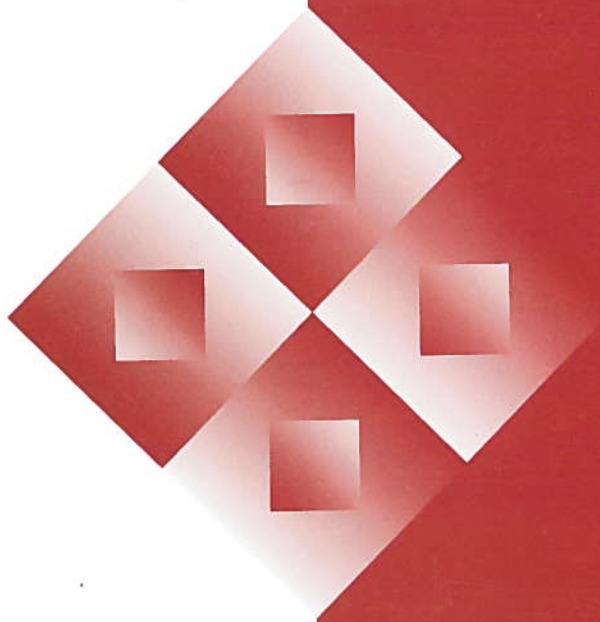

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INSTITUTIONAL TRANSFORMATION OF SMALL-SCALE IRRIGATION FARMING IN SOUTH AFRICA

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The paper outlines recent developments in small-scale irrigation farming in South Africa, particularly in terms of various institutional changes. In an attempt to put the South African situation in a broader context, institutional arrangements related to credit provision to small-scale farmers in Ghana, Tanzania and Pakistan are described. For two case studies from South Africa, regression models are used to estimate the impact of credit, extension and land tenure arrangements on small-scale farmers' net income. The findings confirm the positive impact of access to institutions on farmers' performance. We conclude by stressing the importance of institutions in small-scale irrigation farming and suggest that more emphasis should be put on the development of effective institutions in policy, program implementation and research.

1. INTRODUCTION

In South Africa about one million rural households are involved in small-scale agriculture, primarily for subsistence. In order to increase the contribution of small-scale agriculture to income, employment generation and rural development, the South African Government aims to integrate it into the mainstream economy, through productivity increases and market-orientation. In this context irrigated agriculture could play an important role.

Presently irrigated small-scale agriculture is carried out in two broad categories of operation:

(1) in irrigation schemes, where about 40 000 farmers operate on a total area of 50 000 ha[2], and

(2) in numerous food garden projects which involve thousands of rural people, mainly women[2] (Ministry of Agriculture and Land Affairs, 1998).

The irrigation schemes which were developed by government agencies over the last five decades, were meant to stimulate the rural economy and to provide income, employment and food security to scheme members. This objective resulted in the general crop pattern of maize cultivated as a food crop and wheat or cotton as a cash crop. In the Lowveld fruit plantations were established. In the past, the schemes received significant support from government agencies.

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Government employees organised or carried out most cropping and marketing activities. Inputs were supplied involving subsidised credit, and extension was offered on a regular basis. However, despite the support, productivity and profitability were low.

Food garden projects were initiated by various government departments and non-governmental organisations to assist poor rural households with the production of food and the generation of income. The individual plot size is usually small, less than 0.15 hectare. To compensate for small plots, farmers concentrate on high value crops, particularly vegetables, rather than staple food. The support food garden projects receive varies substantially. Usually, farmers get extension advice from government officers, and often projects receive grants for fencing or irrigation equipment. Formal credit is not available for food garden farmers, primarily because of the high costs involved in the administration of small loans.

Since 1998 government support to smallholder schemes has been reduced substantially as a result of curtailed budget allocations to support agencies. Mechanisation services are now provided against full cost recovery only and farmers are responsible for the payment of operation and maintenance costs.

Credit for inputs, previously provided by the government agency managing the scheme, has been phased out. Currently, the parastatal Land Bank is mandated to support small-scale farmers with loans. The Land Bank is the only formal bank which accepts Permission to Occupy (PTO), the prevailing land ownership arrangement in communal areas, as a collateral. However, the Land Bank offers loans under conditions that are much more unfavourable for farmers compared to previous conditions. Moreover, farmers' access to Land Bank loans is hampered by lack of information, distance to bank branches, etc.

In 1998, in an attempt to overcome the lack of access to credit, government agents negotiated cotton production contracts with a cotton marketing company for a number of schemes. Contracts included credit and input supply, and product transport. However, the outcomes of the contracts were unsatisfactory for both sides. Yields were low, primarily as a result of water management problems caused by the shift of responsibilities for maintenance. Besides, repayment problems were experienced and the administration of the relative small credits turned out to be too burdensome for the company. As a result of these circumstances, contracting was not repeated in subsequent seasons.

Extension service provided to farmers was also effected by government's financial cut backs. Particularly reductions in transport allowances hampered

extension officers' involvement with farmers. This impacted especially on food plot farmers who depended on regular and timely advice for the production of vegetables. Besides, a major shortcoming observed in terms of extension is the lack of marketing advice extension officers offer. This again affects primarily vegetable producers, because product marketing for field crop producers used to be organised by the government agency. With more and more responsibilities transferred to scheme farmers in future, and possibly a partial shift to the production of alternative crops other than field crops, marketing skills will become increasingly important for all farmers.

In terms of farmer organisation and collaboration related to input and output marketing, only few initiatives can be observed. This is obvious considering the government's strong involvement in the past. However, lack of farmer organisation results in high transaction costs for input supply and output marketing incurred by individual farmers.

A summary and assessment of critical aspects of the existing institutional environment for small-scale irrigation farmers is given in Table 1. In general, government's withdrawal particularly in terms of credit provision, but also in terms of management and extension resulted in a breakdown of existing institutional arrangements. Because alternative institutional arrangements are not readily in place, production discontinued or was seriously reduced in many places. This has had negative effects on farmers' welfare. However, it is not known whether these effects could have been avoided through a smooth process of management transfer.

The withdrawal of government support from small-scale agriculture, and irrigated agriculture in particular, has happened in many other countries in the last two decades. The next chapter briefly summarises three examples of market failure in credit and input markets and responses to these problems. The review offers an opportunity to consider various options to overcome institutional constraints for small-scale farmers in South Africa.

This article draws on some of the experiences made elsewhere to investigate the potential impact of institutional change in transforming the small-scale irrigation sector in South Africa.

2. RESPONSE TO INSTITUTIONAL CONSTRAINTS: EXAMPLES FROM ELSEWHERE

The following examples from Ghana, Pakistan and Tanzania, discussed in the context of the new institutional economics, describe situations that developed

Table 1: The impact of the institutional set-up after Government's withdrawal on small- scale irrigation farmer's performance

Institution	Scheme Farmers (> 1 hectare), producing bulk crops: maize, wheat, cotton, etc.	Food Plot Farmers (< 0.15 hectare), producing vegetables
Water Management (operation and maintenance of water supply equipment)	Lack of co-ordination and collaboration among farmers leads to failure to cultivate in many schemes	Lack of co-ordination Hampers production
Credit (for inputs)	Lack of credit leads to failure to cultivate in many schemes	Not essential; input costs are low due to small plots
Information (e.g. on production and marketing through extension)	Is becoming difficult to access, will be of increasing importance in future	Is insufficient, this has a negative impact on production and income generation
Farmer Organisation (input supply, output marketing)	Is becoming essential with management responsibility handed over to farmers	Is presently limited, but could be very beneficial
Output markets	Previous markets are in existence and accessible	Markets exist but farmers have little information
Land tenure	Presently not a limiting production factor in most schemes, farmers feel secure in terms of ownership rights	Presently not limiting (same as for scheme farmers)

Source: Various surveys 1998 – 2000, University of the North, Department of Agricultural Economics.

following market liberalisation. In most instances market liberalisation went along with the withdrawal of government intervention.

Cotton production in Ghana has improved substantially following liberalisation and privatisation of the parastatal that formerly controlled the industry. Farmers purchase cotton inputs using credit provided by cotton companies through contracts that tie input and credit provision to subsequent sales of the crop. The companies' primary business is in trading and processing cotton. Yet, they

engage in credit provision to boost the volume of cotton production. The cotton industry accesses capital to lend through credit from the African Development Bank. Transaction costs in lending are reduced by the use of the cotton crop as partial collateral. However, loans are recovered from the price paid for all cotton rather than being tied to individual deliveries. This unusual form of lending had recently resulted in difficulties to further encourage cotton production. Farmers have little incentives to repay loans, because default does not lead to significant loss of earnings. Farmers in default with one company may be able to receive inputs from another company, because effective information sharing or third party referee mechanisms are not available. Alternatively farmers can shift to crops that have very low purchased input requirements but yield comparable returns to cotton (Poulton, 1998a).

Cotton production in Sindh, Pakistan, is thriving, particularly since duties and restrictions on exports were lifted in the mid-1990s. Farmers' access to inputs and finance for inputs is not constraining production. Inputs are mainly purchased on credit provided by traders, interlocked with cotton sales. This allows traders to increase the volume of cotton traded, which subsequently increases returns. Through information sharing among traders and the use of third party referees information about credit applicants loan history is available to traders. Loan default by a farmer leads to a denial of future access to credit from all traders, which could limit farmers' future income earning opportunities. This system reduces transaction costs in lending. Information about credit applicants is available for lenders, which reduces loan recovery costs and risk from default, and farmers cotton crop can be used as a substitute for collateral (Stockbridge *et al*, 1998).

The cashew industry in southern Tanzania is characterised by market failure in seasonal finance. Low levels of input use result in low productivity. Transactions that interlock crop purchases and input credit are not existing, but local governments have developed institutions that allow them to support farmers' purchases of fertiliser while at the same time providing themselves and their officials with an opportunity to earn income. Interlocking transactions between traders and farmers did not develop due to low incentives for traders to invest in interlocking transactions and limited access to capital of traders. Besides, the low number of traders operating in the area have no long-term specific assets tying them to the cashew industry (Poulton, 1998b).

Credit provision to South Africa's small-scale irrigation farmers differs from any of the above examples, yet, similarities exist with some aspects of credit provision described for Ghana and Tanzania. In South Africa lack of credit to purchase inputs restricts small-scale irrigation farmers'production significantly. Credit

provision through the Agriculture and Rural Development Corporation (ARDC), a parastatal, terminated in 1998. Interlocking transactions with a cotton company has failed. Local competition for product purchases is limited. Private trade, discouraged under the previous government, is developing slowly. Land Bank loan programmes, a new option for small-scale farmers, are not widely adopted.

The examples from Ghana, Pakistan and Tanzania show that the private sector has not provided independent credit markets to fill the gap left by the withdrawal of parastatals from credit provision, but, to a greater or lesser extent, institutions have developed that support credit provision. In South Africa this process is still at an initial stage. It could be accelerated through the provision of information and training to various stakeholders, including farmers, government officials, non-governmental organisations and private companies and the establishment of pilot market information projects. To facilitate these activities, the public sector still has an important role to play.

3. ACCESS TO INSTITUTIONS AND PROFITABILITY: THE CASE OF SMALL-SCALE IRRIGATED AGRICULTURE IN SOUTH AFRICA'S NORTHERN PROVINCE

The previous section focussed on credit provision for input purchases, but small-scale irrigated agriculture is also affected by new institutional developments related to information, water management, etc. In an attempt to better understand the impact of institutional arrangements on the performance of small-scale irrigated agriculture, two case studies are analysed.

The projects are located 40 km east of Arabie dam, along the Olifants River in the Northern Province. The projects differ substantially in a number of characteristics, most noticeably in individual plot sizes and crop patterns. Sepitsi is a food garden project with about 80 members, cultivating 0.12 ha each. Veeplaats belongs to 106 members each operating on 2.5 ha. Sepitsi food plot farmers concentrate on vegetables while Veeplaats farmers grow field crops (maize, wheat, cotton). In the past Veeplaats was managed by government officials and farmers received subsidised credit for inputs and extension. Sepitsi farmers had no access to credit and the supply of extension services was irregular. Despite large differences in individual plot sizes and external support between the two projects, net income from irrigated agriculture does not differ much. On average Veeplaats farmers generate only 39 % more income from their plots than Sepitsi farmers. This is a result of lower returns from field crops versus vegetables, and high input and mechanisation costs for Veeplaats farmers. Table 2 summarises selected characteristics in terms of productivity and access to institutions for the two projects. The information is based on a household survey

carried out in November 1998, before ARDC's withdrawal from credit provision for Veeplaats.

Table 2: Characteristics of irrigated agriculture

Characteristics	Veeplaats (n = 22)	Sepitsi (n = 37)	Total (n=59)
Plot size (ha)	2.5 (0)	0.12 (0)	1.01 (1.16)
Average net income (Rand), 1998 winter season	1 092 (504)	667 (521)	825 (551)
Average net income per ha (Rand), 1998 winter season	437 (202)	14 008 (30 404)	8948 (24 851)
Average amount of credit received (Rand), 1998 winter season	3 873 (1 786)	0 (0)	1445 (2173)
Access to extension (% of farmers), 1= yes, 0= no or sporadic	100	0	37
Farmer's perception on land ownership rights, 1 to 5; 5 = full ownership	4.32 (1.21)	4.59 (0.78)	4.49 (0.97)

Figures in brackets = standard deviations

Source: Irrigation-Survey, 1998, University of the North, Department of Agricultural Economics.

We assume that access to institutions matters, yet the question to what extent still has to be answered. To quantify the impact of institutions on returns to irrigation farming, we use a regression model, with net income from irrigated agriculture as the dependent variable and access to credit and extension and farmers' perceptions on land ownership rights as independent variables. Data from both projects were pooled in a sample of 59 households. However, because access to credit and extension are highly correlated, we separated them to avoid multicollinearity and estimated the impact of credit and land ownership rights first and the impact of extension in a separate model. To account for diminishing returns of net income, the first model is estimated using a Cobb Douglas function. Because access to extension is measured as a dummy variable, we use Ordinary Least Squares (OLS) in the second model. This permits the interpretation of the regression coefficient in terms of unit changes of the dependent variable. The following results were obtained from the two models.

Model 1: (Cobb Douglas Function)

Net income = 6.16 + 0.09 (Access to formal Credit) + -0.31 (Land Ownership Rights)
(47.27)*** (3.47)** (-0.96)
$R^2 = 0.19$

(** and *** indicate significance levels at 5 and 1%, respectively; figures in brackets show t-test statistics)

Model 2: (OLS regression)

Net income = 666.56 + 425.69 (Access to Extension)
(7.87)*** (3.07)*
$R^2 = 0.14$

(* and *** indicate significance levels at 10 and 1%, respectively; figures in brackets show t-test statistics)

The results show that farmers' perceptions on land ownership rights do not significantly influence net income. Irrespective of individual plot size, farmers feel secure in terms of land ownership rights. The results also show that credit positively and significantly impacts on net income. Yet, the elasticity of credit is low. A 10 percent increase in credit would result in a 1 percent increase in net income only. This might partly be related to another institutional arrangement, the external management of the irrigation project, in this case Veeplaats. Only Veeplaats farmers were entitled to obtain formal credit. Veeplaats is externally managed, farmers are only marginally involved in the decision-making process. External management of irrigated agriculture generally results in low productivity (Merrey, 1997).

The second model shows that access to extension has a substantial impact on net income. On average returns increased by 51 percent with access to extension. This confirms the importance of training for farmers. Unfortunately, the results of the two models do not account for interactive effects between credit and extension. But the aim of the analysis, which is to stress the importance of institutional arrangements is attained.

4. CONCLUDING REMAKRS

This paper tries to raise the awareness for the importance of efficient institutions in the context of small-scale irrigation farming in South Africa. Government's withdrawal from support to small-scale irrigation farmers resulted in reduced productivity in some cases and a complete failure to produce in many other cases.

We suggest that through an interactive process farmers are prepared to cope with the new environment. This would involve primarily information and training on how to access credit, input and output markets and how to benefit from co-

operation. New, government supported credit options are presently developed, however, more work needs to be done, to streamline alternative formal credit programmes, to promote informal credit options (e.g. savings clubs) and to encourage private sector involvement, including traders and processing companies.

There is substantial scope to learn from experiences elsewhere, this paper only hints on this potential. The failure of cotton companies in Ghana to develop incentives for loan repayments, for example, hampered the development of the cotton industry. Lack of access to capital for credit and ties between farmers and traders led to low productivity in the southern Tanzanian cashew industry. Other experiences could offer more insight and options for the South African situation. An in depth analysis of alternative institutional arrangements, their effects and interactions, could contribute to improve the performance of the transforming small-scale irrigation sector in South Africa.

NOTES

1. *In contrast large-scale commercial farmers in South Africa irrigate a total area of 1.2 million hectares.*

2. *The total area under irrigation in food garden projects is unknown, estimates range from 10 000 to 50 000 ha (Backeberg and Odendaal, 1998 and Northern Province Department of Agriculture, Land and Environment, 2000).*

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