MARKETING METHODS AND INCOME GENERATION AMONGST SMALL-SCALE FARMERS IN TWO COMMUNAL AREAS OF KWAZULU-NATAL, SOUTH AFRICA

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ABSTRACT

High transaction costs are detrimental to the efficient operation or existence of markets for inputs and outputs. The cost of information and the costs associated with the search for trade partners, distance to formal markets and contract enforcement are likely to influence the marketing of food crops. This study hypothesises that the level of income generated from food crop sales by small-scale farmers in the Impendle and Swayimana districts of KwaZulu-Natal, South Africa, is influenced by transaction costs and certain household and farm characteristics. Regression analysis shows that the depth of marketing methods is significantly influenced by transaction cost proxies such as co-operation with large commercial farmers and ownership of means of transport. Results from a block-recursive regression analysis show that the level of crop income generated is determined by the depth of marketing methods, the size of allocated arable land and off-farm income. Households with lower transaction costs, and having sizeable allocated land and off-farm income can be expected to generate higher crop income. Investment in public goods such as roads, telecommunications and an efficient legal system (to uphold commercial contracts), and farmer support services (extension, marketing information and research) would likely raise farm and non-farm income by reducing transaction costs. This would increase the effective demand for locally produced goods and services, thus contributing to rural employment and livelihoods within rural communal areas.

INTRODUCTION

Small-scale agriculture in South Africa cannot be ignored as it has the potential to

become a major source of employment and political stability (Delgado, 1999). Farmers engaged in small-scale agriculture have limited access to factors of production, credit and information. Markets are often constrained by inadequate property rights and high transaction costs (Lyne, 1996). Despite these problems farmers in two communal areas of KwaZulu-Natal, South Africa, have managed to produce food for both own consumption and marketing. These farmers sell their produce through formal and informal channels. This paper tests the hypothesis that high transaction costs adversely affect farmers' participation in product markets and revenue from crop sales.

The study draws on New Institutional Economics, focusing on transaction costs and the institutions needed to lower them (Williamson, 1985; North, 1990; Dorward *et al.*, 1998). Institutions are the formal laws and informal conventions that influence transaction costs and shape the benefits offered by trade, while transaction costs are the costs involved in exchange (e.g. marketing costs), costs of intangibles (such as search for exchange partners), contract monitoring and enforcement (North, 1990). Generally, transaction costs can be explicit and/or implicit. Explicit transaction costs include transport costs, for example bus fares, while implicit transaction costs include the opportunity cost of time spent searching for new partners, gathering market information, traveling and waiting time. The implicit costs are usually higher, suggesting that proximity to institutions such as markets and banking facilities is crucial. The size of these costs depends on the degree of market organization and development of physical and institutional infrastructure (Gonzalez-Vega, 1993).

The terms on which transactions take place are complex and diverse, and may be strongly structured by social factors such as gender and class. High transaction costs mean that it is not worthwhile for many farmers to participate in critical markets (e.g. credit, food and insurance), even if these markets exist. The provision of physical and legal infrastructure, information and education through extension may lower transaction costs.

This study identifies market constraints in two communal areas of KwaZulu-Natal in order to arrive at recommendations for improving agricultural income in those areas. The empirical analysis identifies variables that influence the level of income generated

from crop sales such as maize, madumbi (a root crop) and potatoes. The paper first presents socio-economic characteristics for both areas. The empirical model and its results are then presented followed by conclusions and policy implications.

STUDY AREA AND CHARACTERISTICS OF RESPONDENTS

The province of KwaZulu-Natal is situated on the eastern seaboard of South Africa. Prior to the 1994 elections, this area was constituted as a province (Natal), and a separate black homeland (KwaZulu). The two co-existed until the formation of the Government of National Unity in terms of which KwaZulu and Natal were united as the present KwaZulu-Natal (Barnes & Morris, 1997). Of the two study areas, Impendle lies south-west and Swayimana north-east of Pietermaritzburg, the provincial capital. The annual rainfall varies between 800 and 1500mm in Impendle and exceeds 1000mm in Swayimana.

Primary data used in this analysis were collected from January to May 1999. Multi-stage sampling techniques were used to draw a sample of 240 households, 120 in each of the study areas. The average size of sample households is 6.2 and 7.1 persons in Impendle and Swayimana, respectively. On average, sample farmers in Impendle had 1.1 hectares of cropland compared to almost two hectares in Swayimana. Female-headed households made up 32.5 per cent of the sample in Impendle versus 39.1 per cent in Swayimana. Education levels of household heads in Impendle and Swayimana are low, with high proportions of farmers never having attended school (15% and 10%, respectively). Table 1 highlights major characteristics of the respondents in the two study areas. Off-farm income comes from welfare payments (pensions), wage employment, livestock sales and wage remittances, as well as from other non-farm activities. The main crops marketed were maize, madumbi, potatoes, beans and various vegetables.

Table 1: Sample Household Characteristics in Impendle and Swayimana, KwaZulu-Natal, 1999

Particulars	Impendle (n=120)	Swayimana (n=120)	Average (n=240)
Mean household size (persons)	6.2	7.1	6.7
Mean age of household head (years)	57.9	59.0	58.5
Years of formal education	4.8	5.6	5.2
Mean distance to district road (Km)	7.0	5.7	6.3
Mean distance to public phone (Km)	2.8	4.6	3.7
Years of residence in the district	25.4	37.5	31.3
Mean land size (hectares)	1.1	1.8	1.5
Visits by extension officers /year	1.2	1.0	1.1
Dependents per worker	2.3	2.0	2.2
Households with own transport (%)	27.5	37.5	32.5
Households with TV/radio (%)	55.8	55.0	55.4
Households headed by a female (%)	32.5	39.1	35.5
Household heads speak English (%)	32.5	40.0	36.2
Mean crop income (in 1997/98, Rand*)	1183	1416	1299
Mean off-farm income (in 1997/98, Rand*)	2479	841	1660
Distance to Pietermaritzburg (Km)	85	65	75

*** One Rand (R) = ± 0.14 Euro in March 2001**

Many respondents saw the lack of inputs such as fertilizer and improved seeds as one of their main problems. Sample households obtained their inputs from nearby towns (Howick, Wartburg) and the city of Pietermaritzburg. Women in these areas contributed more in terms of labour to farming than did their male counterparts. However, female farmers are known to face particular constraints such as insecure land rights, poor access to common property resources, limited contact with agricultural extension, and lower levels of education. The low level of education of household heads, coupled with their inability to communicate in the nation's business language (English), also contributes to the high transaction costs faced by farmers. High transaction costs in the production and marketing of commodities often exclude poorer farmers from participating in growth opportunities. They may have to act as a group to spread fixed transaction costs; however, the large number of scattered and sometimes isolated small farmers may impede efforts to co-ordinate their activities as a group. In sum, high transaction costs within these regions are the result of poor physical infrastructure (poor

communications) and a weak institutional environment (lack of contract enforcement). Furthermore, tenure insecurity can have a negative impact on the incentive to invest in agriculture. Thomson (1996) found that insecure tenure inhibited rental transactions in arable land in the communal areas of KwaZulu-Natal.

SPECIFICATION OF THE MODEL

The aim of the study is to identify market constraints to inform recommendations for improving household agricultural incomes in rural KwaZulu-Natal. The model developed explains the relationship between food crop revenue and measures of transaction costs, resources, household and farmer characteristics. The model is specified as follows:

Marketing methods (**MKTMETHOD**) = f_1 (Transaction costs, land) . . . . . (**1**)
Crop revenue (**CROPINCOM**) = f_2 (Marketing methods, cultivated land,
household and farmer characteristics) . . . (**2**)

CROPINCOM represents the total food crop revenue, in Rand, of marketed output per household. MKTMETHOD describes the variety and quality of channels used by the household to market agricultural output (informal, i.e. neighbours, pension markets and roadside, and formal channels such as hawkers, stalls in town, shops and supply contracts). The model hypothesises that food crop revenue is explained by marketing methods used, the area of cultivated land, and farmer and household characteristics. In turn, marketing methods are dependent on transaction cost variables and the full area of arable land allocated to the household. Empirically the two equations constitute a block-recursive model (Gujarati, 1995: 680).

Transaction cost variables influencing the choice of marketing channels in the study areas

Exogenous regressors include the area of allocated arable land, the dependency ratio of the household and specific proxy variables for transaction costs. A regional dummy variable distinguishing Impendle from Swayimana is also included. The latter is closer

(65 km versus 85 km) to the urban market of Pietermaritzburg, so the dummy is expected to reflect slightly lower transport and information costs. Equation (1) was estimated as:

Marketing methods index = f (AGEH; ACC; ELEC; COOP; DISTRA; LAND; D-RATIO; DISTRICT) . . . . . **(3)**

where the explanatory variables and their expected signs are defined in Table 2. The dependent variable is an index showing depth in marketing methods used by the households.

Table 2: Hypothesised transaction cost variables influencing marketing methods of households in Impendle and Swayimana, KwaZulu-Natal, 1999

Variable	Code	Description	Expected Sign
Age	**AGEH**	Age of the household head (in years)	+
Bank account	**ACC**	Household head operates a bank account (1 if yes, 0 otherwise)	+
Electricity	**ELEC**	Household has access to electricity (1 if yes, 0 otherwise)	+
Co-operation	**COOP**	Household head co-operates with commercial farmers (1 if yes, 0 otherwise)	+
Distance	**DISTRA**	Interaction between distance (in Km) and vehicle ownership (DISTRA = Km if household does not have a vehicle, or 0 if household does have a vehicle).	-
Land size	**LAND**	Size of allocated arable land, in hectares	+
Dependency	**D-RATIO**	Dependency ratio in the household (consumers/on-farm worker)	-
Region	**DISTRICT**	Dummy variable for the study area (1 if Swayimana; 0 if Impendle)	+

Dependent variable: Natural log of Marketing Methods Index **(LMKTMETHOD)**

The greater the depth in marketing methods used, the greater the expected crop income. Six market channels were used by 220 sample households, including neighbours, hawkers, roadside points, local shops, monthly pension markets and nearby towns. A set of three mutually exclusive variables was created and hierarchical scores were assigned to each such that neighbours and hawkers scored one (**1**), roadside, local shops and pension markets scored two (**2**) and towns scored four (**4**). The scores on these three variables were summed and the total was multiplied by the number of marketing channels (**n**) used by the household. Households used different techniques to inform

potential customers about their products. A binary variable was created yielding a score of one (**1**) for households who used notice boards or posters, and zero for no advertising. The marketing methods index was computed as follows:

Marketing methods index = {(Zchan + 5) * n)} * (Zadv + 5)

where **Zchan** is the standardized value of channel scores, n represents the number of channels used by the household and **Zadv** is the standardized value of the advertising dummy. The constant term (5) is used to remove negative values from the system. A low score on the index shows that a household uses few, thinly traded markets to sell its surplus food crops. Conversely, a high score indicates greater depth in marketing methods because the household is using several channels.

Older and more experienced household heads tend to have more personal contacts, allowing trading opportunities to be discovered at low cost, and are expected to face lower transaction costs and use more marketing channels. Having a formal bank account (ACC) increases contact with towns, where inputs and products can be bought and sold. Electricity (ELECT) reduces transaction costs by improving access to information through radio and television. Large commercial farmers' expertise can contribute positively to marketing practices of small-scale farmers. The co-operation (COOP) indicated by sample households consisted of production and marketing advice, and is expected to have a positive impact on reducing transaction costs and improving marketing methods.

Distance and lack of transport in many parts of rural Sub-Saharan Africa are major constraints to expanding local production. In this study, DISTRA represents the interaction between the ownership of a vehicle and distances to a public telephone and district road. The sum of the two distances is multiplied by a dummy scoring 1 if the household does not own a vehicle and zero otherwise. Consequently, distances faced by a household are not significant when in possession of a vehicle. Ownership of a vehicle is expected to reduce transaction costs, offering greater depth in marketing methods. The size of land (LAND) is included because transaction costs are largely fixed costs which can be spread across more output on larger farms. Likewise, households with lower dependency ratios (D-RATIO), i.e. number of dependents per on-farm worker,

can market a greater share of their output and therefore face lower unit transaction costs. Table 3 presents the results of ordinary-least squares (OLS) regression analysis of the marketing methods index.

Table 3: Results of OLS regression analysis of the marketing methods index (n = 214) (Dependent variable: LMKTMETHOD)

Variable	Expected Sign	Coefficient	Beta	t-value
AGEH	+	0.014	0.122	1.860*
ACC	+	0.298	0.134	2.028**
ELEC	+	-0.074	-0.036	-0.284
COOP	+	0.627	0.241	3.830***
DISTRA	-	-0.176	-0.196	2.874***
LAND	+	0.114	0.153	2.279**
D-RATIO	-	-0.110	-0.127	-1.930*
DISTRICT	+	-0.506	-0.243	-1.904*
CONSTANT		1.924		3.781***
F-statistic	**7.424*** **			
R^2	**0.224**			

***, **, * Significant at the one, five and ten per cent levels of probability, respectively.

Most of the transactions cost proxies significantly influence the depth of marketing methods, and the signs of the estimated coefficients are consistent with *a priori* expectations. This is true of co-operation with large commercial farmers, distance from telephones and district roads, the presence of a formal bank account and the age of the household head. As expected, a larger area of arable land helps to reduce transaction costs per unit of output and is positively related to LMKTMETHOD. Since the dependent variable is expressed in natural log units, the coefficients can be interpreted in percentage terms. For example, the coefficient of 0.014 for AGEH indicates that a unit (year) increase in age of the household head leads to a 1.4 per cent increase in the marketing methods index score, all other explanatory variables held constant. Likewise, a coefficient of - 0.176 for DISTRA indicates that the marketing methods index score is estimated to be about 18 per cent lower for households that do not own transport relative to those that do, *ceteris paribus*. The beta coefficients in column 4 indicate the

relative importance of each explanatory variable in the model. Thus, COOP and DISTRICT have the largest impact on the dependent variable. The area of arable land (LAND) positively influences the marketing methods index, but its impact is less than that of COOP and DISTRA. The regional dummy is significant but its coefficient carries an unexpected sign suggesting that transaction costs are higher in Swayimana.

Explanatory variables considered in the crop income equation

The variables used to estimate equation (2) are presented in Table 4, along with their expected signs.

Table 4: Hypothesised variables for the income model, Impendle and Swayimana, KwaZulu-Natal, 1999

Variable	Code	Description	Expected Sign
Marketing methods	**LMKTMETHOD**	Marketing methods index, in natural logs	+
Cropped area	**CROPAREA**	Cultivated arable land, in hectares	+
Liquidity	**LIQUIDITY**	Off-farm income and livestock sales, in Rand	+
Household size	**HSIZE**	Number of household members	
Dependency ratio	**D-RATIO**	Dependency ratio (consumers/on-farm worker)	-
Visits by extension officers	**VISITS**	Number of visits by extension officers per year	+
Region	**DISTRICT**	Regional variable (1= Swayimana, 0= Impendle)	+

Dependent variable: Food crop income (**CROPINCOM**)

For the purpose of this study, the dependent variable is defined only as the income derived from the sale of food crops, omitting livestock sales. Formal livestock markets are readily accessible owing to public investment in sales yards serving both commercial and small-scale livestock farmers. Equation (2) was estimated as:

CROPINCOM = f (LMKTMETHOD, CROPAREA, LIQUIDITY, HSIZE,
D-RATIO, VISITS, DISTRICT) . . . . . (**4**)

It is expected that greater depth in marketing methods (LMKTMETHOD) will generate

higher income from surplus crops. High transaction costs restrict the household to a few local markets where sales are discouraged by thin trading. Cultivated area (CROPAREA), measured as the area of allocated arable land cultivated by each household, is expected to bear positively on crop income because output is directly related to area cultivated. Non-farm income plays an important role in increasing the liquidity needed to purchase farming inputs. Liquidity (LIQUIDITY) is measured as total cash in Rand, received from non-agricultural activities and from livestock sales.

The number of dependants, defined as number of school children and those of non-school age, can negatively influence marketing participation of the household because a large portion of the food produced is used to meet consumption needs. On the other hand, the more on-farm workers in the household, the more likely it will produce a surplus, *ceteris paribus* (Low,1986). Hence, the variable D-RATIO, measured as the number of dependants per on-farm worker (i.e. non-employed adults and pensioners) in the household, is expected to be inversely related to surplus production and crop income. Household size is included only as a control variable for D-RATIO. Visits by extension officers (VISITS) were found to be highly correlated with workshop participation organised by the extension services and could demonstrate the household head's commitment to commercial agriculture. Visits are therefore expected to have a positive impact on crop income. The dummy variable (DISTRICT) is used to capture agronomic differences between the two study districts and is expected to have a positive impact because Swayimana (DISTRICT = 1) is more fertile than Impendle (DISTRICT = 0), and property rights may be more secure as the area was not subject to betterment planning, a policy that distanced households from their arable lands to promote soil conservation.

Equation 2 could be estimated using OLS if it is assumed that the error term is not correlated with the stochastic variable "marketing methods index". However, to account for possible correlation with the error term, the stochastic variable was replaced with an instrumental variable (estimated marketing methods index) predicted from all of the exogenous variables in the block-recursive model. This was achieved using the two-stage least squares (2SLS) routine available in the Statistical Package for Social Sciences, version 8. Table 5 summarises the results of the crop income equation.

Table 5: Results of 2SLS regression analysis of the crop income equation (n=214), 1999 (Dependent variable: CROPINCOM)

Variable	Expected Sign	Coefficient	Beta	t-value
LMKTMETHOD	+	704.249	0.446	3.251***
CROPAREA	+	406.964	0.307	4.639***
HSIZE		-84.309	-0.109	-1.821*
LIQUIDITY	+	0.102	0.252	3.907***
VISITS	+	1.946	0.002	0.036
D-RATIO	-	18.896	0.013	0.229
DISTRICT	+	487.719	0.148	2.179**
CONSTANT		-760.527		1.274
F-statistic	**14.324*** **			
R^2	**0.326**			

***, **, * Significant at the one, five and ten per cent levels of probability, respectively.

Again, the results are consistent with the hypothesised relationships, particularly with respect to the significant and positive effects of marketing methods index (LMKTMETHOD), cultivated arable land (CROPAREA) and off-farm income (LIQUIDITY) on crop sales.

Greater depth in marketing methods, which indirectly reflects lower transaction costs faced by the households, has a strong positive impact on the level of crop income. The lower the transaction costs faced the greater the depth in marketing methods, and the higher the crop income. In absolute terms, the results suggest that a unit increase in the marketing methods index score will increase household crop income by R704.25. Beta coefficients suggest that marketing methods have the greatest impact on crop income. The result implies that formal marketing channels (higher index score) are associated with higher crop income. The area of cultivated arable land is also significant and, according to the beta coefficients, is the second most important determinant of crop income after marketing methods. The results also suggest that off-farm income (LIQUIDITY) is critical to farming enterprises.

Although conforming to *a priori* expectations in terms of having a positive effect on the level of crop income, the number of visits by extension officers (VISITS) is not statistically significant. Extension services in the two areas are mainly confined to small projects such as community gardens. A change in the household size (HSIZE) significantly and negatively influences the level of crop income, while the dependency ratio (D-RATIO) has an unexpected sign but is not statistically significant. The HSIZE and D-RATIO variables are collinear (r = 0.197). When household size is omitted from the income equation, the dependency ratio is, as expected, negatively associated with crop income. The result suggests that larger farm households with higher dependency ratios would generate lower crop income. As expected, the regional dummy variable (DISTRICT) coefficient is statistically significant. Swayimana is the more fertile area and was expected to generate higher crop yields.

CONCLUSION AND POLICY IMPLICATIONS

This paper provides empirical evidence of the impact of transaction costs on crop income earned by communal farmers in two regions of KwaZulu-Natal. The hypothesis that the variety and quality of marketing channels is determined by transaction costs, which in turn influence the level of crop income, was tested using a block-recursive model. Transaction costs are a primary determinant of crop income level. Greater depth in marketing methods which indirectly reflects low transaction costs has a positive influence on crop income. Three key determinants with statistically significant coefficients - the depth in marketing methods, the size of allocated arable land and off-farm income - had a positive impact on crop income. The significant impact of the regional dummy on crop income implies that the fertility of the study area also affects crop sales.

Small-scale farmers are geographically dispersed with roads and telecommunications usually of poor quality. The results indicated that co-operation with large commercial farmers was a principal determinant influencing the depth of marketing methods, implying that the marketing expertise of large commercial farmers, if shared, could play a positive role in the small-scale sector. Therefore, extension efforts to facilitate such co-operation should be explored. Marketing associations, combined with secure

property rights and contract enforcement, could create a sound environment for private sector involvement in the small-scale agricultural sector. Policies or institutional innovations - such as public investment in improved roads, market places, telecommunications and contract enforcement - could stimulate production and marketing activities within these regions. Moreover, encouraging a rental market for land, as demonstrated elsewhere in the former KwaZulu homeland, would enable households wanting to farm to increase the land area and thus their potential crop income.

REFERENCES

BARNES, J. & MORRIS, M. (1997). KwaZulu-Natal's Rural Institutional Environment: Its Impact on Local Service Delivery. *Development Southern Africa*, 14 (2): 185-209.

DELGADO, C. (1999). Sources of Growth in Smallholder Agriculture in Sub-Saharan Africa: The Role of Vertical Integration of Smallholders with Processors and Marketing of High Value-added Items. *Agrekon*, 38 (Special issue): 165-189.

DORWARD, A., KYDD, J. & POULTON, C. (1998). Smallholder Cash Crop Production under Market Liberalisation: A New Institutional Economics Perspective. CAB International, New York, USA.

GONZALEZ-VEGA, C. (1993). From Policies, to Technologies, to Organizations: The Evolution of the Ohio State University Vision of Rural Financial Markets. Paper Presented at the Finance 2000 Conference on Financial Markets and Institutions in Developing Countries: Reassessing Perspectives, May 27-28, Washington DC, USA.

GUJARATI, D. (1995). Basic Econometrics. Third Edition, McGraw-Hill International Editions, New York, USA.

LOW, A. (1986). Agricultural Development in Southern Africa: Farm-household Economics and the Food Crisis. James Currey Ltd, London, UK.

LYNE, M.C. (1996). Transforming Developing Agriculture: Establishing a Basis for Growth. *Agrekon,* 35 (4): 188-192.

NORTH, D. (1990). Institutions, Institutional Change and Economic Performance. Cambridge University Press, Cambridge, UK.

THOMSON, D. (1996). A Study of Land Rental Markets and Institutions in Communal Areas of Rural KwaZulu-Natal. Unpublished PhD Dissertation, Department of Agricultural Economics, University of Natal, Pietermaritzburg.

WILLIAMSON, O.E. (1985). The Economic Institutions of Capitalism. The Free Press, a division of Macmillan, Inc., New York, USA.

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