1998 | 11 | 11 | 10 | 11 | 11 | -11 |
| 1999 | 11 | 10 | 10 | 11 | 10 | -1 |
| 2000 | 11 | 10 | 11 | 11 | 11 | 2 |
| 2001 | 11 | 11 | 11 | 12 | 11 | 4 |
| 2002 | 12 | 11 | 12 | 14 | 12 | 11 |
| 2003 | 18 | 18 | 19 | 21 | 19 | 54 |
| 2004 | 18 | 19 | 19 | 20 | 19 | 0 |
| 2005 | 17 | 18 | 18 | 20 | 18 | -3 |
| 2006 | 10 | 7 | 7 | 11 | 9 | -53 |
| 2007 | 7 | 7 | 7 | 7 | 7 | -18 |
| 2008 | 7 | 7 | 7 | 7 | 7 | 0 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

## Appendix 8:  Machinery Cost Index: 1990-2008

| Year | Polonnaruwa | Anurahapura | Hambantota | Kurunegala | Average | % change |
|------|-------------|-------------|------------|------------|---------|----------|
| 1990 | 100 | 100 | 100 | 100 | 100 | 0 |
| 1991 | 109 | 87 | 110 | 114 | 105 | 5 |
| 1992 | 111 | 127 | 116 | 163 | 129 | 23 |
| 1993 | 132 | 156 | 117 | 208 | 153 | 18 |
| 1994 | 155 | 108 | 114 | 206 | 146 | -5 |
| 1995 | 167 | 152 | 142 | 213 | 169 | 16 |
| 1996 | 162 | 154 | 152 | 213 | 170 | 1 |
| 1997 | 173 | 212 | 177 | 280 | 211 | 24 |
| 1998 | 182 | 208 | 185 | 294 | 217 | 3 |
| 1999 | 183 | 232 | 189 | 296 | 225 | 4 |
| 2000 | 193 | 231 | 196 | 304 | 231 | 3 |
| 2001 | 224 | 242 | 230 | 339 | 258 | 12 |
| 2002 | 235 | 304 | 269 | 405 | 303 | 17 |
| 2003 | 260 | 327 | 271 | 408 | 317 | 4 |
| 2004 | 270 | 318 | 318 | 438 | 336 | 6 |
| 2005 | 331 | 355 | 319 | 489 | 373 | 11 |
| 2006 | 423 | 492 | 669 | 600 | 546 | 46 |
| 2007 | 443 | 503 | 753 | 682 | 595 | 9 |
| 2008 | 483 | 553 | 819 | 795 | 662 | 11 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

## Appendix 9:  Agro chemical Cost Index: 1990-2008

| Year | Polonnaruwa | Anurahapura | Hambantota | Kurunegala | Average | % change |
|------|-------------|-------------|------------|------------|---------|----------|
| 1990 | 100 | 100 | 100 | 100 | 100 | 0 |
| 1991 | 49 | 97 | 158 | 164 | 117 | 17 |
| 1992 | 93 | 139 | 218 | 139 | 147 | 26 |
| 1993 | 84 | 119 | 207 | 179 | 147 | 0 |
| 1994 | 116 | 126 | 246 | 250 | 185 | 25 |
| 1995 | 159 | 232 | 192 | 214 | 199 | 8 |
| 1996 | 143 | 265 | 201 | 186 | 199 | 0 |
| 1997 | 170 | 604 | 229 | 284 | 322 | 62 |
| 1998 | 178 | 241 | 269 | 230 | 230 | -29 |
| 1999 | 182 | 384 | 259 | 311 | 284 | 24 |
| 2000 | 210 | 422 | 308 | 385 | 331 | 17 |
| 2001 | 197 | 408 | 323 | 393 | 330 | 0 |
| 2002 | 215 | 409 | 329 | 411 | 341 | 3 |
| 2003 | 220 | 394 | 319 | 281 | 304 | -11 |
| 2004 | 184 | 507 | 338 | 456 | 371 | 22 |
| 2005 | 248 | 457 | 381 | 421 | 377 | 1 |
| 2006 | 244 | 604 | 337 | 417 | 401 | 6 |
| 2007 | 306 | 887 | 306 | 509 | 502 | 25 |
| 2008 | 324 | 1148 | 482 | 573 | 631 | 26 |

Source: Cost of Cultivation for *Maha* and *Yala* seasons, Department of Agriculture, 1990-2008

## Annexure 10 A: Weighted Index Values of Inputs-Polonnaruwa District :1990-2008

| Year | Labour | Seeds | Fertiliser | Machinery | Agro chemical | Total | % change |
|------|--------|-------|-----------|-----------|--------------|-------|----------|
| 1990 | 48 | 5 | 14 | 26 | 8 | 100 | 0 |
| 1991 | 54 | 5 | 19 | 28 | 4 | 109 | 9 |
| 1992 | 64 | 6 | 20 | 28 | 7 | 126 | 15 |
| 1993 | 67 | 6 | 21 | 34 | 6 | 134 | 7 |
| 1994 | 79 | 6 | 20 | 40 | 9 | 154 | 15 |
| 1995 | 104 | 6 | 20 | 43 | 12 | 186 | 20 |
| 1996 | 103 | 7 | 22 | 41 | 11 | 184 | -1 |
| 1997 | 110 | 8 | 23 | 44 | 13 | 198 | 7 |
| 1998 | 122 | 8 | 21 | 46 | 14 | 212 | 7 |
| 1999 | 131 | 10 | 21 | 47 | 14 | 223 | 5 |
| 2000 | 148 | 9 | 22 | 49 | 16 | 245 | 10 |
| 2001 | 167 | 10 | 22 | 57 | 15 | 272 | 11 |
| 2002 | 179 | 11 | 24 | 60 | 17 | 289 | 7 |
| 2003 | 189 | 12 | 36 | 66 | 17 | 320 | 10 |
| 2004 | 210 | 13 | 36 | 69 | 14 | 342 | 7 |
| 2005 | 233 | 14 | 34 | 84 | 19 | 385 | 12 |
| 2006 | 249 | 14 | 19 | 108 | 19 | 409 | 6 |
| 2007 | 287 | 17 | 14 | 113 | 24 | 455 | 11 |
| 2008 | 338 | 18 | 14 | 123 | 25 | 518 | 14 |
| Mean | 152 | 10 | 22 | 58 | 14 | 256 | |
| SD | 83 | 4 | 6 | 29 | 6 | 122 | |
| CV | 54 | 41 | 29 | 50 | 40 | 48 | |

Source: Calculation based on data obtained from Department of Census and Statistics

## Annexure 10 B: Weighted Index Values of inputs- Anuradhapura District : 1990-2008

| Year | Labour | Seeds | Fertiliser | Machinery | Agro Chemical | Total | % change |
|------|--------|-------|-----------|-----------|--------------|-------|----------|
| 1990 | 50 | 6 | 13 | 24 | 6 | 100 | 0 |
| 1991 | 56 | 7 | 19 | 21 | 6 | 109 | 9 |
| 1992 | 74 | 10 | 19 | 30 | 9 | 142 | 30 |
| 1993 | 86 | 9 | 19 | 37 | 8 | 158 | 11 |
| 1994 | 100 | 10 | 19 | 25 | 8 | 163 | 3 |
| 1995 | 118 | 10 | 19 | 36 | 15 | 197 | 21 |
| 1996 | 119 | 11 | 21 | 36 | 17 | 204 | 4 |
| 1997 | 129 | 11 | 22 | 50 | 38 | 251 | 23 |
| 1998 | 145 | 12 | 20 | 49 | 39 | 265 | 5 |
| 1999 | 166 | 14 | 19 | 55 | 62 | 315 | 19 |
| 2000 | 178 | 14 | 19 | 55 | 68 | 332 | 5 |
| 2001 | 190 | 15 | 21 | 49 | 15 | 290 | -13 |
| 2002 | 216 | 15 | 21 | 55 | 24 | 332 | 14 |
| 2003 | 225 | 18 | 34 | 55 | 27 | 358 | 8 |
| 2004 | 241 | 20 | 35 | 57 | 26 | 380 | 6 |
| 2005 | 276 | 20 | 34 | 72 | 26 | 428 | 13 |
| 2006 | 301 | 22 | 13 | 77 | 25 | 438 | 2 |
| 2007 | 325 | 24 | 13 | 75 | 32 | 469 | 7 |
| 2008 | 399 | 28 | 13 | 84 | 29 | 553 | 18 |
| Mean | 179 | 15 | 20 | 50 | 25 | 289 | |
| SD | 97 | 6 | 7 | 19 | 17 | 129 | |
| CV | 54 | 41 | 33 | 38 | 69 | 45 | |

Source: Calculation based on data obtained from Department of Census and Statistics

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## Annexure 10C: Weighted Index Values of Inputs -Kurunegala District: 1990-2008

| Year | Labour | Seeds | Fertiliser | Machinery | Agro Chemical | Total | % change |
|---|---|---|---|---|---|---|---|
| 1990 | 51 | 6 | 14 | 22 | 7 | 100 | 0 |
| 1991 | 66 | 7 | 21 | 24 | 11 | 130 | 30 |
| 1992 | 91 | 7 | 21 | 35 | 9 | 163 | 25 |
| 1993 | 99 | 7 | 21 | 45 | 12 | 184 | 13 |
| 1994 | 119 | 7 | 21 | 44 | 17 | 208 | 13 |
| 1995 | 135 | 8 | 21 | 46 | 15 | 224 | 8 |
| 1996 | 153 | 8 | 23 | 46 | 13 | 242 | 8 |
| 1997 | 173 | 9 | 25 | 60 | 19 | 286 | 18 |
| 1998 | 194 | 9 | 22 | 63 | 16 | 303 | 6 |
| 1999 | 203 | 10 | 21 | 64 | 21 | 318 | 5 |
| 2000 | 207 | 12 | 21 | 65 | 26 | 331 | 4 |
| 2001 | 231 | 12 | 23 | 73 | 27 | 365 | 10 |
| 2002 | 286 | 13 | 23 | 87 | 28 | 437 | 20 |
| 2003 | 299 | 14 | 37 | 88 | 19 | 457 | 5 |
| 2004 | 319 | 15 | 39 | 94 | 31 | 498 | 9 |
| 2005 | 345 | 16 | 37 | 105 | 29 | 533 | 7 |
| 2006 | 382 | 16 | 14 | 129 | 28 | 571 | 7 |
| 2007 | 431 | 17 | 14 | 147 | 35 | 644 | 13 |
| 2008 | 485 | 22 | 14 | 171 | 39 | 732 | 14 |
| Mean | 225 | 11 | 23 | 74 | 21 | 354 | |
| SD | 126 | 5 | 7 | 41 | 9 | 180 | |
| CV | 56 | 40 | 33 | 55 | 43 | 51 | |

Source: Calculation based on data obtained from Department of Census and Statistics

## Annexure 10D: Weighted Index Values of Inputs -Hambantota District-:1990-2008

| Year | Labour | Seeds | Fertiliser | Machinery | Agro chemical | Total | % change |
|---|---|---|---|---|---|---|---|
| 1990 | 46 | 8 | 12 | 24 | 9 | 100 | 0 |
| 1991 | 53 | 9 | 13 | 26 | 15 | 117 | 17 |
| 1992 | 64 | 11 | 12 | 28 | 21 | 136 | 16 |
| 1993 | 65 | 11 | 12 | 28 | 20 | 136 | 1 |
| 1994 | 77 | 12 | 13 | 27 | 23 | 152 | 12 |
| 1995 | 78 | 13 | 14 | 34 | 18 | 157 | 3 |
| 1996 | 81 | 14 | 14 | 36 | 19 | 164 | 5 |
| 1997 | 89 | 16 | 14 | 42 | 22 | 184 | 12 |
| 1998 | 109 | 16 | 12 | 44 | 25 | 207 | 12 |
| 1999 | 122 | 18 | 12 | 45 | 24 | 222 | 7 |
| 2000 | 129 | 17 | 14 | 47 | 29 | 235 | 6 |
| 2001 | 136 | 17 | 13 | 55 | 30 | 251 | 7 |
| 2002 | 140 | 19 | 15 | 64 | 31 | 269 | 7 |
| 2003 | 151 | 21 | 24 | 65 | 30 | 290 | 8 |
| 2004 | 166 | 23 | 23 | 76 | 32 | 320 | 10 |
| 2005 | 183 | 25 | 22 | 76 | 36 | 342 | 7 |
| 2006 | 212 | 23 | 9 | 160 | 32 | 435 | 27 |
| 2007 | 260 | 25 | 9 | 180 | 29 | 503 | 16 |
| 2008 | 292 | 29 | 9 | 196 | 45 | 571 | 14 |
| Mean | 129 | 17 | 14 | 66 | 26 | 252 | |
| SD | 69 | 6 | 4 | 53 | 8 | 132 | |
| CV | 54 | 34 | 31 | 80 | 32 | 53 | |

Source: Calculation based on data obtained from Department of Census and Statistics

## Appendix 11: Composite Index of Inputs in Selected Districts; 1990-2008

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average |
|------|--------------|-------------|------------|------------|---------|
| 1990 | 100 | 100 | 100 | 100 | 100 |
| 1991 | 109 | 109 | 130 | 117 | 116 |
| 1992 | 142 | 126 | 163 | 136 | 141 |
| 1993 | 158 | 134 | 184 | 136 | 153 |
| 1994 | 163 | 154 | 208 | 152 | 169 |
| 1995 | 197 | 186 | 224 | 157 | 191 |
| 1996 | 204 | 184 | 242 | 164 | 199 |
| 1997 | 251 | 198 | 286 | 184 | 230 |
| 1998 | 265 | 212 | 303 | 207 | 247 |
| 1999 | 315 | 223 | 318 | 222 | 269 |
| 2000 | 332 | 245 | 331 | 235 | 286 |
| 2001 | 290 | 272 | 365 | 251 | 294 |
| 2002 | 332 | 289 | 437 | 269 | 332 |
| 2003 | 358 | 320 | 457 | 290 | 356 |
| 2004 | 380 | 342 | 498 | 320 | 385 |
| 2005 | 428 | 385 | 533 | 342 | 422 |
| 2006 | 438 | 409 | 571 | 435 | 463 |
| 2007 | 469 | 455 | 644 | 503 | 518 |
| 2008 | 553 | 518 | 732 | 571 | 594 |

Source: Calculations based on data obtained from Cost of Cultivation,
Department of Agriculture

## Appendix 12A: Terms of Trade in Paddy in Selected Districts
### (*Maha* Season)

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average |
|------|--------------|-------------|------------|------------|---------|
| 1990 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1991 | 0.84 | 0.84 | 0.76 | 0.87 | 0.83 |
| 1992 | 0.82 | 0.87 | 0.67 | 0.84 | 0.80 |
| 1993 | 0.80 | 0.79 | 0.59 | 0.84 | 0.75 |
| 1994 | 0.68 | 0.70 | 0.52 | 0.75 | 0.67 |
| 1995 | 0.54 | 0.55 | 0.44 | 0.69 | 0.56 |
| 1996 | 0.62 | 0.67 | 0.50 | 0.83 | 0.65 |
| 1997 | 0.60 | 0.71 | 0.45 | 0.78 | 0.64 |
| 1998 | 0.55 | 0.64 | 0.44 | 0.69 | 0.58 |
| 1999 | 0.58 | 0.81 | 0.53 | 0.93 | 0.71 |
| 2000 | 0.46 | 0.55 | 0.41 | 0.68 | 0.52 |
| 2001 | 0.63 | 0.66 | 0.47 | 0.73 | 0.62 |
| 2002 | 0.61 | 0.65 | 0.43 | 0.80 | 0.62 |
| 2003 | 0.50 | 0.55 | 0.38 | 0.63 | 0.51 |
| 2004 | 0.53 | 0.61 | 0.44 | 0.71 | 0.57 |
| 2005 | 0.55 | 0.55 | 0.42 | 0.69 | 0.55 |
| 2006 | 0.48 | 0.50 | 0.34 | 0.44 | 0.44 |
| 2007 | 0.50 | 0.53 | 0.33 | 0.49 | 0.46 |
| 2008 | 0.82 | 0.92 | 0.59 | 0.82 | 0.79 |

Source: Calculations based on Cost of Cultivation, Department of Agriculture

## Appendix 12 B:Terms of Trade in Paddy in Selected Districts (*Yala* Season)

| Year | Anuradhapura | Polonnaruwa | Kurunegala | Hambantota | Average |
|------|--------------|-------------|------------|------------|---------|
| 1990 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1991 | 0.87 | 0.85 | 0.78 | 0.92 | 0.85 |
| 1992 | 0.77 | 0.82 | 0.74 | 0.96 | 0.82 |
| 1993 | 0.74 | 0.81 | 0.68 | 0.95 | 0.80 |
| 1994 | 0.69 | 0.72 | 0.56 | 0.76 | 0.68 |
| 1995 | 0.53 | 0.53 | 0.46 | 0.73 | 0.56 |
| 1996 | 0.75 | 0.82 | 0.69 | 1.01 | 0.82 |
| 1997 | 0.64 | 0.75 | 0.58 | 0.81 | 0.70 |
| 1998 | 0.60 | 0.67 | 0.46 | 0.73 | 0.61 |
| 1999 | 0.57 | 0.80 | 0.58 | 0.89 | 0.71 |
| 2000 | 0.52 | 0.73 | 0.55 | 0.62 | 0.60 |
| 2001 | 0.63 | 0.65 | 0.58 | 0.76 | 0.66 |
| 2002 | 0.56 | 0.62 | 0.43 | 0.70 | 0.58 |
| 2003 | 0.45 | 0.50 | 0.35 | 0.57 | 0.47 |
| 2004 | 0.61 | 0.66 | 0.53 | 0.82 | 0.66 |
| 2005 | 0.48 | 0.48 | 0.38 | 0.54 | 0.47 |
| 2006 | 0.46 | 0.50 | 0.36 | 0.39 | 0.43 |
| 2007 | 0.58 | 0.58 | 0.45 | 0.48 | 0.51 |
| 2008 | 0.78 | 0.82 | 0.54 | 0.72 | 0.70 |

Source: Calculations based on Cost of Cultivation, Department of Agriculture

## Appendix 13: GDP Deflator Index 1996=100

| Year | Value | Year | Value |
|------|-------|------|-------|
| 1990 | 56.3 | 2000 | 131.3 |
| 1991 | 62.5 | 2001 | 147.6 |
| 1992 | 68.8 | 2002 | 160 |
| 1993 | 75.3 | 2003 | 168.2 |
| 1994 | 82.3 | 2004 | 183.0 |
| 1995 | 89.2 | 2005 | 201.1 |
| 1996 | 100 | 2006 | 224.9 |
| 1997 | 108.6 | 2007 | 256.4 |
| 1998 | 117.8 | 2008 | 298.3 |
| 1999 | 123.1 | 2009 | 315.1 |

Source: Annual Report (2009),Central Bank of Sri Lanka