Private enterprise and the post-harvest sector

GASGA

GROUP FOR ASSISTANCE ON SYSTEMS
RELATING TO GRAIN AFTER HARVEST

GASGA Executive Seminar Series No. 7

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List of participants

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I wish to thank the four speakers for their very valuable contributions to the seminar, both in their presented papers and by their participation in the discussions. I am also grateful to other invited participants from NRI and ODA who made useful inputs to the discussion periods.

C. P. Haines

GASGA Executive Chairman

Preface

Composition of GASGA

GASGA-the Group for Assistance on Systems relating to Grain After-harvest-is a voluntary association of organizations concerned with donor operations on grain storage, handling and processing in developing countries.

These organizations all have major involvement in most, if not all, of the following:

- provision of professional advice;
- conduct of field projects;
- training of developing country personnel; and
- conduct of research and its application in relation to the problems of the post-harvest sector of grain production.

The association is essentially technical; it is international in character, but informal and limited in membership, so that its deliberations can take place more readily.

The following organizations are the current members of GASGA:

- Australian Centre for International Agricultural Research (ACIAR), Canberra, Australia
- Centre de Cooperation Internationale en Recherche Agronomique pour le Dveloppement (CIRAD), Montpellier, France
- Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH (GTZ), Eschborn, Germany
- Food and Agriculture Organization of the United Nations (FAO), Rome, Italy
- Food and Feed Grain Institute, Kansas State University (KSU), Manhattan, Kansas, US
- International Development Research Centre (IDRC), Ottawa, Canada
- Natural Resources Institute (NRI), Chatham, UK

Objectives of GASGA

Within the wider goal of promoting the improvement of agricultural food systems in developing countries, GASGA's main objective is to co-ordinate and disseminate advice in order to influence and improve policies and procedures affecting post-harvest food-crop systems, especially the handling, processing, storage and transport of grains. GASGA seeks to achieve this objective by: harmonizing the activities of its members to

optimize their resources; identifying key technical developments and activities in the post-harvest sector; promoting discussion and analysis of these issues through seminars and working parties; and disseminating this information to donors and developing countries.

GASGA Executive Seminars

The GASGA executive meets annually to review progress in its activities and consider proposals for future work. Since the 19th executive meeting in 1987, a seminar has been held in association with the annual meeting, and papers presented at the seminars have been published in the GASGA Executive Seminar Series.

This volume, the seventh in the series, contains the papers presented at a seminar held during the 25th GASGA executive meeting, hosted by NRI, in Chatham, UK, on 7-11 June 1993.

Previous Executive Seminars have addressed the following subjects:

No.1 Research and development issues in grain post-harvest problems in Africa

No.2 Research and development issues in grain post-harvest problems in Asia

No.3 Problems of pesticide residues in stored grain

No.4 Grain quality considerations in developing regions of the world

No.5 Policy issues in the small grains sector of southern Africa

No.6 Monitoring and evaluation methods for innovations in grain post-harvest technology

Executive Seminar proceedings (except for No.4) are available from the GASGA Joint Secretariat at any of the following addresses:

NRI Food Storage Group
Central Avenue
Chatham Maritime
Kent ME4 4TB
United Kingdom
Fax: (+44)-634880066/77

CIRAD-SAR

SPV Mission de Coopration Phytosanitaire
BP 7309
34184 Montpellier, Cedex 4
France
Fax: (+33)-67 03 10 21

GTZ-Post-Harvest Project
Pickhuben 4
2000 Hamburg 11
Germany

Fax: (+49)-40 37 83 45

Other GASGA activities

GASGA also promotes Technical Seminars and Workshops, organized by one or more members, to bring key issues to the attention of a wider audience or to encourage a synthesis of expert views on important subjects. Topics have included:

- The appropriate use of pesticides for the control of stored products pests in developing countries

- Paddy deterioration in the humid tropics
- The larger grain borer-Prostephanus truncatus (Horn)
- Preservation of grain quality by aeration and instore drying
- Fumigation technology in developing countries

Similarly, a GASGA Working Party on Fungi and Mycotoxins in Asian Food and Feedstuffs has recently been working to co-ordinate a strategy and action plan for ASEAN countries.

GASGA also produces a Newsletter and other occasional publications: further details can be obtained from one of the three Joint Secretariat addresses listed above.

Prface

La composition du GASGA

GASGA-le Groupe d'Assistance aux Systmes concernant les Grains Aprs-Rcolte est une association volontaire d'organisations qui s'intressent aux oprations de donateurs pour le stockage, la manutention et le traitement des crales dans les pays en dveloppement.

Ces organisations se proccupent toutes essentiellement de la plupart des activits suivantes, sinon de toutes:

- mise disposition de conseils professionnels;
- entreprise de projets sur le terrain;
- formation de personnel dans les pays en dveloppement; et
- conduite de recherche et son application en ce qui concerne les problmes du secteur post-rcolte de la production cralire.

Cette association est essentiellement technique; elle est de caractre international, mais sa composition est informelle et restreinte, afin que ses travaux puissent se drouler plus facilement.

Les organisations suivantes sont actuellement membres du GASGA:

- Australian Centre for International Agricultural Research (ACIAR), Canberra, Australie
- Centre de Coopration Internationale en Recherche Agronomique pour le Dveloppement (CIRAD), Montpellier, France
- Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH (GTZ), Eschborn, Allemagne

- Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO), Rome, Italie
- Food and Feed Grain Institute, Kansas State University (KSU), Manhattan, Kansas, USA
- International Development Research Centre (IDRC), Ottawa, Canada
- Natural Resources Institute (NRI), Chatham, Royaume-Uni

Les objectifs du GASGA

Dans le cadre de l'objectif plus vaste consistant promouvoir l'amlioration des systmes agricoles d'alimentation dans les pays en dveloppement, l'objectif primordial du GASGA est de coordonner et de dissminer des conseils afin d'influencer et d'amliorer les politiques et les procdures relatives aux systmes sur les rcoltes alimentaires postrcolte, spcialement la manutention, le traitement, le stockage, le transport des grains. Le GASGA cherche atteindre cet objectif: en harmonisant les activits de ses membres pour porter leurs ressources l'optimum; en identifiant les dveloppements et activits techniques cls dans le secteur post-rcolte; en favorisant les discussions et une analyse de ces problmes par des sminaires et des groupes de travail; et en dissminant ces renseignements aux donateurs et aux pays en dveloppement.

Les Sminaires Excutifs du GASGA

Le Comit Excutif du GASGA se runit annuellement pour passer en revue les progrs de ses activits et envisager des propositions de travail venir. Depuis la 1 9me runion du comit excutif en 1987, un sminaire s'est tenu conjointement avec la runion annuelle et des rapports prsents aux sminaires ont t publis dans la Srie du Comit Excutif du GASGA.

La prsente publication, la septime de la srie rassemble les communications prsentes au sminaire qui s'est tenu lors de la 25me runion du Comit Excutif du GASGA organise au NRI Chatham, Royaume-Uni du 7 au 11 Juin 1993

Les prcdents sminaires executifs ont abord les domaines suivants:

No.1 Rsultats de la recherche et du dveloppement dans le domaine de l'aprs-rcolte des grains en Afrique

No.2 Rsultats de la recherche et du dveloppement dans le domaine de l'aprs-rcolte des grains en Asie

No.3 Les rsidus de pesticides dans les grains stocks

No.4 Problmes de la qualit des crales dans les rgions en dveloppement du

monde

No.5 Questions de politique gnrale sur le secteur des petites crales d'Afrique Australe

No.6 Mthodes de suivi et d'valuation des innovations technologiques dans le domaine post-rcolte des grains

Les comptes-rendus de ces Seminaires Executifs (l'exception du No.4) sont disponibles auprs du Secrtariat Conjoint du GASGA l'une des adresses suvantes:

NRI Food Storage Group
Central Avenue
Chatham Maritime
Kent ME4 4TB
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France
Fax: (+33)-67 03 10 21

GTZ-Post-Harvest Project
Pickhuben 4
2000 Hambourg 11
Allemagne
Fax: (+49)40 37 83 45

Autres activits du GASGA

Le GASGA favorise aussi la runion de Sminaires Techniques et d'Ateliers, organiss par un ou plusieurs membres, afin de porter des questions cls l'attention d'un public plus large ou d'encourager former une synthse des opinions d'experts sur des sujets importants. Les sujets ont comport:

- L'usage appropri de pesticides pour la lutte contre les ennemis des produits en stock dans les pays en dveloppement
- Dtrioration du riz en zone tropicale humide

- Le grand capucin du grain-Prostephanus truncatus (Horn)
- Prservation de la qualit des grains par ventilation et schage en silo
- Technologie de fumigation dans les pays en dveloppement

De mme, un Groupe de Travail du GASGA sur les Champignons et les Mycotoxines dans les Produits Alimentaires et Produits d'Affouragement Asiatiques a rcemment travaill coordonner une stratgie et un plan d'action pour les pays membres de l'ASEAN (Association des Pays du Sud-Est Asiatique).

Le GASGA produit aussi un Bulletin d'Information et d'autres publications dates irrgulires: de plus amples dtails peuvent tre fournis en s'adressant l'une des trois adresses du Secrtariat Conjoint indiques cidessus.

Introduction

M. J. Hebblethwaite

Seminar Chairman

Head of Social Sciences Group, NRI

The objectives of this seminar on private enterprise and the post-harvest sector were:

- to encourage the GASGA Executive to discuss the GASGA role in promoting private enterprise in the post-harvest sector;
- to prepare a GASGA position paper on support to private enterprise in the post-harvest sector; and
- to identify opportunities for action by the GASGA Joint Secretariat.

The topic of the seminar was a response to a current major emphasis by donors. Indicative of that emphasis was a current study, led by the World Bank, and with contributions from ODA and NRI, on agricultural marketing and processing in Sub-Saharan Africa, the role of the private sector, and how this is influenced by the policy environment.

The perspective of donor policy at a broad level is focused largely on the respective roles of government and the private sector.

The role of government is usually seen as:

- providing the policy environment on exchange rates, export incentives and avoidance of distortions in market prices;

- investing in physical infrastructure, especially transport, in relation to agricultural marketing;
- investing in social capital, namely education and health services, to improve the human resources of a country; and
- undertaking research and providing technical advice.

It should be noted, however, that some of these functions are no longer seen as the sole preserve of governments. The private sector, for instance, is active in research and provides advice on agricultural services and products, promoting their sale. Nevertheless, in the foodgrains sector, while market liberalization has proceeded a long way in Africa, governments are still commonly seen as having a role in financing and holding food security reserves.

The private sector is seen as having an increasing role in agriculture, especially in those functions which require entrepreneurial risk-taking skills. These include the provision of agricultural inputs, and the marketing and processing of outputs, as well as production itself. The role of the private sector in providing financial and technical services is being increasingly emphasized. Commercial banks are being more frequently considered for provision of these services, given the very mixed experience with state-financed credit institutions. Private sector provision of technical services is on the increase, as a result of doubts about the financial sustainability and effectiveness of,

for instance, government extension services in their traditional form.

In practice, the relationship between private enterprise and government policies is more complex than this introductory outline indicates. The four papers presented at this seminar illustrate some facets of this relationship.

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Measures to encourage and improve the performance of the private sector in the marketing of crops

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Ghana Institute of Management and Public Administration

Abstract

Measures to encourage and improve the performance of the private sector in the marketing of crops

The problems facing private sector maize marketing in Ghana are addressed. The characteristics of the private sector participants are identified together with areas where strengthening would improve their efficiency.

Lack of government support and capital, transaction costs and non-availability of storage facilities are the major constraints.

Recommendations include the introduction of credit schemes and grading standards, a clear government policy on agricultural trade and training programmes for traders.

Rsum

Mesures pour encourager et amliorer le rendement du secteur priv dans la commercialisation des rcoltes Les problmes qui se posent a la commercialisation du mars par le secteur priv au Ghana vent envisages. Les caractristiques des participants vent identifies, ainsi que les zones du secteur priv dont l'efficacit serait amliore si elle

tait renforce. Le manque d'un appui du gouvernement et de capitaux, les cots de transaction et la non-disponibilit de moyens de stockage vent les principales contraintes. Les recommendations comportent l'introduction de plans de credit et de normes de qualit, une politique claire du gouvernement sur le commerce agricole et les programmes de formation des commerants.

INTRODUCTION

The marketing of most agricultural products in Ghana has been dominated by the private sector. However, these activities have not received much support from successive governments, and their potential contribution to the development of an efficient agricultural marketing system has not been harnessed effectively.

The main objectives of the presentation are to:

- identify the characteristics of the private sector participants in the marketing of crops; and
- determine areas that can be strengthened to encourage and improve their efficiency in the marketing system.

The emphasis will be on cereals, especially maize, in this presentation.

There are differences in the procedures governing the marketing of various types of agricultural crops. There are elaborate institutional arrangements for the marketing of the traditional export crops, namely, cocoa, coffee and sheanuts. In the case of crops which are produced mainly to feed local manufacturing entities, the producer has nothing to do with their storage. The marketing agencies buy the produce immediately it is ready. This category includes tobacco for the cigarette factories and cotton for the Cotton Development Company, Plantations Limited, Agro-trade, and other entities who sell cotton to the textile mills. The market for these crops is well organized. There are quality specifications and produce is purchased by weight. The prices for these crops are tied to the standard and quality specifications.

The case for maize and other food crops is different. Weights are not used in the marketing of these crops, and standards and quality specifications are virtually non-existent. In the case of cereals, the traders may purchase maize in bags or other containers which can vary in weight by as much as 20%. Purchasers must rely on their experience to be able to determine the moisture content of the grain.

Participants in the maize market consist of producers and marketing intermediaries from both the state and private sectors. The private sector is competitive (with many small-scale traders) and handles over 90% of the grain market. This is the focus of this paper.

The Ghana Food Distribution Corporation (GFDC), which is state-owned, was a major buyer in the past. More recently it has been hampered by liquidity problems, and now purchases only about 1% of the maize marketable surplus. A study by Obeng et al. (1990) has shown that most farmers sell their farm produce through private marketing intermediaries. As indicated in Table 1, as many as 94% of the respondents sold farm produce to private marketing intermediaries. Only about 30% sold any produce to the GFDC.

The decline in the purchases by GFDC makes it more important than ever to improve the effectiveness and efficiency of the private maize traders who perform the marketing functions. This and other indications show that the latter will continue to play a major role in the foreseeable future.

Table 1 Marketing channels for farmers

Sales channels	Frequency	Percentage
GFDC	98	29.5
Ghana Seed Company	6	1.8
Grains Warehouse Company	4	4.2
Commercial store/firm	8	5.4

Private traders	312	94.0
Factory/cannery/mills	17	5.1
Institutions (schools, etc.)	89	26.8
Others	2 3	6.9
Number of farmers	332	

The main focus of public policy on food marketing has been the state-buying agencies. The state has supported the state-buying agencies with the construction of silos and other warehousing facilities. Even though overwhelming evidence has shown that it is the private sector which markets the bulk of agricultural produce, no attention has been paid to this sector by previous governments. Rather, some government policies have militated against the participation of the private sector in the marketing system.

Most private traders have in the past been reluctant, for instance, to store grain. Storage of agricultural products, especially cereals, is undertaken by farmers, the parastatals, and, to a small extent, traders. The parastatals, specifically the GFDC and formerly the Grain Warehousing Company Ltd (GWC) operate the bulk of modern maize storage facilities. A few farms and some poultry mills also have modern storage facilities including silos. The bulk of maize and other cereals in Ghana is stored by the

farmers in barns or other traditional storage facilities. With the present near-total dominance of the private sector in the cereal market, its participation in the marketing system will have to be improved and strengthened for the benefit of the farmer and the consumer.

CHARACTERISTICS OF MARKET PARTICIPANTS AND MODE OF OPERATION

Participants in the maize trade

The maize market is dominated by several small-scale traders, the greater proportion of whom are women. Five main participants in the maize trade may be identified: the farmer/seller, the local assembler, the commission agent, the long-distance wholesaler, the market-based wholesaler and the market-based retailer.

Farmer/seller The farmer/seller is the farmer who sells his/her produce to any of the other market participants. He normally sells to the buyers for cash but in some cases, especially during periods of bumper harvest, may sell on credit. The farmer may store maize on cobs in traditional barns, in homes or compounds, or in other traditional storage structures.

Local assemblers The local assemblers buy produce from village bulking markets or

from the compounds of farmer/sellers. They transport the produce to wholesale markets for sale to long-distance wholesalers either directly or through commission agents. Most local assemblers or traders specialize in the sale of particular staples. In many cases, the local assemblers (most of whom are women) are part-time farmers. Nearly 70% of local assemblers use their own funds to finance their operations, and the rest is obtained from relatives or money-lenders. In the late 1960s and early 1970s, maize was usually bought on credit. This has changed in the last decade.

The local assemblers provide a vital link in the marketing system between the remote villages and wholesale markets. Some assemblers may buy maize on credit but have to make a down-payment to the farmers. These assemblers normally operate on a rapid stock turnover basis.

Local traders normally assemble more maize in the post-harvest period than in the preharvest market period. Average weekly turnover for these traders is about 15 bags during the post-harvest period and about 2 bags during the preharvest period. The local assemblers replenish stock, on average, every two weeks.

Maize may be stored on the assembler's compound. The period of storage depends on the length of time needed to assemble substantial maize to justify a trip to wholesale markets and normally does not exceed two weeks. Few assemblers store produce with

the object of taking advantage of higher prices in the future. They do not see long-term storage as part of their business or as a means of earning larger profits.

A major reason given by the local assemblers for the low volume of operation is lack of capital. Their inability to store produce for speculative purposes has been attributed largely to the unavailability of storage facilities.

Long distance traders The long-distance traders are mostly full-time traders. The long-distance wholesalers normally travel from the urban consuming areas to buy maize in the producing areas and transfer produce to base for resale at wholesale level. They normally buy produce from local assemblers and farmer/ sellers with or without the services of commission agents. Most wholesale traders are women. Some have moved up from farmer/ sellers and local assemblers to the status of wholesale traders. The long-distance traders are, on average, older than the local assemblers. They have considerable experience in the maize trade. Most are independent operators.

Armah (1989) has indicated that the long-distance wholesalers and their local assemblers are the major agents in the trade, and buy over 70% of marketed maize. The volume of operation of each of these market intermediaries is always quite small. They buy quantities which they can sell within a short time before their next market day, or before their next round if they are itinerant traders. They buy for cash and

normally sell on credit. The results of Armah's study indicate that over half the sales volume of the long-distance wholesalers are made on a credit basis for periods up to a month or more.

The long-distance wholesalers, like the local assemblers, engage in short-time storage in the normal course of their business. Most of the long-distance traders also operate with their own funds; thus the ability to increase their volume of business and to store grains for speculative purposes is limited.

The long-distance traders face price uncertainty which results from the relatively long time-lag between purchase and re-sale. This requires that they develop risk-taking abilities and acquire knowledge of local and temporal supply-and-demand conditions.

Commission agents The commission agents establish links between farmer/sellers, local assemblers and the long-distance wholesalers or traders. They may be market-based wholesalers or retailers operating in bulking markets in producing areas or urban consuming markets. They may also operate directly in producing areas as local assemblers or agents of long-distance assemblers.

Market-based wholesalers The market-based wholesaler may buy maize from long-distance wholesalers or farmer/sellers who bring their produce directly to the urban

markets where such traders are based. The market-based traders may also sell on a commission basis for the producers and local assemblers. They may have reasonably good or makeshift warehousing facilities or stores in the markets where the maize may be kept. The market-based wholesalers buy the maize in bags and sell it in bags.

Sales may be either on a cash or credit basis, depending on whether the maize is being sold to market-based retailers or customers who prepare maize-based foods.

Market-based retailers The market-based retailers buy and sell in the market and normally perform the function of breaking bulk and retailing. They have few overhead expenses, such as the market tolls charged by the district assembly. The market-based retailers buy maize either with cash or on credit from farmer/sellers, market-based wholesalers or long-distance wholesalers. They sell the maize for cash.

Gao traders The Gao are not indigenous to Ghana. They normally operate as longdistance wholesalers, market-based wholesalers/ commission agents. The largest operators in the maize trade (in terms of volume of maize purchased) may be found among this group of traders.

The Gao traders appear to have an appreciable understanding of the maize market. They are aware of the massive price variation and may buy and store maize for periods

of up to three months. These traders do not have adequate warehousing facilities and may store maize, other cereals and pulses in the open air covered with tarpaulin or polythene. This group of traders would be most likely to utilize the services of a reliable warehousing company.

Input supply to farmers

Some traders, especially the long-distance wholesalers, provide inputs and other services to farmers. The farmers may then be committed to selling a percentage of the produce to the trader later. The traders extend these facilities to the farmers with the objective of assuring themselves of good supplies of maize especially during the post-harvest period when prices are low.

Financing of maize trade

The results of Asante et al. (1989) and other studies confirm that most itinerant traders, private market intermediaries, do not have access to institutional credit and cannot mobilize the funds needed to increase their volume of purchases.

Only 14% of itinerant traders in Asante's study had access to institutional credit. The credit situation for cereal producers was no better. As many as 80% of producers

financed their farm operations from their own resources. Table 2 shows the sources of funding for the marketing operations of some private marketing intermediaries.

Table 2 Source of funding for private market intermediaries

Source	No. of respondents
Own	34
Banks	6
Friends	2
Total	42

Storage

The traders may store the maize for 2-4 weeks on average (if they store it at all). Most of the traders have only limited storage space in their homes, in the market and occasionally in rented warehouses. They are not conversant with good warehousing practices. A visit to the markets where these traders operate amply demonstrates the inadequacy of warehousing facilities and their warehousing practices.

The new breed of long-distance traders Most of the marketing intermediaries in the

maize trade have very little or no formal education. They normally do not have business or marketing skills, and may not keep accounts or have financial statements. It thus becomes very difficult for banks to assess the creditworthiness of these traders. However, a group of young men and women in the maize trade who are better educated and more aware of modern business practices is emerging. Most of these traders operate in the long-distance wholesaler category. They buy directly from farmers, local assemblers and bulking markets in the producing areas. They may also use local commission agents who buy maize from the farmers on their behalf. Some of these traders advance money to the commission agents for this purpose.

These traders normally obtain contracts from feedmills and poultry farmers and deliver the maize and other produce they purchase to them. They may also sell maize to food preparers, market-based wholesalers or retailers. These sales may be on credit. The farmers may hand over the maize to the trader and collect the proceeds after the trader has sold the produce. This emerging breed of traders is now 'the big boys of the trade'. Some may have a turnover of between 600 tonnes and 1000 tonnes or more compared to the maximum of 120 bags purchased by the old breed of long-distance traders. Some members of this emerging group use, for a fee, storage facilities belonging to the GFDC. They may also dry the maize with commercial maize driers. This emerging group appears to be progressive and could be encouraged to expand and increase the efficiency of its operations, if some of the constraints facing the

traders are addressed.

CONSTRAINTS FACING MARKETING PARTICIPANTS

The constraints traders face can be categorized into three:

- **those attributable to government policy;**
- **the financial system; and**
- **those emanating from the mode of operations.**

Lack of government support

Government support for the private sector in the marketing of food crops has been lacking. In the case of traditional export crops such as cocoa, coffee and sheanuts, there is an elaborate marketing system and environment which has been fostered by various governments. These crops are purchased by weight. In addition, there are government-approved quality standards. The producers of these crops do not undertake their storage. The buyers of other cash crops which are produced to feed local manufacturing concerns also have quality standards, and purchase them by weight.

There are no such arrangements for the food crop sector. As stated earlier, buyers may purchase maize which may vary in weight by as much as 20%. The moisture content may be far from ideal (i.e. above the 13% moisture content which is desirable) and this may result in an effective increase in the price of maize purchased by the trader when the maize is dried to the required moisture content level. Inexperienced traders may suffer losses as a result of moulds which may form on grains with a high moisture content. While governments have been concerned with food security and have arranged with foreign donors to construct modern warehousing and drying facilities (including silos for the GFDC, which handles less than 5% of the marketable surplus), the private sector has not been encouraged to acquire any of these facilities. As a result, private marketing intermediaries do not have ready access to improved drying and storage facilities. There are no nationally recognized weights or grades for the private sector.

The private marketing intermediaries also face high transport costs which may range between 35% and 65% of marketing costs. These increased costs are partly due to the bad condition of roads in most areas producing food crops.

Dealers in maize and other commodities have also had cause to be wary of governments who, in previous times, have accused those traders who have stored produce of 'hoarding'. People with money who could have entered the maize trade to

take advantage of the wide variation in prices have been reluctant to enter the cereal trade for fear of losing their capital.

Ambiguous government policies on exports and imports have created problems for maize traders. Some maize traders have been unable to fulfil export commitments; others have suffered losses as a result of sudden imports of yellow maize (through donor food aid).

While farmers obtain extension advice on production methods, the marketing intermediaries do not have access to any advisory service which would help them to improve or acquire the skills required for their trade.

Constraints from the financial system (lack of capital)

Lack of capital was cited as the major problem for maize traders in Armah's study (1989). In another study by Asante et al. (1989), it was observed that only 14% of traders obtain institutional credit for their marketing operations. Most of the traders normally use their own capital, which is inadequate and, as a result, the traders deal in small volumes (the local assemblers, on average, handle 12-14 bags per week during the post-harvest season and only 2 bags per week during the preharvest season). In a recent survey (Courter et al., 1993), it was observed that at Kaneshie (Accra, Ghana)

most of the long-distance traders had a turnover of between 3580 bags every two weeks. There are, however, a few long-distance wholesalers (especially the Gao traders and the emerging young men and women traders identified earlier in the paper) who handle up to 100 bags or more (220 lb/bag) per week.

All categories of traders have indicated their belief that they could double their volume of business if they could gain access to credit. The formal banking system is mainly based on collateral banking. Most of these traders may not have assets which are acceptable to the banks as collateral, and even those who have are limited by the value of their assets. The concerns of the banks centre on the difficulty of assessing the creditworthiness of individual traders and the high cost of collecting debts from a large number of traders.

Constraints from the mode of operation

In the marketing of traditional export crops and other cash crops (such as cotton and tobacco) the farmer takes his produce to a buying depot and the crop is bulked. However, in the case of cereals (especially during the preharvest period) the marketing intermediaries have to move from village to village or compound to compound to find maize to purchase. This mode of operation greatly increases the transaction costs.

The non-availability of storage facilities is a major constraint that marketing intermediaries at all levels face. The high cost of procuring modern storage and drying facilities is beyond the reach of the majority of traders.

The traders also face the problem of the risk of price change in consuming markets because of their inability to monitor supply and demand. The very large number of buyers may also limit the volume that each local assembler can purchase.

MEASURES AND STRATEGIES TO ENHANCE THE EFFICIENCY OF THE PRIVATE MARKET INTERMEDIARIES

This section attempts to identify policies, strategies and actions which could be adopted to improve the performance of the private sector in the marketing of food crops, especially grains and pulses. The policies needed to provide an enabling environment would have to emanate from the government.

The negative (or, at best, indifferent) attitude of governments towards the private marketing intermediaries, especially maize traders, is a major impediment. The traders gave fear of being accused of hoarding as one of the reasons for their unwillingness to store maize. It is thus crucial that the government produces a policy statement promising non-interference in the activities of private marketing intermediaries. For

instance, a situation should be created in which it would not be possible for anybody to seize produce stored by any trader and would allow traders to export food crops if they so desired.

It should be possible for the government to evince the same interest in private marketing intermediaries that it shows to farmers and private sector entrepreneurs who supply the farmers. To this end, the government should use the extension service to provide advice and training programmes for the private sector entrepreneurs in the maize trade.

A policy which would enhance the maize trade would be the introduction of weights, standards (quality standards) and grades in the cereal and pulses trade. Marketing of maize would then be uniform throughout the country. This might not be too difficult since small-scale farmers producing cocoa, coffee, sheanuts, cotton and tobacco sell produce on the basis of quality standards and weights used in the industry. In those circumstances, both the farmers and traders would have to be given some training in the quality standards for the industry. The use of quality standards at the primary level would make it easier to introduce an inventory credit scheme for the maize traders.

In view of the diminished role of the GFDC in the maize trade, the government should

also consider leasing some of the silos and warehouses being operated by the GFDC to private sector entrepreneurs in the maize trade. This would prevent a situation where there is excess storage capacity in the system which is inaccessible to private sector traders.

The high cost of transport from farm to market is attributable, to a large extent, to the poor condition of the roads in the producing areas. One other policy which the government could implement to help traders is the expansion and acceleration of the rural road improvement programme.

The division of the Policy Planning, Monitoring and Evaluation Department (PPMED) of the Ministry of Agriculture should be strengthened in order to provide more up-to-date and accurate information on supply and demand for cereals and other agricultural crops. This information should be readily accessible to traders. The government could also use this information to prevent any unnecessary imports of maize. Some traders have suffered severe losses as a result of imports of yellow corn (through food aid) when there is already enough maize in the system.

The private sector traders may buy produce direct from farmers, farmer/sellers, commission agents and local bulking markets. The high transaction costs that are incurred by the movement of traders from one village to the next could be reduced

with the establishment of buying centres. This practice should not be difficult to institute as Ghanaian farmers have already been through this process with the cocoa, coffee, sheanut, tobacco and cotton industries. The GFDC also uses buying centres for purchasing maize. However it should be tried first in areas where maize is more or less a cash crop, or there is a large volume of marketable surplus.

One of the constraints which limits the volume of business, especially during the post-harvest period, is credit. Alternative methods of providing credit to the private marketing intermediaries include:

- **buying produce on credit from farmers;**
- **collateral credit from the traditional banking system; and**
- **inventory credit schemes.**

The first method is practiced on a very limited scale and only helps the farmer to dispose of his/her produce. The second is also used on a limited scale since most of the traders do not have bankable assets. An alternative which is not currently in use in Ghana is the inventory credit scheme, which has great potential. Some banks and a few companies which have experience in warehousing have shown interest in such a scheme and it appears to appeal to some long-distance traders (particularly Gao traders). The introduction of weight and quality standards in the maize trade is

essential for an inventory scheme and the government should consider the preparation of rules and regulations for operation of an inventory credit scheme as a matter of urgency.

There are problems that must be addressed in order to increase the efficiency and effectiveness of the private marketing intermediaries. The turnover for most of these traders is quite small. Several reasons have been given for this. One which seems to be beyond the control of traders is the productivity of the farmers. The fallow period has shortened and this has had an adverse impact on land productivity. There is a need to encourage the use of fertilizer by the farmers. However, most of these farmers cannot afford the high cost of fertilizer, especially after the removal of subsidies.

Provision of input credit to farmers by traders may be an effective method of channelling loanable funds to farmers. Traders who purchase maize at buying centres may stock fertilizer and other inputs and provide these to the farmers on credit. Another approach could be through private market intermediaries guaranteeing inputs and services which the farmer would receive from an input dealer and could be repaid later in the year. (Private input sellers could also be encouraged to buy produce from farmers.) A few traders already supply inputs to farmers informally.

SUMMARY AND RECOMMENDATIONS

Summary

An attempt has been made to identify the characteristics of private market participants and the problems that they face. Some suggested measures to improve the performance of the private sector in the marketing of cereals have been highlighted. Appropriate recommendations have been made. The maize market is basically a private sector activity. The majority of the traders are women who operate on a very low turnover. Identifiable participants in the market are the farmer/seller, the local assembler, long-distance traders, commission agents, market-based wholesalers and the market-based retailers. The characteristics of these participants have been discussed, touching on the volume of business, storage facilities, financing of trade, experiences and mode of operation. The emergence of a new breed of young and educated people in the maize trade has been recognized and their characteristics and mode of operation described. The marketing of maize in Ghana is not sophisticated. No quality standards and grades have been established. Most of the traders operate on a very small scale and use their own funds. Most of the traders have very little formal business and/or marketing skills.

The lack of enabling government policy initiatives which would improve the private sector traders' efficiency and effectiveness is a major obstacle to improving efficiency and effectiveness in the maize trade. There are no rules and regulations for the

conduct of the maize trade as pertains in the cocoa, coffee, sheanuts, cotton and tobacco trades. Another major constraint the traders face is their lack of access to adequate storage facilities (even though the GFDC, which handles less than 5% of the marketable surplus, has excess storage capacity and continues to build more). Unclear government policies have given wrong signals to traders about storage and exports of maize.

Lack of finance for the maize trade is a serious problem faced by the traders.

Unlike farmers who obtain extension advice to improve upon their production skills, the market intermediaries do not obtain any extension advice for their activities. Measures that have been identified and that would enhance the performance of private sector maize traders include: appropriate policy statements assuring the traders that under no circumstance will inventory or stock-in-trade be seized; the introduction of weights and standards grading in the maize trade; and release of excess storage capacity under the control of GFDC to the private sector.

Other measures include: the mounting of training programmes to upgrade the technical, financial, business and marketing skills of the private sector maize traders; expansion and acceleration of the programme to rehabilitate rural roads; the provision of more up-to-date and accurate information on prices and the supply and

demand for cereals and other agricultural crops; and measures to reduce transaction costs such as the establishment of buying centres in producing areas. Government support of innovative ways of providing credit would help to alleviate the financial constraints the operators in the food crop sector face.

The provision of input and inventory credits and other services such as ploughing would assure the traders of being able to purchase large volumes of maize which would reduce unit transaction costs and increase profits.

Recommendations

The government should, as a matter of urgency, issue a policy statement on measures intended to enhance the performance of private sector participants in the maize trade. Such measures should include provisions for the export of agricultural crops, extension support and training programmes for the traders such as are available for crop producers and are proposed for private fertilizer sellers.

Preparation of rules and regulations for the operation of an inventory scheme

To support the introduction of inventory credit scheme the government should solicit the input of experts conversant in this area to draw up appropriate guidelines, rules

and regulations for the operation of the scheme.

Upgrading of marketing

Some of the emerging young maize traders should be targeted and helped. It is time that traders with the potential to expand are helped to move to higher levels of operation, for example, the marketing of own brands of maize as whole grains, milled grains or other processed forms.

Introduction of grades, standards and weights in the maize trade

The Ministry of Agriculture (MOA), the maize traders and the Standards Board should agree on grades for the maize trade.

Policy on agricultural trade The government should provide a clear policy on both the import and export of agricultural crops, especially food crops, and including maize.

Mounting training programmes for the traders To support and enhance the performance of the private sector maize traders, a training programme to upgrade technical, marketing, financial and business skills should be implemented.

Provision of market information The appropriate department of MOA should be

strengthened so that up-to-date prices, and supply-and-demand information for cereals and other agricultural crops could be collected and made available to traders.

Donor support may be required in the implementation of the recommendations concerning the mounting of training programmes and the strengthening of institutions for providing timely and relevant market information.

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Investment criteria to ensure a successful private sector post-harvest enterprise

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Rural Investment Overseas Limited

Abstract

Investment criteria to ensure a successful private sector post-harvest enterprise

The major factors affecting private sector enterprises are discussed, with examples of successful projects from Ghana, Tanzania and Thailand.

Post-harvest technologies such as drying, storage and processing require high levels of capital and so great care must be taken in the planning and management of projects. This presents the greatest risk to a new business.

The promoter is the key factor in any private enterprise.

Rsum

Critres d'investissement pour assurer une entreprise russie dans le secteur priv post-

rcolte

Les principaux facteurs qui affectent les entreprises du secteur priv vent examines, avec des exemples de projets couronns de succs au Ghana, en Tanzanie et en Thalande.

Les technologies post-rcolte comme le schage, le stockage et le traitement exigent d'importants capitaux et il s'agit done de veiller a la planification et a la gestion du projet. C'est la que reside le plus grand risque d'une nouvelie entreprise.

Le facteur cl de toute entreprise prive est l'element qui en prend l'initiative.

INTRODUCTION

Over the past five years more interest has been taken in the development of the private sector than ever before. This is especially true in the emerging, developing countries. There has been a general realization that this is where the future prosperity of the countries will come from and that money spent on, and support given to this area will provide long term, sustainable benefits. However, the private sector cannot flourish without considerable support from financial organizations and technical institutions such as yourselves. Neither can it survive and grow unless the 'public'

sector provides the stability (from government), and general infrastructure, such as roads and communications, within which the private sector can operate.

My own background has included work concerning the introduction of grain post-harvest technology to the private sector, largely in developing countries, and more recently I have been involved with the running of enterprises handling perishable horticultural crops, in Asia and East and West Africa. The company I work for, Rural Investment Overseas (RIO), works almost exclusively with the private sector and undertakes feasibility studies at the request of a promoter or international development institutions; assists in the raising of the necessary finance; and, if appropriate, can be involved in the management of the enterprise. We therefore have practical experience in the development of the private sector in the areas outlined.

For this presentation I would therefore like to outline the various factors which we look for when we are undertaking a study, or other involvement, in a private sector enterprise. I shall also relate these factors to post-harvest and similar projects that we have been involved in and how we believe the work being carried out by international institutions, such as yourselves, can inter-react with and assist these emerging enterprises.

When we talk about post-harvest enterprises we are looking at a very wide range of

products, from instruments and expertise supplied by pest control companies through to large grain stores and drying/processing plants. Many agricultural enterprises, for example, horticultural producers, also have a large post-harvest element in their business. Therefore, my comments have to be very general, but can also be applied to a wide range of enterprises.

There are many factors which have to be considered when looking at, and running, a new or expanding enterprise, but the major ones that I would like to concentrate on are:

- **project planning and investment;**
- **promoter;**
- **product;**
- **market and competition;**
- **infrastructure;**
- **freight and export;**
- **technology; and**
- **management and training.**

One of the examples of a project which I shall use to demonstrate the importance of some of these factors is Camsi Farms in Ghana. This is a business owned by a local

company which grows, packs and exports fresh pineapples and mangoes. In 1989 RlO was approached by the Africa Project Development Facility (APDF) who commissioned RlO to undertake a feasibility study to ascertain Camsi's future viability and funding requirements. We then worked with institutions, including the Commonwealth Development Corporation (CDC), to raise the necessary equity and loans, and finally entered into a management agreement whereby we provide technical assistance and market co-ordination (through our associate Farm Services Company-FSC).

FSC has had a full time expatriate manager on the farm for three years and he has been responsible for the establishment of the growing programme, infrastructural development and training. We also bring in specialist horticulturalists and post-harvest technologists when required. Day-to-day marketing is carried out directly between the farm and the customers but, from the United Kingdom (UK), we are able to assist in identifying customers, following up shipments and helping to resolve any problems that arise.

I would now like to expand further on the issues highlighted earlier whilst providing examples and anecdotes from our experiences in developing Camsi Farms and other private sector projects.

PROJECT PLANNING AND INVESTMENT

The thorough planning of the project, the investigation of all the factors which concern it and the identification of those factors which can make or break it, are essential to the enterprise's future viability. Too many projects start off with unrealistic resources and goals and therefore fail. It is essential that a comprehensive study be carried out and a realistic bankable document produced. Contrary to popular belief, such a document is not designed to prop up uneven desk legs in an office, but is produced to show that the project is viable and will therefore attract the necessary funding to make it a reality.

The main purpose of the study is to produce a set of financial projections, but the assumptions on which these are based can only be made by efficient research and realistic analysis.

Gauging the realities of the market is particularly difficult, but of extreme importance. Statistics can be used to determine trends, but can prove misleading. It is therefore important to talk to as wide a cross-section of people representing the local and export markets as possible in order to confirm the project promoter's figures and market potential.

The level of investment required for the project and its source are always contentious issues. However, in simple terms, the lower the investment necessary (particularly

capital investment) to meet the objectives, and the more the promoter can contribute, the better. A word of caution, however, is that the level of investment, especially in capital equipment, must be sufficient to allow the projections in the business plan to be met. You cannot take short cuts at this early stage, especially when you are having to satisfy overseas buyers and repay foreign exchange loans.

In our experience, many promoters begin with unrealistic expectations of the size of the project and the level of borrowing, compared with their intended equity investment and realistic incomes. Thankfully the proportion of promoters requiring 100% financing now appears to be decreasing. However, it is still necessary to stress the need for realistic debt/ equity ratios in order to maintain interest payments at a reasonable level and provide other investors with the confidence that the promoter is totally committed to the business.

With post-harvest projects involving drying equipment, grain silos, and so on, capital investment can be very high. In addition to the working capital requirements (including interest payments), storing the crop for some time can result in high initial borrowing requirements. It is hoped that projected earnings will outweigh these costs, but in the first few years the project may be at risk if targets and projections are not met. It is for this reason that it is often advisable to phase the project so that the risks are spread in these early, critical, years.

In Tanzania we are presently involved in the support of a cashew nut processing project. A feasibility study has been undertaken and the project appears to be viable but, on paper, it would be more profitable if we were to put in a larger processing plant. However, this would also increase the working capital requirement considerably as the cashew nuts have to bought in over two or three months and stored for processing for a further eight months. It has therefore been decided to introduce the smaller processing facility as stage 1 of the project and add an additional line when the project has proved in practice that it is viable.

The project should also avail itself of any assistance available from the country's government. In particular, this means tax holidays, reduction or waiving of import and sales taxes, export retention schemes and other incentives. After all, the project will almost certainly be earning increased foreign exchange for the country, giving additional employment, and providing examples for other businesses to follow.

A final word: it will always take longer to implement the project than expected. On average we find that projects take about two years from initiation to implementation; this can prove a large financial drain on promoters and those assisting the project at this stage.

PROMOTER

The promoter is the most important factor in the long-term success of the project. It has long been held that if there is a strong project but a weak promoter it will be difficult for the project to succeed; however, if there is a strong promoter but a weak project, the promoter will make all the difference in ensuring success.

RIO is frequently approached by prospective entrepreneurs requesting finance and assistance, as I am sure many of you here today are. I must be frank and say that many will waste your time, a fact that is as true for the developed as well as the developing parts of the world. The first approach is often by letter and fax and it is our policy to reply with a few specific questions.

- **Can we see your business plan?**
- **What is the planned level of your investment?**
- **Are you already involved in this business sector and will you personally be 'driving' it?**
- **Is the project within the sectors being promoted by your country's government?**

If the reply is clear, positive and fast, then it is worth progressing to the next stage, which is meeting the promoter. It is at this point that you get a real feel for the potential of the promoter and his project. To make the project succeed you will have to work very closely with him and this can only happen if you believe he can drive the

project through and that you can work together. After all, going through figures over a desk is one thing, but having to work with him during the planning period, raising the project finance and during the implementation of the project, is another matter completely.

Two good examples of very different promoters are Salim Tindwa, the main instigator of the cashew nut project in Tanzania, and Khun Preecha, an upcountry maize trader with whom we have worked in Thailand.

Salim Tindwa is the director of a co-operative farmers' association, but an accountant by profession. What makes him different from the usual promoter is his understanding of the detail required to give other investors confidence, and the need for fast and frequent communication.

Khun Preecha is a typical up-country Thai maize trader but one who had the foresight to understand that a good quality product would obtain a higher price on the market. This involved the introduction of expensive and sophisticated drying equipment as well as more up-to-date management techniques. It also meant a change in the traditional relationship between the merchant and his farmer/suppliers. Khun Preecha was able to undertake these changes with the result that he now has a very successful business based on quality, as well as quantity.

Therefore, in summary, the ideal promoter must meet the following requirements.

- **He must be strong and dedicated to the project.**
- **He must be honest and realistic in his goals.**
- **He must have adequate financial resources.**
- **He must understand that fast and clear communication is essential.**
- **He must be a good manager and understand the need to employ specialist staff and management where required.**
- **He must have good knowledge of his industry and the people involved.**

Well, I did say this was an ideal person!

PRODUCT

It may appear strange, but correct product identification is often overlooked in the initial planning of many projects, probably from complacency and lack of market intelligence. The following factors should be considered as being most important.

Product variety

The type of product which is to be handled by the new enterprise must be analysed to

show its suitability for storage, handling, and for the intended markets. In a grains post-harvest application the particular variety and type of produce will determine the type of capital equipment required, for example, for drying, cleaning, etc., and the practical storage times. This in turn will affect the working capital requirements.

Growing conditions and raw material supply

Can the produce be grown well in the area of the project? This may sound obvious, but if the project is to succeed the produce chosen must not only grow, but grow well with a yield and a potential quality which will enable the project to be viable.

This is critical for the farmer but is also important for the post-harvest enterprise dealing with the crop. Its viability will largely be dictated by the efficient utilization of equipment; if this is not possible the project will not be successful.

An example of poor attention to the supply of the raw material was a cannery built in Thailand to produce canned baby corn. Because the owners were in the fruit processing business and baby corn was grown in large quantities in the area of the factory, they assumed that raw material supply would not be a problem. However, this was not the case, and because of this lack of attention to raw material supplies and the competition, the factory closed down after one year's intermittent operation.

An additional factor in some smaller grain stores is the cleaning and storage of grain which is still owned by the grower, but stored under contract. The decision to store the individual grower's produce separately or in bulk must be agreed at the collection stage.

Quality and transport

Will the product reach the market in good condition? Fresh horticultural produce has a short shelf-life and needs to be transported quickly from farm to customer. These days it is often too expensive to send produce by air and therefore refrigerated shipping is required. Durable produce is easier to handle, but again, factors such as protection during transit from water, heat and pests will determine the final delivered quality of the produce. These factors, as well as the infrastructural requirements, must be analysed for the chosen produce.

Markets

Markets will be considered in more detail in the next section, but the question of produce type and variety has to be considered with regard to local and export markets. If the project is concentrating on export markets a considerable percentage of the crop may still need to be sold on the local market. It may therefore be that the

enterprise which is storing, processing and marketing the produce is contract-growing the raw material for a specific export or local market. If this is the case, it is necessary for the surplus to be sold at a price which will not affect the viability of the produce.

MARKET AND COMPETITION

As has been explained previously it is important to ensure that the product which is handled is compatible with the market requirements.

Market intelligence

Prior to and following the implementation of the project it is essential that regular market intelligence is available. Other than through direct contact with the buyers, information is available on a regular basis from many local and international organizations. Many items such as cocoa, coffee and grains have internationally published commodity prices, and for horticultural produce, institutions such as COLEACP and the International Trade Centre (ITC) in Geneva provide weekly European price data. However, it must always be remembered that the information (apart from the futures market) is historic and does not guarantee future prices and trends. These can only be gauged through regular contact with the companies' buyers, both locally and overseas.

Local markets

As briefly outlined in Quality and transport, it has to be remembered that any project will at any one time produce and/or handle food which varies widely in quality and standard. Therefore, more than one market will almost certainly be required, or produce will be wasted. As an example, the export trade for horticultural produce is very fickle and generally only takes the highest grade. In the case of pineapples this may be between 50% and 75% of the crop, whereas with, for example, baby corn, it can be as low as 25%. Therefore it is essential to have access to other markets. For export-orientated produce this usually means local sales and processing/animal feed outlets, but can also include export to markets which take different quality levels and standards.

With an export-orientated project it is very easy to spend too much time going after the 'jam' and not giving enough time to securing the 'breed and butter' markets. By this I mean that equal emphasis must be placed on securing the local and processing/feed market as on export, as one market sector on its own is very unlikely to support the whole project.

Quality and consistency of supply

The need for high quality and the consistency of supply of all products, whether destined for local or for export markets, cannot be overemphasized. However, with export crops this is the 'holy grail', especially when applied to high-value commodities such as horticultural produce. In addition I would also add that exporters must listen to the requirements of their customers and, however strange the request, make every effort to comply. Quite simply, if you do not, there is plenty of competition waiting to take your place.

Communication

Good communication is of paramount importance if the project is to maintain a close association with its customers. Again, this is true for local sales as well as for export. However, with more expensive transport, distances and cultures, communication with export buyers is critical. This is difficult in many developing countries, but experience has shown that if there is a will, there is a way! Much too often lame excuses are given for not communicating, but after a while these wear very thin. Customers must be kept constantly up to date with export plans, data on shipments such as airway bill numbers, etc., and any problems which arise. A good principle is that if it is uncertain that the fax or telex did not get through the first time, it should be sent again. It may be expensive, but if you can't afford the cost you should not be in the business.

Don't forget, the importers like to be kept happy, otherwise they will 'forget' to communicate, which could result in delayed payments!

Packaging

Packaging is essentially used to protect the produce during transport and marketing. However, the design and presentation of the packaging may, to the market, be as important as the quality of the produce itself. This can often cause problems in developing countries as good quality packaging may not be available locally. This means that it has to be imported, thus creating greater expense for the company and requiring longer term planning to incorporate manufacture and delivery.

Durable produce such as grains may not have the same constraints, but the forms of packaging can be equally critical to the enterprise, particularly those involved in storage and drying. In developing countries there is still great variance between those involved in bulk transport and those using bags. The methods of packaging used in the supply of produce from the growers and that required by the buyers will greatly influence the equipment needed for storage, processing and transport. All these factors need to be taken into account in the project parameters.

Competition

Competition can both be a threat and an advantage to the business. Any promoter who identifies a 'niche' market has to develop it and become established before the competition can move in. However, there are greater risks in 'being the first' and history shows that it is not necessarily those who open up the market that will prove to be the most successful in the long term. Potential competition must therefore be closely analysed before the project is begun and regularly monitored during its implementation.

In a number of developing countries it is often difficult for businesses, particularly export businesses, to expand because of their industries being below a viable size. An example is the horticultural industry in Tanzania and, to a lesser extent, that in Ghana. Both countries rely on frequent air and sea freight to export their goods, but have now reached a level where all airspace is taken up or there are difficulties with sea freight. The industries are simply not large enough either to justify investment by other parties in larger or better facilities, or to be able to 'lobby' the necessary authorities.

INFRASTRUCTURE

To obtain high quality produce and consistency of supply, a certain minimum level of infrastructure, both in the enterprise and in the country in general, is required. Infrastructure on the project can largely be controlled by investment and good

management, but off the farm it is largely out of the control of the enterprise. This has to be taken into account during the initial project appraisal.

The physical infrastructure of the business is usually taken to consist of utilities such as electricity, fuel and water, and capital items such as tractors, trucks, packhouses, workshops, storage, processing facilities, etc. Whilst it is essential that the business does not invest too heavily in these items, especially capital equipment, there is a minimum level below which the business cannot be sustained. In a developing country it is also sensible to plan to purchase two smaller pieces of equipment rather than one large one. If, for example, one of two trucks fails, the business can still operate, whereas if there is only one larger vehicle, breakdown could lead to considerable difficulties.

One point, which may appear minor, is the purchase of equipment through recognized importers wherever possible. It is often cheaper to import equipment privately, but experience has shown that the project may not end up with the same model as that available locally, which can lead to difficulties with spare parts. Also, the recognized importer, understandably, may be reluctant to service a vehicle which he has not supplied.

The supply of inputs such as packaging materials has already been mentioned, but if

such materials cannot be obtained locally they may have to be imported.

Arguably the greatest threat, or asset, to any private business is the policies and stability of the government, how it is prepared to support private enterprise, and the degree to which it will ensure basic infrastructural facilities such as banking, export incentives, tax holidays, and so on. Without these it is very difficult for industry, as opposed to the service or trading sectors, to flourish.

The physical infrastructure in different countries varies greatly and in many cases there are problems with roads, communications and general facilities. Companies dealing with perishable produce are possibly most at risk from inadequate infrastructural development within a country. RlO's experience with growing, packaging and exporting produce in Asia and Africa confirms this. Delays after harvest and damage in transport and storage are some of the main enemies of horticultural produce; unfortunately such factors are often exacerbated by the lack of infrastructure.

As already stressed, efficient communication between the producer and the buyer is essential. The same is true of good communications between the company, its suppliers and the growers. Orders, transport instructions and so on can vary by the hour and if these requirements cannot be rapidly communicated, then business will suffer.

The local bureaucracy and paperwork which often has be endured by an exporter will add to his costs and reduce his efficiency. This is an area which may on the surface appear to be well designed and controlled; but in reality it is open to a great deal of abuse. This is not confined to documentation, but applies to such areas as the availability of officers at the ports and airports and, in some cases, the obtaining of approval for exports from the central banks.

Phytosanitary documentation is essential for all exports of fresh produce, and whereas exporters do not want lengthy investigations and delays of their produce at the port, efficient inspection is required to maintain standards. There are many cases of countries gaining a poor reputation in the market because a few exporters have consistently shipped poor quality produce. If these exporters are not prevented from doing so then their poor standards will reflect on those exporters with high standards. Efficient and knowledgeable phytosanitary officers can help maintain high standards.

The provision of technical knowledge to the grower, processor and marketing company is essential in keeping them in touch with the latest information and research. However, the dissemination of this knowledge within the country is often difficult. It could be said that it is the responsibility of the company to ensure that it receives such information regularly but often all their time has to be spent concentrating on the shorter term aspects of their business. It is therefore essential

that assistance is given to ensure that there are efficient means of disseminating such information, received either from international or local sources, within the country.

Experience has shown that it is possible to circumnavigate many of these problems, but that it requires a superhuman effort by the staff and management. However, this effort can only be sustained for so long, and if the problems are not resolved, it is very difficult to maintain consistent standards.

FREIGHT AND EXPORT REQUIREMENTS

The safe and efficient transport of produce both in the country and for export is one of the most critical areas for any enterprise. It is therefore surprising that many businesses concentrate on the purchase of storage and processing equipment, but often ignore the transport aspects.

The available hire transport in most developing countries is unreliable. This also applies to the suppliers of the raw materials, and inspection of their transport facilities must be part of the responsibility of the enterprise. Transport of finished goods to the end user or port must be closely controlled, and in many cases the trucks should be owned and run by the company. Regular maintenance is another necessity, especially where roads are bad and spare parts are difficult to obtain.

When considering a project which involves exporting produce, it is essential that transport facilities are available to ensure that the produce can be exported to the required market. Most durable produce is exported by sea, but many horticultural products are still exported by air because of their perishable nature. However, in order to compete in the market place, sea freight is becoming a necessity. It is essential that the type of transport, destinations and transit times match the requirements of the product and the intended market.

As important as the connections and the journey time is the infrastructure present at the air and sea ports. This is crucial when contemplating sea freight, as the port handling facilities must enable the produce to be handled quickly and efficiently. With durables this will depend on whether the exports, or imports, are to be in bags or bulk, whereas with horticultural exports facilities will be required to handle cool (reefer) containers. In addition to the physical facilities there are those which are required to process the necessary export documentation. Unfortunately this can be very time-consuming, as documents often have to be filled in and signed by many different authorities every time there is a shipment. In many cases the offices are in different places and the people concerned keep changing, thus creating great difficulties to the exporter. What is needed is a one-stop centre, at the port, where most of the documentation can be completed.

TECHNOLOGY

With all projects a compromise must be reached on the level of technology that is introduced, especially in the initial stages. Whilst accepting that there is a minimum level that must be utilized if product quality and consistency of supply is to be achieved and sustained, it is often counter-productive for the project to be overburdened with complicated technology. In the first instance it may place an unacceptable strain on finances, and it may constitute too large a step into the unknown for the staff and management. At a later stage maintaining and repairing equipment may be difficult.

Experience has shown that initially it is best to introduce a minimum of new technology and to integrate it with the current methods used, so long as they are acceptable. This can then form the basis for the introduction of more advanced technology at a later stage when staff have more experience, and when it can complement other activities.

In Thailand, where RIO and NRI were working on the production and marketing of low-aflatoxin maize, the initial trials were undertaken using basic static bulk driers. One of these trials was run with the merchant previously mentioned, Khun Preecha, who organized growers, monitored the trials and helped to transport and market the

grain. Over two years he saw their success and proved to himself the viability of the project. Based on these results he then purchased a $ 1 m continuous flow drier, which has since been extended.

MANAGEMENT AND TRAINING

Even with the best product in the world, good infrastructure and appropriate equipment, it will not be possible to meet customers' requirements consistently if good management and training are not implemented.

It is often the case that an entrepreneur does not make a good manager; thus attention has to be paid to ensuring that he has the necessary professional staff as back-up. In many countries family ties can make this difficult, but it is essential that every job is filled by a well trained and competent person. One weak link in the chain and it will break!

Wages and salaries in developing countries can appear very low, especially to people in the West. However, all is not what it seems as other 'support' may also be given. Whatever their level, it is essential that all staff have the necessary 'incentive' to work in what may be a new industry, and to higher standards than those they have previously experienced. In many projects people are being asked to work in a

disciplined manner for the first time in their lives. Therefore, close attention has to be paid to giving them incentives which will ensure their continuing presence-and this is not always money.

Everybody has their strengths and weaknesses; therefore training in order to increase the knowledge of the staff and to upgrade their ability is necessary. Key staff should have the opportunity to experience what the customer requires by travelling to the market and seeing for themselves. Properly controlled this acts as a strong incentive and the staff concerned will work harder to produce the quality required.

The need for technical and other management advice is the main reason why RIO are involved in a number of horticultural projects in East and West Africa. Through this we can bring in new methods and technology and also train local staff in the requirements of the overseas markets.

SUMMARY

Establishing any new enterprise is difficult, particularly in developing countries. Many agricultural enterprises, whether for durable or perishable goods, include some degree of post-harvest technology. If this involves the drying, storage and/or processing of produce, purchased by the company, then high levels of fixed and working capital are

required. Therefore great care has to be taken in the planning and management of the business as substantial investment is at risk and loans will have to be repaid.

It is in these areas of planning and management where the greatest risk can be to a new or expanding enterprise. If the project is well researched, with good management in all departments, it will probably succeed. If this is not the case, then all the investment and equipment in the world will not save it.

In this paper I have tried to highlight some of the areas on which all enterprises, be they private or public, should concentrate. The degree to which these factors will affect the business will depend on its activities, size, etc. Obviously a business concerned with the supply of moisture meters or pest control services will not have the same investment as a large grain drying and storage operation. However, the same fears and opportunities are there for both forms of company and the factors which will make or break the businesses are fundamentally the same.

In conclusion I would therefore select the promoter as the key factor in any private sector enterprise. It is he who has to build it, lead it and commit himself wholly to it. Without him there is no business. With a good promoter there is a strong possibility of creating a success.

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Financing agricultural trade: the Agrotrade approach

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A. Sikpa

Managing Director, Agrotrade Limited

Abstract

Financing agricultural trade: the Agrotrade approach

The work of Agrotrade Ltd in pre-financing cotton farmers in Ghana is described. The company sets up outgrower schemes and provides land preparation, storage and supply of inputs together with technical and marketing advice to farmers.

Agrotrade guarantees to buy the farmer's crop at the current producer price. The

farmer repays the prefinancing when his produce is sold to the company.

As an additional incentive, at least one food crop is also financed.

Rsum

Financement du commerce agricole: la mthode Agrotrade

Description des activits d'Agrotrade Ltd pour pr-financer les cultivateurs qui produisent du coton au Ghana. La socit tablit des plans de cultures dtaches et fournit une prparation du terrain, le stockage et les intrants, ainsi que des conseils techniques et de commercialisation aux producteurs.

Agrotrade garantit d'acheter les rcoltes au prix au producteur courant. Le cultivateur rembourse le prefinancement lorsque sa production est vendue a la socit.

A titre d'encouragement additionnel, au moins une culture vivrire est galement finance.

BACKGROUND

Bounded on the east by the Republic of Togo, by Cte d'Ivoire on the west, on the

north by Burkina Faso and by the Atlantic Ocean to the south (Figure 1), Ghana occupies an area of about 239,460 square kilometres, and has a population of about sixteen million.

Two-thirds of the country's land area is suitable for cultivation and nearly 70% of the adult population are involved in farming. In the plains of the Northern Region cereal crops like millet and corn, sorghum, yams, cowpeas and peanuts are produced. The more humid valleys of the north support rice, sweet potatoes, tomatoes, and eggplant.

The coastal plains, which are often arid, are generally given over to the cultivation of drought-resistant strains of corn and cassava (manioc). With irrigation, the dry but fertile soil of these regions would be capable of sustaining many other types of crops. The forest regions sustain cash crops such as kola, palm, cocoa and coffee. Some of these crops have been cultivated since the 1800s and formed the basis of a North-South trade, and later, trade with Europeans. Sugar cane, tobacco and cotton have been grown in commercial quantities when markets are available.

Though cocoa has been a principal export and source of foreign exchange, in recent years the government has attached a great deal of importance to other types of agricultural produce. These contribute to the reduction of the food import bill and

also represent a potential source of foreign exchange. For example, corn production has increased from 173,000 tonnes in 1975 to 715,000 tonnes in 1989. Also in 1989 one farmer exported a record-breaking 2,187 tonnes of pineapple which represented 27.3% of Ghana's export tonnage of pineapple. Similar encouraging performances have been recorded in banana, cotton seed, rubber tree sap, ginger, and palm oil production.

FINANCE

Most of the achievements recorded above could not have been realized without support, both financial and technical, to the Ghanaian farmer. A great deal of financial support was received from the World Bank for cocoa farmers through the Ghana Cocoa Board, from the European Economic Community to the Horticulturist Association, (which includes the pineapple farmers) and other groups such as the Sasakawa Global 2000 to maize growers.

Most other crops which are cultivated by peasant farmers have been without financial support. The commercial banks have helped in the past and some farmers have failed to honour their obligations, but of late high interest rates have prevented most farmers from applying to the commercial banks for loans to support their operations.

Figure 1 Map of Ghana, showing national and regional borders

THE AGROTRADE APPROACH TO FINANCING AGRICULTURAL TRADE

Agrotrade Ltd is a wholly Ghanaian-owned company which began trading in 1990. It is engaged in the import and export of agricultural produce and products. Since its inception rice, soyameal, fishmeal and yellow maize for the poultry industry have been imported. Palm kernel cake, cotton seeds, sheanuts and coffee have been exported and, in the near future, cocoa and cashew nuts. In order to secure a regular supply of export commodities to satisfy increasing demand, the company had to engage in some form of prefinancing. This included pre-financing some farmers cropping cotton in order to obtain a regular supply of cotton seed, with the additional incentive to the farmer of prefinancing at least one food crop. With this additional help the farmer was assured of some of his food needs, and left him enough time to undertake cotton cropping.

ORGANIZATION

Agrotrade operates with farmers in the Upper West Region. This is because of easy access to land suitable for cotton cultivation, and to a ready supply of farmers who already possess some knowledge of cotton cultivation. During 1992/1993 774 peasant

farmers/families cultivating nearly 450 hectares of cotton and 200 hectares of cowpeas in 21 villages in the Upper West Region were involved.

The field operation is headed by a project manager, a qualified agriculturist with a background in cotton cultivation. He is resident in Wa, the capital of the Upper West Region. He has a team of field assistants who are trained extension officers working with him who are indigenous to the areas under their control. They are backed by tractor operators, drivers and secretarial staff. In all, a staff of ten who deal directly with the farmers is employed. This will increase as the project expands.

A year's operation begins by the identification and registration of prospective farmers in a particular village or location. Agrotrade surveys and maps out a target tract of land which is demarcated into units of 1.25 acres or 0.5 hectare. Each registered farmer or family takes over and clears a unit manually. Agrotrade then ploughs the whole land either by tractor or by bullocks.

The identification and registration is done by personal visits from Agrotrade's staff. The farmers in each village are encouraged to form a society with an elected chairman and a secretary. These leaders not only act as spokesmen in dealing with Agrotrade, but also exert group pressure on the members to ensure compliance with the rules and objectives of the society and the exercise. Last year, for example, there were

twenty-one societies with a membership varying from 5 to 175.

The societies are then zoned on the basis of location, and a technical officer who lives in the zone is attached to each zone. This is to ensure better communication and interaction with the individual farmers, and also to cut down on operational expenses to the company. It also eliminates absenteeism on the part of the technical officers.

The company provides the technical assistant with the necessary logistics to make him easily accessible to the various farmers in his zone. A bonus scheme for the technical staff has been instituted based on yield per unit. This encourages them to discharge their duties efficiently and effectively.

Agrotrade takes care that the technical officers are not allocated so many farmers that they are ineffective in providing technical advice to the farmers. Each technical officer operates within a 15 kilometre radius, and does not supervise more than 250 units.

With the land cleared, the farmer registered and a technical officer in place, Agrotrade procures seeds, fertilizer and agro-chemicals and makes these available to the farmers through the technical officer. The technical officer then ensures that the right sowing distances are kept, and fertilizer and agrochemicals are applied at the right time and in the right quantities.

Although Agrotrade provides the farmer with tractor services for ploughing, seeds, fertilizers and agro-chemicals, the unit does not belong to Agrotrade: it is the property of the farmer. Agrotrade only provides the necessary prefinancing by way of inputs and technical advice, and more importantly, a ready market for the produce. This is what is referred to as the out-growers scheme.

THE ROLE OF AGROTRADE LTD

Agrotrade provides pre-financing to the farmers as follows:

Storage and supply of essential inputs Improved and tested seeds, appropriate compound fertilizer and insecticide, and spraying machines are procured, stored and supplied to the farmers' doorstep at no extra cost.

Technical advice

Technical know-how and current techniques are made available to farmers, as well as assistance in land demarcation, selection of good seeds and fertilizer and agrochemicals application.

Technical services

Agrotrade provides a complete tractor service, using either its own tractors, hired tractors or bullocks. Ploughs and accessories are provided in areas where bullocks are used, as well as transport for distributing inputs to the various societies using Agrotrade's vehicles and tractors.

Marketing services

Post-harvest storage, handling, trucking to marketing centres and actual marketing of produce can be expensive for most cash crop farmers in Ghana who produce, for example, tomato, cassava, plantain, cotton and coffee. Agrotrade provides the farmer with marketing inputs such as weighing scales for the marketing of the crop, and buys all the produce from affiliated farmers at the current producer price which is reviewed annually; post-harvest losses and storage expenses are therefore reduced, if not eliminated.

The farmer is paid at the agreed price, which takes into account the cost of pre-financing. Thus the farmer repays the pre-financing when his produce is sold to the company.

Agrotrade has an incentive scheme for higher yields per unit, and the farmer is therefore encouraged to practice better farm husbandry. The company receives a

better return on its investment.

BENEFITS DERIVED BY THE FARMER FROM PRE-FINANCING

The farmer is assured of financing for inputs without the need to borrow money in the open market at current high rates of interest; the need to provide collateral in the form of properties is removed.

The problems associated with the procurement of inputs such as sourcing, arranging payment and transportation are removed from the farmer, thus giving him time to take care of his farm and other needs. He receives the necessary inputs at no extra cost and is assured of a timely delivery to his doorstep. Post-harvest problems of handling, cleaning, storage and trucking to market centres, and the sourcing of markets for the produce are undertaken by

Agrotrade Ltd. A ready cash payment for the produce is guaranteed. Perhaps this is the biggest attraction of the system to the farmer.

The group farming or out-grower system approach facilitates the sharing of common services such as tractors, bullocks, ploughs, spraying machines, technical advice and other services which would otherwise be too expensive for most peasant farmers to

procure. Additionally, it helps reduce or eliminate fraud, as group pressure is brought to bear on members.

This approach makes it easier for Agrotrade Ltd to identify groups for any special assistance such as provision of potable water, schools, etc.

It also allows technology transfer. The farmers acquire new knowledge of crop cultivation through extension provided by the technical assistants.

The farmer's lot is improved, as he is able to acquire, for example, bicycles, or cement for construction, which can be procured for him by Agrotrade Ltd and sold to him at cost price.

APPLICABILITY OF ESSENTIAL INPUTS FINANCING TO GRAINS

Agrotrade has effectively applied the essential inputs financing method in soyabean and cowpea production in the Upper West Region of Ghana; from this experience it is believed that the approach can be applied to a major grain crop such as maize, if certain facilities are in place, and its use is restricted.

RESTRICTION AND ADAPTATION

Application of this method will need to be limited to areas where maize is grown more as a cash crop than as a staple food, in order to avoid fraud, or an effective produce-sharing method will need to be devised in order to guarantee the farmer a share of the produce for food, with the rest going to the financing company to offset the cost of prefinancing. It is possible for this to happen in the middle corn belt of Ghana where maize production is far in excess of the food needs of the local maize producers.

LAND

Land will need to be made readily available to farmers interested in taking part in such a scheme, otherwise land acquisition problems could affect the success of the project. In the Upper West Region of Ghana, land does not have to be purchased before it is used for growing cotton, but this may not be the case in the corn belt where maize is grown.

FARMER IDENTIFICATION

The authorities should assist the would-be investor in identifying reliable and trustworthy farmers with the requisite knowledge of the cultivation of the crop.

DRYING

Drying is essential in bulk grain handling to ensure longer storage life. It has been suggested that drying facilities should be provided near all large maize-producing areas, just as there are ginneries near all major cotton-growing areas. This could be provided by the input financiers, as in the case of cotton, or by individual companies or agencies and owners of warehouses.

STORAGE AND WAREHOUSE FACILITIES

Warehousing may be grouped into two areas:

- **pre-harvest warehousing; and**
- **post-harvest warehousing.**

Pre-harvest warehousing is required to store all major inputs such as seed maize, fertilizer, insecticides and machinery, etc. Such a warehouse could be owned by the input financier. This warehousing need not be large and should be sited near the farmers' farms.

Post-harvest warehousing is required to store the dried maize. This could be owned by

the input financier, or by a warehousing company, or jointly. It is important to site it in a major marketing town within the maize production area where there are good road networks to facilitate bulk transport, often by articulated trucks, to consumption centres.

With these conditions prevailing, together with government allowing some tax relief to companies involved in the input inventory financing for the first few years, and with a liberalized market, many companies, including Agrotrade would be encouraged to participate in such a venture.

CONCLUSION

Agrotrade's experience in financing agricultural trade and how this approach can be applied to grains such as maize has been outlined with the hope it will be adaptable to various individual situations.

Privatization of post-harvest pest control in developing countries

C. R. Watson and P. R. Watson

Igrox Limited

Abstract

Privatization of post-harvest pest control in developing countries

Privatization can affect standards of post-harvest pest control. Liberalization together with technical training is not sufficient to protect the producer and consumer from shoddy work.

The amount of capital and level of expertise needed to set up and run a pest control company are not high. Technical and business training is necessary, but most important is government legislation to regulate the industry.

Examples of fumigations in the UK and Mozambique are used to indicate the problems that can occur in the absence of proper legislation.

Rsum

Privatisation de la lutte contre les ennemis post-recolte dans les pays en

dveloppement

La privatisation peut affecter les normes de lutte contre les ennemis post-rcolte. La libralisation, jointe a une formation technique, ne suffit pas pour protger le producteur et le consommateur d'un travail sabot.

Le montant des capitaux et le niveau des expertises ncessaires pour instituer et grer une socit de lutte contre les ennemis ne vent pas trs levs. La formation technique et commerciale est ncessaire mats, ce qui est le plus important, c'est la lgislation du gouvernement pour rguler l'industrie.

Des exemples de fumigations au Royaume Uni et au Mozambique servent 3 indiquer les problmes qui peuvent se poser en l'absence d'une lgislation adquate.

BACKGROUND

As part of the continuing effort to draw back the boundaries of the state in the developing world, marketing boards and state co-operatives no longer monopolize the grain market and supporting services. This process has begun to affect the market for agricultural services such as pest control and fumigation. In this paper, how privatization can affect the standards of post-harvest pest control will be discussed. It

is postulated that liberalization of the market in conjunction with technical training is not sufficient to safeguard standards (and may cause them to decline) and so the producer and consumer will fail to be protected from losses caused by infestation.

Post-harvest pest control is concerned with the protection of harvested food along all stages of the food chain. Initially, the objective is to prevent losses in the quality and quantity of the food during transport and storage, while at the later stages it is to ensure that the processing and distribution are both safe and hygienic. The other, perhaps even more vital area of post-harvest pest control is the elimination of quarantine pests. These objectives cannot be assured by technical training alone. The dictates of the market mean that a high standard of work will be carried out only when the consumer demands it, not because it is a desirable goal in itself.

The development of pest control services in the UK provides an illustration of this. During the 1950s pest control in the UK was primitive. Most of the work was carried out by the public sector. The private sector was small and the level of technical ability and customer awareness was low. By the 1970s the awareness and demands of the UK food producers and consumers had increased; therefore the private sector expanded. The standard of service was highly variable, because the choice of operator was governed only by price, not value for money. As a result, many of the treatments were only partially effective at best. The introduction of legal minimum standards, such as

those contained in the Food and Environmental Protection Act 1985 (FEPA) and the Food Safety Act 1990, have changed this situation. The clink of spurs is no longer a common sound in the pest control business of the UK. Food producers have to protect themselves from legislation by reaching minimum standards and they have also had to respond to the increased demands and sensitivities of their customers. Thus, the standard of service from the private sector has both risen and become more uniform. The now mature market is driven much more by value for money than by price.

It would appear, in the case of the UK, that the customer has been unable to dictate the quality of service provided by pest control and fumigation companies. Increased competition did not lead to an improvement in service, because it is difficult for the customer to measure the extent to which he is getting value for money. In such circumstances the customer is forced to fall back on contractor selection based solely on price. The nature of the work being carried out means that unless the customer is well informed he has no other choice. Examples of this customer weakness can be seen by looking at cases from the UK and Mozambique.

CUSTOMER WEAKNESS AND THE NATURE OF FUMIGATION

Increased levels of food aid have been flowing into Mozambique, leading to an expansion of the warehousing of maize and other foodstuffs. As a result, the need for

post-harvest pest control in cereal stores and warehousing has rapidly increased. Fumigation with methyl bromide (CH3Br) and phosphine (PH3), has become 'big business'. In 1992 there was only one company using methyl bromide in Mozambique. The charge for the fumigation of stacks of maize and other foodstuffs in warehouses was about 80 cents (US)/tonne. The standard of treatments was low because of the lack of training; additionally neither the fumigation company nor the storekeepers had the means or knowledge to measure the effectiveness of the treatment.

This situation can pertain because of the way in which fumigation works. The effect of the gas on the insect is a direct result of the average concentration of gas that is retained in the stack for the period of the fumigation; the temperature, which dictates the respiration rate of the insect, also has to be taken into account. Therefore, the amount of fumigant used in relation to the volume or weight of the foodstuff, while providing a guide to what can affect a proper fumigation, is not in itself important as a measure of effectiveness. The important criterion is the level of fumigation retained during the fumigation; monitoring of this allows the average concentration, or Concentration x Time Product (CTP) to be calculated. The CTP figures needed for total eradication are well documented for all insects at different temperatures.

Unfortunately, the method most often used to check the effectiveness of a fumigation is to check that there are no visible live insects in the stack after fumigation. The adult,

visible, insects will be killed with a low CTP, while the invisible eggs will only be killed with a much higher CTP. Thus, on many occasions the fumigation is accepted as being successful when only the adults have been killed; the eggs are left to re-infest the stack within days or weeks.

The increased competition in the fumigation market in Mozambique led to a fall in prices and standards because contractors were able to use these facts to their advantage. Prices fell from 80 cents (US)/tonne to 40-50 cents/tonne; costs were cut to the bone with less gas and labour being used, therefore lower application rates were used and poorer sealing of stacks occurred. However, the customers did not complain because they still found no live adult insects in the stacks. The companies were still in business because they could kill all visible adults with a reduced CTP. Indeed the need to re-fumigate every few weeks when surviving eggs hatched increased the volume of business for the fumigation companies. It is not simply the failure to control the insects, the cost of the repeated fumigations, or the loss of foodstuffs that can cause difficulties. The ancillary costs can increase greatly, with interrupted distribution, rejection of consignments, and failure to meet contractual commitments, let alone the incalculable costs that can arise from the introduction of quarantine pests into a country or region that is free from that pest.

It has been argued that the use of fumigation in temperate zones is an expensive

luxury that amounts to overkill. Certainly, in comparison with problems in the tropics, infestations in temperate areas are small. Despite this, they can still be significant. Many of the grain storage facilities in the UK, especially those on farms, are not of a high standard; thus while the insects do not often reduce grain to dust, they are able rapidly to have a devastating effect on quality. The demand for insect-free commodities and insect-free production systems, as well as low-residue pest control often makes fumigation the preferred option.

For example, in a UK scenario, if a shipment of cocoa is infested with flour beetle and moth larvae, methyl bromide fumigation will be ordered at an application rate of 32 g/m (32 oz./1000 cu. ft). Other work in the warehouse will be terminated for 2-3 days while the process is being carried out. The cost depends on various factors, but for a consignment of 2000 tonnes the cost of fumigation and warehousing, etc. would be about 4000. There are no live insects found after fumigation, but insects start appearing again 4-6 weeks later. An investigation is carried out but it proves impossible to discover where the insects have come from. Has cross-contamination occurred between stocks within the warehouse, or have some eggs survived the fumigation? In most of these cases re-infestation occurs because total eradication was not achieved the first time. However, this is extremely difficult to prove. If the gas concentration were measured correctly during the fumigation extra gas could have been added, if required, to reach the required CTP. This would have cost possibly 100-

1000 more, so the huge cost of complete refumigation and the deterioration of the product could have been avoided.

This does not occur so much in the UK these days, because of legislation. A person ordering fumigation may have to prove that if reinfestation occurs he has been 'duly diligent' in preventing it. Thus, if a fumigator has been appointed on an incorrect technical basis and/ or procedures were not instigated to ensure the work was carried out properly, the storekeeper is held responsible for the resulting infestation, since the wrong fumigation contractor was employed.

If these problems are examined in the context of quarantine pests the problem becomes even more serious. No longer do only losses of profit, hygiene, and foodstuffs have to be taken into account, but the spread of alien pests into an environment has to be taken into account. In such a situation effective control is not only highly desirable, but crucial. Mozambique is a good example of this, as it is under threat from the Larger Grain Borer (LOB) (Prostephanus truncatus). Indeed, a number of countries in Southern Africa are threatened by the importation of LGB through the Mozambican ports. When fumigation is carried out in this situation it is absolutely vital that there is total eradication of the insects. Therefore, an effective fumigation service, and a plant quarantine service with the power to oversee it, is essential. How can the quarantine service achieve the necessary level of expertise and efficiency? It must have the

backing of legislation and the requisite technical skills. The service could be contracted out, but this would not necessarily be good for the development of local skills. A possible solution may be that used by one rapidly developing country. Their plant quarantine services have been run by a multi-national company, but are returning to government control as the system becomes firmly established. Such a system puts in place a structure that is efficient, but keeps skills in the country. In Australia, the market for private fumigators is very competitive, but the level of expertise required to carry out quarantine fumigation is very high. This is simply the result of a strong quarantine system, which by inspection and enforcement, allows the private fumigation market to operate to a very efficient standard. However it is done, the service must have the skills needed to implement the legislation and safeguard the quality of pest control services.

POST-HARVEST PEST CONTROL WITHOUT FUMIGATION

The privatization of fumigation, which provides the most dramatic examples of the problems involved has been discussed, but all other procedures suffer from the fact that the customer cannot easily measure the value of the service he receives. Fumigation is just one part of a strategy to protect products along the entire food chain. Once complete eradication of pests from the product has been achieved by correct fumigation, the programme must concentrate on the prevention of re-

infestation during processing, and distribution to the consumer. The objective should be to have well-trained staff using the minimum of pesticide. As with fumigation, there is a danger that the choice of contractor will be price driven. Therefore the customer may be sent technicians who are poorly trained, and only spend half the time they should on site visits. This again leads to fierce price competition, and a reduction of costs by the contractor. In the UK this has been stopped by a combination of factors, such as customer demand for clean foodstuffs, but legislation which sets enforceable minimum requirements for contractors and food processors has been the main reason.

INTRODUCTION OF PRIVATIZATION

Therefore, because of the nature of the business, fumigation privatization will not be straightforward. Legislation will be required that sets minimum standards. For example, the plant quarantine department should have the power to check fumigation treatments and order refumigation, at the fumigation company's expense, if minimum CTP figures are not reached. The customer must be educated to make him aware of what he should demand from the fumigation and pest control contractor. In the UK, even when the buyer is fully conversant with the problem, and knows that a higher quotation will give better protection of the product, it is still difficult for him to recommend paying more because of budgetary constraints. If, however, he can accept

the higher bid, because it is the only one likely to reach the minimum legal standard, and thus prevent his company from being prosecuted for not showing 'due diligence', then it is a much easier decision to justify. This is how the Food Safety Act operates in the UK. It has made food handlers and processors aware of their minimum responsibilities so that they have insisted that the pest control companies they employ meet these standards.

NEW COMPANIES

How will private pest control companies be formed? Who will be capable of operating these companies? If there is a market and it is seen that there is profit to be made, there will be no lack of private companies. The amount of capital required to establish a pest control business is small. Also, as has been indicated, a low level of expertise can be 'got away with'. The market will not maintain a high standard of expertise without help. In addition to legislation on minimum standards, technical and perhaps business training should be provided. Therefore the new companies will have the opportunity to acquire the knowledge to operate well, but above all the market must be controlled by effective legislation.

CONCLUSION

It is well established that in technical terms post-harvest pest control needs to consist of an integrated strategy of technology to achieve pest prevention, with the minimum use of pesticides and fumigation. It is however, equally important to understand that privatizing the industry must also be linked to the strategic use of enforceable legislation. This will ensure that technical aid and assistance are utilized in the market place.

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Panel discussion

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The speakers highlighted the areas where donor focus should lie:

Dr Asante-Traders with the right qualities to sustain grain marketing initiatives should be targeted for credit support; donor expertise is needed to help establish rules and

regulations for inventory credit, but these rules should not be too intrusive or limiting; market intermediaries and associated institutions, such as the banking sector, will need skills training.

Mr Cutler-The private and public sectors must be encouraged to talk to each other and overcome problems arising from mutual distrust; assistance will have to be targeted initially at medium- to large-scale organizations; it will be difficult to target support to small-scale private enterprise; the phasing out of public sector support should be provided for. Likewise, governments should be encouraged to liberalize completely (i.e. not half-hearted attempts as has often happened).

Mr Sikpa-The private sector has been shown to be quite capable of pre-financing grain trading, but the impact is reduced by government indifference or even interference-governments should be encouraged to be more pro-active.

Mr Watson-Quality control will only be achieved by thorough understanding of customer requirements and awareness of procedures used to maintain quality; technical training should be directed at the customer as well as the private contractor.

POLICY IMPLICATIONS

The need to persuade governments not to impose restrictions on private enterprise is important. The government role is to provide a facilitating environment and to monitor, for example, national stocks, prices and food quality, within that environment. The private sector needs to be able to rely on consistency over time in government policy and practice. Clearly governments cannot be pushed too hard, but some conditionality in this direction might be appropriate. It will be important to bring together public and private interests, to encourage awareness of each other's problems and to discuss the way forward.

The importance of creating sustainability was emphasized. Donor-funded support projects are often over-prescriptive in terms of targeting particular socio-economic groups, but this sometimes perpetuated the need for outside assistance.

The call from the speakers for appropriate legislation to support food quality is not easily reconciled with market liberalization initiatives involving reduction in the size of the public sector, since legislation implies public sector monitoring. However, there may be considerable scope (in Ghana, at least) for redirection of effort in government activities. Furthermore, reduction in the size of the public sector may lead to better incentives for, and higher productivity from, those remaining in service. An alternative solution suggested was to allow the private sector to monitor itself on the basis that it needs to satisfy the customer. Commodity owners and managers will need certain

skills to be able to judge the value of a particular quality control operation.

OPERATIONAL CONSTRAINTS

The principal limitations of private enterprise development in the grain post-harvest sector include access to storage facilities and credit.

Governments of many countries in sub-Saharan Africa control substantial storage facilities, many of which are standing idle following reductions in government funding for grain procurement. Leasing is an option and a means of increasing income for the residual parastatals. Medium- to large-scale traders (who may also be producers) could use such facilities to phase their marketing through the year. This increases local incomes by encouraging ancillary services (processing, pest control, construction).

Much discussion was focused on the introduction of inventory credit schemes into countries like Ghana. The initial inventory is financed by the trader who obtains loans on the unsold inventory. A crucial issue in managing inventory credit is good warehouse management of the inventory and availability of suitable storage capacity through, for example, leasing arrangements. Traders will need to be educated in making presentations to the banking sector and banks should be prepared to support and guide entrepreneurs. Prefinancing of production by traders, where the trader will

supply advice and inputs on credit, was also discussed. Successful operation relies on strong links between the trader and the producer. Opportunities for default can be reduced in Ghana by: operating in the central corn belt, where grain is a cash crop, rather than by dissipating efforts in provinces where grain is kept for home consumption; discouraging sale to other traders; providing a reliable market; using locally respected people as representatives and extension workers, motivated by incentives; and by selecting farmers for loans.

It is important that traders are seen, by banks, government and donors, to want support and that the support is correctly identified. A forum is needed to encourage communication, for example, by inviting traders to government-sponsored seminars and workshops.

TECHNICAL SUPPORT

Quality control could become an issue, particularly if grain is sold by volume rather than weight and assessment by eye is used as a means of maintaining standards.

Legislation for freedom from certain quarantine pests will be required, with the responsibility placed on the manager of the stocks and not the pest control company. Managers may elect to charge a storage fee to cover pest control services with a

guaranteed output. For example, managers might demand a record of CT products achieved as a measure of the success of the treatment and could be trained in their interpretation.

Maintaining standards will become important when large numbers of pest control companies emerge to exploit a potentially profitable market. Setting up a professional association will give a certain amount of protection against poorly equipped operators, but proper control will only be achieved by training both customer and contractor and by setting up appropriate contracts.

Opportunities should be identified to make efficient use of redundant infrastructure and trained staff from the public sector, by leasing grain storage and handling facilities and by encouraging staff transfer to the private sector. It may be the role of donors to monitor the policy reform process and to build up confidence in the private sector.

Finally, there is a need for information on the quantity of grain in the system as early warning of shortages or surpluses. Traders could be required to reveal their stock levels on a regular basis.

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Abbreviations

ACIAR-Australian Centre for International Agricultural Research

CIRAD-Centre de Cooperation Internationale en Recherche Agronomique pour le Dveloppement

FAO -Food and Agriculture Organization of the United Nations

GTZ -Deutsche Gesellschaft fur Technische Zusammenarbeit GmbH

IDRC -International Development Research Centre

NRI -Natural Resources Institute

ODA -Overseas Development Administration

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