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Getting Marketing into Farming Systems Research: A Case Study from Western Sudan

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Marketing is arguably the most neglected issue in farming systems research (FSR). While leading proponents of FSR frequently cite marketing as an important consideration (Collinson 1982; Gilbert et.al. 1980), none has attempted to explain in detail how the study of farmer marketing opportunities and constraints would actually contribute to specific FSR activities such as defining recommendation domains or improving the interpretation of on-farm agronomic trials[1]. Marketing does receive some attention in discussions of the diagnostic survey, or sondeo[2]. In this initial field reconnaissance and discovery phase of FSR, observation of local markets is necessary to make note of the availability of purchased inputs and to determine the farm products that are sold rather than consumed by the household. Useful as the checklist of "marketing factors affecting small farmers" (Shaner et.al. 1981:259-61) is for guiding interviews with farmers, agricultural extension agents, and local officials during a sondeo, it doesn't propose how specific marketing data should be collected and integrated into the later stages of FSR. I believe that there are two related reasons why no progress has been made to explicitly incorporate marketing analysis in FSR. The first is the overwhelming concern of FSR with alleviating biological constraints by the design, testing and recommendation to farmers of improved technologies. The second is a disciplinary bias which views marketing as an issue that is "exogenous" to the farm household and of concern largely in macro-level analyses that are carried out to inform policy-makers. Recent developments in the wake of the "Green Revolution" call into question the wisdom of these biases.

The contribution that economic anthropologists can make to FSR methodology lies in their emphasis on direct observation and behavioral analysis of marketing systems (Beals 1975;

Cancian 1972:77-95; Plattner 1983). To fully realize this, they must be familiar with the strengths of the macro-level analysis that agricultural economists do so well (e.g. Jones 1976; Mellor et.al 1968; Schmidt 1982; Southworth et.al. 1979). But, their particular contributions will lie not in the application of powerful, highly abstract theoretical models to the aggregate statistics of price movements and commodity flows[3]. Rather it will lie in concrete behavioral observations of farmer strategies for adapting to macro-level market conditions and the influence of this adaptation on farm management and the adoption of new technology. This means that the concept of farmer adaptive strategies (Bennett 1969, 1976; Barlett 1980), which has often been applied to farm production may also be applied to farmer participation in marketing. To illustrate how a behavioral study of farmer marketing strategies may contribute to biotechnical research of the sort that is advocated in FSR, I use the example of the well-known CIMMYT[4] method of economic analysis for agronomic research (Perrin et.al. 1976; Harrington 1982; Shaner et.al. 1981:125-38).

The objectives of the remainder of the paper are: (a) to explain the partial-budget analysis procedure advocated by CIMMYT (b) to critique the procedure by referring to a case study of farmer marketing strategies in Western Sudan, and (c) to draw conclusions about how a micro-level study of farmer marketing behavior can contribute to the CIMMYT procedure and to FSR in general.

Partial-Budget Analysis of Agronomic Trials

The partial-budget analysis that has been worked out by CIMMYT economists is designed to help agronomists select among alternative technologies, or treatments, the one that is most likely to be acceptable to a homogeneous category of farmers. Several assumptions are made: First, that the FSR team can distinguish a target group of farmers within an agro-climatic zone whose farms are similar and who have a similar form of management. Second, that having delineated this group of relatively homogeneous farmers, called a "recommendation domain" in FSR terminology (cf. Shaner et. al. 1982:215), it will be possible to conduct experiments under conditions representative of their farms. Normally, this requires the testing of new techniques and inputs on farmers' fields replicating their management capabilities and labor resources. Third, that alternative treatments used in the trials are not so complex and interactive that the effects cannot be

measured with considerable accuracy. Fourth, that farmers think in terms of "net benefits" as they make farm decisions. This means that in evaluating a new technique or input the farmer will base his conclusion on weighing what he expects to gain from adopting the innovation against what he will have to give up. Finally, that the farmer's gains and costs, and by subtracting costs from gains, his net benefit, have money prices which can be estimated with sufficient accuracy to make the methodology worthwhile. When the actual local price of a farm input or product is known, that amount may be used to quantify the costs or gain. If the farmer's costs or gain cannot be measured directly (as in the case of family labor or food crops that are grown for family consumption rather than for sale), the concept of opportunity cost is employed to estimate a price for the input or product, since no money price is actually given up or received.

The CIMMYT methodology which is based on these assumptions is a form of marginal analysis referred to as partial budget analysis. It is designed to show, not profit or loss to the farm as a whole, but the net increase or decrease in farm income resulting from the proposed changes in techniques and inputs. Consequently, it involves only the gains and costs that vary with the treatments being compared. The objective of the analytical procedures is to derive recommendations from agronomic experiments that meet the requirements of maximizing net benefits to the farmer while avoiding the risk of unacceptable loss. An outline of the procedures is shown in the below:

Outline of procedures in Partial Budget Analysis

1. Calculate the average net benefits for each treatment.
   1.1. Estimate the benefits for each treatment.
      1.1.1. Calculate average yields for each treatment using customary agronomic procedures. Adjust yields first for differences between experimental management levels and farmer management levels. Then adjust for normal harvest and storage losses.
      1.1.2. Estimate the field price of the crop. This will be the local farmer market price less costs of harvesting, shelling/threshing, storage, and transportation from the field to the point of sale.
      1.1.3. Multiply field price times adjusted average yield for each product from the crop and sum to obtain gross field benefit for each treatment.

1.2. Estimate variable costs for each treatment.

1.2.1. Identify the variable inputs: those items which are affected by the choice of treatment. Estimate the quantity of each of these inputs used for each treatment.

1.2.2. Estimate the field price of each input. Normally this will be retail price plus transportation costs for purchased input. Field price of family labor will be an opportunity cost.

1.2.3. Multiply the field price of each input by the quantity and sum over inputs to obtain the variable cost for each treatment.

1.3. Subtract variable costs from gross field benefit to obtain the net benefit for each treatment.

2. Choose a recommended treatment using marginal analysis.

2.1. Array treatments from high to low in net returns. Eliminate dominated treatments. Calculate the rate of return to each treatment in capital. Graph the net returns curve if several treatments are involved[5].

2.2. Select as the recommendation the treatment which offers the highest net benefit and a marginal rate of return of at least 40% on the last increment of capital.

3. Check the suitability of the recommendation from the point of view of yield and price variability. The purpose of these additional analyses is to determine if the recommendation meets farmer standards for risk aversion.

3.1. Use minimum return analysis to compare the minimum returns from the selected treatment to those from all other treatments. If it compares unfavorably, a different recommendation may be more consistent with local farmer circumstances.

3.2. Use sensitivity analysis[6] to determine whether the choice of recommendation is sensitive to product or input prices which are particularly subject to estimation error. If the recommendation is sensitive to these changes, consider changing the recommendations or obtaining more information about the prices in question.

The contribution which an anthropologist could make to this sort of analysis is in the estimation of field prices and variable costs which accurately reflect the circumstances of different categories of farmers. My point is that farmer access to input and product markets can vary even when farming operations are homogeneous. One group of farmers may be relatively free to purchase or sell in the channel of their choosing and have partial control over their costs and the benefits received; other farmers may be constrained by their

circumstances to choose less desirable options and consequently have less control. The prices found in the different market channels are linked with different farmer opportunities that may result in significantly different net benefits to the separate categories of farmers involved. To give substance to this argument I will review the circumstances of small farmers in the el-Obeid area of the Western Sudan[7].

Farmers and Marketing in the Western Sudan

Farming in the el-Obeid area is small-scale, family based, and commercialized to a considerable degree. Over 90% of the families produce food crops for sale and purchase much of the food that they eat. The rural population is dispersed in nucleated villages that vary in size from five or six households to 1,000 or more. Village population fluctuates seasonally. It is greatest during the rainy months when the crops are grown and least during the hot, dry season. The average household is composed of seven or eight members. Nuclear family residence, extended families, and other household arrangements are all common. Whereas the household is the basic unit of consumption (all members "eat from one pot"), agricultural production is typically managed by more than one decision-maker in the household. A typical pattern is for the husband and wife to manage separate farms. Unmarried sons and daughters who are old enough are also given land to cultivate and manage, when it is available. In addition to farming, virtually every household has members who work in off-farm occupations, which usually start after the harvest. The household head cultivates an average of 10 hectares, but the range of farm size is very great, from less than 2 to 30 hectares. While the outright sale of land is rare, one third of all cultivated lands are rented rather than owned by the farm operator. Most of the rented land is leased by better off farmers from farmers who are poorer than average. Labor is a key constraint. Therefore, farmers lacking the working capital to hire sufficient labor to cultivate all their arable land may still gain an income from the unutilized land by leasing it to someone else. The major field crops are sesame, millet, sorghum, groundnut, and roselle. Millet and sorghum are grown for household consumption, but surpluses are sold to other households and local middlemen. Millet grain is the preferred cereal staple of the rural diet, and the stalks of millet are used as a building material. Sorghum is frequently interplanted with sesame to stabilize the soil against wind storms. Sorghum grain like millet is used to

make porridge; it is also used to brew into beer. Sorghum stover is a fodder. Sorghum is not nearly as important as millet in terms of the area devoted to its production or its role in the rural diet. Sesame is the principal market crop. About half of the cultivated area of most farms is planted in sesame. Most of it is sold to middlemen at various regional markets and is destined for processing into cooking oil that is consumed by the urban populations. Market prices of sesame tend to follow a predictable pattern. The market for groundnut, on the other hand, is quite unpredictable due to the volatility of the export market. groundnut planting varies with the previous year's market demand and farmer expectations of the current year's market. In the 1980-81 season, about 10 percent of the cultivated land was planted in groundnut after the previous season had established record high prices. Roselle is another crop whose cultivation is subject to volatile export prices. It is frequently intercropped with sesame and sorghum and is the least important of the major field crops.

The cropping cycle starts in April or earlier with land clearing. The field crops are planted between May and August. The uncertainty of rain leads to a strategy of phased planting of the crops and replanting patches where the crops fail to germinate. Farmers with more than 20 hectares to cultivate commonly hire labor for some operations. Laborers are compensated by cash wages that are negotiated between the farm manager and the laborer. The demand for labor varies unpredictably according to such factors as rainfall and rate of weed growth. Furthermore, the supply of free labor varies from village to village, again according to the sporadic distribution of rainfall as well as demographic factors, particularly the concentration of population in the vicinity of the village. The variation in wage rates between villages for a season and within the same village at different times in the same season can be substantial (Table 6.1). Moreover, whereas farmers with working capital can purchase labor for multiple weedings of their crops, farmers lacking the cash to purchase food for the family may neglect adequate weedings on their own fields in order to work on someone else's field and receive a wage. After the vagaries of climate, labor is the most important constraint on the cropping system. The cost of sustaining the household work force and of hiring additional laborers is the largest input expenditure. Capital investment by comparison is almost negligible since all agricultural operations are performed entirely with hand tools which are purchased at a modest cost from local suppliers and have a long use-life. The use of pesticides, particularly for groundnut, is beginning to come into practice; but as yet only a few farmers do this.

Generally speaking, farm management practices are homogeneous among all farmers in the region because of the hand-tool technology employed by all.

Transporting crops from the field to the village and after that to rural markets is accomplished by pack animals. A farmer who does not own a donkey to carry his crop can borrow (or rent) one from a neighbor. Transporting of crops from the villages to the central urban market at el-Obeid is accomplished by truck. A shortage of motor transport was not found in any of the villages studied. Villages which did not have a truck operated by one of their own inhabitants depended on regular visits from a transporter coming from a neighboring village. At the height of the marketing season, a village is usually visited by several trucks competing for business. Since crop marketing occurs in the dry season, the flooding of roads and tracks is not a problem. Long-term storage is also not a problem in this arid area because the highly reliable technique of pit storage is used.

Table 6.1
Wages* Paid for First Weeding of Millet (by area unit).

Village Name	Wage Rate	Village Name	Wage Rate
Umm Sot	5.000 - 10.000	Kazgeil	8.000
el-Kharta	5.000 - 15.000	Umm Arada	6.000 - 10.000
Demokia	3.000 - 15.000	Kaba	2.000 - 6.000
Umm Kuka	6.000 - 10.000	Umm Ramad	3.000 - 12.000
el-Hammadiya	6.000 - 12.000	Abu Haraz	10.000
el-Geifil	5.000 - 10.000	Wardass	10.000 - 14.000
el-Filia	4.000 - 10.000	Umm Sabagha	5.000 - 6.000
Burbur	7.000 - 10.000	Ayara	5.000 - 10.000
Bangedid	6.000 - 7.000	Bagbage	3.000 - 5.000

* Wages in Sudanese pounds. 1981 (1.000 L.S. = $ 0.90 US at official rate). All figures referring to Sudanese pounds are written with Sudanese notation, with a period rather than a comma marking the thousands column. The exchange rate noted above shows one thousand Sudanese pounds equivalent to 90 US cents.

The pervasiveness of the market in the lives of the farming peoples in the el-Obeid area can be gauged by the ubiquitous institution of the village shop. Local shopkeepers are responsible for the day-to-day provisioning of the farm household. Rarely are these individuals local monopolists. Shopkeepers depend on maintaining the goodwill of a clientele so

that subtle forms of competition develop among them. In the larger villages the large number of shops leads to the development of periodic markets, which are usually associated with government-sponsored crop auctions that are open to all producers selling in lots of one sack or more. (Small farmers wanting to sell in smaller quantities may combine their separate marketings to make up an acceptable lot.)

A large wholesale crop auction is administered by government officials at el-Obeid. This market is for bulk sales so that in order to sell there small producers have to pool their products. Typically, the pooling is accomplished by villagers going together to hire a truck to haul a full load to the urban market. The auction market at el-Obeid was found to be the bellweather market for crop prices throughout the region. The prices posted at this market are usually lowest in the immediate post-harvest season (November), climb steadily through mid-season (January), and gradually decline after that. Both farmers and middlemen recognize this pattern as a recurring one. It has resulted in the characteristic marketing strategy which is elaborated below: farmers endeavor to hold the bulk of their crops off the market during the early part of the marketing season in order to take advantage of the rise in prices.

The rural and urban crop auctions are the formally instituted, official marketing channels. One purpose of the auctions is to permit the assessment and collection of taxes on the sale of the crops. This is a major revenue source for rural government. But there are other, informal channels which are important alternatives for farmers. Often, sale in these channels evades taxation; thus, they are officially frowned upon although the government lacks the police resources to prevent farmers and middlemen from taking advantage of them. These other channels include direct sales to el-Obeid merchants, sales to rural agents of the urban merchants, and sales to middlemen based in the farmer's own village. The latter are usually the owner-operators of shops and their crop-buying activities are part of the complex relationship these village merchants have with farm families. I turn now to an examination of that relationship.

The village shopkeeper has been maligned in many countries of Africa as a monopolist and exploiter of the rural population (Lele 1979), but at least one study in the Sudan argues that the farmer and the shopkeeper both benefit from their relationship (Wilmington 1955). An important step toward understanding the significance of marketing for the farming system in el-Obeid area is to comprehend how exchanges between farm families and village shopkeepers satisfy the

consumption wants of the farm household. With more than half of the cultivated land producing crops for sale, the farm household is compelled to buy most of its food from local shopkeepers. Purchases are made daily or every few days, with the daily food bill ranging between 1.500 to 2.500 L.S.[8] for most families[9]. Thus, a central preoccupation of the household is to have money income to purchase food according to the daily requirements. A principal means to obtain the money income is from the sale of crops. But to sell immediately after the harvest entails a disadvantage because the prices are lower at that time than later in the marketing season. Farmers attempt to hold back as much of the crop as they can until the prices have increased. Still, they must have food, and money or a substitute for money is needed to buy it. This is where a major economic role of the village shopkeepers is engaged. Most shopkeepers will accept crops as payment for purchases of goods at the shop. The farmer adapts to this circumstance by selling only small amounts of crops to satisfy the immediate consumption needs, retaining the bulk for sale at a higher price.

Starting about midway through the dry season (February) and continuing until the time of the next year's harvest, farm families are confronted by another cash flow problem. Poor families and those with bad harvests run short in their stocks of crops to obtain a continuing money income or to exchange in kind for food. To some extent the money shortage is relieved by selling labor or taking up a seasonal trade. Nevertheless, many families experience a cash flow squeeze because household expenditures increase during the dry season as water becomes increasingly scarce and costly. As the cropping season begins with the onset of the rains, water is no longer expensive but now commercial sorghum, the mainstay of the diet when the millet stocks are exhausted, increases in price (100% in recent years) and there are the additional costs of farm inputs, particularly labor and sometimes seed. Again it is the village shopkeeper who provides a service that alleviates the strain. Goods from the shop are sold to farm families on credit. This is virtually a universal role of shopkeepers. Credit sales usually entail a promise by the purchaser to pay directly after the harvest in cash or in an amount of crops that has an equivalent money price. In the some instances the shopkeeper may put a service charge of 5-10% on the goods purchased. But according to farmers there is no extra charge in most cases if the customer is a relative or a close friend of the shopkeeper. Shopkeepers explain that credit sales allow them to move inventory at a season of the year when money is scarce. Offering credit is an important strategy for keeping a clientele,

and foregoing the service fee amounts to a business promotion. When a credit balance is paid in crops the shopkeeper may gain, however; if the debt is paid early in the marketing season, the shopkeeper may store the crop for several months and receive a 20% increase in price.

While the cash flow problems of farmers are commonplace so that the relationship between shopkeepers and farm households just described obtains in a majority of the cases, it is not true that every farm family is hampered by a perpetual cycle of indebtedness. A sizeable minority of the farmers are able to avoid the cycle, and this has consequences that are seen in the different marketing strategies characteristic of indebted and debt-free farmers. The debt-free farmers have assets which can be liquidated when cash is required to meet household needs. Livestock are a major form of asset, and the larger crop producers regularly purchase animals with the surplus gained from crop sales. Owning a business is another form of asset. Over 90 percent of the shopkeepers were farmers. For them, shopkeeping is fundamentally an investment made by a successful farmer as a hedge against crop failure and agricultural market instability.

The general picture of the crop marketing system is that agricultural products move from the smaller villages to rural bulking centers and then to wholesalers, processors, and exporters in el-Obeid. The system appears to have a "dendritic structure" (Smith 1976) which would suggest that rural marketing centers are linked in highly stratified networks that sharply constrain the opportunities of all producers to market crops. Our study of crop marketing that used a sample of 166 farmers does not fully confirm this, however. It shows instead that a minority of farmers have greater flexibility in their marketing strategy than others. In comparing farmer access to channels it was found that larger producers are more likely to sell in only one channel while smaller producers sell in more than one channel (Table 6.2). This does not mean that the large producers have a more restricted opportunity. The opposite is the case. Field interviews determined the reason for this pattern is that smaller producers must opt for a diversified marketing strategy if they wish to maximize their returns. They have to sell small amounts of crops to local middlemen to purchase food while attempting to reserve the balance for later sale in a higher-return channel. Larger producers do not experience the cash flow constraint and are able to market all their crops in a single channel that brings the highest returns. They are also likely to store their crops until the prices are at the highest level expected for the season.

The patterns of marketing strategy become clearer if we

examine crop sales in the five channels (Table 6.3):

Urban Crop Auction: Twenty-three percent of the farmer sales transactions were at the crop auction in el-Obeid. Nearly half of all the producers' crops (by weight) are sold in this manner. On average, farmers market the largest quantity of crops in this channel (16 kantars) and earn the highest return of any legal marketing option (89-95%). The buyers in this channel are big merchants, warehousers, processors, and export agents who are licensed to bid in the auction. Taxes are assessed by the weight and auction price and are included in the sale price which the buyer pays. The producer pays for transportation and a 2% commission charged by the market agent who takes care of the crops during the weighing and auctioning procedures.

Table 6.2
Farmers' Mean Production (in mids*) of All Crops by Access to Channels.

Channel Access	N	Mean Production	Std. Error	Level of Significance**
only one	95	703.4	72.1	
more than one	59	243.4	31.7	0.001

* The "mid" is a Sudanese unit of volume equivalent to 4.125 liters.
** Student's t test for the difference of means.

Rural Crop Auction: Nineteen percent of producer sales transactions were in this channel, but the quantity sold amounted to only 7% of the total. This channel also had the lowest average quantity sold (2.2 kantars). Sales in the rural crop auction market are made to local village middlemen and occasionally to outside agents entering the market to compete with them. This channel appears to be the least important marketing alternative as far as the farmers are concerned. Generally speaking, farmers sell crops at the rural auction market when they intend to purchase expensive goods, such as livestock or clothing, at the periodic village market.

Table 6.3
Marketing Crops by Channel

	Channel				
	Urban Auction	Rural Auction	Shop Keeper	Agent	Urban Merchant
Proportion of farmer sales transactions	23%	19%	41%	9%	9%
Proportion of all crops (by weight)	43%	7%	29%	12%	10%
Average total quantity sold per farmer*	16.0	3.2	6.0	11.6	8.9
Estimated average return to the farmer by crop**					
sesame	95%	92%	88%	95%	98%***
groundnuts	89%	87%	75%	89%	91%***
roselle	97%	90%	83%	97%	97%***

* Expressed in "kantars". One kantar equals approximately 45 kg.
** The estimated percentage of the median daily price of crops at el-Obeid market which farmers may expect to receive by selling in each channel; these estimates are based on an informal survey of farmers, village merchants, and market clerks.
*** These estimates include a bonus which the urban merchant pays to the producer for conveying untaxed crops.

Village Shopkeeper: The highest proportion of crop sales transactions were in this channel (41%). The proportion of the total quantity of crops sold in this channel (29%) is second only to the urban crop auction. These results are consonant with the analysis above concerning the symbiotic relationship between farm households and shopkeepers. The returns to the farmer in this channel (83-88%) are the lowest of all five channels and this also explains why the average quantity sold is also rather low (6 kantars). Farmers said they would rather not market in this channel because of the low return, but it was convenient and sometimes necessary to do so when purchasing goods from a

shop or paying off a debt. Unless the village shopkeeper reports these sales to a market clerk or sells the products at a crop auction, the crops sold in this channel are likely to escape taxation. However, survey results showed that, according to the shopkeepers' own reports, eighty-four percent of the crops sold were in a legal channel.

Agent: Nine percent of the producer sales transactions were made with rural agents working for the urban merchants, and this amounted to 12% of the crops by weight. Sales to agents brought producers the second highest returns (95-97%) and this is reflected in the high average quantity of crops sold (11.6 kantars). Direct sales by farmers to agents occur most frequently in the latter half of the marketing season (January through May), when farmers are opening storage pits and selling crops to pay for land clearing or to purchase commercial grain sorghum while the price is still low. This is a channel in which tax evasion occurs as a matter of course, since agents will not sell at the urban auction market unless they are apprehended by the police and compelled to do so.

Urban Merchant: Farmer sales transactions direct with the urban merchant account for 9% of all sales and 10% by weight of the crops sold. The average quantity of crops passing through this channel was 8.9 kantars while the estimated return to the producer was 91-98%, a little higher than selling to the rural agent. Marketing does not occur more often in this channel because of the risks to an independent transporter when hauling untaxed crops. Another reason that truck drivers mentioned was that lines of trucks back up in front of the merchant's warehouse. To avoid having the truck tied up for hours, the driver may go instead to the urban auction market where the load can be left with the commissioned market agent. The truck is then free to haul another load.

These data show that marketing alternatives are clearly available to producers. Forty-one percent of all sales transactions and 65% of all crops by weight were marketed in the higher-return channels (Urban Auction, Agent and Urban Market). The Rural Crops Auction and the Shopkeepers on the other hand — making up 60% of all sales transactions and 36 percent of all crops by weight — are relatively low return channels but they have a different function than the high-return channels. Transactions at local markets or with village shopkeepers occur in relatively small quantities when the strategy is to satisfy immediate consumption wants.

In their discussion of farmer access to markets Norman et.al. (1982:106-8) identify the proximity of developed markets and availability of transportation as major considerations in northern Nigeria. In the el-Obeid area, by contrast, transport

services and market development did not pose very significant constraints. Student's t-tests for the differences in the mean quantities of crops sold between villages with a high level of institutional development (including the availability of transportation) and those with a low level of development reveals a significant difference in only the agent and urban merchant channels (Table 6.4). In developed villages there is a significantly higher average quantity of all crops sold to agents than in undeveloped villages. This finding is reversed in the case of sales directly to urban merchants. Since nearly the same proportion of sales transactions and quantities of crops sold occur with agents and urban merchants (Table 6.3), we may conclude that the farmers in the developed villages are more likely to sell to agents while in undeveloped villages the farmers are more likely to sell to urban merchants directly. This finding seems paradoxical. With their greater access to transportation farmers in the developed villages could be hypothesized to have greater opportunity to smuggle their crops directly rather than sell to an intermediary. But two circumstances discourage this pattern occurring. First, detection of smuggling is a greater risk in large developed villages where there are police officers and market officials charged with being on the lookout for smugglers. The risk of detection is less in undeveloped villages. Second, the agents in the developed villages are heavily capitalized compared to ordinary village shopkeepers who buy crops in exchange for goods. These agents have their own trucks and are practiced in smuggling and evading detection. The agent relies on the margin of profit that is gained from smuggling to offer farmers a relatively high price. In this perspective, agents and urban merchants seem to be alternative channels that are found in villages with different levels of commercial development.

The level of farm production, on the other hand, is a very significant indicator of farmer marketing strategies. The mean total production of the farmers selling in each channel was compared using a one-way analysis of variance (Table 6.5). A significant difference was found between mean production of farmers selling to the urban market and to village shopkeepers. This finding supports the analysis above concerning the relationship between cash flow and marketing strategy. Large producers are owners of non-crop assets such as livestock and business interests which provide liquidity. As a consequence they are able to market in a high return channel like that of selling to the urban market. Smaller producers facing cash flow constraints must market crops at the village shop.

Table 6.4
Mean Sales of All Crops by Marketing Channel and Village Institutional Development.

Village Environment	Channels											
	Urban Auction		Rural Auction		Shop Keeper		Agent		Urban Merchant			
	Mean Q*	N	Mean Q*	N	Mean Q*	N	Mean Q*	N	Mean Q*	N		
Developed	668	11	234	18	293	31	812	8	70	3		
Undeveloped	521	40	98	23	193	54	182	13	299	21		
Significance	N.S.		N.S.		N.S.		0.052		0.003			

* Mean Q = Mean Quantity in "kantars". One kantar equals approximately 45 kg.

Table 6.5
Farmers' Choice of Channels by Mean Production (in mids*) of All Crops.

Channel	N**	Mean
Urban Auction	51	857.5*** (Shopkeeper)
Rural Auction	41	568.1
Shopkeeper	73	487.6*** (Urban Auction)
Agent	21	974.9
Urban Merchant	24	644.0
Total	210	629.8

ANOVA F ratio = 2.794. P Less Than .0273

* The "mid" is a Sudanese unit of volume equivalent to 4.125 liters.
** The samples are based on interview with 166 farmers. A third of the farmers marketed in more than one channel resulting in double counting. Since this would tend to make the means more similar rather than more different, the conclusions drawn in the text are made stronger by including farmers marketing in more than one channel.
*** Indicates significant differences between channel means by LSD Procedure (P Less Than .05).

Implications for the Use of Partial-Budget Analysis

I now turn back to partial-budget analysis and consider what the data from the western Sudan suggests about the methodology. My comments are addressed to three procedures: (a) estimating the field price of the crops, (b) estimating the field price of inputs, and (c) the identification of a recommendation domain — a homogeneous category of farmers. All three of these procedures are critical for the success of partial-budget analysis and the last one is also essential to any kind of FSR methodology.

To review, the field price of the crop is defined by the CIMMYT economists as: sale price less harvest costs, shelling/threshing, storage and transportation from the field to the point of sale.

The data presented above on farming systems and agricultural markets in the Western Sudan show that the field price of crops varies not only with the above factors but also with the marketing strategy which farmers are able to operationalize. Marketing strategy was found to vary with cash flow constraints experienced by the farm household and the

level of total crop production. Larger producers, who do not experience a cash flow constraint, are able to reserve all their crops for sale when the prices are highest, and they are able to sell in a high-return channel. Smaller producers, experiencing chronic cash shortages, have to sell at least a portion of their crops at a disadvantageous time and in a low return channel. Moreover, the economist's practice of using average prices obtained from official market records to estimate the sale price would not reflect the prices received by most farmers in the el-Obeid area. Similarly, costs of inputs can be affected by marketing channel used. Consequently, access to beneficial prices and preferred marketing channels may be affected by farmers' economic conditions and production levels.

When accurate estimates of the field price of crops and variable inputs are not made, an accurate estimation of the net benefits of alternative treatments to farmers cannot be made, the partial-budget analysis is invalidated and doubt is cast on researcher recommendations. The result will discredit FSR and contribute to a heightening of the mutual misunderstanding and distrust that has been a dreary feature of relations between agricultural scientists and small-scale, limited resource farmers in many developing countries. In a worst case scenario, FSR in spite of its on-farm research approach could end up, like conventional agricultural research, giving the greatest assistance to those who least need it — the higher resource farmers.

This brings me to the issue of selecting recommendation domains of farmers. If FSR is to attain the goal of helping the world's poorer farmers it must be highly sensitive to all factors which differentiate farmers according to their advantages and disadvantages. The usual procedure in FSR is to differentiate recommendation domains according to production characteristics and directly related factors, such as climate, soil type, technology level, and general farm management practices. In the present paper I have tried to show that farmers who are highly similar on the bio-technical dimension may have different capabilities when it comes to product marketing and the management of cash flow to the household. This is a strong reason for including a behavioral analysis of farming marketing strategies in the delineation of recommendation domains. In the el-Obeid area, for example, I would make a distinction between larger producers, who market crops in high-return channels and are debt-free, and smaller producers, who market in low-return channels and are chronically indebted. Since a partial-budget analysis is pointless unless a valid recommendation has been identified, I would propose that a survey of farmer marketing behavior is an essential prerequisite to on-farm agronomic trials

and their evaluation. I would be skeptical of a proposal to undertake on-farm trials immediately after a **sondeo** (Hildebrand and Waugh 1983) without a detailed survey of farmer circumstances including marketing opportunities and constraints.

Conclusion

I have criticized the methodology of FSR for neglecting the subject of farmer marketing strategies, and I have related this shortcoming to disciplinary biases in agricultural research and development. I have proposed that this omission opens an opportunity for economic anthropologists to participate in FSR projects. The study of farmer marketing strategies requires attention to regional marketing systems, particularly the channels for product and input marketing that are available to farmers, as well as to farm-level marketing constraints associated with the level of farm production and cash flow to the household. That an anthropologist's concern with understanding farmer marketing strategies can tie together both the micro-level, technological concerns of agronomists and the macro-level, institutional concerns of agricultural economists was demonstrated with reference to the partial-budget analysis developed by the CIMMYT Economics Program.

I conclude this paper with four additional remarks about the role of economic anthropologists in FSR, especially with reference to studying farmer marketing strategies. First, my emphasis here has been on the behavioral analysis of farmer marketing activities, but I do not regard this approach to be in competition with the cognitive approach to farmer decision-making, such as Gladwin (1982) advocates. The two approaches are complementary and both will contribute to FSR methodology. Second, I would stress, as Hildebrand and Waugh (1983) have done, that FSR is multidisciplinary research that is team-oriented. Anthropology has a highly productive tradition of individual field research, but the impulse "to do your own thing" must be eschewed when participating in an FSR project. Most of what anthropologists can contribute to FSR will be in helping the traditional agricultural disciplines to better grasp the realities of limited-resource farming. Anthropologists will have to learn to accept this supportive role without resentment and without succumbing to the urge to "chuck it". We are a discipline that prides itself on being sensitive to cultural differences. It is time that we developed some sensitivity toward the limits of our own disciplinary subculture and that we become willing to communicate with the members of other

disciplinary subcultures as sympathetically as we do with the people of Bongo-Bongo. Third, anthropologists can take consolation in the fact that the task which FSR has set for itself is historical and immensely important for the welfare of much of the world population. If their role in FSR will be largely in support of the research of other disciplines, anthropologists should realize that understanding small farmers will tax all their conceptual and methodological skills. Finally, I can see nothing but benefits for the development of theory by anthropologists' participation in FSR. The issue of farmer marketing strategies alone would seem to call for the development of a new theoretical model that would integrate cultural ecology, regional analysis and political economy[10].

Notes

1. The major exception to this generalization, and it is only a partial one, is the work of Norman **et. al.** (1982). Even the marketing analysis in this study and its use of average margins for farmer sales begs the question whether variation in returns to different categories of farmers would significantly affect the economic evaluation of agronomic trials.
2. The **sondeo** is a preliminary reconnaissance of a region that is designed to discover broad characteristics of farming systems and major problems of concern to farmers. On the methodology of the **sondeo**, see Shaner **et.al.** (1982:289-93).
3. Anthropologists have been in the forefront of criticizing overly abstract and rationalistic, economic models of farmer decision-making (Barlett 1980; Cancian 1972; Ortiz 1983). For a critique of macro-economic analyses in the Sudano-Sahelian zone of West Africa see Harriss (1982).
4. Centro Internacional de Mejoramiento de Maiz y Trigo.
5. A "dominated treatment" has lower net benefits and higher variable costs than some other treatments in the experiment. Dominated treatments are eliminated from further consideration because they are clearly inferior to some other treatments. The purpose of calculating the rate of return to each increment of capital is to determine if it meets farmer minimum requirements for investment. The CIMMYT economists believe that a 40% return is generally the minimum rate that small farmers will accept (Harrington 1982:17-23).

6. Sensitivity analysis determines the effect of price variation on a treatment that is being considered for recommendation to farmers. Very simply, it entails calculating the marginal return (see above) twice, once using a high but likely price and once using a low but also likely price (Harrington 1982: 35–37).
7. The information was gathered during a 14 month study (1981–82) of small farmers and rural markets in the el-Obeid area of North Kordofan, Sudan. The study combined in-depth interviews with structured surveys in 15 villages. A close collegial relationship was secured with agricultural scientists working in the region. The project was sponsored by the International Sorghum-Millet Research Project and the Departments of Anthropology and Sociology at the University of Kentucky, with funding provided by the U.S. Agency for International Development.
8. In 1982, 1.000 L.S.=$US 1.11.
9. A survey revealed that farm families produced on the average only enough millet and sorghum grain to supply the household for about six months. For the remainder of the year commercial sorghum is purchased from local suppliers.
10. For a survey of the literature on cultural ecology that would be of interest to FSR practitioners, see Barlett (1980). Smith (1976; 1983) is a key resource for regional analysis. On the political economy perspective, see Nash (1981), Wallerstein (1979), Wolf (1982) and Worsley (1984).

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