

PRICE REFORMS AND SMALLHOLDER AGRICULTURAL PRODUCTION IN RUNGWE DISTRICT*

By

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Abstract

This paper presents research findings based on data collected for a study that was conducted in Rungwe district in 1997 covering the 1993 to 1996 cropping season. The objectives of the study were to investigate the effects of price reform measures on smallholder production systems in Rungwe district. The study also investigated responses and changes that have taken place in smallholder agricultural production systems in the study area following the institution of price reform policies in Tanzania. A multi-stage sampling design was adopted. Ninety farmers were randomly selected from the six villages chosen (three from each of the two divisions). Simple statistics such as frequency, percentages and means were employed to summarise the information collected. Quantitative analysis involved the use of the double log regression analysis, which was used to assess the influence of the crops on area cultivated. The study results revealed that some farmers have switched from growing some crops that were using lesser amounts of farm inputs in their farm plot and abandoned some crops (e.g. tea). From the same study the results indicated that some farmers failed to expand the area under cultivation of some crops with increasing profit margins because of high population density, increased cost of production and delay in payment of crops sold in that particular cropping season. Some of the policy suggestions that have emanated from the study include: encouraging farmers to form their associations/groups through which they can take the advantages of bargaining power in the input, output and credit market and farmers need to be advised to use capital intensive inputs such as fertilisers in order to improve crop productivity in their existing small plots.

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INTRODUCTION

Tanzania began implementing the IMF/World Bank supported price reform policies since the mid of 1980s. A number of other Sub-Saharan countries have implemented similar programmes over the period of the 1980s and 1990s. Such countries include Ghana, Uganda, Zambia and many others. In that context, one of the major undertakings of the Tanzania Government has been the liberalisation of the agricultural input and output markets. Market liberalisation aimed at allowing greater play for market forces. This was to be achieved through removal of state control on the price of goods and services in the market (Seif, 1995; Maliyamkono and Bagachwa, 1990; Amani, 1992), and allowing greater private traders participation in agricultural products and input markets. Other major policy changes with direct bearing on agriculture, which have taken place in the country include:

- The removal of price subsidies on export crops, staple foods and agricultural inputs with the purpose of promoting efficiency in resource allocation and distribution.
- The liberalisation of the co-operative marketing system at farm level by removing restrictions which hitherto hindered private traders from purchasing crops directly from villages and farmers to promote price competition. This was accompanied by the removal of restrictions on inter-regional trade.

- Liberalisation of the banking and financial system, which has resulted in contracted credit, services for agriculture and the rural sector.

Whereas the social impacts of price reforms have been very well studied and reported (for example studies by Bukuku, 1994; 1993; Maliyamkono and Bagachwa, 1990; Mtatifikolo, 1994; Bagachwa *et al*, 1992). However, there are only a few studies which have so far been conducted to trace the impact of SAPs on agricultural production and marketing (see Kashuliza and Mbiha (1995); Shechambo and Kulindwa (1995); Sankhayan (1995); Turuka (1995)).

This paper presents some empirical evidence on the impact of price reform measures on smallholder farming systems in Tanzania with particular emphasis in Rungwe district, Mbeya region. Changes in smallholder farming systems as a result of price reform policies in the study areas have been discussed. The responses and strategies that have been undertaken by farmers to cope with such changes are also presented in the paper.

The paper is organised as follows; the second part presents the study methodology, that is description of the study area, and methods of collecting and analysing the data. The third part describes the study results. The last part of the paper contains concluding remarks and policy suggestions by the study.

STUDY METHODOLOGY

Study area

Empirical data for this paper is based on a study that was conducted in Rungwe district in Mbeya region during the period of March and April 1997. The data collected cover four cropping seasons from 1993 up to 1996.

Rungwe district was selected for this study as a representative of Mbeya region of the Southern Highland regions (i.e. Rukwa, Ruvuma and Iringa), which are important agricultural regions of Tanzania. The district has some important cash and food crops, such as coffee, tea, pyrethrum, cocoa as cash crops and maize, paddy, banana, beans as food crops.

Human Population, Land Area and Use

Rungwe district covers a land area of 2,211 sq. Km.(221,100ha) of which 1,658.25 sq.km (165,825 ha) is suitable for agriculture, 221.06 sq.km (22,106 ha) is dry land and the remaining 55.27 sq.km is not suitable for agriculture because it is either water logged, forest and/or Mountainous.

Based on the population census of 1988, Rungwe district has a population density of 315,000 people, with density ranging from 120 - 150 per sq.km. (Bureau of statistics, 1988). This implies that on average each person in the district occupies about 0.53 ha of the land suitable for agriculture, which is very small for agricultural production as compared to

the average holding of about 1.26 ha within the smallholder farming systems in the country (Eriksson, 1992). This is because there is a high population density with a very high population to land ratios in the district (Mlambiti, 1994). Smallholder farming is predominant in the highland and valley areas of Rungwe district. There are also tea estates in the district. Ninety percent of the population in Rungwe district depends on agriculture; livestock keeping and small-scale trade while the remaining 10 percent depend on non-agricultural activities.

Main sources of livelihood in the study area

In many rural areas of developing countries, agricultural production plays an important role in the lives of rural households. They need cash from time to time for meeting their family and farm needs, such as, clothing, medical services, educational services, transport and other consumer goods. Besides, consumer goods, cash is also needed to buy important farm inputs like improved seeds, fertilizer, animal feeds and other chemical inputs. Households obtain cash to sustain their needs through sales of farm produce at the time of harvest. In the study area, cash is mainly obtained mainly through sales of cash crops and in some cases the surplus from food crops is sold to supplement the income from cash crop sales.

Land use pattern and production in the study area

Crops Grown

Farmers in the study area grow a number of major and minor crops. Some of the crops are grown in a pure stand and others may be grown in mixtures. In Rungwe district major cash crops grown include coffee, cocoa, pyrethrum and tea. However, in recent years some farmers have started growing banana as a cash crop (Mwakalobo and Kashuliza, 1999; Mwakalobo, 1998). The major food crops in Rungwe district are maize, beans and banana. The typical land tenure system in the district is that land is owned by private individuals, as a consequence land is a very scarce resource and has a very high value both financially and socially. Land is given only to family members and/or members of the same clan. Land in the district is an asset because about 90% of the households obtain cash to sustain their needs through sales of farm produce at the time of harvest. Cash is mainly obtained mainly through sales of cash crops and in some cases the surplus from food crops is sold to supplement the income from cash crop sales.

Production systems and farm technologies used in the study area

The farming system is characterized by both rotations of fields as well as crops. Crops are either intercropped and/or grown in pure stands. For example, maize is commonly intercropped with other crops such as beans, and/or groundnuts. In this cropping system beans are grown twice a year. Coffee and banana are mixed together, whereas tea is grown as a pure stand.

Farmers in Rungwe district cultivate different crops on small-scattered plots (i.e. less than the district average holding per household), where they obtain all the requirements they need for household consumption. Almost all areas are under cultivation, and there is no possibility for land expansion due to high population density ranging from 120-150 people per square kilometer, with the average holding of about 0.53 ha of the arable land. Subsequently, crop combinations are common for maximizing output from the available land.

Crop production is underdeveloped in the district as most of the farmers use hand hoes for land preparation, mechanization is difficult because most of the areas have steep gradients and mountainous.

Sampling and Data collection

A multi-stage sampling design was adopted. Two divisions were selected for the study on the basis of their better agricultural potential, ease of accessibility and communication. Three villages were chosen from each division making a total of six villages for the study.

Fifteen farmers from each village were formally interviewed using a structured questionnaire. A total of 90 farmers were interviewed. Informal discussions with key informants included village leaders, extension agents, officials from primary co-

operative societies and other farmers outside the formal sample provided additional information to supplement field data.

Data Analysis

Analytical Techniques

Descriptive statistics including frequency tables, percentages and averages were the major means of data analysis.

A double-log regression equation was employed to assess the influence of price of the crop on area cultivated. The regression parameters were estimated by ordinary least squares. This form of regression equation was adopted because it provided the best fit when it was compared to other functional forms. This test had been carried out to provide the basis and alternative ground to verify the hypothesis of the study. In the study it was hypothesised that farmers would have responded to price incentives, thereby changing the crop area cultivated either by increasing or reducing it. The double-log regression equation was specified as follows: -

$$\log A_i = \beta_0 + \beta_1 \log P_i + \beta_2 \log P_j + U_i$$

Where:

A_i = cultivated area (in ha) for crop i

P_i = real price (in Tshs) of crop i

P_j = real price (in Tshs) of crop j which was considered to substitute crop i

U_i = error term

i,j = maize, coffee, tea beans etc.

This model was mainly run to check crop area cultivated against the crop's own real price and in some cases with real price of other crops that compete with the crop under investigation.

Selection and definition of variables

Selection of variables for this analysis stems from the hypothesis that the selected variables influence crop area cultivated. The independent variables selected for the analysis were: -

P_{Tea} = real price of tea

P_{Coffee} = real price of coffee

P_{Banana} = real price of Banana

P_{Beans} = real price of beans

P_{Maize} = real price of maize

The dependent variables were: -

A_{Maize} = area under maize

A_{Beans} = area under beans

A_{Banana} = area under banana

A_{Tea} = area under tea

A_{Coffee} = area under coffee

Results and discussion***Crop area cultivated***

The cultivated land size was estimated from the annual cropped area of the sample farmers as presented in Table 1 for the years 1993-1996 respectively. The average cropped area per household was observed to show a decreasing trend over the period of four years as shown in Table 1 in the study villages. This probably implies that some farmers were responding to some liberalisation measures by decreasing crop area under cultivation.

Table 1 Average annual cropped area per household of the sample farmers in the study area 1993-1996

District	Number of Household	Cropped area (hectares) during the 1993-1996			
		1993	1994	1995	1996
Rungwe	90	2.93	2.46	2.46	2.43

Source: Survey data, 1997

Some of the reasons reported by farmers to explain this trend include increased cost of production which resulted from the removal of subsidies of agricultural inputs and delay in payment of the crop sold. Another main reason is that the high population density in the area limited possibilities of increasing crop area under cultivation. Most of the farmers interviewed about 82% (Mwakalobo, 1998), reported to have reduced the area under intensive management. These results are also substantiated by regression results in Table 2 and 3 below.

Regression results

Relationship between Output Price and Area cultivated

This model was mainly run to check crop area cultivated against the crop's own real price and in some cases with the real price of another crop thought to be a substitute. The regression was mainly run to examine and validate the hypothesis that price incentive through devaluation and/or price liberalisation could have led into cultivation of larger farm areas in order to obtain higher outputs.

Results of the least squares regression based on the specified model are summarised in Table 2 and Table 3 below respectively. Table 2 is a summary of the results of crop area cultivated for the tea model. The variables included in the equation explain about 53% of the variation in crop area cultivated. All the included explanatory variables were statistically significant in explaining the variations in crop area cultivated.

These results show that the price of tea had a positive influence on its cultivated area whereas the price of coffee and that of banana had a negative effect on the area under tea. Banana had a very high significant effect on area of tea cultivated than any other variables because in Rungwe farmers have stopped plucking tea and directed their efforts to banana cultivation and dairy husbandry. The main reason for not plucking tea is due to the fact that farmers were not paid for their tea produced immediately as in some instances they had to wait for several months.

Table 2 Regression Results of area under tea in Rungwe district

Variable	Coefficient	T-ratio
P _{Tea}	0.2358	1.241 ^{**}
P _{Coffee}	-0.8887	-3.316 ^{***}
P _{Banana}	-0.9213	-4.128 ^{***}
Constant	-12.2130	-3.214

R-square adjusted = 0.5214

F-ratio = 5.7825^{***}

DW = 2.342

Source: Survey data, 1997

* Significant at 0.10% level

** Significant at 0.05% level

*** Significant at 0.01% Level

Table 3 summarises the results of crop area cultivated against own price model. The results reveal that, there was a positive relationship between crop area cultivated and its own price. However, the insignificance of price fails to explain this variations. This is supported by the F-test, which also explains the significance of the variations among the variables. The results indicate that the explanatory variables are significant in explaining the variations on crop area cultivated despite insignificance of the individual coefficients of the variables in respective equations. No variable was significant in explaining the variations in crop area cultivated because there are no possibilities in expanding crop area due to high population density in the study area.

Table 3. Regression Results of crop area cultivated for five major crop cultivated in Rungwe district.

Crop	Constant	Crop own price	R²-Adjusted	F-ratio	DW
Coffee	-3.167 (-2.675)	0.6781 (1.287)	0.3767	12.168***	2.023
Tea	-4.621 (-2.341)	0.9876 (1.384)	0.4161	9.1016**	2.303
Maize	0.2461 (4.612)	0.7123 (2.413)	0.3181	8.1812**	2.207
Beans	-2.168 (-2.684)	0.2617 (1.767)	0.4516	10.2462**	2.105
Banana	-2.347 (-4.671)	0.6178 (2.168)	0.4321	6.142**	2.306

Note: Value in brackets are T-value

* Significant at 0.10% level

** Significant at 0.05% level

*** Significant at 0.01% Level

Source: Survey data, 1997

Changes in the cropping Patterns in Response to price reforms

During the study it was found that bananas have increasingly become a cash crop in Rungwe district. Before price reforms in the early 1980s, bananas were mainly taken as the staple food crop in the district. However, following the implementation of these policies the crop has now become a prominent cash crop in the district (see. Table 4 below).

Table 4. Farmers growing banana as a cash crop in the study villages of Rungwe district

Division	Village	Sample farmers growing as a cash crop		
		Sample farmers	Frequency	Percent
Pakati	Mpuga	15	8	53.33
	Katundulu	15	6	40.00
	Segela	15	10	66.67
Ukukwe	Kyimo	15	12	75.00
	Ibula	15	7	46.67
	Mpandapanda	15	9	60.00
Overall	Rungwe district	90	52	57.78

Source: Own Survey Data, (1997).

Results in Table 4 indicate that of the 90 interviewed farmers show that over 50% grow bananas as a cash crop. This change is partly associated with the fact that farmers have reduced management of the area under tea and in some cases stopped plucking it because they have for several months not been receiving payments for the leaves previously sold to Tanzania Tea Authority (TTA). Consequently, farmers have opted to re-allocate their time and labour to banana farming because this crop generates income throughout the year compared to other crops. Results in Table 4 depict this situation, whereas specifically 53.3%, 40% and 66.7% of the sampled farmers in Mpuga, Katundulu and Segela village

respectively grow banana as a cash crop and also allocate more labour time on this crop. The corresponding results of Kyimo, Ibula and Mpandapanda villages are 75%, 46.7% and 60% respectively. The overall figure is 57.8% of the sampled farmers who were interviewed.

Abandoning and Reducing Crop Area under Cultivation

Interviews with farmers and discussion with key-informants in the study area indicated that some farmers were abandoning and/or reducing growing some crops in response to SAP policies. The results are depicted in Table 5.

Table 5 Effect of SAP measures on crop cultivation in the study area

Farmers' perception	Frequency	Percent
Abandoned	32	35.6
Not abandoned	58	64.4
Reduced	49	54.4
Not reduced	41	45.6

Source: Own Survey Data, (1997).

During the study, it was found that, 35.6% of the sampled farmers have abandoned growing some crops and 54.4% of the sampled farmers in the district reduced the crop area under cultivation. The reasons for abandoning and/or reducing growing of some crops provided by farmers in Rungwe district are increased costs of production because of high prices of inputs. Lack of credit inputs was

also mentioned to be among the reasons, which compelled farmers to abandon and reduce growing some crops.

Of the total sample size of 90 farmers interviewed in Rungwe district, 32 (35.6%) reported to have abandoned growing some crops as opposed to 58 (64.4%). For those who abandoned growing some crops, 5 farmers (15.6%) have abandoned coffee and 16 farmers (50%) have stopped plucking tea (see Table 6).

Table 6 Crop abandoned and reduced because of SAP impacts in Rungwe district

Crop	Abandoned		Reduced	
	Frequency	Percent	Frequency	Percent
Coffee	5	15.6	23	46.9
Tea	16	50.0	16	32.7
Maize	0	0.0	10	20.4
Beans	0	0.0	0	0.0
Banana	0	0.0	0	0.0

Source: Own Survey, (1997).

Results in Table 5 show that 45 farmers (54.4%) out of the sample farmers reported to have reduced area under cultivation. Out of those farmers, 23 farmers (46.9%) have reduced coffee production, 16 farmers (32.7%) tea production and 10 farmers (20.4%) maize production. The results show that none of the farmers reported to have abandoned or reduced banana.

Abandoning of crops and reduction of crop area under cultivation was evident in the district partly due to the fact that land expansion is impossible because of high population density in the district. This situation is also common in some other areas of Rungwe district not surveyed because farmers have wider chances of switching to other crops such as banana, coffee maize etc.

The study results show that none of the sample farmers have abandoned coffee in Pakati division while 13.3% of the sample farmers in Ukukwe division have abandoned coffee. The results also indicate that, 20% and 11.1% of the sample farmers in Pakati and Ukukwe divisions have stopped plucking tea respectively. The results reveal that 26.7% and 20% percent have reduced crop area under coffee while 6.67% and 46.7% percent have reduced crop area under tea in Pakati and Ukukwe divisions respectively (Table 7).

Table 7 Crop abandoned and reduced because of SAP impacts in Rungwe District.

Division	Crop abandoned		Crop reduced	
	Coffee	Tea	Coffee	Tea
Pakati	0.00 (0)	20.00(9)	26.67(12)	6.67 (3)
Ukukwe	13.33(6)	11.11(4)	20.00(9)	46.67(21)

Source: Own Survey Data, (1997).

Note: Numbers in brackets are frequencies and those outside are their corresponding percentages.

Some farmers were responding to the price rise by using fewer amounts of inputs on their farms and some indicated to have stopped using inputs completely since 1994. The situation became even more serious since 1995 after the complete removal of input subsidy. The results in Table 8 indicate that 42.2% and 37.6% used fewer amounts of inputs and stopped using inputs completely in Rungwe respectively. Due to increased price of inputs, farmers opted using inputs in some crops (e.g. coffee and maize) which they found profitable.

Interviews with farmers and key informants also reveal that in response to the input subsidy removal, 14.8% of the sample farmers in Rungwe district used inputs only on profitable crops especially coffee. Crop switching was evident in Ukukwe division especially in Ibula, Kyimo and Mpandapanda where farmers have stopped plucking tea and directing their effort to banana cultivation and animal husbandry especially dairy production.

Table 8 Response of farmers on effects of increased cost of production in the study area

Effects of increased cost of production	Frequency	Percent
Less amount of inputs were applied in the field	38	42.2
No inputs were applied in the field at all	34	37.6
Switching from growing some crops	5	5.4
Inputs were applied only to profitable crops	13	14.8

Source: Own Survey Data, (1997).

Lack of cash inputs (32%) and lack of credit inputs (35%) were reported to be among the reasons, which contributed, to using of little amount of inputs by farmers in Rungwe district.

Table 9 Farmers' response with respect to reasons for not using inputs

Reason for not using inputs	Frequency	Percent
Lack of cash input	11	32.35
Lack of credit input	12	35.29
Inputs are expensive	10	29.41
Total	34	100.00

Source: Own Survey Data, (1997).

Due to low level of inputs used, yields of crops were reported to have declined. During the study it was found that less amounts of fertiliser and pesticides were being applied on coffee farms a situation, which provided favourable environments for the outbreak of pests and diseases. This led to a decline in yield level of coffee because the crop was seriously attacked by Coffee Berry Disease (CBD).

CONCLUSIONS AND POLICY SUGGESTIONS

Conclusions

It was hypothesized in the study that farmers would have responded to price incentives, which resulted from trade liberalization thereby responding by increasing crop area under cultivation. However, the study results indicated that land expansion in the area wasn't possible because of the high population density. The study shows that farmers had been switching and abandoning some crops partly because of the increased cost of production (for example coffee production) and delayed payments for the tea leaves sold to Tanzania Tea Authority. In some cases farmers used little amount of inputs than the optimal amount. The reasons mentioned by farmers for the use of less amount of inputs (i.e. fertilizer, pesticide, insecticides etc.); include lack of cash inputs, lack of credit inputs and high prices of those inputs. Consequently farmers opted to use inputs only to some crops found to be profitable (e.g. coffee and maize). This contributed to the decline of crop productivity, making farmers fail to meet the family requirements in terms of food and cash for the ever-increasing population, against the decreasing rate of crop productivity in the study area. Some farmers were responding to these problems by channeling their efforts to banana cultivation and dairy husbandry which were relatively profitable, required little amount of inputs and land and which consequently become an important income generating enterprises.

Increasing population pressure in the area has resulted into land subdivision and fragmentation, which calls for intensive land cultivation. This has forced farmers to continuously cultivate the same plots every year under poor management practices resulting into declined soil fertility and the threat of land degradation.

Policy suggestions

Intensive farming is very important in the area. The increasing usage of capital intensive inputs such as fertilizer can result in higher level of crop yield. This is from the fact that each additional unit of input (say fertilizer) will generate maximum profit by increased application of the input so long as the cost of the additional input (marginal factor cost is greater than the value of extra crop yield (marginal value product).

Farmers should be encouraged to form farmers group (associations) to increase their bargaining power both in the input and output markets. This will ensure better prices for both inputs and outputs. At the same time this will help farmers access important services such as credit, markets, extension, transport and storage facilities, eventually will lead to an increase in the usage of the capital-intensive inputs in the area.

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