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AGRICULTURAL INFORMATION SERVICES
IN DEVELOPING COUNTRIES
FOR PRIVATE AND PUBLIC DECISIONMAKING

by

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I. Introduction and Overview.

Industrialization and development increase the demand for information. Specialization of functions and organization also greatly increases the need for coordination and thus the social returns to and demand for information (Bonnen, 1975). Agricultural information systems are useful to 1) the government officials dealing with food policy and agriculture, including the central bankers, and enterprises in the public sector; 2) the private sector; and, 3) the donors and international organizations.

In most information services in developing countries there is the tendency to overestimate the utility of information to public policy makers and to underestimate its uses to the private sector. The goals of agricultural policy makers cover a wide range and they need a corresponding wide range of information to assist them in achieving their goals. Yet the high degree of uncertainty in the agricultural sector creates a need for an information system also oriented to assist the decisions of the actual market participants, both private and public sector firms. Uncertainty is an important consideration in agricultural decisions at all levels of the marketing system. With uncertainty, information becomes economically valuable and those firms who possess such information can expect to obtain greater profits because of

it.

An important component of a strategy to reorient the agricultural sector toward increased reliance on the market and on private initiative is to create an information system that facilitates informed choices by the buyers/sellers, as well as improved policy formulation by the public sector decisionmakers.

The basic focus of this paper is to review the state of knowledge about the process of improving agricultural market information for both private and public sector uses in developing countries. This involves the question of whether it is wise to invest resources in information services rather than in alternatives like infrastructures. The aim is the improvement of the market coordination of existing firms in the food system. This paper will bring the attention of government officials and rural development personnel to the collection, analysis and dissemination of agricultural information.

The first part of the paper discusses the rationale for a public service oriented to assisting market participants' decision making and describes in detail the concept of crop forecasting and market news services. The second part of the paper attempts to set up a framework for evaluating agricultural information systems in developing countries.

II. The Public and Private Sector Needs for Agricultural Information.

2.1 Introduction

This chapter discusses the nature and the role of agricultural information systems. The discussion emphasizes that different types of information is needed by the different decisionmakers in the food-system, yet some common basis exists for implementing an information service which is useful to all participants.

2.2 The Problem Solving Nature of Information Systems.

"Neither a theory nor a methodology exists to address adequately the economics of information" (Eisgruber, 1978). For the purpose of this paper it seems appropriate to start with a paradigm on general information systems. This does not constitute a full theory of information but identifies the main issues. The paradigm (Bonnen, 1975) states that any information system comprises five phases: 1) conceptualization, 2) operationalization, 3) measurement, 4) analysis and interpretation, and 5) decisionmaking. The five phases represent the logical steps by which data about the real world is processed for decisionmaking.

For the purpose of establishing an information system, the first questions to be answered are: "What is to be counted or measured?" and "Why?". There must be some concept of reality that needs to be measured. In the conceptualization phase, the complexity of the reality is reduced to some basic concepts which often cannot be measured directly. The operationalization phase identifies the measurable variables. In the measurement phase, the actual value of the variables is determined. These must be specific to the decisions the information intends to assist. Also the analysis of the data is done with the purpose of assisting specific decisionmaking functions. Decisionmaking is a continuous cyclical process that goes from identifying problems with respect to some stated goals, formulating and analysing alternative solutions, making choices, observing and evaluating results and then to identifying the new problem. Therefore it is important to identify the objectives (goals) and relative problems which the information system has to address both prior to the phase of collecting and during the data analysis.

2.3 The Characteristics of the Agricultural Sector.

The agricultural sector in most regions of the world is characterized by highly variable production and prices. These may be explained by the following factors (Tomek and Robinsons, 1981, p.18):

- 1) Biological factors affecting yields (weather, pests, diseases) and rigid time lags of production;

2)The nature of demand (generally price inelastic); and
3)The structural characteristics of the production industry (atomistic) which make it difficult to estimate supplies. These characteristics make particularly risky the environment for decisionmaking in the sector.

2.4 The Goals of Agricultural Policy Makers

The goals of agricultural policy makers cover a wide range, for example maximizing food production and urban food supply, increasing and stabilizing rural incomes, promoting technological innovation, improving nutrition, and protecting foreign exchange reserves. Generally, these can be grouped into the following performance criteria: economic efficiency, equity, progressiveness, and full employment of resources (Scherer, 1980). In addition, especially where of highly variable weather conditions exist, the government must be able to anticipate emergency food shortages, in order to assure national food security. Thus, agricultural policy makers need a range of information to assist them in formulating and implementing policies for the achievement of these goals.

2.5 Public Agricultural Information Systems.

For the purpose of assisting the needs of the public sector planning decisions, in both industrial and third world settings, agricultural information is generally supplied by either one or more national statistical services, including

the central statistical agency which is generally within the ministry of agriculture: state or provincial level agencies, which are often uncoordinated and working for agriculture as well as for other needs; the central bank; universities; and non-governmental agencies, including local business, traders and external assistance agencies.

Each of the above agencies specializes in different types of information. Therefore, one problem is to coordinate the activities of these different agencies, especially in third world settings where resources to collect information are very scarce. Furthermore, Riemenschneider (1976) points out that public institutions are necessary to avoid the problem of strategic misrepresentation of information that may occur when private firms supply information for public use.

The literature recognizes in general six categories of data that are required for an adequate information system in agriculture: 1) Benchmark data on physical and human resources and economic activities; and 2) Periodical data on i) farmer/producer behavior (including farm management studies of input/output relationships to learn how they react to public policies; ii) agronomic and agro-climatic data; iii) current supply data (particularly important where weather produce wide variation in yield from year to year; iv) market news (which includes prices and volumes of all major commodities traded or available in the market place, including imports, exports with prices standardized on unit; and v) production and economic projections (Cummings, 1977). This set of data should be useful to the public and private sectors,

and also to donors and international organizations.

In addition sound policy design requires current information on many variables that are outside the traditional scope of agricultural economics (e.g. information on non-farm employment opportunities).

Much has been written on the design of comprehensive agricultural information systems. The need and potential for such a system is widely recognized, but its establishment is an enormous task even in developed countries, where the technologies are more advanced. In developing countries the limited human and capital resources call for a less ambitious approach. For example some basic data may be needed on one-shot or periodic up-dating basis before a continuing statistical series has meaning. The objective must be to achieve a minimum level of information (Cummings, 1977, p.4). In the production of such minimum information, the needs (goals) of both the policy makers and the market participants should be considered.

2.6 Market Participants' Decisionmaking in the Food System

Market participants in the food system include farmers, input suppliers, transporters, traders, processors, retailers, and consumers. They can be private or public agents. Economic theory states that the economic goal of private agents is to maximize profits. Some literature argues that, given the limited information and resources available,

many of these economic agents pursue a satisficing rather than maximizing behavior, which implies that decisions will not be optimal.

In the context of uncertainty information becomes economically valuable. Those firms who possess information can expect to obtain greater profits because of it. Uncertainty is therefore an important consideration at all levels of the marketing system. For example uncertainty about the availability of a product with specific quality forces the traders to undertake personal inspection before the purchase, and this increases transaction costs and errors in resource allocation.

When public firms coexist in the market, their goals are stated by laws and regulations justified by social welfare considerations (e.g. stable prices and level of income). These goals should however, always be pursued while keeping/shaping an incentive structure adequate to the socio-economic situation.

2.7 Information Needed by the Market Participants.

A subset of the broad set of agricultural data listed above is also useful for market participants decisionmaking in the food system: especially expected production and current/expected market conditions. Information directed to the market participants based on those data would lower uncertainty and partially improve the constraints to decisionmaking.

The first category would influence the decisions of farmers to increase (or decrease) their intended plantings of a particular crop (or harvesting, depending on the time the information is available and the product characteristics) or of competing crops; of traders to accumulate stocks (or not) for export (or for import); and of processors to their production activity. The second category would influence current decisions on buying/selling by all market participants. The two kinds of information are closely related. The elaboration of expected market prices requires the knowledge of expected production, so that the existence of reliable crop estimate and forecasts is the premise for a valuable market information system.

For information to be of use it must be available prior to the time at which the decision must be taken. The nature of decisionmaking is continuous and specific. Given the uncertainty and the instability of the agricultural sector, information systems for the use of the market participants must meet different criteria than the information systems for policy design. Much of the information needed for policy design is historical in nature, while the information needed for market decisionmaking is current and predictive (Wigton et al., 1985, p.16). Such information must be produced and supplied with several institutional and clientele considerations in mind:

- 1) The data must be produced using regularized procedures and standards, so that good quality is maintained and the data is trusted by its users.

- 2) The data dissemination and processing must be done in a timely manner and distributed equitably to all participants.
- 3) The data processing and dissemination procedures must be kept free from the influence of political forces and vested interested.
- 4) The terminology used should be easily understood by the targeted decisionmakers and easily accessible.

2.8 Alternative Agricultural Information systems.

In the agricultural markets we distinguish among informal, private, and public information systems. In the informal system, information is unsystematically sought through personal contacts among market participants at the time of market transactions. Firms systematically collect the information that they need on an individual basis or collectively to make it available to the members in the organization (private system). Finally, the government collects data and supplies information to all participants firms (public information service).

The above discussion makes it clear that there is a wide variety of objectives that various groups of decisionmakers pursue in the food system. Since it is very unlikely that there will be an information system which will meet all these objectives equally well, some trade-offs need to be made in its design. Also, given that problems change over time, there is periodically a need for new types of information. Therefore the design of a useful information

system needs to be structured around "recurring" problems and be sufficiently flexible to permit the addition of new information when the need arises.

2.9 Conclusions and Comments

The above discussion on the nature of the public/private decisionmaking and its need for information in agriculture is not exsaustive. It helps to put in perspective the issues that are studied in this paper. The improved environment for private decisionmaking in the food system also works in the direction of helping to achieve the public goals.

III. Economics of Information and the Situation
in Developing Countries

3.1 Introduction

This section deals with the theoretical literature on evaluation of economic information, and the rationale for a public investment in information services useful for public as well as for private participants in the food system. It also discusses the situation in developing countries.

The interest in evaluating information is rising among economists because the costs of information services have risen rapidly, and distributional effects are recognized. Also, increasing concern about the relevance of the data base in the analysis makes pressure onto improve the existing information systems. It is clear that data limits the ability to conceptualize.

The discussion below is based on theoretical and institutional considerations.

3.2 Economic Theory.

Static economic theory emphasizes the role of relative prices in guiding allocation decisions. Prices are viewed either as parameter, to decisionmakers in the firms or households, or as outcomes of decisions, assuming given

demand, supply and cost functions. In the latter case, a certain value of relative prices identifies a unique quantity exchanged in the market and vice versa. The other basic forces of supply and demand and how they interact to determine prices are fixed and known (1), thus information is perfect and is not included into the analysis. In reality such mechanisms are subject to random shocks and characterized by imperfect knowledge. In a dynamic economy the parameters underlying the above functions continuously change. The economic agents need to know the time pattern for which parameters and exogenous variable change. It is difficult to evaluate information. Most information systems do not have an impact over time that is observable in easily measurable variables.

Arrow (1967) was the first economist to introduce the concept of information as a commodity. He conceptualized the market demand and supply for information. The argument is a rationale for a public information service. As a commodity, information has some attributes of a public good:

- 1) Indivisibility, by its nature economic information is indivisible into smaller components.
- 2) Nonappropriability, the producer of information cannot usually charge for further uses of information once it is disseminated, so that the returns to the suppliers of information are not fully appropriable.
- 3) Uncertainty, production of information is a risky process, the value of information cannot be predicted perfectly from the inputs.

4) Increasing returns in use, information acquires value when used in the context of a decision.

From these characteristics it follows that the market incentives to supply information are inadequate and the competitive model leads to a suboptimal social allocation of resources. Thus, there is a rationale for a public service to provide market information on the grounds of improved efficiency and allocation of resources.

The branch of economic theory named economics of information deals with the question of selecting that information system from among many which will provide the largest net benefit over time. Eisgruber (1978) suggests that three different approaches have been applied to evaluate information:

- * The decision theoretic approach,
- * The net social benefit approach, and
- * The scoring approach.

The decision theoretic approach (Marschak, 1968) rests on the assumption that several future states of the nature are possible (to each of them a subjective probability distribution is given). Also a variety of courses of action are available to the decisionmakers. depending on the course of action taken and the state of the nature occurring, a particular payoff (result) will result. In this model, the access to information modifies the probability distribution among the states of the nature. Also the cost of the information changes the results of the action. This model allows us to make comparisons among different information

systems. The major problem is the estimation of the probabilities. This approach has been used mostly for relatively simple evaluation at the firm level.

The net social benefit approach was applied for the first time in 1972 by Hayami and Peterson. Their argument is that too low level of information leads to wrongly perceived supply (or demand) functions, which causes misallocation of resources. The value of information is measured by its impact on the net social benefits. Imperfect information on available supply affects pricing and inventory operations which lead to a net decrease in social welfare. Using the concepts of social welfare developed by Marshall (1948), the net social benefit is graphically illustrated by the difference between the areas under the supply (social costs) and demand (social benefits). They found that better information is a net social benefit only when the model is stable (i.e. it depends on the relative elasticities of the demand and supply of the commodity).

The measurement technique for the social benefit approach varies from econometric to simulation methods. The simplest form (which assumes perfect competition, perfect mobility of resources and statics) has been improved lately by the use of dynamic programming. The calculation of the costs for increasing the accuracy in information allows for estimation of benefit-cost ratios. Models and empirical application are available which permit to evaluate information over long period of time.

The first drawback of this approach is that the reliability of the social benefits depends on the accuracy of

the price elasticities (when the income effect component is small relatively to the substitution effect the price elasticities calculation is more accurate), and thus on the commodity. Also, the net social benefits is an abstract concept which needs to be further qualified.

The scoring approach relies on the opinions of key evaluators (e.g. market participants, scientists, policy makers). Various evaluation criteria can be applied. The National Academy of Sciences' study on information systems for world food and nutrition (Eisgruber, 1978) and the recent study by Christy et al. cited in the section 5.4 both recommend this approach.

Another approach that has been used to evaluate market information is by Antonovitz and Roe (1984). They apply the theory of competitive firm under uncertainty to evaluate the producer's willingness to pay for additional information. The approach incorporates "agents' risk preferences in a market-level econometric model and (tries) to estimate the value of information as a function of the mean and variance of a rational expectations forecast". As the authors point out "numerous hurdles remain before reliable empirical estimates can be obtained on the informational efficiency of markets".

The limited availability of good quality data for a consistent period of time in developing countries limits the use of the more sophisticated quantitative approaches so that this paper will not further elaborate on those. However, more details will be given on the scoring approach.

3.3 Institutional Considerations.

The agricultural sector in most countries is characterized by 1) continuously changing prices, often subject to negotiations among the parties, which are imperfectly known, unless fixed by authority, and 2) physical and institutional constraints to the diffusion of non-price information. It follows that there is a need for studying the local institutions that deal with market intelligence (private or/and public). Also, in order to evaluate their adequacy "economists concerned with the economics of information will need to be concerned with institutional changes. This is necessary since problems in the system change over time and require changes in the information systems" (Eisgruber, 1978). Modern institutional economics applies the industrial organization paradigm to the analysis of institutional change. The extended paradigm includes considerations of the feed-back influences of market environment, behavior and performance (for more details, see Marion, French, Shaffer).

The commodity subsector approach concentrates on the analysis of one commodity (or closely related set of commodities). This is relevant in our discussion because the nature of the commodity greatly affects the problems with information. The subsector approach, developed on the extended industrial organization paradigm, focuses on a) vertical linkages and coordination within the marketing system, b) the role of demand in guiding agricultural production and marketing decisions, and c) dynamic evolution of the food

system (Holzman 1985).

The commodity subsector can be seen as the vertical sequence of transactions which transfer the commodity from the farmer to the consumer (the marketing channel). Since the transactions are the source of market data and use market information, a subsector represents a complete information system. Information flows vertically and horizontally in a two way direction (Purcell, 1966). Along the subsector channel, information is imperfectly utilized.

A useful concept developed by the literature is bounded rationality. Since any person's mind has limits in its capability to understand and analyze information, the market participants take into consideration only a part of the information available. They exhibit bounded rationality. Also, there is lack of systemic perspective. Any participant has his own perspective of the system so that his opinions are necessarily limited. Thirdly, opportunistic behavior exists. An individual participant can manipulate the information in his hand for his own interest; even when he does not do it, the counterpart might think that he does it (Williamson, 1975).

From this perspective, the study of the market structure and behavioral characteristics (e.g. trade practices) of the subsector give some insights into 1) the distribution of costs and benefits of information to private firms and public information service at each stage of the channel; and 2) the types of information needed, and by whom. Those are the basis for decisions whether to establish a

market information service and what information and market participants to target. Unfortunately, the relationship between market structure and trade practices is not automatic (Riemenschneider, 1977), and this makes the analysis more complex. In addition, risk considerations, transaction costs, and customary and social factors determine the types of trade practices. These are not discussed here. The focus, instead, is on relative costs and benefits to access to information.

3.3.1 Access to Information and Industry Structure.

The economic structure of an industry affects the incentives to organize to collect information. As the firm size increases the per unit output costs of its access to information decline, and the likelihood of capturing positive returns from investment in information increases. Also, by undertaking larger transactions, larger firms naturally get more information (since the single transaction is more representative of the entire market). This means that among firms of different size, the smaller ones are less willing to invest in information and will be less informed.

Since information is a source of market power, the distribution of the market power will be skewed against small firms. In aggregate, the social benefits from the establishment of a public information system are higher in a situation of atomized industry, since many market participants will benefit from the provision of impartial information. In the case of coexistent large and small firms,

one of the objectives of the public service might be to redistribute information and the market power in favor of the small firms (Christy, 1980).

3.3.2 Access to Market Information and Types of Transactions.

In addition to the information about the parameters identified by economic theory, in the real world, transactors need other types of information, which qualify the price. In fact, the price perceptions by those who analyse the economy are different from buyers/sellers. For the first group prices are indicators of performance, while for the second group they are "immediate financial opportunities" (Houck, 1977). Price information for the second group needs to be highly specific to location, quality, terms of sale, and different peculiarities of each transaction.

Shaffer (1985) observes that six types of markets exist. He identifies two groups: transactions are either spot transactions or forward contracting. Spot transactions relate to the exchange of product available or delivery on day to day basis. Forward contracts are agreements regarding the delivery and acceptance of a specified commodity at some future date. Spot transactions and forward contracts may use the following pricing mechanisms: individual negotiation (or private treaties), posted prices and auctions. Thus the six markets. At each stage of the channel either one or more or a mix of these markets may coexist.

In individual negotiation the parties discuss price and other terms of trade on a particular lot until mutual agreement is reached. The outcome largely depends on different lots and locations (at one point in time) but also imperfect information, relative bargaining power and trading skills of the individual or groups involved. The level of dispersion and variability of price and non-price conditions is high, causing the cost of collecting data by a public information service to be high.

In posted price transactions, decisions are constrained by the price announced. Price information from other transactions may be therefore easier to access, but non-price information may be not clearly publicized and thus may be difficult to know.

Under the auction system, buyers and sellers meet at the formally organized central market places; in the case of spot markets, the commodities are assembled and inspected. Prices are determined on the basis of competitive bids for each lot, and individual operators have no control on the pricing. The market is transparent, i.e. any type of information is easy to access and disseminate even to interested persons not present in the market. However, when a substantial volume of the commodity bypasses the market, information about representative supplies and demand is obscured. Price fluctuations may occur which are unrelated to the total quantities marketed, and may also reflect different qualities instead of the average of the entire output. Even if the mean of the expected spot markets does not change, the

limited number of transactions on spot market might increase the variance of that price. Auctions in spot markets have the main disadvantage of high costs of assembling the commodities at one place.

Auctions in contracts with expectation of delivery are likely to play an ever more important role in the future with the access of computer technology. The information problem is reduced by highly standardized contracts and terms of sale. Commodity assembling in one place and inspecting procedures are not necessary, making information discovery less expensive than for spot auctions. A market reporter continuously provides information. This arrangement is practiced mainly in developed countries for a limited number of commodities. They require important regulatory systems on quality grades and standards and enforceable contracts.

For an information system to work well the timeliness of information is paramount in spot markets, but not so much in contracting, given the long run nature of the decisions involved. Contracting, instead, requires market predictions which depend on timely and correct current information.

It seems relevant to point out that, even if the occurrence of group bargaining is mostly related to the enhancement/stabilization of producer prices, in fact, it also facilitates the access and distribution of information. (See the example of Korea in the appendix A). In group bargaining, farmers associations or cooperatives bargain with traders. They may engage in any type of transaction. The success of

group bargaining depends on the control of supply, the level of concentration of the buyers, and the price elasticity of demand. The more control over the supply, the more concentrated the buyers, the more inelastic the demand, the easier it is for the group to negotiate higher prices without losses in total revenue. (Tomek and Robinson, 1981, pp.202-222). In the long run, the higher producer prices may increase production and reduce prices, which may constitute an important goal of the government in the context of national food security.

3.4 The Situation in Developing Countries

In developing countries, public information systems for the use of market participants are generally not well developed. The situation varies from country to country and needs to be specified. It may be evident that, for certain commodities, there is need for a public information service. It may be the case that the agricultural industry is atomistic at the producer level while the traders and merchants are more concentrated. This may imply unbalanced distribution of access to market information by the smaller firms. Unbalanced distribution of information is reflected in unbalanced market power skewed against the small farmers which results in perverse production incentives (also, market power reflects in a redistribution of income).

For staple commodities for which marketing boards do not exist, or do not have the monopsony of the market, larger

farmers might undertake some form of vertical integration with traders through contracts, mainly individually negotiated. This improves their level of information.

Small farmers (who do not have the scale to sell otherwise) necessarily operate in residual markets (Raisuddin and Rustagi, 1985), where price and market sale conditions are highly variable. Small farmers trade mostly with other farmers or traders within the village, and at the village market. In either case, the prevalent transaction practices are private treaties on spot or contract arrangements. Within the rural market yards a combination of private treaties and open bid prevails. Given the low opportunity cost of labor, people walk around bargaining, watching others bargain all day. This makes trade conditions tend to converge across the market yard. The village communication and transportation network together with the affluence of traders (who make the link among village markets and with the main regional market) determine the level of information available on the supply and the sale conditions on other markets. Traders, though, may seek to gain access to special information or to suppress information to competitors and counterparts. This tendency is often strengthened by market rules and regulations which constrain competition among traders.

In each of these situations, the social benefits of a public information service may give high social returns, but its costs are high. A public service should concentrate on minimizing cost and data collection. Careful consideration needs to be given to factors which make the costs high, and

data difficult to collect and analyze. Given the dispersion of production and exchange points and the opaque nature of transaction practices, reporters need to be well trained and need to travel widely.

The collection of data is made more complex given the varying specifics created by contracts (e.g. bearing risk practices). For spot transactions many different factors such as time of the day, quantity sold, and quality enter into the judgement of the prevalent market conditions. Also, standards for units, quality and packages do not exist across different areas, requiring the use of conversion factors to make data comparable across space.

It could be suggested, first of all, to establish grades and standards; also to encourage rural markets (which facilitate the circulation of information); and thirdly to change trade rules which raise barriers to entry and limit competition (Mittendorf, 1982).

At its beginning, the public information service should concentrate on a few major rural and urban wholesaler markets. The information service may be organized on the basis of the hierarchy of markets at regional or national levels (see the program of producer markets in Brazil in Appendix A). When, however most of the total supply of the commodity is mostly subsistence agriculture and/or produced by large farmers who bypass the rural markets, the information content of prices collected at any of the market places is lowered. This situation may be conceptualized as thin markets.

Power (1978) argues that the most cost effective

approach to develop thin markets into liquid markets is to stimulate arbitrage among markets. This often implies more information. Further research on the information processing through thin markets is necessary. Caves (1978) argues that case studies are the only feasible starting point for systematic investigation of the problem. The researcher should ascertain what group of agents are willing to undertake arbitrage and the information and the incentive structure should target those. It is usually believed that traders are more inclined towards arbitrage. If this is true, traders should be targeted by the information service. A recent study by Sherman (1984, p.145) found that farmers are willing to travel to sell their products depending on the total value of the product they have to sell. This would exclude small farmers from most arbitrage activities.

In a situation of chronic food shortages, some authors suggest that the public service should concentrate on the types of information needed by small farmers and handlers whose primary role is not market trading but production, processing and physical handling (they may handle the largest share of agricultural products consumed by the non-urban low income population). This additional information from disinterested sources would be incentive to increase the volume of marketed supply.

In the case of administered prices, information on supply availability and movements, indispensable for formulating a wise policy on pricing, is difficult to gather because of parallel markets. Actual prices of these markets

are difficult to collect. It seems evident that the information problem is not solved.

NOTES:

(1): In addition to the change of the commodity price, the quantity demanded is influenced over time by changes in (the exogenous variables in the static model):

- individual tastes/preferences,
- income distribution, - introduction of new products,
- prices of competing or complementary commodities (Tomek and Robinsons, 1982, pp.32-36).

Supply is affected by other factors in addition to price changes:

- weather, pests, changes in technologies which influence yields,
- changes in input prices,
- changes in returns in commodities which compete for the same resources and joint products,
- additional costs for new technologies,
- institutional constraints (Tomek and Robinsons, 1982, pp.80-85).

IV. Definition and Design of Agricultural Information Services

4.1 Introduction.

In addition to a clear and stable incentive structure, market participants need two main categories of information, expected production and current market conditions. This information guides private/public decisions towards both increased production and current consumption. It can be provided by two separate but interrelated public services, crop forecasting, and market news and information services. A vast literature discusses at length the issues of crop forecasting. The discussion below does not try to be exhaustive but highlights key issues related to the topic. In the discussion below, the characteristics of the public service that are relevant to the developing countries are emphasized.

4.2 Crop Forecasting Systems.

"The scope of crop forecasting services is to supply estimates of the expected future production of key commodities in time to affect current decisions". (Wigton et.al., 1985). The compilation of reliable statistics on crop areas, yields and production is an on-going activity. It is generally

carried out on a national basis and disaggregated by region, time (following the crop rotation) and by use (e.g. human versus non human) (FAO, 1982). This data, together with data on the volume of existing stocks and the amount of waste, is also the basis for sound agricultural marketing policy design. In a low income economy, the development of the data base should be confined to the crops and animals which are the most important in local consumption, and figure in foreign trade. Techniques for forecasting reflect the nature of the commodities and their markets, the ecology of the country, and the human and physical resources assigned to the information system.

4.2.1 Problems in Estimating Crop Areas and Yields.

Major problems of estimating crop areas and yields are related to:

- 1) The methodology used in the collection of the data such as complete enumeration versus sampling and what sampling practice was used. Problems with sampling are well known and will not be repeated here in detail (see FAO, 1982). One issue often debated is how much data should be collected in a given sample survey: multipurpose surveys versus common surveys. The empirical evidence is that the first method could be more cost-effective, but the second one could get more information on individual subjects. For example, collecting crop data along with social data may work to the disadvantage of both, and much depends on the psychological attitude of the persons

interviewed.

- 2) The extent of familiarity with statistical concepts and procedures by reporters and respondents.
- 3) Comparability over time and space (this problem arises from lack of uniformity in the application of the recommended concepts and definitions).
- 4) The occurrence of continuous planting, continuous and partial harvesting, and shifting cultivation. Problems also arise for the estimate over the long period of soil occupation, and land use in relation to abandoned land. This land may be used as a reserved stock of cassava or used as a pasture land until, some ten years later, it might be cleared again and cultivated. (The FAO Regional Seminar on the Methodology of Agricultural Surveys recommended introducing a new parameter or concept related to the period of soil occupation).

4.2.2. Indirect Assessment Methods.

Very often in developing countries statisticians have to work with secondary data (by-products of administrative activities) or indirect assessment methods, such as eye estimates or expert opinions instead of direct statistical observations, given the financial and psychological constraints. Some literature looks into this and studies ways to improve the use of such methodology when unavoidable (Delorme, 1982). In general the comparison of direct statistical observations with indirect assessments is

encouraged in order to arrive at the best possible estimate in the light of the data available. The need for a development of statistical surveys is stressed, however. This should involve the design of a sampling frame so that accurate estimates of planting and production can be made, and an understanding of the technical determinants of the factors influencing production and yield, so that an appropriate sampling frame that captures the level of each of them can be developed.

4.2.3 Remote Sensing Technique.

Remote sensing research is the study of imagery or digital data collected from aircraft or spaceborne sensors to detect valuable information about conditions and resources on the earth's surface. It is believed that there is potential for using remote sensing technique in the major areas concerned with improving crop estimation and natural resource management, such as early warning and crop condition assessment, domestic crop and land cover area estimation and mapping, renewable resources inventory, soil moisture, conservation and pollution. In addition, remote sensing techniques are being researched to measure and estimate changes in available soil plant nutrients, yield potential of genetic seed stocks, yield losses from pests, and changes in the type and timeliness of tillage systems. Much remains to be learned especially about the effects of weather, changing production inputs, and production practices on yields

(SRS,USDA 1984).

As far as the application of such techniques in developing countries is concerned, several remarks can be made. The characteristics of agriculture in many developing countries' small, fragmented farms with standing water in the field and the rapid changes in farming (which outdate aerial photographs) make the technique ineffective. Thus, estimates undertaken with remote sensing technique need to be supplemented by traditional methods, and since that requires an experienced statistical data processing and a remote sensing staff, the application of this technique should presently be undertaken by expatriates until the local personnel trained for this purpose are available.

4.3 Market News and Information Services.

A market information service undertakes the functions of market data collection, analysis, and information dissemination to assist the production and marketing decisions of the market participants (Schubert, 1983). Ideally this data includes all the elements which are likely to influence the terms of exchange: sale conditions, current prices, the character and volume of supply of a commodity, its location and probable movement, and the expected level of consumer and wholesaler demand. A more complete list also includes trade opinion as to immediate and future trends; the probable effects of seasonal and climatic influences; forecasts of future production, consumption, and trade

movements; and seasonal variation of yields with their probable impact on prices. In reality an accurate choice of appropriate variables must be done with the specific situation in mind. The service should start by reporting some information only for selected crops in the most important trading centers. The information may be classified as price and non-price information.

A market information system produces information based on different time periods used for different purposes. Current market news (daily and/or weekly) includes current prices (farm, wholesale, retail levels), market conditions, and turn-over, supply data, and short term forecasts. It is a guide to current transactions obtained by direct contact with buyers/sellers in strategic selling points. It is particularly useful for spot markets. Quarterly and annual market outlooks include information on future trends of supply, expected yields, demand and prices. Medium/long-term market outlooks are the basis for decisions on production changes and investment policies.

In terms of geographical areas, market information may be classified as: local (low viability in the long run), national, and international (may avoid severe gluts and shortages, but it is usually extremely difficult to organize for political reasons).

4.3.1 Major Issues related to Market News and Information Services.

In the design of a market information service one needs to consider the extension of coverage, the methodology of data collection and dissemination, and data analysis.

Prior to the design, it is especially important to understand problems with grades and standards, uniform weights, measures and packages, and the existing private information system.

4.3.1.1 Extension of Coverage.

Tradeoffs between specific and general information are necessary. Information needs to be specific to the targeted decisionmakers' needs but very detailed information may be too costly. Also, given bounded rationality of human decisionmakers, only selected information can be used, that information most necessary for the specific transaction types.

In addition, choices must be made about what prices to collect (e.g. producer level versus wholesale). About the emphasis on price versus quantity data, some authors argue that quantity data (anticipated production and storage stocks) are more important, since they guide the market participants in making short-term plans (Riley et al., 1970); other authors emphasize price data (Schubert, 1983). The choice must clearly be made for each specific situation because sometimes supply data may be difficult to get. Usually traders and merchants maintain an informal exchange with other traders regarding commodity prices and volumes including anticipated

supplies availability, and stocks.

The foremost interest of decisionmakers is the future development of the prices of their products. At an individual firm level, accurate price forecasts induce allocation decisions result in increased profits whenever the decisionmakers are able to react. Another possible effect is to smooth the flow of production over time, thus decreasing costs associated with variable production and variable use of marketing facilities.

4.3.1.2 Methodology of Information Collection.

The service should emphasize 1) personal contact with market participants, to collect a variety of data, and also to establish a feed-back mechanism that provide monitoring of the effectiveness of the system. 2) impartiality, 3) consistency (detailed manuals and briefings for new reporters and continuous monitoring are important) and 4) a special incentive structure for personnel.

Given the situation in developing countries, the interpretation and measures of market parameters are difficult for reporters. Schubert (1983) stresses the need to choose reporters who have had trade experience.

Additional issues under this item are: Should the reporting be voluntary or mandatory? Should it be of responsibility of the extension services? (In some countries farmers identify extension officials as controlling government agents, and this can be a detriment to good information). And,

what media are the most suitable?

4.3.1.3 Analysis of Data

The analysis of data may involve simple summarization by calculating averages, and interpretation as to market "tone" and change, with the focus at important trading locations for the commodity. Analysis of price data includes the calculation of trends, seasonal and cyclical indexes, and the expected gross storage margins. (This is the historical price increase for each month over the harvest month).

Special effort must be made by the service to improve its information and include estimates of future price trends. Supply-demand analysis (fundamental analysis) is a major tool used in predicting agricultural price behavior. Charting (technical analysis) can provide information that may be used in conjunction with information gained in fundamental analysis. Basic forms of charting can be particularly useful in local markets, and they may be constructed using daily, weekly, or monthly prices for local, statewide, or regional markets. Charts can reveal certain price trends such as the usual market highs and lows, seasonal price patterns, the range in which prices move, and how fast they move (Cummins, 1985). A high level of accuracy in crop forecasting is essential.

Price forecasts are subject to two main errors: sampling errors, and random factors that will influence the

actual future value. Price forecasts made after production decisions are more accurate, since the problem of farmers changing their plans is avoided. The longer the forecasts, the more important it is to take account of the feedback effect of the forecasts on the production decisions subsequently undertaken (Tomek and Robinson, 1982 pp. 352- 358).

4.3.1.4 Information Dissemination.

Modern communication technology offers a wide range of possibilities for the choice of media. They range from microcomputer and teletypewriter networks, to radio and television, telegram, telephone (including answering devices) and mailing, billboards, or notice boards. The latter may be found in local market yards, loading and forwarding warehouses, post offices, general stores and banking offices and newspapers. Some choices need to be made about: 1) whether to charge user's fees for the information, 2) uniformity versus clarity: how to target terminology and language to the different groups? 3) the organization of educational programs (these may be associated with the extension services).

4.3.1.5 Grades and Standards.

When obtaining price information, it is imperative that the grade and/or standards of the commodity in question be specified. In many markets, inadequate product description makes variable conditions of exchange a problem, and price may

be biased as an incentive for action when uncertainty and lack of knowledge concerning weighing and grading conditions prevail. This is especially true in developing countries where units of measure often change from one area to another within the country.

To introduce grades and standards is not an easy task. One especially needs to use a terminology which is easily understood by all market participants. It must reflect the prevalent trade practices and not require changes in them to function. Bakken and Mueller (1951) stress that a type of information necessary in individual transactions is the relative values of particular lots. Growers selling their crops on the farm are often unable to obtain an accurate estimation of the relative quality of their crops, even if official grades are well established. Farmers may be unable to associate the "general" or "average" prices prevailing in the area with their own crops, given the range of quality. It may be necessary to establish a service in the extension station to evaluate the crop quality, where growers may send representative samples of their crop prior to the sale.

Also one needs to relate official grades and standards to the consumers' criteria of choice. For example, the specification special characteristics of produce color and shape which consumers appreciate should be included in the grade specification.

The grading system should not significantly increase trading costs, prices, or unemployment, and should not reduce competition, productivity, innovation, investment or the

ability of domestic producers to compete internationally.

4.3.1.6 Effective Link with Private Systems.

Where the market structure is such that certain private/public firms engage in information collection and analysis, linking them with public service is an important way to minimize the efforts and maximize the effects.

4.3.1.7 Keeping Abreast of Changing Conditions of the Marketing System.

Very close to Eisgruber's concept of flexibility, Cummings (1977) introduces the concept of "moving minimum". The idea is that there is a minimum amount of information to be provided at different levels of economic development. This minimum changes with time, while the service expands its organization and the users learn how to use the information. In addition, the changing market practices and structure will cause change in information types.

V. Evaluation of Information Services in Developing
Countries: The Issues and a Tentative Framework

5.1 Introduction

This chapter examines the main issues related to evaluating information services in developing countries. The last section presents a pragmatic approach to handling these issues.

5.2 Why so Little on Evaluation in the Reviewed
Literature?

An extensive literature search was undertaken to identify evaluation studies on projects dealing with the creation/improvement of public agricultural market information services. The search covered all developing countries and all commodities for the last fifteen years. The results of the search for examples from six countries are briefly summarized in appendix A. A number of detailed descriptions and recommendations for the implementation of market information services in fruits and vegetables were found. Yet only sparse and partial comments on the results achieved were identified. Projects undertaken twenty years ago (e.g. the case of Peru) are not followed in the literature in more recent periods. Also, personal contacts with consultants and research workers

revealed that in many cases improved market information projects were financed only for a few years, while it is probable that the effects occur after 5-6 years or more depending on the level of development in the country.

As the methodology and the literature review also revealed, there has not been enough research on information processing and evaluation, partly because information is an empirically and theoretically difficult commodity to study.

5.3 The Evaluation Problems.

A broad perspective needs to be taken when dealing with information evaluation studies. The fact that governments must allocate scarce resources among several investment alternatives often discourages continuous financial commitment to improving agricultural information within the market participants. The task of the researcher, then, is to demonstrate the continued economic viability of such services.

Cost-benefit criteria are useful tools to set priorities among alternative public investments. The difficult task is to quantify in monetary terms the effects of lack of information (or expected effect for improved information). These estimates need to be compared with the costs of investments in the market information service. When the sum of the economic costs are lower than the expected benefits, the investment is economically viable.

Only in certain cases it is possible to make a

tentative cost-benefit analysis to assign rank orders to alternative options. For example, benefits flowing from investments in infrastructure, services (information and others) or changes in rules and regulations all contribute to improved information and decision flexibility.

The cost-benefit analysis of these alternatives may or may not have common statistical problems in estimation and thus be comparable.

The true value of improved information (especially social returns) is often understated, because the value of information is determined by the outcome of the decision which it has improved; thus information cannot be valued before it has been used.

In addition, it is difficult to isolate the effects of improved access to information from other factors within the system. These effects are spread over the whole commodity subsector.

Finally, most of the benefits are cumulative over the long run and take time to become evident. This is true for all the alternative investments in this discussion. Usually, the long term pay off is not perceived, and the use of the discount rate to convert the future value into its present value is a controversial matter. The longer the period of time to which the cost-benefit analysis is applied, the less certain are the results.

Because of the uncertainties associated with the longer term pay off, the analyst is normally under pressure to focus on information pertaining to the shorter run. Thus there

must be a serious political commitment for the public sector to engage in information services that focus on the longer term. Gittinger stresses that all these undertakings have more the nature of a program and cannot be easily subdivided into component-projects to be evaluated in a formal cost-benefit analysis.

5.4 Costs and Expected Benefits from Improved Access to Market Information.

The main categories of costs of a public information service are in personnel training and salaries, media and transportation costs, the interest forgone because of the capital expenditures, and social costs. With regard to all these costs, the following points need to be emphasized:

- 1) The costs of data collection will vary depending on the type of markets that exist (whether they are private treaty, auction, or posted prices), and the estimation methods used for crop forecasting. (For details on the types of markets, see Chapter 3, and for the estimation of crops, see Chapter 4).
- 2) Costs of information dissemination may include education programs for producers which are also resource consuming. Eisgruber (1978) emphasizes the magnitude of this problem and warns against concentrating all efforts on the development of a complex system, overlooking the users' ability to take advantage of it.
- 3) The use of microcomputers may lower the costs and increase

the feasibility of timely data processing analysis, and, when the prerequisite exist, speed dissemination functions.

The evaluation study needs to concentrate on short-run expected benefits and identify the different groups of beneficiaries. For example, evident benefits in the form of reduced physical losses may result especially in the case of perishable commodities, where inadequate market information is a cause of physical waste and loss. Products may be loaded onto an already satiated market to be sold at distress prices or moved elsewhere with considerable cost or loss. On the other hand, an unnecessary shortage of supplies may force consumers to pay high prices in other locations.

The length of time necessary to observe the expected benefits from an information system is linked to the time needed for users to start using it and for the system to accumulate the effects at various levels. This process depends heavily on the characteristics of the marketing systems discussed above. The following effects could be partly attributed to better information:

- 1) Improved product planning. This would reduce seasonally erratic production and price fluctuation. Gainers would be farmers (increased income security), and consumers (reduced risk of periodic food shortages).
- 2) Improved agricultural interregional balance of supply and demand through increasing arbitrage. In particular, decreased risk may allow marketing margins to decrease, benefiting both consumers and producers. Part of the cost of these margins is for insurance against large price increases arising from

unexpected changes in the markets, so that a less risky environment will require less "insurance" (Kaynak, 1982, p.20). A more competitive market may increase the average producer price (Schubert, 1983). The knowledge that farmers can compare the prices they can receive in different locations and from different traders may influence buyers in offering fair prices with reasonable terms and conditions. Also storage/transport costs and market gluts may be reduced.

3) Improved resource use in agriculture.

4) Improved purchasing decisions. Consumers informed about supply availability, the quality and nutritional value of products can make wise purchasing decisions. Price competition at the retail level would be improved since consumers would be directed toward lower priced stores.

5) Improved government capabilities in policy design. The effective administration of farm price stabilization and support programs requires accurate estimates of forthcoming production, stocks, carry-overs and internal movements. Disaggregated data allows for efficiency analysis useful for policy-making (e.g. analysis of domestic resource costs erratic production and price fluctuation. Gainers would be analysis of marketing margins to study the economic efficiency of the system). The timeliness and geographical specificity of data are prerequisites for establishing an effective early warning system against food shortages (D'Souza and Shoham, 1985).

The chart in Figure 5.1 attempts to link together expected effects from improved access to information by the

private sector with the goals of the agricultural policy. For example, improved information would enhance farmers' bargaining power (mainly due to two reasons: better informed farmers and more competition among traders), which would involve higher producer prices and higher income and a greater incentive to produce.

These effects, at the system level, would improve the performance with respect to food security. For these results to occur, the assumptions on the last column on the right need to be true. In this example, traders are having better previous information than farmers, and the environment offers the flexibility necessary for farmers to change their decisions because of the additional information provided.

Figure 5.1

GOALS OF AGRICULTURAL POLICY	EXPECTED EFFECTS ON PARTICIPANTS IN THE FOOD SYSTEM FOR IMPROVED INFORMATION	MEASURES OF THE EFFECTS OF IMPROVED INFORMATION	MEANS OF VERIFICATION	ASSUMPTIONS
<ul style="list-style-type: none"> - increase/stabilize: <ul style="list-style-type: none"> - agricultural production - agricultural prices - rural income - urban supply - Promote technological innovation - Improve nutrition - Protect foreign currency reserves 	<ul style="list-style-type: none"> - FARMERS <ul style="list-style-type: none"> 1 strengthen bargaining power 2 improve production planning, and allocation decisions among own consumption, storage, and marketing decisions - TRADERS/PROCESSORS <ul style="list-style-type: none"> increased competition - CONSUMERS <ul style="list-style-type: none"> improved purchasing decisions - GOVERNMENT <ul style="list-style-type: none"> improved policy design 	<ul style="list-style-type: none"> 1 Users of the Information Service obtain higher prices than other farmers 2 Increased Productivity ? Stabilize rural income ? Reduced Marketing Margins ? Increased Number of traders and processors ? Reduced Retail Prices ? Agricultural marketing policies are based on reliable data - Decreased deviation of seasonal price movements from the long term price trend - Decreased deviation of daily average prices from the moving average Decrease in the difference between the regional average prices 	<ul style="list-style-type: none"> Farmers survey Marketing margins analysis Surveys Review of crop marketing policies Variation analysis on the basis of price series as compiled by the price information service Calculation on the basis of price compiled 	<ul style="list-style-type: none"> The existing information lead on the part of the traders leaves the farmers at a disadvantage Farmers have the option to change their production plans to use the information Transportation, storage and credit facilities are available Lack of reliable disaggregated data is a bottleneck in designing agr marketing policies Market information induces market-oriented timing of production/harvest or of supply availability The increase of interregional trade is not hampered by administrative measures
<p>Effects at System Level</p> <ul style="list-style-type: none"> 1 reduced seasonal/erratic price fluctuation 2 improve interregional balance of supply and demand <p>Increase in the correlation coefficient between the price series</p>				

5.5 A Pragmatic Approach to Evaluate Existing Market Information.

The effect of information does not relate only to the information supplied, but also to the extent that the improved information is actually being used. The potential usefulness of any information system can be severely limited by the lack of response by the users.

Main factors which keep the market participants from responding to the improved information are 1) physical factors such as dispersed transaction points, difficult communications and transportation, and lack of storage capacity; 2) elements common in any agricultural sector that are inevitably greater in an impoverished environment. These include asset specificity, lack of alternative employment opportunities, the nature of the commodity, and its own consumption considerations.

The evaluation study at the system level needs to be accompanied by the points of view of the groups concerned. For the purpose of assessing the existing market information (informal, private and public) and to periodically evaluate and monitor the public sector service, a pragmatic approach is advocated within a framework of the subsector.

The description- diagnosis-prescription assessment of the subsector of interest provides the researcher with a basic understanding of how the system is presently organized and operating, thus allowing the researcher to identify the

key constraints to the coordination of the subsector. (Holzman, Goetz 1985). In such a framework, iterative and cyclical hypotheses and goals are specified. As the study progresses, goals and working hypotheses may change. In assessing the need for improved information, the analyst need not overlook the whole set of constraints. Given the nature of a system, the marketing problems identified are likely to be interdependent. The difficulty is to identify the priorities for action, not only in terms of the biggest pay-off, but also in terms of social and political feasibility.

One of the tools that the analyst uses is recurrent contacts with key subsector participants. A recent study by Christy, Klein and Bonnen (1985) attempts to formalize the study of subsector participants' opinions with respect to information. The study describes the existing market information systems (informal, private and public) used by producers and processors in the potato subsector in Michigan. It seems a useful technique to be transported to developing countries (also, Schubert, 1983). The approach used by Christy and al., is an example of the scoring approach already mentioned in the section 3.2 above. In their research, the expert opinions of selected decisionmakers in the marketing channel were used as the source of suggestions about the design of improved information in terms of their specific needs. The list of types of information and price sources can be developed a priori from other studies, from economic theory, and modified via open ended personal interview questions to market participants. The scope is to investigate

what type/source of information the market participants use, what decisions they make, and what type of information is taken into consideration in the context of a particular decision. The key market participants are asked to rate the quality and type of information which support their marketing decisions by comparing specific decisions to specific sources of data. (In Appendix B two tables are reported as examples from the study in Michigan). The system's perspective of the study allows the researcher to form some criteria for deciding trade-offs among targeted groups.

VI. Conclusions and Recommendations.

Agricultural price and production data collection is already periodically undertaken in many developing countries, but in a conceptual orientation that is frequently of inadequate use for market participants in the food system. Data is too often collected for statistical, administrative and controlling purposes, and not for assisting the market decisionmakers. Also, information systems in developing countries have to struggle with several institutional performance.

The paper stresses the need for considering, among other marketing constraints, the access to agricultural information. This is a means of understanding the way the market system works.

The paper has shown that it is difficult to evaluate an information system for a variety of reasons. The evaluation is, though, the premise for taking into consideration the creation or improvement of a public information service.

The evaluation framework discussed here is based on a commodity subsector perspective. The study combines the points of view of key participants within the system (traders, farmers, extension officials, managers, etc.) with a broader system perspective in order to set priorities and targets. The advantages of this approach are:

- 1) It identifies the informational bottlenecks at any

marketing level of the commodity subsector.

2) It can be utilized to minimize the types of data collected by the information service, by closely looking at the needs of the various groups.

3) It helps to put into perspective the action on improving information versus other types of measures to improve the market performance. These could be necessary for increasing the effectiveness of the existing/ improved information system. Such additional alternative measures can be transport and market place infrastructures, storage and credit facilities.

4) It provides a tool for identifying and comparing costs and benefits of alternative investments (that can be valued in a formal cost-benefit analysis).

Having set up what types of information are important for what reasons, using the subsector approach, it is furthermore important to analyze the new system with respect to the following variables:

1) Comprehensiveness; the extent to which an agricultural information system provides data on all important aspects of the agricultural sector to support decision-making.

2) Flexibility. It is the level of responsiveness to the evolving needs of decision-makers. A good system must be responsive to the users and be able to supply the requested data without massive added resource demands.

C) Expandability. It is the extent to which an information system can adapt new technologies into the system without

excessive costs (Wigton et al., 1985).

Once the decision on the need of an agricultural information system oriented to assist private decisionmaking has been made, it should be undertaken in steps. While improving the supply of information, there is need to enhance the analytical capabilities of the users (so that the demand for information is also enhanced over time). The service should build up confidence in the users by providing consistent, accurate and relevant information. In the long run the objective should be to create a local capable institutional basis concerned with the quality and scope of the agricultural statistics.

Appendix A

Some Lessons on Market Information Services in Developing Countries.

The selected case studies represent countries in different stages of agricultural development. Even if agricultural development is not a mechanical process, the experience in one country may be useful to another country.

It is important to note that the case studies only include fruits and vegetables, and the characteristics of the commodity determine a great deal to how it is marketed and the information requirement. When enough information is known about particular case, the discussion is categorized into the following headings: structural and organizational characteristics of the markets, methodology and media, and results and problems.

The cases of Korea, Brazil and Indonesia are successful ones, while the experiences of India, Tanzania and Peru give the opportunity to discuss some typical problems with the implementation of public market information services.

KOREA.

The Market Organization.

In Korea, market information is directed at the trade as a tool of better day-to-day distribution of the produce. Market information is managed by the producers' cooperatives which handle 10% of marketable surplus of grains, 25% of fruits, and 15% of vegetables. The Marketing Department of the National Agricultural Cooperative Federation (NACF) coordinates the cooperative marketing system. It supervises the main wholesale facilities such as wholesale centers, warehouses, assembly and retailing facilities. Cooperatives invest a relatively large share of total annual expenditures on communications.

Methodology and Media

The NACF information system collects every day, through telex or phone, information on the quantity of marketable surplus, the shipped-in quantities, market turnover, farm level prices and wholesale prices. This information is compiled daily by region, market level and commodity and disseminated to users including farmers, consumers, cooperatives and researchers through radio, automatic telephone answering devices, telex and various publications. The communication hardware located at the various cooperative centers is extensively used to regulate the volume and direction of produce according to the prevailing supply and demand situation. The NACF has also introduced a program of standardization of farm products by quality, size and package.

Results

It looks like this impressive system works very well but the author has not seen any complete evaluation study.

INDONESIA

The Market organization and the Information Service.

The agricultural marketing system relies on private trade. The government does not establish regulations of markets, nor does it have any control on the weights used by the traders and on sanitary and hygienic conditions. There does not appear to be much emphasis on infrastructural development but on consistent effort in the field of information services. Since 1979 the National Agricultural Market Information Service has developed an impressive market information network with the support of the German Agency for Technical Cooperation (GTZ). The underlying philosophy is that market innovations can be realized only after a deep understanding of the existent conditions. Preliminary surveys were conducted for getting information about different produce, their sources and supply distribution points, their traditional channels of marketing, commonly accepted grades and standards. Great care was paid to the logistics of the service, the correct timings for the collection of data, how it could be conveyed, and the time

and manner in which it could be disseminated. To guarantee the reliability of data the following measures were adopted:

- Intensive training of the data collectors,
- Permanent intensive control on data collection by specially appointed data controllers and by the project management,
- Cross-checking of all data before publication,
- Frequent consultation with farmers and traders on quality of data.

Methodology and Media.

A step-by-step approach has been used, starting from pilot projects for a limited number of commodities, and extending the activity to other areas and produce. In 1981 prices were collected at the wholesale markets in Jakarta and in three producing areas for 15 vegetables. The program targeted the farmers and their need for information.

Microcomputers are being used to store, check, analyze and process the information. Elaborations of seasonal, cyclical, weekly, monthly and secular trends for different products have been provided to make farmers conscious of the price they can get in relation to the price the traders/consumers pay. Telephones, telex, bulletins and radio broadcasts are the dissemination media more used.

Results

A high percentage of users has been identified.

Periodical surveys among the users reveal that 1) users obtained significantly higher prices than the non-users, and 2) farmers need to be brought to understand information, at this scope special care must be put in analyzing the price data for this audience. A significant feed-back from users was established. A group of farmers had useful suggestions on how to improve the information service.

BRAZIL.

The Market Organization.

In Brazil a national-wide market information service is organized by the Systema Nacional de Centrais de Abastecimento (SINAC). It includes services at national, wholesale and producers levels. Since 1976 great effort has been put into making comparable reports from all the markets in the country. Rigid discipline as to the consistency of the data and time schedule is the formula that makes the service successful.

1) - Information Service at National Level

At the national level, monthly information is provided on market prices, quantities marketed, past trends, produce flows for origins and destinations. Also short-run forecasts and planning advice are provided for the seven most important commodities representing 60% of the vegetable

market.

Methodology.

The market information system includes 33 wholesale markets, 21 rural producer markets, and more than 100 retail markets. A rigid time schedule is applied for the routine procedures, and a central team of officers is responsible for the service, each person in charge of two products. The final report is approved by an editing council of experienced officials, then distributed to all markets, government offices and organizations.

2) - Information Service at Wholesale Level.

The information service gains its information from wholesale centers and producers' markets. Each wholesale market is responsible for the producer markets within its state, for collecting as well as disseminating data to other wholesalers and back to the producer markets. Every wholesale market receives information from the three major wholesale markets in the country (Sao Paulo, Rio de Janeiro and Belo Horizonte), from the same region, and from the major markets for the major commodities of interest. (Individual traders may use the available telex to collect additional information by paying a fee).

Methodology

Emphasis is put on supply information to guide traders in their arbitrage decisions and orientate producer market flows. Information on daily carry-over stocks are provided.

Results.

The service of comparing daily quantity and prices movements has proved to be very useful in improving producing planning. As far as market reporters are concerned, the use of officials with the Servico de Informacoes de Mercado Agricola (SIMA) has caused problems. It is evident that fully integrated personnel with marketing and trading experience are much more suited for this kind of task, since they understand the relevant information to the trade. In the case of inexperienced market reporters, constant vigilance is required to avoid trading circles to manipulate information. Regular meetings with the trading community have been proved to be useful in assessing the performance of the system and in receiving feedback.

3) - Information Service at Producer Market Level

Only since 1982 has SINAC initiated a development program for producer markets. A component of the program, which included the construction of rural markets in distant producer centers, is the information

network for vegetables. Rural markets have been constructed in distant production centers. The objective is to enable the producers to negotiate on an equal information basis with the buyers, where before the producers were dependent on traders' information.

Methodology.

The information includes data on all the types of products offered at the rural markets as well as from the relative wholesale market. The information provided includes product variety, quality standard, type of package, orientation about quantity demand, information on market trends, prices (the lowest, the highest and the most common price), commercial contact possibilities. Different communication arrangements are taken depending on local situations. The information network is supervised by the nearest wholesale market. In general the supervising wholesale market is in charge of gathering information on the relevant products from all the wholesale market outlets in the country and communicating it to the producer markets.

Results.

An initial negative attitude by the trading community was noticed. This contributed to the market officers taking more care to disseminate data correctly. This also brought the decision to include data of interest to

traders such as quantities demanded and supply positions (stocks) at the markets.

A producer education program was implemented which explained how to use the information by accounting for transportation costs, trading margins, and taxes. Satisfactory results in terms of improved producers' bargaining skills was noticed.

In many cases, the service allocated the functions of data collection and dissemination to operational market personnel instead of to SIMA officials, since they found it difficult to understand the commercial transactions and get used to the collection of data at odd hours in the night or in the morning without lengthy bureaucratic procedures. It was found that the information management needs to closely monitor every function. Continuous orientation and education are required in order to maintain the standards and performance of the service. New managements need to receive a proper briefing about the importance of each routine service. It was evident that the permanent fixed costs of market information activities made it important to monitor such activities. The fact that the returns were difficult to measure made it important for the service to rely on the support of the interested groups for securing its continuation. Also market information provided basis for negotiations outside the markets throughout the production zone. Prices between wholesale and producer markets became highly correlated. Producers became accustomed to asking for information and complaining for missing

information, thus assuming a control function of the service.

INDIA.

The information service at the large market Azdpur in Delhi is still in the early development stage, but constitutes a valuable pioneering work. The service was initiated by setting up the data collection. The first step was to undertake a survey of every commodity coming into the market and assess the seasonality, origin, varieties and packaging. The result of the survey was to record the criteria used by the trade for the commodity quality. The second step was to compile the enumerator manual, codifying the methodology to follow and the time schedule. It was evident that the supervising procedure at this stage was very important. Main problems encountered were relative to the quality and reliability of media in the dissemination phase. The major obstacles still to be overcome are 1) the lack of financial and human resources commitment by the market committees (also the lack of recognizing that the market management of a large city needs to have great flexibility and highly professional commitment) and 2) the lack of expansion of the market information units into an integrated national network.

TANZANIA.

In 1971 a market information service was initiated.

The objective was to inform producers and consumers about the supply availability and demand of the commodities. The unit was formed of one FAO expert, four Tanzanian professionals and twenty regional reporters. The service failed to achieve the desired results for the following reasons:

- lack of transport and undependable postal service which made information unreliable and out of date.
- lack of collaboration with traders who associated the market reporters' function of gathering information with government control.
- lack of weighing facilities in the trading places which made it difficult to ascertain the proper unit price.

PERU.

The market information service in Peru was evaluated in 1969, was said to be ineffective for the following reasons:

- The informal system of disseminating information was felt adequate by the farmers and middlemen. Only the large farmers were interested in the service.
- The information was often wrongly interpreted. A large part of the users did not fully understand the information disseminated. Too many products and areas not related to the local market were included. It was found that in many cases it would have been better to disseminate concise information about the market trends instead of daily news.

Appendix B: Examples for the users' pragmatic approach.

Table 4.3 Usefulness of Sources of Price Information in Potato Producers Decision Making.

Sources of Price Data	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total No. 1/
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
Radio & T.V.									
Newspaper									
Magazines									
University Publications									
State & Federal Gov't. Publ. Industry									
Newsletters									
Bankers & Lending Institutions									
Retail Stores									
Potato brokers, dealers, shippers, etc.									
Processors and Agents									
Cooperatives and Farmer Organization									
Neighbors									

Source: Christy, R.D., Klein, M.L. and Bonnen, J.T. (1984) The use of prices and other market information in the Michigan potato industry. Agricultural Economics Report N.461, Michigan State University.

Table 4.5. Usefulness of Price Data for Specific Producers' Decisions by All Respondents.

Decisions	Very Useful		Moderately Useful		Rarely Useful		Not Useful		Total ¹
	No.	Per-cent	No.	Per-cent	No.	Per-cent	No.	Per-cent	
To Plant or Not to Plant Potatoes									
Number of Acres to Plant									
Variety of Potatoes to Plant									
When to Sell Potatoes (timing of Sales)									
To Bargain for Pre-season Contract									
To Join Other Producer in Selling & Mktg The Market in Which to Sell Potatoes									
Geographical Area in Which to sell Potatoes									
Size & Type of Container to Use									
To Whom to Sell Potatoes									

Source: idem

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