

# **FORCASTING THE PADDY PRODUCTION IN SRI LANKA**

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**Year: 2003**

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Thesis submitted to the university of Sri Jayewardenepura for award of the degree of Master of Philosophy in Statistics on 31/12/2003.

The work described in this Thesis was carried out by me under the supervision of Prof. R. A. Dayananda and Mr. P. Dias and a report on this has not been submitted to any university for another degree.

Date: 21/12/2003



Signature  
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I / We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the university for the purpose of evaluation.

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## **Abstract**

This thesis deals with modeling the paddy production in Sri Lanka and Anuradhapura District. In this study the average production have been modeled for each season. The time series techniques especially ARIMA models have been used to perform statistical analysis of the data, collected by the Department of Census and Statistics, on paddy cultivation. Satisfactory models have been fitted to average paddy production per hectare in Sri Lanka and Anuradhapura district seperately. Models were fitted for both Yala and Maha seasons. It was found that the models fitted are suitable for forecasting paddy production in the country and Anuradhapura district provided that the area sown is known.

## Acknowledgments

This postgraduate thesis on Forecasting the Paddy Production in Sri Lanka would have been an unbearably tiresome task if not for the invaluable services rendered by notable academics to whom I yearn to offer my deepest appreciation and gratitude.

First of all, I wish to express my deepest gratitude to my supervisors Prof. R. A. Dayananda and Mr. P. Dias, Department of Statistics and Computer Science, University of Sri Jayewardenepura, for their able guidance, kind advice and suggestions to complete my thesis successfully.

Further I wish to convey my sincere thanks to my colleagues in the Department of Physical Science, Vavuniya Campus for assisting me to accomplish this task.

Eventually, I am obliged to my family members for their unrelenting encouragement especially throughout the period of preparation and documentation of this thesis.

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# Chapter 1

## Introduction

### 1.1 General Background

Rice is the staple food of the nation of Sri Lanka and evidently paddy cultivation has taken prominence over all other food crops since the ancient times. Promotion of paddy cultivation towards self-sufficiency in rice has always been the ambitious goal of the responsible authorities. Many projects were launched and policies were formulated to accomplish this. As a result paddy cultivation has taken vast strides since independence and currently paddy production is very close to the anticipated level. The Mahaweli development project has contributed enormously for this success while research and extension services also have made a great impact on the cultivation practices, thus boosting the production. But attention should be drawn to the fact that there is room for further improvement by finding ways and means of fully utilizing the general cultivable area referred as asweddumised area later extent especially in the Yala season in which more than 50% of the paddy lands lie uncultivated([21], [25]).

## **1.2 Paddy Production Seasons**

Adequate and properly regulated supply of water is one of the main requirements of paddy cultivation. As such rainfall, availability of irrigation water and water control patterns determine the production of paddy. The main source of water is the monsoon rains. Sri Lanka comes under the influence of the South-West monsoon and North-East monsoon, which bring the monsoon rains. There are two recognized seasons of paddy production based on the rainfall distribution.

1. Maha season coincides with the North-East monsoon.
2. Yala season coincides with the South-West monsoon.

During the Maha season the paddy production is spread over the entire country from October to December. Harvesting begins in January and continues till the end of March. During the Yala season (from May to September) the production is mainly confined to the wet zone and to the major irrigation schemes in the dry zone. Although paddy is grown in both seasons, Maha and Yala, the major season is Maha the crops in which contribute around 65% to the annual production. There is an increase in the extent under cultivation, especially in the dry zone due to availability of water from the North-East monsoon rains during the Maha season. The cropping intensity, that is a ratio of cultivated extent to asweddumized area, is around 75% in Maha season and Yala season is around 40%.

## **1.3 Area of Sown**

Sri Lanka has 6.55 million hectares of asweddumized land available for paddy cultivation of which only 560,000 hectares in Maha and 310,000 hectares in Yala are cultivated due to the limited availability of irrigation water. This is hardly surprising as rice cultivation in rainfed and minor irrigation environments, which comprise 36 and 23 percent respectively, is associated with risk of crop loss due to vagaries of weather, mainly

inadequate rainfall. Thus, the average annual extent sown to rice is about 870,000 hect. with an annual rough rice production of 2.7 million tons. With an estimated per capita consumption of about 96 kg per annum, this amount fulfils about 90% of the local demand.([22], [25])

#### **1.4 Paddy Production**

Although paddy is grown in both seasons, Maha and Yala, the major season is Maha the crops in which contribute around 65% to the annual production. There is an increase in the extent under cultivation, especially in the dry zone due to availability of water from the North-East monsoon rains during the Maha season. The cropping intensity, that is a ratio of cultivated extent to asweddumized area, is around 75% in Maha season and Yala is around 40%.

#### **1.5 Focus on Anuradhapura**

Another notable feature is that 60% of the production is from five districts together with the Mahaweli H area. In the Yala season, Ampara district alone contributes 21% to the total production. Anuradhapura district and the Mahaweli H are important as they produce 8% and 6% of the Maha production respectively. Any development programs on paddy should focus on these areas first and their maximum potential should be exploited to feed the country's growing population. Anurathapura district has also same pattern of rainfall system like the other part of country.[25]

#### **1.6 Extent Under Paddy Cultivation**

The cultivated extent has direct impact on the volume of paddy production. Paddy is grown under all three modes of water supply: major irrigation, minor irrigation and rainfed conditions. Although major irrigation facilities have been developed, over 40% of the paddy lands in Maha and over 50% in Yala are still under minor irrigation and are

rainfed and under direct influence of seasonal rains. Therefore, it is important that minor irrigation schemes and small tanks should be rehabilitated to increase cropping intensity.

## **1.7 Average Yield**

Yield is often influenced by technology and reflects an efficiency in farming. Yield is defined as the output for a given unit of input such as land, labour and capital. Average yield indicates the level of land productivity. However, labour productivity and the rate of return, that is return on capital, are important factors, especially in commercial farming.

## **1.8 Labour Force**

Ten of the total population or 800,000 farm families depend on paddy cultivation for their livelihood. The rice sector accounts for the direct or indirect involvement of 30% of the labour force and contributes about 16% to the agricultural income within the country. Rice plays an important role in the nutrition of the average Sri Lankan, as it provides 45% of the calorie and 40% of the protein requirements and constitutes 68% of the total cereal consumption.

## **1.9 Future Challenges**

Challenges faced by Sri Lanka is provision of full employment to the paddy farmers. This has become important because paddy farmers incomes have dropped significantly with the liberalized economic system. Possible areas that should be considered are increased value addition through undertaking activities such as strong, processing, transporting and provision of on and off-farm employment opportunities. Livestock farming is one area in this regard. Demand for livestock products, such as milk powder and poultry meat is growing.

With increasing urbanization and income of the country, consumers prefer quality products and convenient foods such as fast food items. This trend has already started. Rice without sand has good demand and demand for rice flour is growing. Most of the paddy millers do not have adequate facilities to produce quality rice. In future, paddy processing industry needs to be upgraded to cater to market demand.

## **1.10 Objective**

The main objective of this study is, by using the time series techniques for average paddy production, to develop a model which can be used to forecast future paddy production level in our country.

## **1.11 Methodology**

### **1.11.1 Data Collection**

The Department of Census and Statistics has been conducting survey on the acreage and yield on paddy cultivation. The department collects data on sown and harvested paddy acreage on a complete enumeration basis. Data obtained at village levels are consolidated up to AGA division and then up to district levels and the whole island for each season. Again the parcels are classified by mode of irrigation major, minor and rainfed ([10]). Here we are used the data from 1969 to 1995 to fit a model for the paddy production in Sri Lanka and Anurathapura district for each season.

### **1.11.2 Model Selection**

Here the average paddy production has been used as time series data.

First the series was plotted and examine the main features of the graph, checking in particular if there is a trend, a seasonal component, any apparent sharp changes in behavior, or any outlying observations. The trend and seasonal components were