RICE PINCH TO WAR THROWN NATION: AN OVERVIEW OF THE RICE SUPPLY CHAIN OF SRI LANKA AND THE CONSUMER ATTITUDES ON GOVERNMENT RICE RISK MANAGEMENT

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ABSTRACT

Rice is staple for 2 million people in war thrown nation devastated by tsunami. This is the second year running in which production increased in real terms through out past has failed to keep pace with population growth. The harvest has also been hit by floods and unusual wet weather. Time series forecasting analysis based on the secondary data was carried out to identify the past, present and future trends of rice production, prices and self sufficiency level. Focus group discussions and field observations used to construct the rice trading pattern. Primary data on consumer attitudes on government rice risk management obtained through the field survey. The study locations include both major rice growing areas (Hambantota, Anuradhapura and Pollonnnaruwa) as well as important consumer hubs (Colombo, Ratnapura, Galle, Matara and Hambantota). Cultivated and harvested land extends and yield have positive increasing trend while simple time series modeler explains the increasing trend of retail prices. Private sector is playing a very important role in rice marketing channel where government intervention is minimal. Behavior of the rice processors has direct impact on the availability of rice and the pricing in dome market. Consumers have negative attitudes on government rice risk management and they are not confident on state intervention.

Key words*: Rice, Sri Lanka, time series forecasting, consumer attitudes.*

INTRODUCTION

World's biggest rice producers are developing nations, except China, to whom rice is staple to their diet. Especially the 2/3 of the world's poor is depending on rice or food subsidies from their own governments. As harvests are always subject to risks, a potential exporter may temporarily become a rice importer, consequently changing its trading policy ex. Vietnam, India, Thailand and Mynanmar (UNCTAD, 2008). Rice staple to the 19.8 million inhabitants in Sri Lanka where people used to consume minimum two rice based meals per day. More often Sri Lankans used to take 3 meals based on rice and curry. Globalization changes the food habits of the people around the world including tiny Asian island. Today, most of the urban dwellers in Sri Lanka used to take one or two rice based meals. Majority of the middle class consumers seeking convenience and especially the preference of working mothers goes for bread or "take away" meals. The per capita consumption of rice fluctuates around 100 Kg/year depending on the price of rice, bread and wheat flour (Ministry of Agriculture, 2000). Rice is the single most important crop occupying 34% (0.77/million/ha) of the total cultivated area in Sri Lanka ((Ministry of Agriculture, 2000). On average 560,000 ha are cultivated during Maha season (October to February) and 310,000 ha during Yala season (May to September) making the average annual extent shown with rice to about 870,000 ha (Ministry of Agriculture, 2000). About 1.8 million farm families are engaged in paddy cultivation. Country currently produces 2.7 million tones of rough rice annually and satisfies around 95% of the domestic requirement and imported 88,000 MT

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milled rice (Department of Census and statistics, 2007). Rice provides 45% of total calorie and 40% of total protein requirement of an average Sri Lankan. According to the projections of Ministry of Agriculture, the demand for rice will increase at 1.1% year and to meet this rice production should grow at the rate of 2.9%/year. Current cost of production of rough paddy is about Rs. 8.57/Kg (Department of Census and statistics, 2006). The cost of labor, farm power and tradable inputs consists of 55%, 23% and 23% respectively in total rice production (Ministry of Agriculture, 2005). Global as well as local demand for rice will increase at 1.62% per annum making the tradable rice volume to be doubled in another 20 years time (Ministry of Agriculture, 2005). In general, milled brown and white rice are marketed in wholesale trade. Producers used to sell paddy to millers and paddy is not distribute through the proper channel.

Research problem

According to the Food and Agriculture Organization (FAO, 2007), global food process rose by 40% in 2007. Producing the highest food cost level on record making 2007 as a year of food price hyper inflation. The world's most vulnerable millions of people are facing starvation. The economists and the heads of the international financial institutions world over have cited at least four reasons for the price increase: oil prices, climate, market speculation and economic boom. Oil price hike has both direct and indirect involvement with the recent food crises as a net importer of crude oil (In 1983 inflation adjusted price of barrel of crude oil had been 25 US$ and it was reached to 100 US$ in 2007 and pass 135 US$ in May 2008). Recent rice riots, the surge in the volume of mass media coverage about rice shortages and the political panic about agricultural policies especially changing rice policy direct us to investigate on current topic. The principal research

questions were what will be the shape of the retail rice price curve in future? and what are the future production trends?. Moreover, this study aims to investigate the seasonal gults and shortages of rice prices in retail market. Spiraling rice prices have left the people of war thrown country facing their worst food shortages since 1970s'. This study aims to understand whether the Sri Lankan consumers are confident in government intervention in recent rice crises or not?

Objectives of the study

1. To investigate the past, present and future trends of rice production, price, marketing and consumption in Sri Lanka
2. To analyze the consumer attitudes on government in rice risk management in Sri Lanka while facing the civil war

This paper consists of three main parts. First part is covering the introductory note following the history of rice marketing in Sri Lanka. The body of the paper consists of methodology and findings. Final part composted of concluding remarks together with recommendations for future policy.

MATERIALS AND METHODS

Major focuses of the study were three fold; first to perform forecasting analysis for the rice production in Sri Lanka, imports and market prices to examine the future trends of Sri Lankan rice market. Time series forecasting analysis was utilized the published secondary data of the Department of Census and Statistics, Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI), Department of Sri Lanka Customs and annual reports of Central Bank of Sri Lanka. Time period for the production data was 1952 to 2007 and retail prices and import figures were taken from mid 1990s to 2007 for the analysis. Moreover, time series forecasting analysis was carried out

using SPSS 16 analysis package (SPSS inc. 2007). The retail prices of three common varieties of rice in domestic market were used for the analysis. Simple seasonal time series model was used to observe the future trends of rice prices.

Second focus of the study was to investigate using the primary data collected by different destinations of the island. Primary data on consumer's confidence on government rice risk management attitudes were obtained through the field survey. Study locations included both major rice growing areas as well as important consumer hubs in main cities. The selected cities were Colombo, Ratnapura, Galle, Matara and Hambantota. Thirty consumers from each location were randomly selected to measure their attitudes on food risk management or confidence in government intervention on current rice crises. Primary data were collected through self administered structured questionnaire. Consumer attitudes were tested using attitudes survey and "t" test was used to analyze the significance of the test.

Food shoppers were tested using 10 attributes on government rice risk management. Interviews were conducted during the weekend. In general, many people used to shop for food during the weekend and grocery stores are packed by food shoppers. Study locations of the each destination were the rice retailers, grocery stores, supermarkets and weekly direct markets (fair or Pola). Seventy five consumers from supermarkets and 75 from other type of retailers were selected to collect the primary data. Every 5th food shopper was selected and asked to answer the structured questionnaire. When 5th consumer refused to answer and then requested from the 6th. Five point Likert type response format were used to measure their attitudes on government intervention on rice risk management Survey was not intended to collect details

about consumers and length of the survey was about 10 minutes. The questionnaire was focused on two main areas, demographics and confidence in rice risk management. Table 1 describes the details of the demographics and their occurrence.

Focus group discussions and field observations were carried out using experienced field workers were used to collect the data on existing rice trading pattern of Sri Lanka. Discussions were conducted at major rice growing areas in South, North-East, Central, Sabaragamuwa and Western provinces. Primary data were collected through case study approach from retailers, wholesalers, millers, traders, middlemen, importers and consumers.

Table 01: Demographics and their occurrence in the sample

Demographic feature	Percentage
1. Age (Years)	
<20	2
21 – 30	18.67
31 – 40	40.67
41 – 51	21.33
51 -60	10.67
60<	6.66
2. Gender	
Male	29.33
Female	70.67
3. Level of income (Rupees/Month)	
<5000.00	4
5001.00 – 10,000.00	16
10001.00 – 15,000.00	28.67
15001.00 – 20,000.00	38
20001.00 – 25,000.00	7.33
>25,001.00	6
4. Health Consciousness	
Yes	81.33
No	18.67
5. Level of Education	
Primary education	7.33
G.C.E. O/L pass	17.33
G.C.L. A/L pass	51.33
Degree holders	24
6. Employment	
House wife	5.33
Self employment	2.67
Laborer	8.67
Clerical staff and teachers	41.33
Mid level executives	24
Executives and higher	18

(Currency conversion 1 US$ = 107.92 Rupees; G.C.E. O/L – General Certificate Examination of Ordinary Level; G.C.E. A/L - General Certificate Examination of Advanced Level)
Source: Field survey, February, 2008.

RESULTS AND DISCUSSION

Major concerns of the study were to analyze the present and future market trends of retail prices, rice production, imports and self sufficiency in Sri Lanka.

Time series forecasting analysis utilized rice production data from 1952 to 2008. Holt time series modeler was used to forecast the future trends of extend of paddy shown; extend of harvest, average yield and production. Figure 1 explains the pattern of rice production within the last five decades and drastic fluctuations of the curve. Especially, harvested land extend is always lowered than the shown area. Adverse climatic changes are badly affected the expected rice yield. Crops have been constrained by adverse weather often associated with "La Nina" conditions (Zubair, 2002, Zubair and Simasundara, 2000). Temperature increases, rising seas and changes in rainfall pattern and distribution due to global climate change will lead to substantial modifications in land and water resources for rice production as well as in the productivity of rice crops affecting the food security (Chandrapala, 2005). Moreover, civil conflicts in Northern and Eastern provinces are badly affected the paddy farming and North and East are vulnerable to food insecurity (World Food Programme, 2003). Especially in these two provinces total available land is not utilized for paddy cultivation but natural resources and conditions are rich for farming. Moreover, harvested extent is always lower than the shown in Northern and Eastern provinces due to illegal harvesting of farmers fields by the terrorists. Figure 2 describes the rice production and average yield figures of two main rice growing seasons of the country. Yala and Maha are the main rice growing seasons of the country and total rice production and average yield of Maha is higher than the Yala.
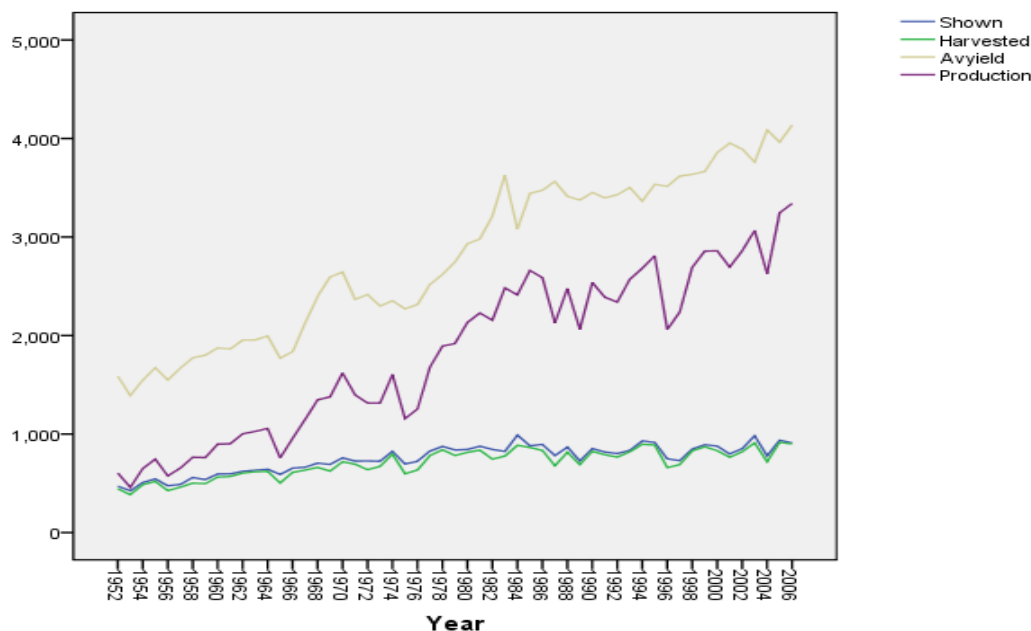

Figure 01: Trend analysis for the rice production from 1952 – 2006
(Source: Department and Census and Statistics ,1952-2006)
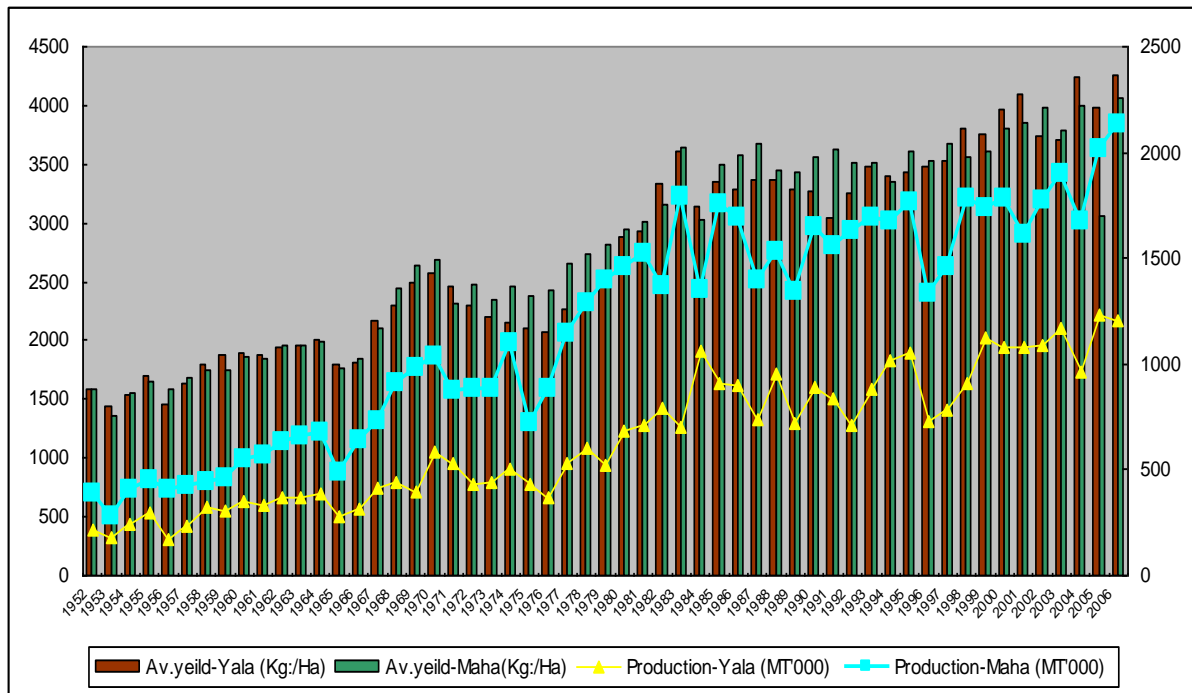
Figure 02: Rice production and average yield figures of Yala and Maha seasons
(Source: Department and Census and Statistics ,1952-2006)

Average yield forecast has positive increasing trend but curve shows minimum fluctuations. Prominent fluctuations on average yield occurred during 1969 and 1982. Forecasting model for rice production has continuous ups and downs with positive increasing trend. Figure 3 shows the time series trend of the rice production. With the bulk of the 2008 Yala season paddy crops were already harvested and government forecast for rice production was declined due to unexpected floods and ethnic conflicts.

Time series analysis was carried out to identify the future trends of rice production in Sri Lanka. Holt time series model was used to analyzed the future trends of extend of land under paddy cultivation; extend of harvested land, average yield and production. Moreover simple seasonal time series model was used to predict the future retail prices of three common rice types of Sri Lanka. The three rice types are having popularity in different regions. Such as Parboiled rice is popular in North, North-Western and Central provinces; Nadu is the popular brand comes from South and highly preferable as a healthy diet for diabetes. Especially, Samba is commonly consuming in urban areas and cities and preferable among working mothers. Figure 3 presents the time series forecasting features of extend of paddy land cultivated harvested, average yield and production trends for year 2010.
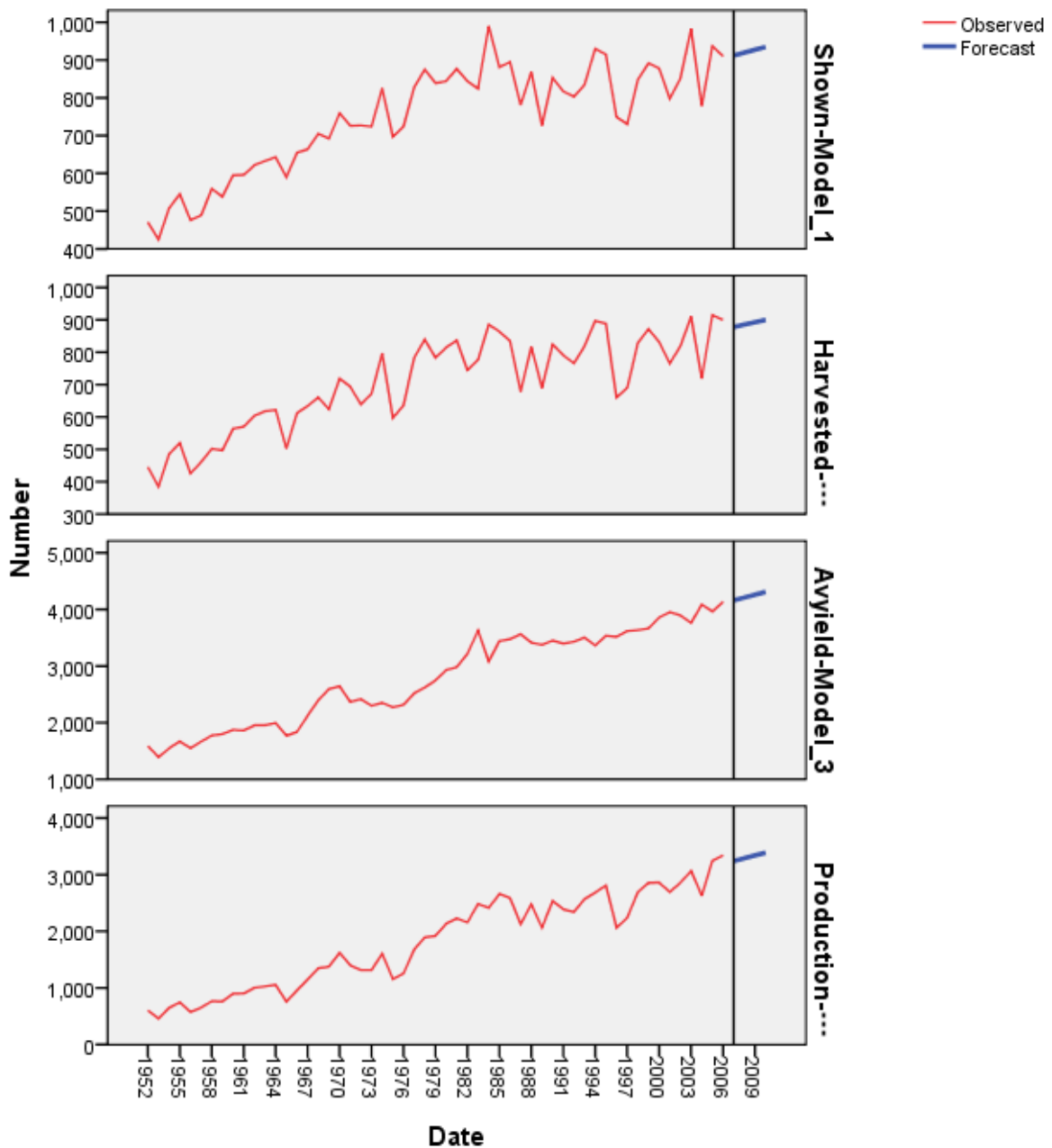
Figure 03: Time series forecasting of extent of paddy cultivation, extend of paddy harvested, average yield and production

Forecasting analysis shows that both shown and harvested models have positive increasing trends with drastic fluctuations. Table 2 and 3 presenting the model statistics of the time series modeler where 4 models were build for extent of paddy cultivated land, extent of harvested area, average yield and production. Four models were having high levels of stationary R^2 and highly significant figures.

Table 02: Model statistics for time series modeler for production features

Model	Number of Predictors	Model Fit statistics Stationary R-squared	Ljung-Box Q(18)			Number of Outliers
			Statistics	DF	Sig.	
Shown-Model_1	0	.776	8.901	16	.917	0
Harvested-Model_2	0	.762	11.876	16	.752	0
Avyield-Model_3	0	.653	8.556	16	.931	0
Production-Model_4	0	.701	8.695	16	.925	0

Table 03: Statistics for the forecast

Model		2007	2008	2009	2010
Shown-Model_1	Forecast	912.29	919.82	927.35	934.88
	UCL	1039.64	1052.79	1065.71	1078.43
	LCL	784.94	786.85	788.99	791.33
Harvested-Model_2	Forecast	878.01	885.49	892.97	900.45
	UCL	1024.98	1035.41	1045.79	1056.11
	LCL	731.04	735.57	740.16	744.80
Avyield-Model_3	Forecast	4159.84	4209.99	4260.15	4310.30
	UCL	4478.54	4599.01	4708.58	4811.16
	LCL	3841.14	3820.98	3811.71	3809.44
Production-Model_4	Forecast	3241.77	3291.27	3340.77	3390.27
	UCL	3699.93	3784.72	3867.15	3947.64
	LCL	2783.61	2797.82	2814.39	2832.90

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier.

Table 04: Model statistics of the time series modeler for retail rice prices

Attitude	Disagree	Slightly disagree	No idea	Agree	Preferably agree
1. Confidence on rice supply to domestic retail markets	64	22	04	10	00
2. Confidence in quality of domestic rice	00	30	02	30	38
3. Confidence in quality of imported rice – India	18	36	16	30	00
4. Confidence in quality of imported rice – Thailand	42	27	21	10	00
5. Confidence on government intervention in rice supply and price control	68	22	03	07	00
6. Rice is selling at affordable price	72	26	00	02	00
7. Availability of different varieties in the local market	45	36	00	18	01
8. Substitute effect of wheat flour	04	27	19	39	11
9. Complementary effect of price of coconut	07	16	12	47	18
10. Plenty of branded rice in supers markets and affordable prices	51	36	08	05	00

Table 05 : Statistics for the forecasting of rice retail prices

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
ricesupply	150	2.0200	1.17850	.09622
ricequalityD	150	3.8667	1.12725	.09204
ricequalityI	150	2.1667	1.25006	.10207
ricequalityT	150	1.6333	.79779	.06514
gvernmentint	150	1.8867	.79035	.06453
riceprice	150	1.4933	.70231	.05734
differentvar	150	2.0867	1.18682	.09690
substituteeffect	150	3.2600	1.19524	.09759
complimentary	150	3.1133	1.19021	.09718
brandedrice	150	2.1067	.86813	.07088

Tables 4 and 5 present the statistics of the time series modeler for the retail prices of three common rice types in domestic market in Sri Lanka. Analysis suggested that the forecasting figures are not highly significant.
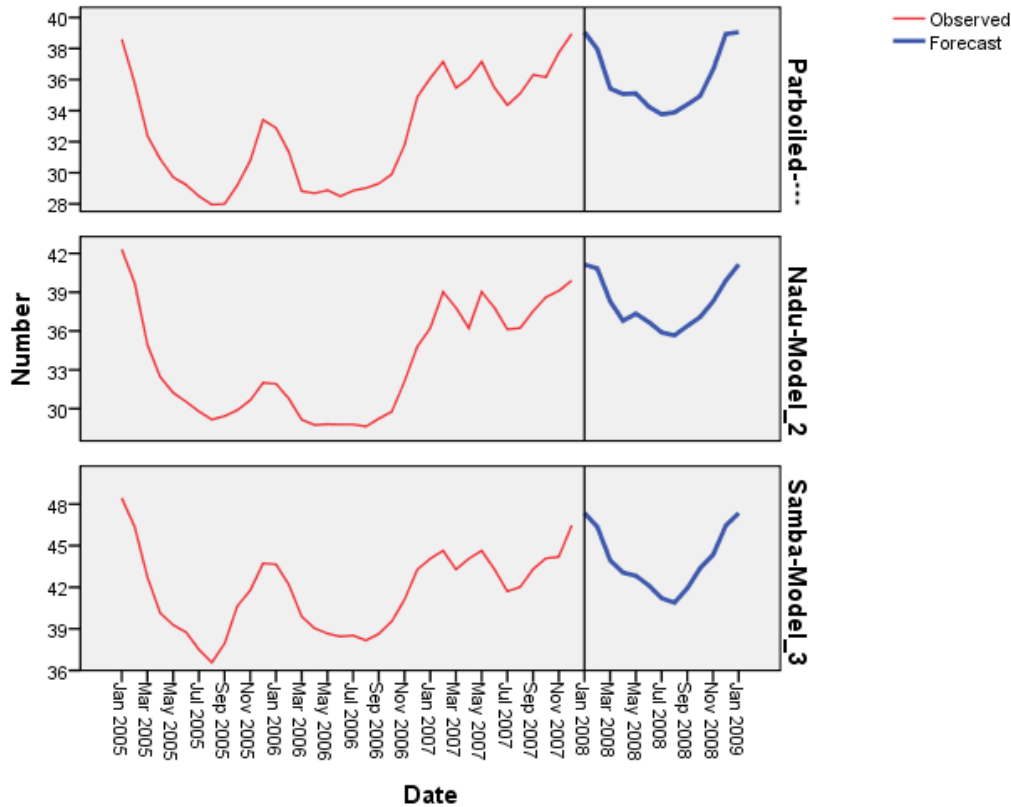
Figure 04: Time series forecasting retail prices for three common rice types (Parboiled, Nadu and Samba rice) in domestic market

The retail prices of three common varieties of rice in domestic market were used for the analysis. Figure 4 shows the results of the analysis and the curve has a positive increasing trend. The shape of the three plots was similar. In general, retail prices of many rice varieties are low during the harvesting season. Harvesting of Yala season falls between August and September and Maha season falls between February and March. Retail prices were sharply declined during the harvesting time and it can be clearly observed in major cultivated areas. Furthermore, main harvesting season, Yala claims a sharp decline in retail prices compared to Maha. Retail prices are usually high during the main festive seasons, which fall in December to January (Christmas and New Year). The time of traditional Sinhala and Tamil New year which falls just after the main harvesting season, Maha and no price hike can be observed. Retail price curve of the rice is composed with repeat ups and downs. But, the prices of last two years have the same shape with increasing trend. The common reasons for price hike during last two years were adverse climatic effects (crops were destroyed heavily by frequent floods), civil war, and increase consumption due to health concerns, high prices of wheat flour and bread, government policy (campaign on healthy diet and requested to replace rice for bread), high crude oil prices and unbearable input costs (but paddy farmers are receiving fertilizer subsidy). Moreover, alternative uses of rice also add fire to the present crisis. Paddy being used for animal – feed production and government restrictions on private rice importers has been attributed as the one main reason for soaring rice prices. Moreover, production of rice flour based processed food items

such as noodles, string hopper mixtures; hopper mixtures, biscuits, etc. indirectly affect the rice availability in the local market. But popular belief of the country was supply control by the paddy millers make the condition worst. Exceptionally wet conditions prevailed in large parts of the country, especially wet zone, hindering crops in most locations and causing the country production fall. Moreover, recent fierce fighting between government forces and terrorists limit the available dry zone paddy lands for cultivation. It was the major impact on annual Maha crops. The contribution of dry zone is high compared to wet zone in annual rice production. With the inclusion of rice to the list of

essential goods government hopes to punish those who have withheld stocks and aims to solve the crisis. Food and Agricultural Organization (2007) listed Sri Lanka among 14 countries facing 'food emergencies' due to rising prices. Some unofficial figures show that consumption of bread and wheat-based products has fallen by as much as 40 percent. Wheat grain imports have been hovering around 80,000 metric tones per month in recent months, compared to around 120,000 metric tones a month about five years ago (Dept. of Customs, 2007). State campaign on healthy diet appeals consumers to eat more rice than wheat based products.
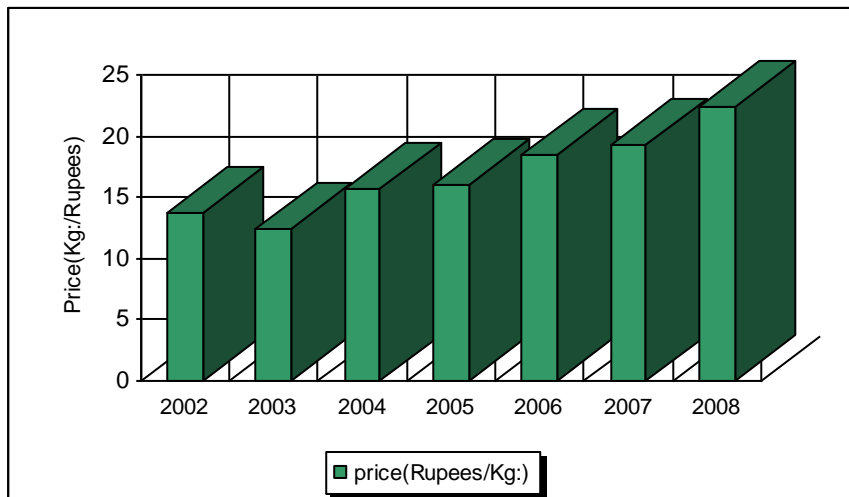

Figure 05: Farm gate prices of paddy (Source: Department of Census and Statistics, 2002– 2008)

Figure 5 presents the farm gate prices of paddy during 2002 and 2008. The average farm gate prices of paddy shows a positive increasing trend with the time. There was a slight decline of farm gate prices in 2003 and 2005 due to better crops compared to other seasons. Moreover, figure 6 concerns on average farm gate paddy prices of 9 major cultivating areas of the country. Short grain varieties always fetch higher prices compared to long grain varieties. Southern part of the country is famous for long grain varieties especially the red rice or nadu. Moreover, short grain varieties are found in North, Central and Eastern

provinces. Farm gate prices of Ampara and Dehiattakandiya is low due the limited market access. Farmers are facing transport difficulties and exploitation of farmers by middlemen and millers were common in these areas. According to the field observations majority of paddy farmers were lack in own transport facilities and they have to rely on millers or middlemen. In general, millers or middlemen collect paddy at the farm gate. Farm gate prices of Anuradhapura and Polonnarauwa districts were high compared to other places due to heavy competition among large scale millers. Moreover, long grain varieties of

white and red rice of South usually fetch high farm gate prices. Farmers endowed with proper transport facilities, easy market access, large number of small and medium scale millers, high demand and popular belief of "clean tasty rice of South".
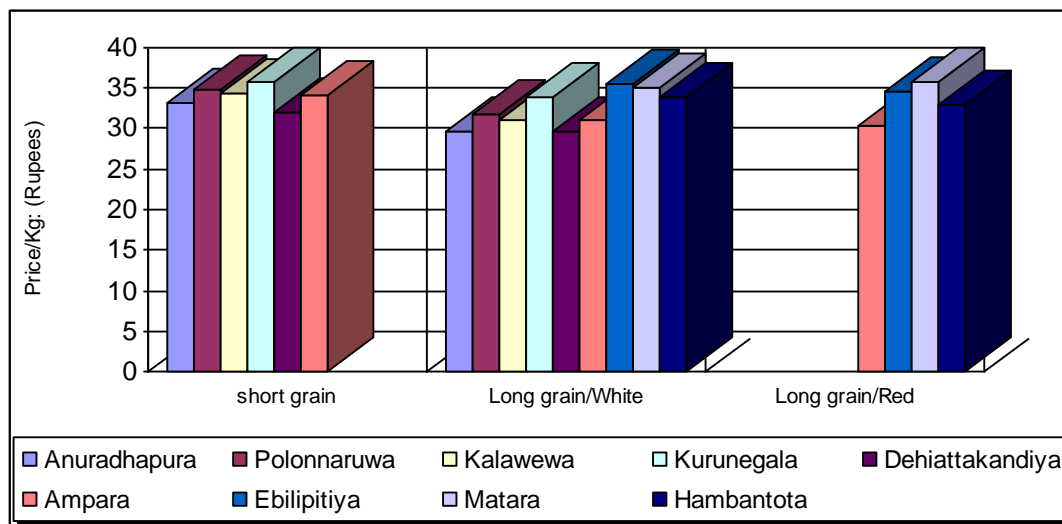
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Figure 06: Farm gate prices of different rice varieties in major cultivating areas
(Source: Department of Census and Statistics, 2002 – 2008)

Figures 7 and 8 discuss the whole sale and retail prices of rice during 2007 and 2008. Both graphs show a clear difference of price and sharp increase of price in 2008. Percentage change of wholesale market was more than 50% except nadu 2 type. Moreover, linear percentage changes of all varieties have a positive increasing trend.

Percentage of retail prices of samba 2, samba 3 and raw white was more than 65%. In general, Sri Lankan rice market consists of many rice verities. Crisis period makes only few verities available to the market and it were badly affected the consumption during last New Year period.
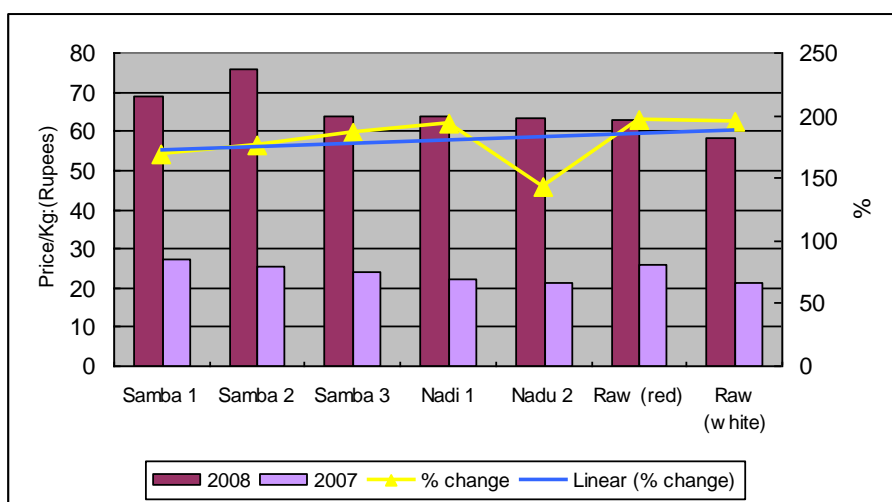
Figure 07: Whole sale prices of rice and % changes in 2007 and 2008 (Source: Department of Census and Statistics, 2007-2008)
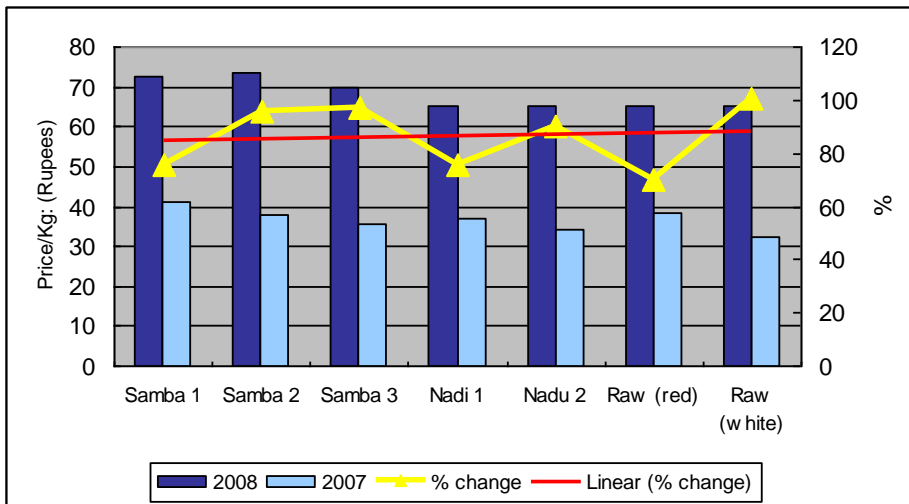
Figure 08: Retail sale prices of rice and % changes in 2007 and 2008 (Source: Department and Census and Statistics, 2007-2008)

Figure 9 presents the self-sufficiency level of rice in Sri Lanka during the period of 1994 – 2006. According to the figure, per capita availability of rice is always compatible with the percentage of domestic rice supply. In general, country can fulfill its demand for rice except unusual weather conditions (Chandrapala, 2005). In mid 1980s country again reached the level of self-sufficiency in rice production while experiencing the taste of new irrigation schemes. Recent crises of rice supply have unusual face considered with the country's long experience of self-sufficiency. Moreover, paddy farmers and consumers believe that current crisis is artificial and created by middlemen and the millers seeking profit over it. On the other hand increasing demand for broken rice and rice bran as animal feed affected the supply of rice for human consumption. Sri Lankan government have taken steps to ban the production, storage and distribution of rice-based animal feed. The government has decided to impose this ban because the rising rice prices are hurting the consumer and until prices stabilize with imports and the next harvest (The Poultry Site, 2008). Especially, domestic consumers have to compete with large scale animal feed producers such as Prima Co. Ltd., Gold Coin Pvt. Ltd.,

Chemical Industries Colombo Ltd., for rice while producers feel comfortable to deal with multinational feed producers. Attractive packages of feed producers appeal rice farmers to sell their products to companies. Company packages consists of transportation, fixed price, assurance of purchase on agreement, paying on time and extra services such as input supplies. Figure 10 explains the rice and wheat imports to Sri Lanka from 1990 to 2007. Wheat imports have positive and increasing trends with slight fluctuations. But rice imports during the same period have drastic fluctuations with a positive increasing trend. Especially, mid 1996 and mid 2005 adverse climatic changes including floods and rains destroyed the harvest and imported rice fulfilled the demand. Moreover, perfect weather conditions in 1995 - Yala, 2000 – Yala and 2006 – Yala produced better yields and resulted lowest rice imports. Heavy rains and unusual wet weather conditions in 2007 resulted poor harvests and add fire to the present crisis. Furthermore, poor rice harvest and changing consumption trends (seeking for more convenience meals for working middle class) create high demand on wheat. The demand push supply curve of wheat shifted upwards.
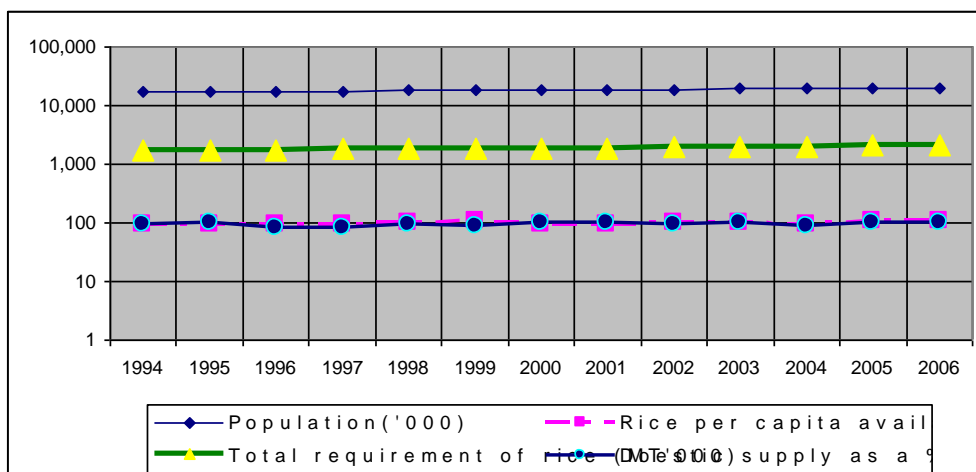
Figure 09: Levels of self-sufficiency in rice (Source: Department of Census and Statistics , 2007-2008)
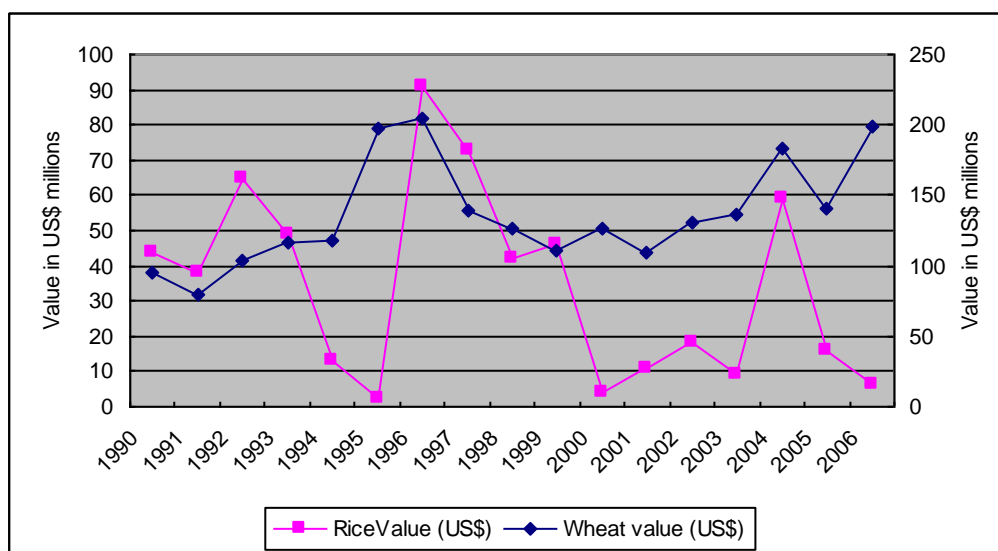

Figure 10: Trends of rice and wheat imports to Sri Lanka (Source: Department of Customs , 1990-2006)

The other concerns were focused on to examine the existing trading pattern of rice, ethno-domination and consumer attitudes on government rice risk management. Analysis of the rice trading pattern required to identify the major stake holders in the channel. Small and medium scale farmers, millers, wholesalers, retailers, and middlemen in transportation are the key features in rice marketing channel.

Paddy farming and farmers

In general, paddy farmers in many Asian nations are old and youth rarely involved in production process. Paddy farming is not attractive to them due to several reasons. Common inhibitors are high cost of production, low profit margin, unexpected weather conditions (floods and droughts), poor social reputation and small holdings or lack of arable lands (Suraweera, 2008). Unless research intervention to increase per acre yields or

without any intervention by the government such as subsidies, guaranteed price for paddy, timely purchase of harvest, etc. farmers abandoning their fields are unavoidable. Moreover, paddy fields converting to industrial and housing purposes are common in every where, even though government banned the conversion of paddy fields. Paddy farmers are shifting to cash crops seeking high profits also caused to increase the recent rice crises. Lack of high technological farming implements, poor quality of seed paddy, high cost of labor, poor access to the investment capital, high cost of inputs and expensive food habits are involving in creating rice crises at different levels. In Sri Lanka, sadly the biggest problem is lack of consistent government policy on essential food items, especially the imports of essential food items and levels of taxes on imports.

Paddy millers and traders

Field observations identified that there are about five large scale millers and about 5000 small and medium scale millers around the country. Fifty to sixty percent of the harvest is handled by the small and medium scale millers scattered around the country or based on main cultivating areas. About 40% of the harvest is handled by the large scale millers. Moreover, some of the retail chains are operating small scale milling to produce own brands. Rice processing in Sri Lanka is completely private sector handled business now. State intervention in purchasing paddy, storage and milling was carried out before introducing free trade economy to the country. In early 1970s, sate own milling stations, warehouses help to maintain stable supply of rice at a affordable price. On the other hand which helped central government to manage the food subsidy schemes and maintain stable market price. Unfortunately, with the recent crises, state is unable to manage the situation. Especially millers and traders are handling

the rice marketing in Sri Lanka while farmers and consumers are suffering. Large-scale millers are deciding the direction of the business and they used to purchase harvest at a comparably high rate during short harvesting season and commonly engage in buy back arrangements. Where, small and medium scale millers' intervention is low due to lack bargain power and limited availability of investment capital to expand the business. In one hand, wholesalers are ascertaining that adequate stocks do not reach the city. On the other hand, millers claim that consumer demand for rice has decreased substantially because of the high price. Consumers are looking for cheap substitutes such as wheat flour, bread or pulses and grains. Unfortunately, high wheat and bread prices and poor supply of pulses and grains directly affecting the consumption trends. Moreover, millers also accuse wholesale dealers keeping a margin for in excess. The millers act as middlemen between the farmer and the consumer while large scale millers are representing wholesalers too. There is a requirement to establish a comprehensive data base to monitor the stocks with millers and traders. Millers are accused for keeping stocks and seeking a high profit margin during the festive season. Government intervention is poor in management of paddy stocks and state own Cooperative Wholesale Establishment (CWE) handle very small amount of paddy stocks for its own processing. CWE is acting as a rice importer to the government but they are managing limited stocks. Government has to depend on millers for keeping stocks and releasing rice to the domestic market. In Sri Lanka, millers' behavior is very important to handle the rise crises. Both short harvest periods (3-4 weeks) in Yala and Maha, millers release large stocks of rice to the domestic market and create a seasonal gult. This leads to drop the price of rice and paddy to a minimum level. Ultimate result is paddy purchasing price decline sharply

and millers having high bargaining power used to packed their warehouses from new harvest. But soon after, the harvesting season, millers cancel the release of milled rice to the wholesale market to create a scarcity of rice.

Wholesalers

Wholesalers are based on central and municipal wholesale markets established in main cities. They are maintaining direct contacts with both large scale and small and medium scale millers. Large scale millers supply bulk of the milled rice to wholesalers under two categories, such as branded and unbranded. Branded milled rice sacks comes to the market in different weight forms such as 10 Kg, 5 Kg, 2 Kg and 1 Kg. In general, retail chains prefer branded small sacks compared to bulk rice.

Retailers

Rice retailers are commonly found in everywhere in the country as the crop is staple to the people. Retailers have different faces such as Village Boutique, Grocery store, Cooperatives, CWE, Welfare shops, Super markets and Retail Chains (Cargills, Keels, etc.). In general, retail chains prefer branded small sacks compared to the bulk rice.Retail chains purchase milled rice directly from branded large scale millers or purchase milled rice from small and medium millers and packed by using their own brand. Established retailers such as Cargills Ceylon Ltd. Has started their own rice processing facility and Cargills outlets are selling own branded rice. In general, retail prices are varied place to place and shop to shop. Cooperatives and CWE are providing rice at a reasonable price compared to private sector retailers. Consumer behavior and patterns were changed with the introduction of the supermarket or retail chain culture to the home market in Sri Lanka. Consumers

shop at retail chains prefer small sizes of packed rice compared to the bulk rice. Retailing of bulk rice is common allover the country and rural consumers used to buy rice in bulk forms.

Rice distribution channels in Sri Lanka are unorganized and government has minimum intervention ability to manage the supply chain. Domestic rice supply channels are controlled by private sector. Only handful of millers control the rice distribution channel and artificial price fluctuations are common in the domestic market. State intervention acts as a facilitator on rice supply chain and providing financial assistance through state banks to the millers. According to the field survey, state banks provide low interest rate loans to millers for purchasing and storing paddy.

Second focus of the study was to identify the consumer confidence on government food risk management attitudes. Preference based segmentation used attitudinal bases, within this approach, consumers who hold similar beliefs, attitudes or preferences within a particular category are grouped together (Honkanen. et. al. 2004). A hierarchic cluster analysis was performed first to get an indication of the proper number of clusters. Ward's method was used to maximize within cluster homogeneity. The dendrogram (see figure 12) indicated either a two or four cluster solution. A cluster was developed for the sample. Hierarchical cluster analysis was used to group the rice consumers where 2 main clusters were identified. The two basic clusters were consumers with brand concern and non-brand concern. First cluster non brand concern, of the sample majority belongs to this category. Second cluster was for branded rice which represents few percentage of the sample. Especially consumers who used to shop super markets for rice are more concern on brands and they were belonging to middle or upper middle class. On the other hand,

majority of consumers were concern more on substitutes such as wheat flour and behavior of complementary goods such as price of coconuts. Nine sub categories exist within the non brand concern group. Lower .

class or poor consumers were more concern on substitutes and the complementary goods. Table 6 shows the percentage of consumer responses on government rice risk management attitudes.
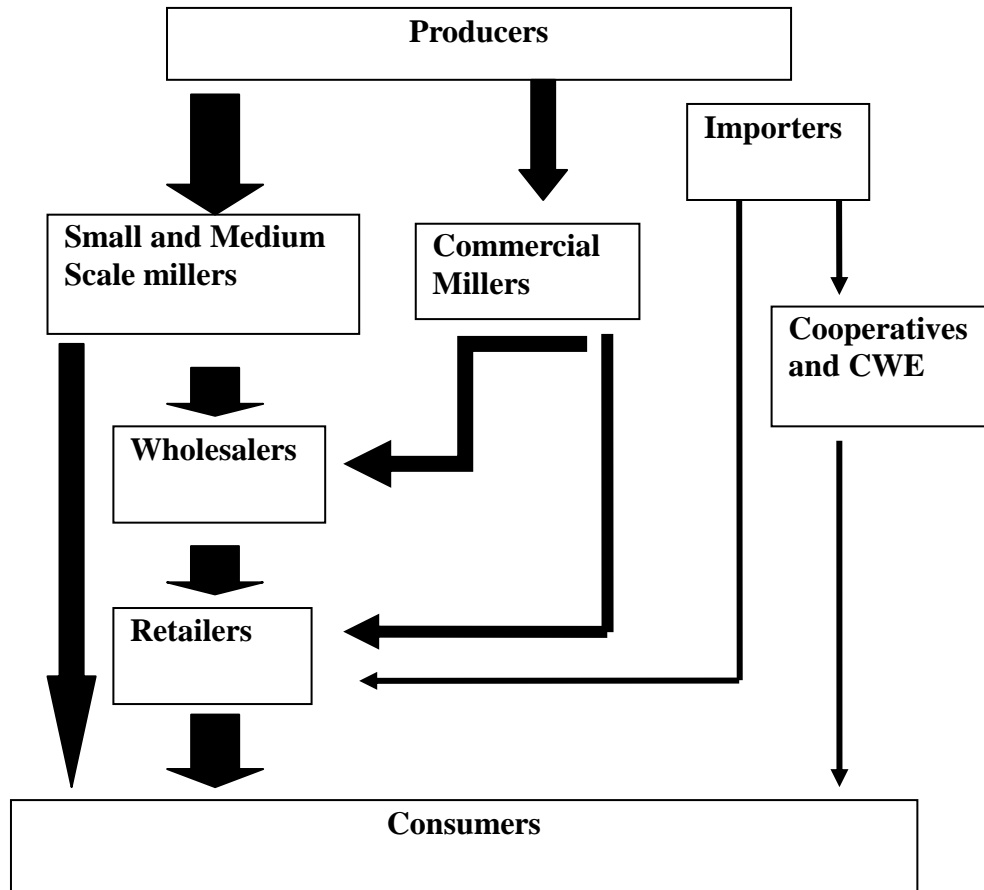
Figure 11: Distribution channel of the rice with stake holders

One sample "t" test was carried out to test the difference between a sample mean of attitudes and hypothesis. The sample means disperse around the attitudinal score of 15 and small stewarded deviation figures indicate small amount of variation appeared. Test statistic table (see table 6) shows the results of the one sample "t" test. One sample "t" test assumes that the data be reasonably normally distributed, especially with respect to the skewness. Based on analysis, the means of the different

consumer's attitudes is higher than the population mean. There is a significant difference between the two groups (70. 05)

```
                    Rescaled Distance Cluster Combine


   C A S E        0         5        10        15        20        25

  Label    Num    +---------+---------+---------+---------+---------+


  ricequal    4   ─┬─┐
  gvernmen    5   ─┘ ├───┐
  ricepric    6   ───┘   ├───────────────┐
  ricequ_1    3   ─┬─┐   │               │
  differen    7   ─┘ ├─┐ │               ├───────────────────────┐
  ricesupp    1   ───┘ ├─┘               │                       │
  substitu    8   ─┬─┐ │                 │                       │
  complime    9   ─┘ │ ├─────────────────┘                       │
  ricequ_2    2   ───┴─┘                                         │
  brandedr   10   ─────────────────────────────────────────────┘
```
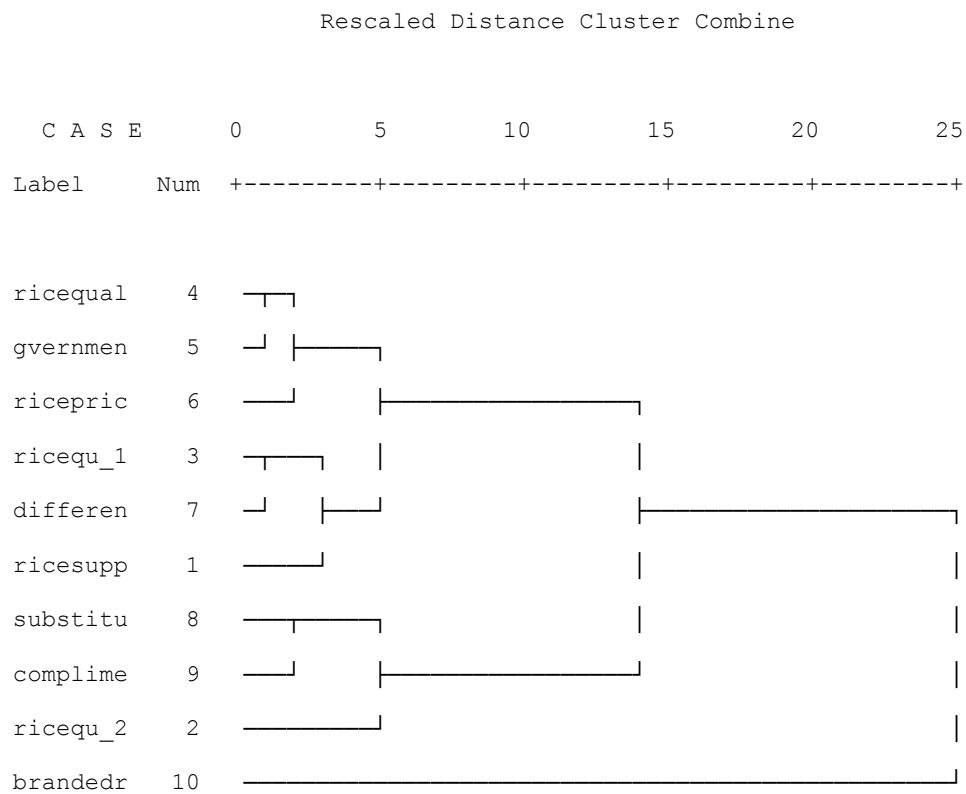
(Abbreviated Extended : brandedr – brandedrice; complime – complimentary; different – differentvar;

gvernmen – gvernmentint; ricepric – riceprice; ricequ – ricequalityI; ricequ_2 – ricequalityD;

ricequal – ricequalityT; ricesupp – ricesupply; substitu – substituteeffect)

Figure 12: Dendrogram using Average Linkage (Between Groups) of the consumer

Table 06: Results of the one sample statistics

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
ricesupply	150	2.0200	1.17850	.09622
ricequalityD	150	3.8667	1.12725	.09204
ricequalityI	150	2.1667	1.25006	.10207
ricequalityT	150	1.6333	.79779	.06514
gvernmentint	150	1.8867	.79035	.06453
riceprice	150	1.4933	.70231	.05734
differentvar	150	2.0867	1.18682	.09690
substituteeffect	150	3.2600	1.19524	.09759
complimentary	150	3.1133	1.19021	.09718
brandedrice	150	2.1067	.86813	.07088

Table 07: One-sample "t" test

	Test Value = 15					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ricesupply	-134.894	149	.000	-12.98000	-13.1701	-12.7899
ricequalityD	-120.962	149	.000	-11.13333	-11.3152	-10.9515
ricequalityI	-125.735	149	.000	-12.83333	-13.0350	-12.6316
ricequalityT	-205.202	149	.000	-13.36667	-13.4954	-13.2380
gvernmentint	-203.207	149	.000	-13.11333	-13.2408	-12.9858
riceprice	-235.539	149	.000	-13.50667	-13.6200	-13.3934
differentvar	-133.260	149	.000	-12.91333	-13.1048	-12.7219
substituteeffect	-120.298	149	.000	-11.74000	-11.9328	-11.5472
complimentary	-122.316	149	.000	-11.88667	-12.0787	-11.6946
brandedrice	-181.898	149	.000	-12.89333	-13.0334	-12.7533

CONCLUSIONS

Initial focus of the study was to identify the trends of rice market and major concerns were production and prices. The extent of cultivated land, harvested extent and yield has positive increasing trend while retail prices of the three common types of rice also having positive increasing trend. The alarming conditions ask policy makers to take necessary actions to combat the present rice crises. The interesting features of the present crises were in one hand production is increasing and on the other hand prices are increasing too. Immediate measures are essential to address this issue. The sharp rise in rice prices has been driven by many factors.
.
Poor state intervention on managing the present rice crises and prominent role of commercial millers were responsible for recent crisis in the domestic rice market. The increase in rice prices has matched sharp inflation ([15.7%], Central Intelligence Agency, 2008) in other key food products. Majority of the consumers are not confident on government rice risk management attitudes and they were in disagreement with recent policy trends. Even though, consumers are confident on the quality of domestic produce but they were not agreeing on the quality of imported rice, especially rice from Thailand. They believe that effect of substitutes such as wheat flour has negative effect on rice prices. Especially they were not happy with the availability of branded domestic produce in super markets. But super markets are catering to niche market of brand concern consumers and they are willing to pay extra for the quality. The main measures used by the state were rice imports from neighbors and price policies consisted of applying maximum prices for retail market (Rs. 70.00/Kg.). Recently government has banned the bulk purchasing of rice for alternative uses, such as animal feeds. Rice imports from India helps to manage the situation temporally. Close proximity to India is convenient to import rice within the shorter period. Moreover, Sri Lankan government has to face more difficulties when India banned the rice exports. Thailand and Myanmar became the new rice suppliers to Sri Lanka. Unfortunately, new imports do not match with the Sri Lankan taste. Even though, government has supported farmers through fertilizer subsidy and duty free importation of agricultural vehicles, equipments etc. and low interest rate loans to millers were unable to hold the burden of crises.

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