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FOOD SAFETY AND VALUE ADDED
PRODUCTION AND MARKETING
OF TROPICAL CROPS

Title: A Competitiveness Study of Four Rice Production Systems in Trinidad and
Tobago

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A COMPETITIVENESS STUDY OF FOUR RICE PRODUCTION SYSTEMS IN TRINIDAD AND TOBAGO

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ABSTRACT

Rice imports into Trinidad and Tobago in 2005 represented approximately 95% of domestic demand. Local production has been declining since reaching a peak of 21,000 tonnes in 1992. Present production is 3,500 tonnes. Rice is produced under a variety of production systems and on farms of varying sizes, productivity and quality of output.

This paper examines the competitiveness of four production systems used in Trinidad and Tobago, viz.: the transplanting system (ST), the broadcast seeded system (SB) (both being small farms and highly labour intensive), the partially mechanized system of medium sized farms (MM) and a fully mechanized large farm utilizing aerial technology in the production system (CRP). The methodology involved the collection of data on revenue and cost of production and analysis using the framework of the policy analysis matrix, which allowed estimation of the indicators of policy effects, competitiveness and comparative advantage. A scenario analysis of the MM system was done using improved farm outputs.

Results of the analysis indicated that the labour intensive, small farm systems are not internationally competitive, unlike the mechanized systems of the medium and large farms. None of the four systems showed comparative advantage. All the systems had Nominal Protection Coefficient (NPC) values of 1.75 – 1.79, indicating that farmers derived positive protection from government policies of guaranteed pricing for rice paddy. The ST, SB MM and CRP systems had Effective Protection Coefficient (EPC) values of 2.38, 2.73, 4.56 and 3.68, respectively, also indicating heavy support to output prices and tradable inputs such as fertilizers and pesticides. The Producer Subsidy Equivalent (PSE) values were positive for all systems indicating net transfers to farmers. Both small-farm production systems had Domestic Resource Coefficient (DRC) values of around 4.5, whereas, the MM and CRP values were around 2.5 indicating higher levels of efficiency on larger farms. A scenario analysis of the MM system using improved outputs showed improvements to competitiveness and comparative advantage. To attain comparative advantage in the four production systems and the one scenario will require further improvements in technology, productivity and quality of paddy. The small farms had negative private profitability and prevailing conditions are unattractive for the continued existence of these farms.

Keywords: rice, policy analysis matrix, competitiveness, comparative advantage, production systems.

1.0: INTRODUCTION

This study of the competitiveness of the rice industry in Trinidad and Tobago (T&T) is important in the context of issues internal to T&T, viz., food security needs, and on the other hand external issues, viz., the changing global trading environment. The focus of food security issues in T&T for a basic staple such as rice is on keeping the price of the commodity low and accessible to all income groups. The changing global trading environment emphasises the need

for increased competitiveness and comparative advantage in production and marketing systems for agricultural commodities.

The need for increased competitiveness and comparative advantage in agricultural production and marketing also is driven by the structural characteristics of the economy of T&T. The relative strength and profitability of the hydrocarbon sector encourages the movement of resources out of agriculture and acts as a disincentive to investment in agriculture

The agricultural sector, in 2003, contributed 1.17% of the gross domestic product (GDP); the comparable values in 1994 and 1984 were 2.2% and 4.2% respectively. The relative contribution of (primary) agriculture to GDP shows a declining long-term trend, as would be expected, consistent with knowledge of the process of economic transformation of a hydrocarbon economy. The sector employed 43,000 persons or 8% of the national labour force in the first quarter of 2003; the average in 1994 was 12.4% (Central Statistical Office (CSO)).

The Government of T&T accords an important role to the agricultural sector in strategic plans to further diversify the economy, create employment, enhance food and nutrition security and sustain economic growth. The development strategy for the agricultural sector involves increasing labour productivity so as to increase the returns to labour and improving competitiveness and comparative advantage in order to compete more effectively in the international trading arena.

This paper will *inter alia*: (i) review relevant production and marketing issues in the rice industry; (ii) highlight the farming types in Trinidad and Tobago and distinguish among the types in terms of the utilization of improved technologies, and agronomic and management practices; (iii) determine the competitiveness and comparative advantage of rice produced in T&T, and (iv) provide recommendations for the further development of the rice industry.

The paper expands on the document by Hosein, *et al* (2003) that analysed the small farm, transplanting system.

2.0: THE RICE INDUSTRY IN TRINIDAD AND TOBAGO

2.1 Production, Productivity, Consumption and Market Trends

Rice is staple food in the diet in Trinidad and Tobago (T&T). It is grown only in the island of Trinidad and is of tremendous cultural and social significance to certain farming areas having

been introduced by the indentured laborers who planted the crop in the floodplains of rivers and in the Caroni, Oropouche and Nariva swamps. Historically it has contributed to a significant part of the earnings of rural farmers.

In 1980, paddy production was 9,500 tonnes and declined to between 3-4,000 tonnes in the early- mid 1980's. To halt the decline, guaranteed prices were set at \$TT 0.82/lb (TT\$ 1.96/kg) and there were immediate positive responses. A major positive response was the establishment in 1985 of an 800 hectare irrigated rice farm, the Caroni Rice Project (CRP). Other responses were the cultivation by some 15 large farmers of more than 1,000 hectares utilising fully mechanised farming systems in the Nariva Swamp and surrounding areas, and increased production by small farmers especially in the Oropouche area. These interventions led to production reaching 21,200 tonnes in 1992.

Paddy production declined from 21,200 tonnes in 1992 to 2,065 tonnes in 2004. The decline followed the introduction of a grading system with highest prices paid for highest quality paddy. Previously, to encourage farmers to reenter rice production, there was only one grade and an associated guaranteed price for all paddy. Since 1993, many farmers have found it uneconomical to produce rice if they could not obtain the price for Grade 1 paddy and consequently, discontinued rice cultivation. In 2003, the Caroni Rice Project was terminated. Presently, rice production is at the mid-1980's level of approximately 3500 tonnes, but the outlook for increased production appears encouraging as the lands formerly occupied by the Caroni Rice Project, together with other rainfed lands, were leased to rice farmers in early 2005.

Rice productivity in T&T is below those of the major rice producing countries in the region. Productivity in the Dominican Republic is by far the highest, approaching 5.0 t/ha, as compared to T&T with just over 3.0 t/ha (Table 1). Rice productivity in Guyana and Suriname is nearing 4.0 t/ha.

Table 1: Yields of Paddy in Trinidad and Tobago and in Selected Countries, 2000-2005.

Year	Productivity (tonnes/ha)			
	Trinidad and Tobago*	Dominican Republic	Guyana	Suriname
2000	3.2*	4.84	3.87	3.90
2001	3.3*	4.90	3.98	3.77
2002	3.2*	48.6	3.83	3.92
2003	3.4*	4.87	4016	3.69
2004	3.4*	4.93	4.23	3.80
2005	3.5*	4.84	3.67	3.80

Sources: (i) FAOSTAT; *Research Division, Min. of Agric., Land and Marine Resources

T&T rice imports account for approximately 4% of the total food import bill. More than 90% of the domestic demand for rice is imported, mainly from Guyana, USA, Uruguay and Thailand. In 2003, 32,704 tonnes of rice was imported valued at \$TT 68.4 million; in 2004, import quantity decreased to 30,464 tonnes but the valued increased to \$TT 79.1 million.

Recently, with several operators entering the rice processing (albeit minimal processing) and marketing industry, T&T has become an exporter of rice. In 2003, the country exported 3,309 tonnes of rice valued at \$TT 9.8 million (\$US 1.56 million). Exports increased in 2004, realising a value of \$TT 12.7 million (\$US 2.02 million), an increase of around 30%. Almost all of the rice exported was imported, polished in some cases, packaged and exported. The target export countries included Grenada, Dominica, St. Lucia, Antigua and Barbuda.

2.2 Farmers and Farming Systems

In 1992, there were almost 6000 small farmers involved in rice production, most using the transplanting system. There were around twenty farmers with medium-sized farms. The data from the Rice Mills show that in 2003 the number of active rice farmers declined to around 100 with a further declined to 47 farmers in 2004. Almost all of farmers in 2004 had medium-sized, partially mechanised farms.

We can distinguish four principal farming systems, which are described below.

§ *Small farm, transplanting (ST) system:*

This system is highly labour intensive. The rice is planted in puddled soil (puddling is done mechanically). Labour is required for some land levelling (especially for the nursery), seeding of the nursery, uprooting the seedlings,

transplanting, some weed control, fertilising, spraying, harvesting, threshing and in some cases, drying. This system is dependent on rainfall to supply water requirements, though some farmers may utilise water from ponds to irrigate the fields. One crop of rice is usually cultivated per year during the rainy season (June – December) followed by a vegetable crop, which is planted in the dry season (January – May). Farm sizes in this system of production range from one to three acres (0.4 - 1.20 hectares).

§ *Small farm, broadcast seeded (SB) system:*

In this system, seeds are broadcast manually directly to the prepared land (puddled or double rotivated, dry soil). In instances where the soil is puddled, the seeds are pre-germinated, and for dry soil, dry seeds are used. Timing of dry seeding is critical for success of the crop as cultivation is largely rainfed. Fertilising, spraying for weeds and pests, harvesting and some drying are done manually. Threshing is done either by contracting out to operators using small threshers or using labour gangs. Similar to the transplanting system, around 50% of the threshed paddy is usually sold 'wet', directly from the field to the Mill, and the other half of the paddy is sun dried on roadways and under houses before selling to the Mill. Farm sizes range from one to ten acres (0.4 – 4.0 hectares).

§ *Medium-sized, mechanised (MM) system:*

This system is presently the most utilised system in the country. Land preparation is done using tractors. Seeding is done either by hand broadcasting or by tractor drawn equipment. Spraying is done manually using mist blowers

and knap-sac equipment. Fertiliser is manually broadcast. Harvesting and threshing are done using rice combines. The harvested 'wet' paddy is loaded into trucks and taken directly from the field to the Mill. Some farmers grow a second crop,. Seeding for this crop is done around late October to early November. Early crop development is supported by rainfall in the latter part of the rainy season. Usually a good second crop is realised. The size of these farms range from forty to fifty acres (16 – 20 hectares).

§ Caroni Rice Project (CRP):

This farm was controlled by a state company, Caroni (1975) Limited and in 2003 ceased operations. It had an efficient irrigation and drainage system and produced two crops per year. Land preparation was done using tractor drawn equipment. Laser levelling of the land was done occasionally. Seeding and weed and pest control were accomplished using aircraft. Rice combines were used for harvesting and threshing. The paddy was moved directly from the field to the Mill for processing. The farm was around 2000 acres (800 hectares).

3.0: METHODOLOGY

The assessment of competitiveness and comparative advantage of the rice industry in T&T involved analysing the data for four rice production systems. The four rice production systems were (i) small farm, transplanting (ST) system; (ii) small farm, broadcast seeded (SB) system; (iii) medium-size, mechanised (MM) system; and (iv) the Caroni Rice Project (CRP). A scenario analysis was performed on the MM system utilising projected higher productivity (4000 lbs/ac) and quality paddy (80% Grade I and 20% Grade II).

Data on the cost of production and revenues of the production systems and quality of paddy produced were collected from surveys of more than 10 % of farmers, randomly selected, in the respective farming systems existing in T&T. Data also were collected from paddy sales to the sole paddy Mill in the country in 2003 and early 2004 (Appendix 1-4). Import and export data, rates and taxes, (and other miscellaneous data) were gathered from the Central Statistical Office (CSO) and the Agricultural Planning Division of the MALMR (Personal Communication).

The analyses were conducted using the framework of the policy analysis matrix (PAM). The PAM collated cost of production and marketing data into two budgets, one calculated

in market/private prices and the other in economic/social prices. The PAM provided an easy method of calculating the effects of policies on revenues, costs, and profits. The effects of policies, competitiveness and comparative advantage are conveniently expressed in calculations of private and economic profits and indicators of policy effects. Indicators of policy effects include the nominal protection coefficient (NPC) which measures the extent of policy-induced support provided to the output, effective protection coefficient (EPC) which measures the impact of the policy environment on value-added, and the producer subsidy equivalent (PSE) which measures the contribution of policies to farm revenues. The domestic resource cost (DRC) and economic profits are measures of comparative advantage while private profits measure competitiveness.

The farm gate was used as the location for comparing the private and economic prices for the commodity evaluated in this study. The farm gate is located in the central part of the country and this was reflected in the adjustments to transport charges.

Economic prices were calculated using a number of methodologies. In the case of non-traded items, which were principally labour, the opportunity cost principle was applied and the wage in construction was used as the best alternative. The wages of unskilled and skilled labour in agriculture were TT\$80 and TT\$100 while comparable wages in construction were TT\$100 and TT\$120, respectively. In the case of traded inputs, import parity prices were calculated by adjusting the cost insurance freight (CIF) prices for applicable landing charges, transport and marketing and handling charges, and exclusion of taxes and subsidies. CIF prices were obtained from the United Nations database (COMTRADE), Hosein, *et al* (2003), records of the Customs and Excise Division of the Ministry of Finance and Custom Brokers. In some cases the conversion of private prices to efficiency prices was accomplished by using the conversion factors in Hosein, *et al* (2003) which itself relied on a 1993 study completed by Maxwell Stamp. It was assumed that the exchange rate was correctly priced at US\$ 1 = TT\$ 6.30 because of a floating exchange rate in T&T.

The economic price of locally produced paddy was derived from the CIF price of brown rice, adjusted to obtain a parity price of paddy at the level of the farm gate, since paddy for milling is not imported into T&T. Table 3 details the

calculation of the economic price for paddy. One difficulty was the inability to distinguish grades of rice in the CIF data. Farmers in T&T produce a mix of Grade I and Grade II paddy, and thus the difficulty was in obtaining an economic price for Grade II paddy. This was resolved by assuming the imported rice as being derived from Grade I paddy and specifying a percentage reduction to obtain the price for Grade II. This work utilises a percentage reduction of 17%, the same differential that exists in the guaranteed pricing scheme for paddy.

Apart from the adjustments made for the difference in quality of paddy produced among the farming systems, adjustments also were made for drying charges for 'wet' paddy. Some small farmers dry paddy to around 16-18% moisture content (MC) before sale to the Mill and the appropriate adjustments were made. The Mill has a sliding scale of charges for drying listed against the different MC of paddy.

4.0 RESULTS

The results of the analyses are presented in Tables 2, 3, 4, 5, 6 and 7. Table 2 shows paddy production, total costs and the respective grades obtained from the four farming systems. Small farmers in both systems (ST and SB) indicated yields of 4000 lbs/ac (4480 kg/ha). The MM and CRP had yields of 3500 lbs/ac (3920 kg/ha) and 3300 lbs/ac (3700 kg/ha), respectively. There

was significant variation in the quality of paddy across the production systems. Both small farming systems had paddy quality in the ratio of Grades I:II of 60:40; in the MM systems it was 75:25 and in the case of the CPR, 50:50. The amount of Grade III and Grade IV paddy sold to the Mill was insignificant. Small farms had lower quality paddy because, in many cases, the drying process used before delivering paddy to the mill often resulted in high discolouration of the grains ('stack burning'), a major factor for lowering quality of the paddy. The larger farms avoided this negative process by selling 'wet' paddy (directly from the fields) to the Mill. Higher drying charges were subjected to the 'wet' paddy but higher prices for higher quality paddy were realised, as the 'wet' paddy was dried by the Mill using proper drying technologies and resulting in high quality rice. The combined charges for quality of paddy and drying was TT\$ 0.112, 0.112, 0.009 and 0.011 for the ST, SB, MM and CRP systems, respectively. Of note was that the drying of the paddy by small farmers resulted with less returns per pound of paddy due to the lowered quality of paddy (grain discolouration) although attracting less drying charges. The low quality obtained by the CRP resulted largely from unavailability of machinery for timely harvesting (due to lack of spares for repairs of combines), resulting with over-ripe and/or lodged paddy with high levels of chalky and broken grains.

Table 2: Paddy Production, Costs at Market Prices and Grades of Four Farming Systems

	Small, Transplant (ST)	Small, Broadcast (SB)	Medium, Mechanised (MM)	Caroni Rice Project (CRP)
Paddy Production	4000	4000	3500	3300
Total Cost (TT\$)	4736.50	4277.50	2231.40	2315.75
Grade I : Grade II	60 : 40	60 : 40	75 : 25	50 : 50

For small farms, establishment of the crop by broadcast seeding significantly reduced costs by TT\$ 459.00 compared to transplanting (Appendices 1 and 2). Utilisation of machinery in the MM system further reduced cost (Appendix 3) which was more than 50% less than the TT\$ 4736.50 cost for the ST system. It was expected that the cost of production for the CRP (Appendix 4) would have been less than the MM system due to adoption of aerial technology. However, the high cost of management and payment for water increased production costs to TT\$ 2315.70 compared to

TT\$ 2231.40 for the MM system. The combined cost for management and water accounted for TT\$ 380.84. In the MM, ST and SB systems no costs were attributed to management and water. Table 3 shows the calculation of the economic price for paddy. The guaranteed price of TT\$ 0.95/ lb for Grade I paddy at the farm gate is much higher than the CIF derived price of TT\$ 0.51/ lb. This effect is reflected in the PAM as much higher values for revenues valued in market prices as against economic prices. The prices for prior years are presented for comparison.

Table 3: Calculation of Economic Price per lb of Grade I Rice Paddy (TT\$)

	2003	1999	1995	1990
CIF Price (Per lb of Brown rice)	1.00	1.40	1.12	0.96
Add Port Charges for off loading and Handling	0.01	0.01	0.01	0.01
Add transport to factory	0.03	0.03	0.03	0.03
Value of Rice Ex-Factory (per lb of rice)	1.05	1.44	1.16	1.00
Less Factory Margin (15%)	0.16	0.22	0.17	0.15
Sub-Total	0.89	1.22	0.99	0.85
Conversion Factor (converts brown rice to paddy) ; 0.78	0.58	0.95	0.77	0.66
Less Milling Costs	0.03	0.03	0.03	0.03
COST OF PADDY at MILL GATE (per lb)	0.55	0.92	0.74	0.63
Less Transport Cost of Paddy : Factory to Farm	0.04	0.04	0.04	0.04
FARM GATE PRICE GRADE I PADDY (per lb)	0.51	0.88	0.70	0.59

Table 4 presents the PAM for the four production systems. It shows that for the ST and SB the total value of traded cost items is lower and the total value of non-traded items higher when valued in economic prices. These effects principally are due to the exclusion of import tariffs from the traded (imported) inputs and to the higher wage rate for labour in the construction sector (the opportunity cost of

labour in agriculture). The PAM also shows negative private profits of TT\$ -1406.5 (ST) and TT\$ -947.5 (SB) in the small farm production systems but positive private profits in the MM (TT\$ 780.85) and CRP (TT\$ 443.05) systems. Each of the four production systems produced negative economic profits and large net transfers.

Table 4: Policy Analysis Matrices for the Four Production Systems (TT\$/acre)

	Small, Transplant				Small, Broadcast			
	Gross	Costs			Gross	Costs		
	Revenue	Traded	Non-Traded	Net Profit	Revenue	Traded	Non-Traded	Net Profit
Budget at Market Prices	3,330.00	887.50	3,849.00	-1,406.50	3,330.00	1,108.50	3,169.00	-947.50
Budget at Econ Price	1,904.00	875.84	4,639.00	-3,610.84	1,904.00	1,088.95	3,769.00	-2,953.95
Divergences	1,426.00	11.66	-790.00	2,204.34	1,426.00	19.55	-600.00	2,006.45
	Medium, Mechanised				Caroni Rice Project			
	Gross	Costs			Gross	Costs		
	Revenue	Traded	Non-Traded	Net Profit	Revenue	Traded	Non-Traded	Net Profit
Budget at Market Prices	3,012.25	1,380.15	851.25	780.85	2,758.80	1,117.98	1,197.77	443.05
Budget at Social Price	1,711.59	1,353.38	886.25	-528.04	1,542.15	1,096.57	1,090.44	-644.86
Divergences	1,300.66	26.77	-35.00	1,216.65	1,313.97	21.41	107.32	1,087.92

Table 5 presents the indicators of policy effects, competitiveness and comparative advantage. The results presented in Table 5 show that in 2003 the production systems had NPC's of 1.75 for both the small farms and 1.76 and 1.79 for the MM and CRP systems, respectively. The influence of the heavy support to output price also is seen in the values for the EPC's, which

range from 2.38 to 4.56. The ST system had the lowest EPC of 2.38 compared to the SB, CRP and MM systems with EPC's of 2.73, 3.68 and 4.56, respectively. The PSE ranged from 0.39 to 0.66; the large farms having the lowest values and the small farms, highest values. The DRC values were 4.51, 4.62, 2.47 and 2.45 for the SB, ST, MM and CRP systems, respectively.

Table 5: Indicators of Policy Effects, Competitiveness and Comparative Advantage

Indicator	Small Transplant	Small Broadcast	Medium	Caroni
Nominal Protection Coefficient (NPC)	1.75	1.75	1.76	1.79
Effective Protection Coefficient (EPC)	2.38	2.73	4.56	3.68
Producer Subsidy Equivalent (PSE)	0.66	0.60	0.43	0.39
Private Profitability (TT\$)	-1,406.50	-947.50	780.85	443.05
Social Profitability (TT\$)	-3,610.84	-2,953.95	-528.04	-644.86
Domestic Resource Cost (DRC)	4.51	4.62	2.47	2.45

5.0 DISCUSSION

Examination of the NPCs in the PAM indicates that farmers derived positive protection from the government's policy of a guaranteed pricing system (Table 8). In effect, farmers obtained a price for paddy that was between 75% and 79% above what would have obtained for parity with imported rice (Table 5). The EPC values indicate that value-added was 138% - 356% greater than what was possible without policy support to the output and tradable inputs.. That is, the combined effect of policies on the output and tradable inputs provides very significant assistance to farmers. The PSE, which gives a percentage value for the contribution of the net effect of all policies to farm revenues were positive in all systems. The small farms benefited most (> 60%) from Government policies (based on revenues) and the larger farms less, with around 40%.

The analysis indicates that paddy production was not competitive for both small farm production systems since private profits were negative. The MM and CRP systems were found to be competitive. Here competitiveness is measured by positive private profits and accordingly, reflects the capacity of the farming system to generate profits in the presence of all policies.

None of the production systems were found to have comparative advantage as indicated by negative economic profits ranging from TT\$ - 528.04 to TT\$ -3,610.84 and DRC values that

exceed unity. The ST and SB systems with DRC values of 4.51 and 4.62 respectively, were furthest away from attaining comparative advantage and the MM and CRP systems with values of 2.47 and 2.45 respectively, were closest.

The results show that the smaller farms suffer losses, which provides an explanation for the decline of small farm production units in Trinidad and Tobago. Further, the innovation of broadcast planting as a means of reducing costs does not make the small farm production profitable indicating it is a beneficial but still inadequate innovation. In fact, the results suggest that the small farm production systems may no longer be attractive on the grounds of insufficiency of family income even if profits could be made positive. Thus, we can conclude that further agronomic research work in support of the small farm system will be insufficient to generate a resurgence of small farming systems in the rice industry of T&T.

The results also provide an explanation for the continued operations of the larger-sized farms. The larger farms achieve private profits largely because of cost reductions through increased mechanisation. However, the size of private profits earned by the larger farms also may be just marginal in providing sufficient incentives to farm families given the risks associated with rice production without efficient water control and increasing costs of mechanised technology. The per capita GDP in T&T is in excess of TT\$ 52,000 (ECLAC) and

the MM farms earn around TT\$ 60,000 from two successful crops per year.

A scenario analysis was performed on the MM system with adjustments made for productivity and paddy quality. For the scenario analysis a projected yield of 4000 lbs/ac (similar to the small farms; and below the national average of the Dominican Republic) and a Grade of 80:20 was used. This can be achieved with no increase in costs just greater attention to the timing of operations.

Table 6 (scenario analysis) indicates that the net profits are increased to TT\$ 1245.17 per acre, up from TT\$ 780.85, realising profits of around TT\$ 100,000.00 annually for successfully cropping 40 acres twice per year. This appears to be a sustainable and attractive proposition for farmers. The social profitability would be

reduced to TT\$ -266.16, down from TT\$ -528.04. Also of significance in (Table 7), was that the EPC was lowered to 3.38 from 4.56 and the DRC also reduced to 1.43 from 2.47. Although no comparative advantage would be attained by increasing yield and quality to the stipulated values, the margins between international and market prices are reduced. More attention should be focussed on this system with further improvements to increase yields beyond 4000 lbs/ac and reducing costs by using aerial technology and other mechanisation methods, inclusive of the no-till system. Further approaches of cultivating aromatic types of rice and utilising good agricultural practices (GAP) can increase marketability and returns, and make this farming system less burdensome on government intervention.

Table 6: Scenario Analysis; Policy Analysis Matrix for Medium Mechanised Systems

	Gross Revenue	Costs/acre (TT\$)		(TT\$)
		Traded	Non-Traded	Net Profit
Budget at Market Prices	3,476.57	1,380.15	851.25	1,245.17
Budget at Social Price	1,973.46	1,353.38	886.25	-266.16
Divergences	1,503.11	26.77	-35.00	1,511.33

Table 7: Scenario Analysis: Indicators of Policy Effects, Competitiveness and Comparative Advantage

Indicator	Value
Nominal Protection Coefficient (NPC)	1.76
Effective Protection Coefficient (EPC)	3.38
Producer Subsidy Equivalent (PSE)	0.43
Private Profitability (TT\$)	1,245.17
Social Profitability (TT\$)	-266.16
Domestic Resource Cost (DRC)	1.43

The results of the four systems also provide some clarification in two areas – the issue of the payment to farmers for rice paddy delivered to the Mill, and appropriateness of the current grading system for rice. Under the current guaranteed pricing system farmers receive TT\$ 1.00 per lb for Grade I paddy delivered to the

mill gate, of which the Mill pays TT\$ 0.35/lb and the Government provides the remaining TT\$ 0.65 as a subsidy (Table 8). There is need to re-examine the contribution of the Mill given our calculations of a derived economic price of TT\$ 0.55 / lb at the mill gate (Table 3).

Table 8: Guaranteed Prices for Paddy, Payment by the Mill and Subsidy

Paddy	Price TT\$/kg	Price TT\$/lb	NFM Payment TT\$/kg	Subsidy TT\$/lb	NFM Payment TT\$/lb	Subsidy TT\$/lb
Grade I	2.20	1.00	0.77	1.43	0.35	0.65
Grade II	1.82	0.83	0.70	1.12	0.32	0.51
Grade III	1.36	0.62	0.64	0.72	0.29	0.33
Grade IV	0.66	0.30	0.57	0.09	0.26	0.04

Table 3 excludes consideration of import tariffs, which is 25% on non-CARICOM imports and zero on imports from intra-regional sources. Data for 2000-2002 reveal that the effective rate (collections) of tariff on rice was 13.6%. Taking the effective tariff rate into account generates a mill gate price of TT\$ 0.55 per lb. However, there is one caveat; mill efficiency. The Mill has a capacity of 5-8 tonnes/hr but is operating at less than 10% of capacity, given the current size of harvests. In effect therefore, the rice Mill is utilising the difference between the amount it pays and the amount it should pay as a subsidy for continued operations given low levels of processing efficiency.

The grading system applied to rice paddy is another area of concern. In the interest of fairness and incentive to farmers, the grading system for rice paddy should bear relevance to the grades of rice sold in the retail market. The guaranteed payment system operates on a 4-grade system with prices of TTS 2.20/kg, TT\$ 1.82, TT\$ 1.36, and TT\$ 0.66 for Grades I-IV, respectively. However, the retail market seems to operate a system of two grades -- fit for human consumption and all else for animal consumption. Most important is that the retail price for rice derived from Grades III and IV, and considered pet rice, is fairly close to that of the rice sold for human consumption. Thus, the price received by farmers for Grades III and IV (although a very small amount sold), may be too low given the retail price of pet rice and the price differential between pet rice and rice for human consumption.

6.0: CONCLUSION

Conclusions from the results are that there is a future for the rice industry in Trinidad and Tobago. However, the future lies in larger farms with mechanization that can provide opportunities for adequate returns per farm family. Increased productivity and quality would make these farms sustainable in the presence of the prevailing policy support. The CRP closure apparently could not have been due to losses by the Company but due to a broader decision by Government. There are no sustainable benefits for the small farming system.

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Appendix 1: Private and Social Costs and Revenue for Small, Transplanting Farms**FARM BUDGET (per acre)**

	Unit	Qty	Unit Price	Value TT\$ / acre	
				Private Prices	Social Prices
REVENUE					
Yield	lb / ac			4000	4000
Price (Grade 60:40 ; Grade I:II)	TT\$/lb			0.88	0.46
Total Revenue				3,502.00	1,840.31
COSTS					
<i>Land Preparation</i>					
Brush Cutting	job/ acre	1.00	300.00	300.00	300.00
Rotavate 1	job/acre	1.00	300.00	300.00	300.00
Rotavate 2	job/acre	1.00	200.00	200.00	200.00
Land Levelling-Minor	mdy	2.00	80.00	160.00	200.00
<i>Nursery/Transplanting</i>					
Nursery Bed Preparation	job	1.00	100.00	100.00	100.00
Land Levelling-Minor	mdy	0.50	80.00	40.00	50.00
Pesticide Application	mdy	0.50	100.00	50.00	60.00
Pesticide	ml	200.00	0.12	24.00	23.14
<i>Seeds</i>					
Seed (Oryzica-1)	lbs	50.00	1.25	62.50	60.27
Seeding Nursery Labour	mdy	0.50	80.00	40.00	50.00
<i>Transplanting</i>					
Uprooting Seedlings & Transplanting	mdy	11.00	80.00	880.00	1,100.00
<i>Crop Maintenance</i>					
Urea	bag	1.50	80.00	120.00	115.72
Fertiliser Application	mdy	1.00	80.00	80.00	100.00
Herbicide-Propanil	ml	1,600.00	0.04	56.00	54.00
Herbicide- 2,4-D	ml	1,600.00	0.03	40.00	38.57
Herbicide Application	mdy	1.00	100.00	100.00	120.00
Pesticide	ml	200.00	0.12	24.00	23.14
Pesticide Application	mdy	1.00	100.00	100.00	120.00
Water Control	mdy	1.00	80.00	80.00	100.00
<i>Harvest/Post Harvest</i>					
Harvesting	mdy	13.00	80.00	1,040.00	1,300.00
Threshing & Winnowing	mdy	4.00	80.00	320.00	400.00
Drying & Bagging	mdy	4.00	80.00	320.00	400.00
<i>Land Rent</i>	acre	1.00	200.00	200.00	200.00
<i>Miscellaneous</i>				100	100
Total Cost				4,736.50	5,514.84
Profit				-1,234.50	-3,674.54

Appendix 2: Private and Social Costs and Revenue for Small, Broadcast Seeded Farms**FARM BUDGET (per acre)**

	Unit	Qty	Unit Price	Value TT\$/acre	
				Private Prices	Social Prices
REVENUE					
Yield	lb / ac			4,000	4000
Price (Grade 60:40 ; Grade I:II)	TT\$/lb			0.88	0.46
Total Revenue				3,502.00	1,840.31
COSTS					
<i>Land Preparation</i>					
Brush Cutting	job/acre	1.00	300.00	300.00	300.00
Rotavate 1	job/acre	1.00	300.00	300.00	300.00
Rotavate 2	job/acre	1.00	200.00	200.00	200.00
Land Levelling	job/acre	1.00	150.00	150.00	150.00
<i>Seeds</i>					
Seed (Oryzica-1)	lbs	150.00	1.25	187.50	180.81
Seeding	mdy	1.00	80.00	80.00	100.00
<i>Crop Maintenance</i>					
Urea	bag	1.50	80.00	120.00	115.72
Fertiliser Application	mdy	2.00	80.00	160.00	200.00
Herbicide-Propanil	ml	3,200.00	0.04	112.00	108.00
Herbicide- 2,4-D	ml	3,200.00	0.03	80.00	77.14
Herbicide Application	mdy	2.00	100.00	200.00	240.00
Pesticide	ml	400.00	0.12	48.00	46.29
Pesticide Application	mdy	2.00	100.00	200.00	240.00
Water Control	mdy	2.00	80.00	160.00	200.00
<i>Harvest/Post Harvest</i>					
Harvesting	mdy	13.00	80.00	1,040.00	1,300.00
Threshing & Winnowing	mdy	4.00	80.00	320.00	400.00
Drying & Bagging	mdy	4.00	80.00	320.00	400.00
<i>Land Rent</i>	acre	1.00	200.00	200.00	200.00
<i>Miscellaneous</i>				100	100
Total Cost				4,277.50	4,857.95
Profit				-775.50	-3,017.65

Appendix 3: Private and Social Costs and Revenue for Medium, Mechanised Farms**FARM BUDGET (per acre)**

	Unit	Qty	Unit Price	Value TT\$/acre	
				Private Prices	Social Prices
<u>REVENUE</u>					
Yield	lbs / ac			3,500	3500
Price (Grade 75:25 ; Grade I:II)	TT\$/lb			0.91	0.47
Total Revenue				3,192.50	1,657.12
<u>COSTS</u>					
<i>Land Preparation</i>					
Ramping	job/acre	1.00	40.00	40.00	40.00
Rotavate/Level 1	job/acre	1.00	300.00	300.00	300.00
<i>Seeds</i>					
Seed-Oryzica-1	lbs	120.00	1.00	120.00	115.72
Seeding	mdy	0.25	80.00	20.00	25.00
<i>Water Management</i>					
Flooding	job	1.00	40.00	40.00	40.00
Drainage	job	0.07	60	4.00	4.00
<i>Crop Management</i>					
Urea	bag	150.00	0.80	120.00	115.72
Fertiliser Application	mdy	0.50	100.00	50.00	60.00
Herbicide-Nominee	ml	2.00	80.00	160.00	154.29
Herbicide Application	mdy	0.50	100.00	50.00	60.00
Pesticide (Fastac/Padan)	ltr	2.50	140.00	350.00	337.51
Pesticide Application	mdy	0.50	100.00	50.00	60.00
<i>Harvest/Post Harvest</i>					
Harvesting Combine	job			525.00	525.00
<i>Land Rent</i>					
	acre	1.00	200.00	200.00	200.00
<i>Miscellaneous</i>					
				202.4	202.4
Total Cost				2,231.40	2,239.63
Profit				961.10	-2,239.15

Appendix 4: Private and Social Costs and Revenue for the Caroni Rice Project**FARM BUDGET (Per Acre)**

	Unit	Qty	Unit Price	Value TT\$/acre	
				Private Prices	Social Prices
<u>REVENUE</u>					
Yield	lbs/ ac			3,300	3300
Sales (Grade 50:50 ; Grade I:II)	TT\$/lb			0.89	0.45
Total Revenue				2,920.50	1,488.80
<u>COSTS</u>					
<i>Land Preparation</i>					
Land Prep	job	1.00	284.36	284.36	284.36
<i>Seeds</i>					
Seed-Oryzica-1	lbs	130.00	1.00	130.00	125.36
Pre-germination	mdy	0.03	120.00	3.75	3.13
Seed Treatment	mdy	0.01	120.00	0.75	0.63
Loading plane	mdy	0.04	135.00	5.06	4.50
Airplane rental	Use/ac	1	22.91	22.91	22.91
<i>Water Control</i>					
Irrigation for land prep	mdy	0.18	150.00	26.25	21.00
Pump Operation (mdt, fuels, etc.)		1.00		52.38	50.51
Sealing/monitoring/draining fields	mdy	0.51	120.00	61.50	51.25
Irrigation (for I crop maintenance)	mdy	0.18	120.00	21.00	17.50
Topping-up Fields	mdy	0.62	120.00	73.38	73.38
Draining	mdy	0.04	120.00	4.50	3.75
Water Cost (avg dry/wet season)		1.00	178.84	178.84	178.84
<i>Crop Maintenance</i>					
<i>Pre-emergence Herbicide</i>					
Airplane	Use / ac	1.00	20.54	20.54	20.54
Labour	mdy	0.03	135.00	4.22	3.75
Herbicide-Proponil	ltr	1.50	21.99	32.99	31.81
Herbicide-Buctril	ltr	0.75	68.31	51.2325	49.40
Herbicide-Facet	ltr	0.50	232.00	116	111.86
<i>Post emergence Herbicide</i>					
Airplane	Use /ac	1.00	20.54	20.54	20.54
Labour	mdy	0.03	135.00	4.22	3.75
Herbicide- Machete	ltr	2.00	30.49	60.98	58.80
Herbicide-Supertac	ltr	0.08	98.52	7.88	7.60
<i>Insecticide</i>					
Airplane	Use / ac	1.00	20.54	20.54	20.54
Labour	mdy	0.03	135.00	4.22	3.75
Malathion	ltr	1.00	40.00	40.00	38.57

**Appendix 4: Private and Social Costs and Revenue for the Caroni Rice Project
(Continued)**

<i>Fertiliser</i>					
Airplane	Use / ac	2.00	20.54	41.08	41.08
Labour	mdy	0.06	135.00	8.44	7.50
Urea	kg	60.00	1.22	73.20	70.59
Potash	kg	25.00	1.69	42.25	40.74
<i>Pest Monitoring</i>					
Pest Monitoring	mdy	0.13	120.00	15.00	12.50
<i>Harvest/Post Harvest</i>					
Combine	TT\$/lb	3,300.00	0.09	297.00	297.00
<i>Management and Staff</i>		1.00	202.00	202.00	121.20
<i>Land rental</i>	acre	1.00	200.00	200.00	200.00
<i>Miscellaneous</i>		1.00	178.74	178.74	178.74
Total Cost				2,315.75	2,187.02
Profit				604.75	-698.21