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**INCORPORATING FINANCE INTO A MODIFIED SUB-SECTOR
FRAMEWORK AS APPLIED TO THE FERTILIZER SUB-SECTOR
IN THE GAMBIA**

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Abstract

The sub-sector analytical framework as currently used is usually limited to examining a sub-sector in a single market, product or input. The framework excludes an explicit analysis of financial markets due to the assumption that they function in a competitive environment. This assumption is inappropriate in most developing countries where financial markets are imperfect and access to financial services is rationed. This paper proposes a modified sub-sector framework that endogenizes the financial markets affecting a given sub-sector in order to more fully explain operational efficiency and market technology. The framework is used in a study of the fertilizer sub-sector in The Gambia.

INCORPORATING FINANCE INTO A MODIFIED SUB-SECTOR FRAMEWORK AS APPLIED TO THE FERTILIZER SUB-SECTOR IN THE GAMBIA

by Geetha Nagarajan and Richard L. Meyer¹

I. Introduction

Financial markets in developing countries are often imperfect and inefficient. In the absence of complete information about the contracting parties, the characteristic of financial transactions that involve a future promise of payment for a current transaction leads to special problems of moral hazard and adverse selection. Consequently, access to financial services is rationed to internalize the externalities caused by asymmetric information. The efficiency of financial markets, the limited access to finance for many economic agents and the terms and conditions of financial contracts often influence the flow of commodities and the evolution of various sub-sectors in developing countries. The nature of the financial flows that affect commodity flows and the differences in market technologies and organizational patterns of alternative channels within a sub-sector are influenced by differential access to financial markets. Indeed, in some cases particular agents/channels owe their very existence to their preferential access to finance. As a result, access to financial markets by the various agents within a sub-sector is expected to be reflected in the organization of the sub-sector and the market technology employed in the different channels.

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The sub-sector framework developed and refined over the years by researchers at the Michigan State University is useful in examining the flow of commodities in a sub-sector. It is dynamic and considers the flow of commodities in a specific sector in a specific market through different channels involving heterogenous participants under a competitive institutional and regulatory environment (Boomgard et al., 1986; Boomgard et al., 1992). As normally used, however, the sub-sector framework considers the flow of commodities in input or product markets but excludes an explicit treatment of financial markets and the financial flows that accompany the commodity flows. The framework assumes that institutions, such as financial institutions, market research and extension etc., are part of the competitive environment/context within which the sub-sector operates rather than as an integral part of the sub-sector itself (Boomgard et al., 1986). This simplifying assumption may be reasonable in developed economies but presents a problem in developing countries where financial markets are imperfect and access to financial services is rationed. In such situations, financial markets importantly influence the market technologies employed by various agents and the efficiency of the sub-sector. Therefore, while employing the sub-sector framework highlights the importance of coordinating institutional arrangements and agents, it represents only a partial approach and as such is a first order approximation to a complete study of a sub-sector. The framework needs to be broadened, both in methodology and analysis of empirical relationships, to explicitly incorporate the imperfections of and access to financial markets.

In this paper, we propose a modified sub-sector framework that endogenizes financial markets in order to more fully explain the operational efficiency of a sub-sector and to

predict the direction of its future evolution. After outlining the key characteristics of the sub-sector framework, we discuss the concept of our modified framework. The modified framework is then applied to a study of the fertilizer sub-sector in The Gambia. A discussion about what we gained by endogenizing financial markets into the sub-sector framework concludes the paper.

II. The Standard Sub-sector Framework: An Overview

This section draws heavily on the pioneering research conducted by faculty, students and alumni of the Michigan State University based on the structure, conduct, performance framework of industrial organization theory used to examine the interdependent activities of a sub-sector. The literature consulted included Boomgard et al, 1986 and 1992; Davies, 1988; Hagablade, 1984; Holtzman, 1986; Menagay 1989; Shaffer, 1973.²

Several theoretical frameworks including industrial organization theory and several methodologies such as cross-section studies, case studies etc., have been developed based on neo-classical economics to study the operational efficiencies of commodity flows that involve several firms/agents.³ Industrial organization theory provides a general framework

² A similar framework called "Commodity Systems Framework (CSF)" also emphasizes that the food sector is demand driven, considers farm level production and marketing activities as interdependent activities and vertically integrated, and recognizes that production and marketing activities need to be coordinated through markets, cooperatives and administrative means (Jaffee, 1992). CSF, however, additionally recognizes that physical commodity flows are followed, preceded or accompanied by technical and informational flows, financial flows and ownership rights to the property. However, like the Sub-sector framework, these concepts have not been fully and explicitly incorporated into the framework in empirical studies.

³ The terms firms and agents are used interchangeably in this paper.

for cross sectional studies that examine the structure, conduct and performance of agents/firms performing homogenous functions in a single stage of a commodity flow. These studies focus on the "horizontal" but not the "vertical" relationships among firms/agents that affect the commodity flow.⁴ The stages involved in the flow of agricultural commodities from production to distribution to final consumers are, however, often interdependent and vertically integrated. Furthermore, the stages or functions are performed by heterogenous agents/firms through multiple competing and/or complementary channels. A comprehensive examination of the operational efficiency of a commodity flow through alternative complex organizational structures within various channels that involve administrative and exchange coordination requires a "systems" approach that incorporates both horizontal and vertical elements. Therefore, the "sub-sector framework" was developed as a "systems approach" in order to examine a dynamic sector characterized by heterogenous participants (Shaffer, 1973).⁵ The framework, unlike cross-section studies, seldom allows quantitative analysis, but it is cost efficient and improves the accuracy of the sub-sector analysis.

⁴ While 'horizontal' relationships relate to the entry and competitiveness among firms/agents at a single stage of the commodity flow, 'vertical' elements include market size, and location and ownership integration of all agents/firms engaged in all stages of the commodity flow, viz., production to assembly to processing to distribution to final consumers (Jaffee, 1992).

⁵ Some argue that the term 'sub-sector' is inappropriate to describe this framework since it more often cuts across several sectors, markets and industries in its analysis. They propose the use of 'food commodity system' or 'trans-sector' or 'cross-sector' as an appropriate term to describe the framework (Jaffee, 1992; Boomgard 1992). For convenience, however, the popular term 'sub-sector' will be used throughout this paper.

A 'sub-sector' is broadly defined as an aggregation of competing agents/firms active in alternative channels that facilitate the flow of a commodity from producers to final consumers. It encompasses the horizontal and vertical relationships involved in the commodity flow from production to assembly to processing to distribution to consumption. The precise boundary for study of a sub-sector in terms of product types, geographic coverage, and functions and channels within a sub-sector are, however, subjective and depend on the objective of the specific study.

The components of the sub-sector framework define the individual transformation stages found during the commodity flow and examine how these several stages are linked through various types of actors to facilitate the flow of a commodity from production to consumption through heterogenous participants in various channels. Each step or transformation in a sequence of production/distribution activities is called a function, and any traceable path through a system defines a channel of product transformation. A sub-sector map is often used as a visual representation to develop a sampling frame and to determine the allocation of resources spent to generate information about the basic functions, participants, linkages and the relative importance of alternative channels in the commodity flow. The sub-sector framework defines the environment as the context within which a sub-system is assumed to operate. The environmental components include (i) the rules that govern participants within and between functions, (ii) the information flows about technological processes, markets, qualities, and prices and rules of the game, and (iii) service institutions such as secondary input suppliers, courts, financial markets and research

institutions. It is important to note that the environment is considered as part of the context within which the sub-sector operates rather than part of the sub-system.

The principal characteristics of the sub-sector framework can be identified as:

... It is organized around a particular commodity or commodity groups, and is demand oriented;

... It is conceptualized around the concepts of verticality, coordination within channels, competition between channels, and leverage;

... It emphasizes transformation, value adding and transactions at every stage in the flow of a commodity from production to assembly to processing to distribution to final consumption;

... It closely examines shifts in supply and demand conditions for the commodity;

... It underscores the importance of the nature of coordinating institutional arrangements such as markets, vertical integration, contracts, and coordinating agents such as transportation, quality requirements, market information and communications;

... It focusses on a single market to identify the institutional relationships that affect the competitive positions of the various channels, the ease of coordination among the channels and obstacles to growth in the different channels;

... It implicitly incorporates capital markets by including risk sharing institutions and arrangements that affect the structure of a sub-sector.

III. The Concept of a Modified Sub-sector Framework

An important limitation of the sub-sector framework when employed in developing countries is that it does not internalize the imperfections of the financial markets that often exist. Therefore, for environments characterized by imperfect financial markets, we propose the use of a modified sub-sector framework that endogenizes the functioning of financial markets for a given sub-sector. This more comprehensive approach follows the traditional sub-sector approach by examining all the sub-sector participants at various levels in the primary markets relevant to the sub-sector. But in addition, it also explicitly examines the terms and conditions of the financial contracts that are accessible to the participants.

Our modified framework considers financial markets as part of the system rather than simply part of the environment within which the sub-sector operates. It recognizes that flow of commodities is accompanied by a payment system that often involves deferred or advance payments. Asymmetric information among the participants in these transactions leads to a rationing of the agents who have access to credit. Therefore, the modified framework includes financial market agents as participants in the sub-sector in addition to input and product producers and dealers. When financial markets are endogenized, the transaction costs inherent in financial transactions due to asymmetric information, and the risk characteristics of various contracts need to be considered. This framework, therefore, recognizes the importance of transaction costs involved in the vertically coordinated flow of commodities because these costs alone may serve as entry barriers for many agents/firms. Transaction costs include information costs incurred in identifying and screening different opportunities, contract negotiation costs, costs incurred in the actual transfer of commodities

and monitoring of trade, and enforcement costs (Williamson, 1979). Furthermore, the modified framework recognizes that the evolution of segmented, specialized systems leads to new forms of linkages and coordination among agents/firms. For this reason, it is especially important to examine any interlinked contracts found among the sub-sector participants.

As with the standard sub-sector framework, the modified framework is flexible and allows for several types of methodologies to gather data for the analysis. The rapid appraisal approach, case studies and cross-section studies can all be used under this framework. After identifying the boundaries of a sub-sector and the stages in the commodity flows, the framework requires (i) structured or informal interviews with its principal coordinating agencies, channels and participants at all stages, (ii) structured or informal interviews with key informants related to the sub-sector, and (iii) the collection of relevant secondary data. Case studies of selected participants and/or stages and cross-section studies at a particular stage can also be conducted to substantiate the analysis.

While cross-section studies facilitate a rigorous quantitative analysis which can lead to sound policy prescriptions, a rapid appraisal technique can be used as a preliminary guiding framework to be followed later by a detailed study for more rigorous policy recommendations. Nonetheless, a rapid appraisal technique can be used when there is little information about a given sub-sector and when the objective is to effectively understand the organization, operation and performance of commodity markets within a short period of time. Rapid appraisal is based on the Neo-classical economics framework, and the structure, conduct, performance paradigm of industrial organization theory as adopted to

commodity sub-systems. It focusses on identifying and diagnosing constraints to improve sub-sector performance. In general, rapid appraisal is focussed on domestic marketing systems, but it can also be undertaken to study foreign markets that are connected with the domestic markets viz., export markets. Rapid appraisal techniques, however, cannot be applied in cases where panel data are required, when information on a sub-sector is large, or when it is necessary to study supporting or coordinating agencies that cut across several sub-sectors.⁶ Furthermore, it is useful to cover only a geographically restricted area rather than a nationwide indepth survey when using this methodology (see Holtzman, 1993).

IV. Fertilizer Sub-Sector in the Gambia: The Need for a Modified Framework

Fertilizer is an important production input that is used to augment the production of groundnuts, a major foreign exchange earner in The Gambia. The government of The Gambia liberalized its markets in 1985 under the Economic Recovery Program recommended by the World Bank. Since the implementation of the Economic Recovery Program (ERP), the fertilizer sub-sector in The Gambia has undergone a gradual process of liberalization. The evolving stages of privatization and liberalization of the sub-sector relaxed legal barriers to entry to encourage participation by private entrepreneurs. While government parastatals were the sole participants in the pre ERP period, a number of private entrepreneurs entered the sub-sector in the post ERP period.

⁶ Supporting institutions include input suppliers, financial institutions, and agricultural research centers. Coordinating organizations and institutions include governments, contractors, futures markets, and industry/trade associations (Holtzman, 1993).

Currently, the various stages of the fertilizer trade including importation and distribution are conducted through multiple trade channels to increase its timely availability. The number of fertilizer trade channels has increased, and the participants within each channel have changed over time. The channels include the Food and Agricultural Organization (FAO), a parastatal - Gambia Produce Marketing Board (GPMB), a privatized cooperative - Gambia Cooperative Union (GCU), Non-governmental Organizations (NGOs), a few Registered Private Entrepreneurs (RPEs), and Unregistered Private Entrepreneurs (UPEs).⁷

While the proliferation of trade channels implies numerous sources of supply, the response by private entrepreneurs in fact has been lethargic. This is primarily due to (i) the uncertainties in fertilizer demand and the future role of governmental and international donors, and (ii) limited access to capital from both domestic and off-shore banks to finance the fertilizer operations of the private entrepreneurs. The domestic formal financial markets have been inactive and highly inefficient in financing agricultural activities while off-shore financing has required the use of tangible collateral and is limited to only the largest firms (Graham et al., 1993). The emergence of the FAO as a major importer/supplier and the NGOs as supplemental suppliers has occurred due in part to their favorable access to foreign capital.

The fertilizer trade involves a commodity flow that is facilitated by financial services provided under various contract terms and conditions by diverse types of financial sources.

⁷ The RPEs are licensed by the Department of Business and Commerce. The UPEs are unlicensed and usually operate in parallel markets.

The transactions among participants at various levels of trade often involve deferred payments and forward contracts. Therefore, the trade and financial channels are often intertwined and this promotes linkages among the heterogeneous agents within and across trade channels. The efficient flow of fertilizer among various agents, therefore, is expected to be importantly shaped by their access to financial markets. Hence the need for a modified framework that endogenizes finance into the analysis.

V. Methodology

A rapid appraisal approach (RA) was used in this study with the modified framework to examine the fertilizer sub-sector in The Gambia during the post ERP period. The RA methodology included (i) the identification of the size, functions and type of formal and informal market channels in the fertilizer market along with the principal participants in each, (ii) the identification of the coordinating mechanisms in terms of trade and financial contract terms and conditions that link the heterogeneous participants within the channels in a given market and with related markets, (iii) the collection of quantitative and qualitative data through an examination of official records, field interviews with sub-sector participants at various levels in several markets including importers, exporters, government regulators, bankers, brokers, wholesalers, retailers, direct buyers, and representative consumers using systematic sampling procedures, and the direct observation of key operations, and (iv) an examination of the competitiveness and coordination among various channels as affected by efficiencies in several related markets to assess the implications of proposed changes in inter and intra-channel relationships.

It was discovered that the fertilizer sub-sector includes several heterogeneous formal, semi-formal and informal agents operating through various channels to supply fertilizer to the final consumers. For the purposes of this study, the formal participants were defined to include the FAO, the GCU, and government development projects.⁸ Non-Governmental Organizations (NGOs) and Registered Private Entrepreneurs (RPEs) were classified as semi-formal participants while Unregistered Private Entrepreneurs (UPEs) and informal groups like *kafos* were classified as informal participants.⁹ The informal participants operate independently or link with formal participants to facilitate the flow of fertilizers to the consumers.

Detailed interviews were conducted with six types of participants at all marketing levels: bankers, government research institutions, importers, wholesalers, retailers and final consumers. The sample size at each level within a market channel was dictated by logistical reasons. While all importers and wholesalers were interviewed due to their small number, a stratified random sampling procedure was followed to choose retailers located in all five geographic divisions of the country.¹⁰ Officials in government projects like the Jahally-Pacharr Rice Project (JP) and the Department of Agriculture, and commercial bankers were also interviewed along with officers in the largest NGO Action Aid, The Gambia (AATG).

⁸ The government development programs include the Jahally-Pacharr Irrigated Rice Development Project (JP project), the Cotton Development Project (CDP) and the Upper River Division Irrigation Project (URDIP).

⁹ Kafos are informal groups of varying strength and cohesiveness that are multifunctional in nature (see Nagarajan, Meyer and Ouattara, 1993; and Shipton, 1992 for further details).

¹⁰ See Nagarajan et al., 1993 for details.

To determine the extent of farmer access to fertilizer, a purposive sample of 14 villages was selected that were located in the market area of the sampled retailers. In these villages, several farmers and kafos were interviewed in groups using the rapid appraisal technique.

Some of the information needed for this study was sensitive, especially for private entrepreneurs involved in importing and marketing fertilizer. For this reason, informal interviews were conducted with participants at all levels using unstructured questionnaires designed to gather qualitative data on the nature of operations, number and type of clients, sources of finance, type of competitors, and major constraints faced by the respondents. In addition, several official documents such as annual reports, financial statements, consultant reports and government memoranda were consulted to gather quantitative data on the size of the sector, mode of operation and sources of finance. By collecting information from both sides of a transaction (buyer/seller; borrower/lender), it was possible to corroborate key information in spite of its sensitivity.

VI. Fertilizer Trade and Financial Services in The Gambia

With the implementation of the ERP, the parastatals were divested of fertilizer importation. Import tariffs were lowered and fertilizer price subsidies were discontinued.¹¹ Fertilizer prices at the wholesale and retail levels eventually were based on world market prices. Private entrepreneurs were encouraged to actively participate in fertilizer imports,

¹¹ While the subsidies ranged from 6 to 80 percent in the pre ERP period, they were gradually reduced to zero after 1986.

distribution and reexports. While the government parastatals were the only trade channels in the pre ERP period, several channels emerged in the post ERP period. The sub-sector currently includes multiple supply channels that compete and collaborate with each other at various stages in the importation and distribution of fertilizer. The current configuration of the sub-sector is mapped in Figure 1. It is led by the GCU (C1), the FAO (C2), the RPEs (C3), the Government of the Gambia (C4) and the UPEs (C5). The operations of these channels are described below.

A. Marketing Stages and Trade Channels

a.) Importation of fertilizer

Whereas the ERP reduced import tariffs and regulations, the private entrepreneurs were reluctant to engage in fertilizer importation reportedly due to capital constraints, limited access to foreign exchange, uncertainty in the government's fertilizer policy, and low expected profit margins compared to their other commercial activities. Therefore, the Department of Agriculture imported fertilizer through grants from the Italian government during the 1986-89 period. With the drying up of Italian grants in 1989, the GCU, the FAO, the GOG and a few RPEs (with the help of FAO) became involved in fertilizer importation. While there is anecdotal evidence on importation by UPEs through cross border trade with Senegal, it is difficult to quantify the volume transacted. Presumably the amount was only a few tons out of a total of 3200 tons of official imports in 1991.

b.) Wholesale Fertilizer Distribution

The parastatal, Gambia Produce Marketing Board (GPMB), remained as the principal fertilizer wholesaler until 1987. With the divesture of the GPMB from the GCU

coupled with the slow response from private entrepreneurs, the GCU and FAO assumed the responsibility for fertilizer wholesaling beginning in 1988. In that year, the fertilizer imported by the Department of Agriculture was auctioned off to the FAO and the GCU.

c.) Retail Fertilizer Distribution

The GCU was exclusively entrusted with primary level retailing during 1986 and 1987, and it utilized its affiliates, the Cooperative Produce Marketing Societies (CPMS), and government development projects as secondary retailers. In 1988, the FAO established a Private Dealer Network (PDN) to act as its primary retailers, and the GCU became a farmer owned private cooperative with 54 affiliated CPMS to engage in retailing. Since 1988, the GCU used its affiliated CPMS while the FAO channeled its fertilizer through its PDN, NGOs (AATG) and government programs at the primary retail level. Furthermore, kafos and an undocumented number of UPEs have also functioned as secondary retailers. The kafos, in general, were linked to FAO private dealers, the NGOs, and the UPEs.

d.) Reexport of fertilizers

No official documentation exists on fertilizer reexports in The Gambia but a limited amount is known to occur among agents in informal trade channels involved in cross border trade. All importers interviewed expressed a need to reexport to neighboring countries to realize greater scale and scope economies. Indeed, reexporting is a rational option considering the strategic geographic location of The Gambia and its liberal export and import tariff structure compared to neighboring countries like Senegal, Bissau, Mauritania and Guinea-Bissau. Furthermore, the cost of maintaining a large inventory is not economical if it only serves the limited demand of local consumers.

The above discussion indicates differences in market technology employed by various channels in terms of integration of activities from production/procurement/import to distribution to final consumers. The following conclusions can be drawn from the above: (i) the functions of the GCU, FAO and GOG are completely vertically integrated from importation to distribution to final consumers; (ii) the functions of the NGOs are partially vertically integrated at the retail level while the functions of RPEs are partially integrated at the import and wholesale level, and (iii) the functions of the UPEs are not vertically integrated, but are limited to spot market transactions and informal forward contracts with their business partners.

Several factors contribute to the above observations on the market technologies followed by several agents in the sub-sector. An efficient market technology should economize on all marketing functions and is determined by the degree of asset specificity required for the flow of the commodity and the degree of uncertainty related to the trading of the commodity (Jaffee, 1992). Jaffee developed a matrix of appropriate marketing technologies ranging from spot market transactions to forward contracts to vertical integration under various combinations of specialization of assets required for the trade (asset specificity) and the magnitude of uncertainty (uncertainty) in trading the commodity.¹² Fertilizer is a commodity that involves a medium to high level of asset specificity and a medium to high level of uncertainty in developing countries. Therefore,

¹² Asset specificity can be measured by the scale and scope economies, degree of specialized machinery, equipment, production inputs and technology required for production, and degree of substitutability. Uncertainty refers to the degree of raw material perishability, uncertainty in predicting demand, uncertainty in predicting government and donor policies that may affect fertilizer supplies, prices, and access to product markets.

an efficient market technology for fertilizer, based on Jaffee's criteria, would require vertical integration of marketing operations.

The inherent characteristics of fertilizer requires that the alternative channels should be vertically integrated for operational efficiency. If financial markets did not matter and if they were perfect and equally accessible to all agents/firms, the market technology followed by various channels would be similar. We postulate that the market technologies used by the diverse agents in these different fertilizer marketing channels are influenced in important ways by their access to financial markets. The next section explores this hypothesis.

B. Financial Arrangements

While domestic banks were reluctant to finance fertilizer distribution, a number of external sources were utilized by some trade channels to finance the fertilizer trade. The efficient flow of fertilizers through the layers of heterogenous marketing agents within various trade channels was influenced by their access to financial markets. The terms and conditions of the financial arrangements that facilitate the flow of fertilizer through the various trade channels are summarized in Table 1.

a) The GCU Channel

The GCU fertilizer trade activities have been financed by a revolving fund established through World Bank grants to finance fertilizer imports and wholesaling, and the credit activities of the GCU at the retail level through their affiliated CPMS. The GCU has been the only source of finance for the retail operations of its CPMS network which in turn has traditionally been the major retail supplier of fertilizer through short-term credit to

farmers.¹³ The CPMS on-lent fertilizers to qualified village branches that in turn functioned as secondary retailers to distribute fertilizer as 100 percent in-kind loans to farmers. These loans to farmers were often tied to the sale of groundnuts to the GCU.

b) The FAO

The FAO operation at the importation and wholesaling level is financed by a revolving fund established in 1988 through grants from the Danish Government. In the 1990 and 1991 trade seasons, the FAO used two RPEs as agents to import fertilizer. The RPEs financed their imports and delivery to provincial depots through lines of credit obtained from commercial banks in London. The FAO revolving fund was used as a 100 percent guarantee to obtain the line of credit from the RPE's off-shore financiers who paid the fertilizer suppliers. At the primary retail level, the Private Dealers (PDs) and Maize Growers Association received fertilizer on credit from the FAO at an 18 percent annual interest rate payable to the revolving fund. The NGO, AATG, buys fertilizer on cash from the FAO through grants from England, while the Women in Development (WID) project uses interest free loans from the Women's World Bank and the Jahally-Pachar project uses foreign grants to procure fertilizer on cash from the FAO to distribute to its clients. At the secondary retail level, the PDs can choose to extend fertilizer loans or sell on a cash basis

¹³ Nearly 80% of the fertilizer was sold on credit by 43 CPMS in the 1991-92 agricultural season. The GCU provided fertilizer to all affiliated CPMS irrespective of previous loan repayment performance until 1989 which led to poor repayment performance and erosion of the revolving fund. Therefore, strict procedures were implemented in the 1989-90 trade season to streamline the GCU's credit operations. Since the majority of the CPMS do not have their own funds to purchase fertilizer from the GCU on cash and since the bulk of the fertilizer distributed to consumers was on credit, the unqualified CPMS ceased fertilizer retailing.

to their final customers. The AATG distributed fertilizer as grants to kafos in their service areas. However, the kafos had to sell the fertilizer to their members at a kafo determined price and form a village level revolving fund for the future purchase of fertilizer.

c) GOG

The GOG operations are generally financed through external grants.

d) RPEs

The RPEs involvement in the fertilizer sector is fairly recent and is in collaboration with the FAO. In the 1990 and 1991 trade seasons, the FAO used two RPEs to import fertilizer. The RPEs financed their imports and delivery to provincial depots through lines of credit from commercial banks in London. The FAO revolving fund was used as a guarantee to obtain the line of credit. This experience provides evidence that at least in this one case guarantee funds helped to induce more private sector participation in the fertilizer trade at the wholesale level.¹⁴

e) UPEs

Interviews with the UPEs revealed that generally they are either self financed or obtain funds through informal credit markets to conduct their trade operations. A limited amount of trade credit through UPE wholesalers is available. Price markups instead of explicit interest are involved in these financial operations. The UPEs extended credit only to their long-term clients and charged an implicit interest rate of 18 percent for 6 months.

¹⁴ Generally, the finance literature tends to be skeptical about the effectiveness of guarantee funds in stimulating lending.

f) Final Consumers

The majority of farmers interviewed reported that they purchased fertilizer on credit primarily from the GCU and secondarily from the FAO, government programs, the NGOs and informal sources.¹⁵ The terms and conditions, however, varied with the source of fertilizer. In general, loans were taken for a period of six months with no down payment or explicit collateral requirements. However, the GCU implicitly linked its loans with groundnut marketing, and women PDs from the FAO required guarantees from kafos. While the GCU charged an annual interest of 21 percent, the PDs from FAO charged 18 percent, and the Jahally-Pacharr rice development project charged 11 percent. A limited amount of inter and intra-household borrowing of fertilizer based on reciprocity was also observed.

Figure 2 summarizes the links between source of funds and market technology followed by various marketing channels in the fertilizer sub-sector in The Gambia. The commodity and financial flows as diagramed, *ceteris paribus*, indicates the following: (i) access to a steady source of funds facilitates the complete vertical integration of marketing operations such as found in the FAO, GCU and GOG; (ii) access to limited and/or unreliable funds is related to partially integrated marketing operations such as in NGOs and RPEs;¹⁶ and (iii) a reliance on equity funds to facilitate trade is associated with a

¹⁵ Very few sample farmers reported buying chemical fertilizer for cash or with a small down payment, perhaps because they had the option of using credit. In the absence of credit, it is likely that the number of farmers buying fertilizer on a cash basis would rise substantially if yield response and prices were more favorable.

¹⁶ For instance, the two private food importers used the FAO's revolving funds as a guarantee to obtain offshore loans to finance fertilizer imports for FAO. They, however, did not engage in wholesale and retail distribution for the FAO. This is perhaps due to their lack of access to guarantee funds to access offshore or domestic financing for a longer

decentralized or spot marketing technology. Therefore, we concluded that although the intrinsic nature of the commodity leads us to anticipate a vertically integrated market technology, the actual structure of the various channels in the sub-sector is determined by access to financial markets.

The vertical integration of functions in the fertilizer sub-sector seems to require a steady flow of funds, either domestic or external. With the drying up of foreign grants, it will be essential for private entrepreneurs to assume a more active role in the sub-sector. The participation by private entrepreneurs is still constrained by several factors such as (i) the nature of financial instruments available to finance fertilizer compared to other commodities, (ii) cost of borrowed funds, and (iii) ease of making retail loans to facilitate fertilizer trade through coordination and integration of functions compared to other commodities. Financial constraints are, therefore, likely to impede their full participation and will influence the future structure and performance of the sub-sector. The next section explores the future development of the sub-sector.

VII. Future Development of the Fertilizer Sector

The policies and programs of the Gambian government including the ERP and agricultural extension programs have contributed to (i) a dramatic expansion in the use of and demand for fertilizer, and (ii) the entry of multiple channels into the market to supply fertilizer (Nagarajan et al., 1993). The sub-sector currently includes multiple supply channels that compete and collaborate with each other at various stages in the importation

period of time to finance distribution of fertilizer.

and distribution of fertilizer. Although the intrinsic nature of the fertilizer trade requires the alternative fertilizer supply channels to vertically integrate their operations to realize economies of scale and scope, access to financial markets influences the actual market technology followed by the various marketing channels and their ability to effectively compete with each other. Therefore, the sector is characterized by multiple channels following heterogenous market technologies and by quasi-monopolists or oligopolists with access to financial markets.¹⁷ Serious problems exist if the country does not develop an efficient and sustainable fertilizer marketing and financial system.

The possibilities for local financing of fertilizer imports and distribution are uncertain, given the inefficient formal financial system in the country. Whereas food commodity traders access off-shore financing for importing rice, sugar and textiles,¹⁸ the fertilizer trade has become dependant on grants, not loans. Furthermore, the difficulty in loan recovery experienced by the GCU and the FAO PDs demonstrate that these channels have not yet developed adequate expertise to make and recover fertilizer loans. Therefore, while domestic banks have financed groundnut trading, they have been reluctant to finance the fertilizer trade. With the drying up of foreign grants, however, it is essential to encourage a more active role for private entrepreneurs in the economy.

Baydas and Meyer (1993) show that the food commodity traders in The Gambia have marketing experience, market contacts and established relations with foreign financial

¹⁷ The market shares of the FAO, the GCU, the Government, the NGOs and registered private entrepreneurs in the 1991-92 trading season were 35, 29, 27, 5, and 4 percent respectively. For further details, see Nagarajan, Meyer and Graham, 1993.

¹⁸ See Baydas and Meyer, 1993.

markets. Therefore, these food commodity traders have the potential to expand into the fertilizer sector by using their extensive food trading experience. Whereas these traders may achieve economies of scope by adding fertilizer to their currently traded commodities, it will be difficult to realize economies of scale in fertilizer trading due to the thin domestic market and a large number of competitors. While they have established links with financial markets for trading food commodities, these links may not carry over into the fertilizer trade. Fertilizer trading requires longer term loans than made for food commodities and involves higher lending risks due to production and policy uncertainties. Longer term loans increase moral hazard problems for the creditors (i.e. borrowers engage in unsound business practices after receiving a loan) at the farmer/consumer level. In addition, a weak legal environment for enforcing loan contracts inhibits supplier credits. But by granting shorter term supplier credits and maintaining frequent contact with their customers because of their high sales turnover, food traders are able to monitor the loans made and avoid loan losses. Their limited access to financial markets will constrain these traders from entering into the fertilize sub-sector and those that become involved are less likely to vertically integrate their fertilizer marketing operations than they do with their other commodities.

Until a more conducive environment with better access to financial markets is developed, the private sector in The Gambia is likely to "sit on the sidelines" rather than actively participate in fertilizer trade. With an uncertain future for the FAO, the GCU and the NGOs as major participants in the fertilizer sub-sector and with the reluctance of the private entrepreneurs, the government will be tempted, therefore, to get involved again in the fertilizer sub-sector. Its negative experience during the past two decades of intervention

into factor and product markets argues against such intervention even at the expense of short term disruptions of input supplies. Resolving the financial market problems of the country is more likely to be an effective way to stimulate these markets than direct government intervention.

VIII. Application of the Modified Sub-sector Framework in The Gambia: What Do we Gain?

The flow of fertilizer from producers/importers to final consumers in The Gambia is implemented through heterogenous agents who are actively involved in diverse marketing channels. The research challenge was to define the boundary and participants in the fertilizer and related markets, and to develop a methodology to gather information for a careful examination of the sub-sector. The sub-sector framework developed at the Michigan State University helps understand the flow of commodities through heterogenous agents and channels in a sub-sector. However, its implicit assumption of competitive financial markets poses a problem to adequately examine sub-sectors in developing countries such as The Gambia where financial markets are imperfect and access to finance is rationed. For this research, therefore, we developed a modified sub-sector framework that endogenized financial markets into the sub-system.

The analysis revealed that access to a steady supply of external funds at subsidized rates has facilitated the emergence of vertically integrated fertilizer channels such as the FAO and the GCU. Some access to domestic and off-shore financing sources for the registered private entrepreneurs has led to partially integrated channels. But the limited availability of borrowed funds to finance the fertilizer trade for unregistered private

entrepreneurs has constrained their degree of market integration and has led them to rely exclusively on spot market transactions and to provide little or no credit to their customers. Consequently, the market technologies followed by these alternative channels has led to an oligopolistic or quasi-monopolistic fertilizer market in the Gambia dominated by those firms/agents with better access to financial markets.

Use of standard sub-sector framework would have revealed the pattern in market technology followed by the various channels in the fertilizer sector. But it would have been difficult to understand the reasons for the limited competition that exists, the differences in marketing technologies found in the various channels, and the evolution of the sub-sector. Our modified framework that endogenized financial markets provided an additional dimension to the analysis that showed how financial markets shape the sub-sector and influence its performance. Therefore, it helped identify the trade and financial market nodes at which policy implications can be useful to develop an efficient fertilizer market. The approach leads to a more comprehensive set of policy prescriptions for the sub-sector and the benefits of using the modified framework far outweighs the additional costs involved in gathering data from financial market participants.

Even though our modified framework expanded our understanding of the dynamics of the fertilizer sector, it has obvious limitations. It is less rigorous than some types of quantitative analysis, and like the traditional sub-sector framework it treats as exogenous those institutional issues related with property rights and social customs that help explain how financial markets operate. We succeeded in pushing out the boundaries of the sub-sector that were crucial in this particular study. The challenge lies in continuing to expand

the sub-sector framework to endogenize those crucial institutional factors that must be examined in order to adequately understand the structure and performance of commodity systems in developing countries.

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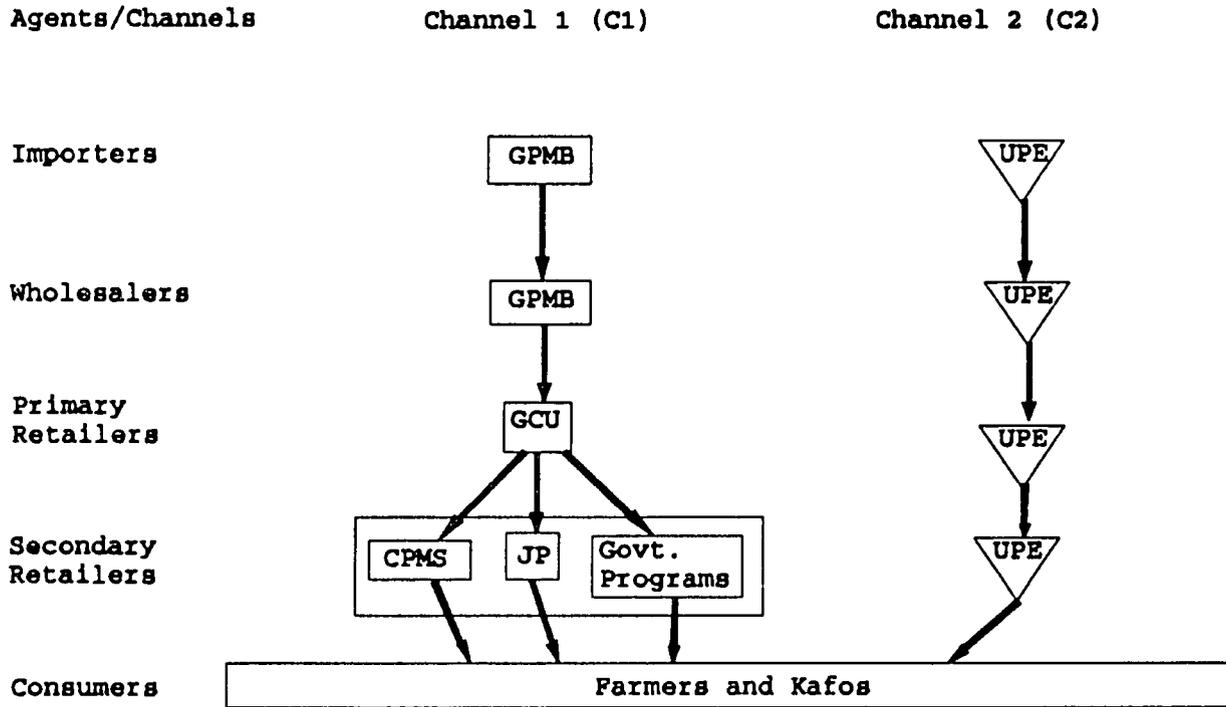
Table 1. Terms and Conditions of Financial Arrangements in Fertilizer Sector by Market Levels, Agents and Creditors.

Channel	Marketing Level	Participant	Creditor	Terms and Conditions	
				Annual int.rate	Collateral
(1)	(2)	(3)	(4)	(5)	(6)
GCU	Import and Wholesale	GCU	ADP II (World Bank)	0	None
	Primary retailer	CPMS	GCU	16	Outstanding loans, product market links
	Secondary retailer	Village Branches	CPMS	21	Outstanding loans, product market links
	Consumers	Farmers	Village Branches	21	Product market links, social links
FAO	Importation and Wholesaling	FAO	Grant & Women's World Bank (WWB)	0	None
	Primary Retailers	PDs	FAO	18	None
		JP, AATG	Cash sale	-	-
		MGA	FAO	18	None
		BD	PDs	18	Group guarantee
		WID	FAO/WWB	NA	NA
	Secondary retail	Kafos	PDs	18	Group guarantee
			AATG	0 (12% from 1992)	Group guarantee
		Women PDAs	WID/WWB	18	FAO guarantee
		Consumers	Farmers	PDs	18
JP				11	Social links
MGA	18			Members	
		BD	18	Demonstration farmers	
		PDs (thru'kafo)	18	Legal protection	
		AATG (thru' kafo)	9 (15% from 1992)	Peer pressure	
GOG	Import, Wholesale	GOG	Grants	0	none
	Primary Retail	CDP, URDIP	Grants	0	NA
	Consumers	Farmers	CDP URDIP	11	NA
RPE	Import and Wholesale	RPEs	LC from London bank	NA	FAO revolving fund as guarantee
UPE	Import, wholesale, Retail	UPEs	Informal credit markets	Variable	Social and business links
	Consumers	Farmers	Informal credit markets, UPEs	Variable	Social and business links

NA: Not available.

Source: GCU, FAO, OSU survey.

Figure 1
Configuration of the Fertilizer Trade Channels in the Pre ERP Period

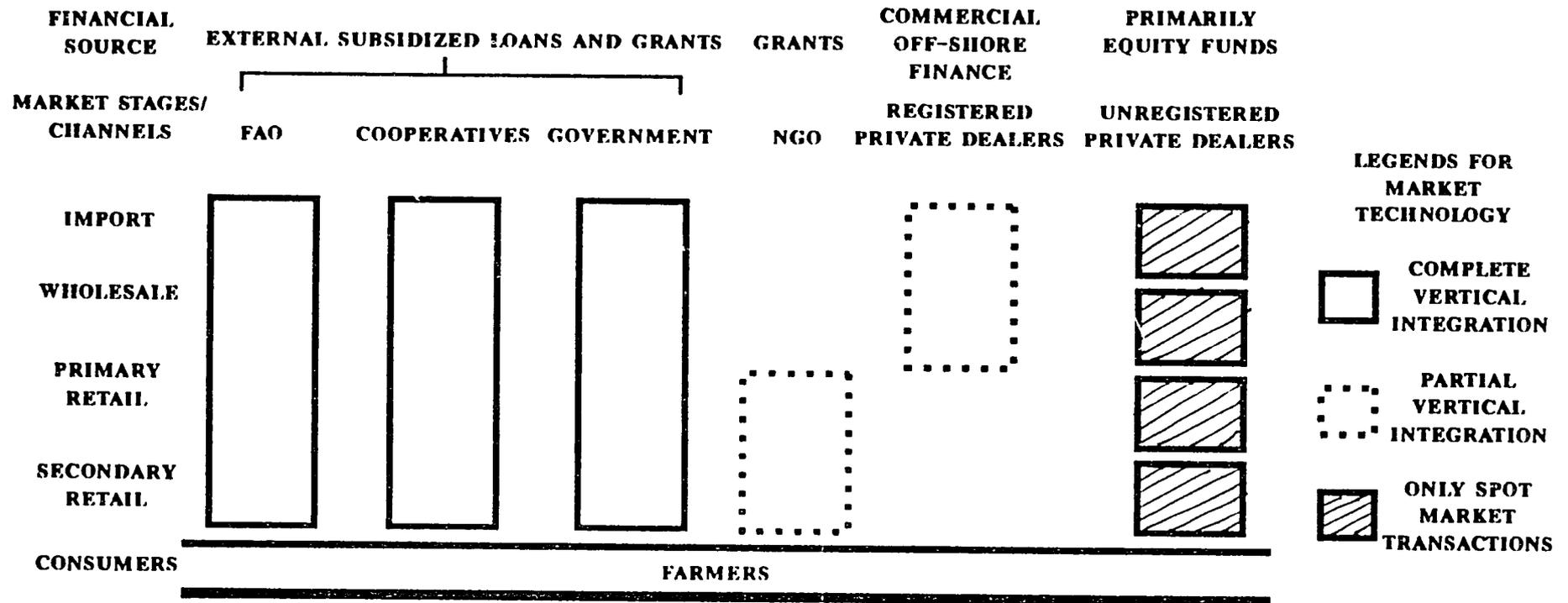


Notes:

- 1) □ Formal Channel
 ▼ Informal Channel
- 2) GPMB: Gambia Produce Marketing Board; CPMS: Cooperative Produce Marketing Societies; JP: Jahally-Pacharr Irrigated Project; UPE: Unregistered Private Entrepreneurs.

Figure 2

**MODIFIED FRAMEWORK APPLIED TO FERTILIZER SUB-SECTOR
IN THE GAMBIA: RESULTS**



IMPLICATION: ACCESS TO FINANCIAL MARKETS SHAPES THE MARKET TECHNOLOGY CURRENTLY FOUND IN ALTERNATIVE MARKETING CHANNELS AND THE EVOLUTION OF THE SUB-SECTOR