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Consulting the stakeholders on pro-poor market segmentation of maize seed in Africa

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Abstract

Market segmentation, while popular in the pharmaceutical industry, is rarely used in agricultural technology dissemination, where beneficiary targeting is preferred. Market segmentation, while easy and cheap, tends to generate leakages, while beneficiary targeting, is typically associated with high administrative costs and distortionary effects.

To achieve a better understanding of the potential for using market segmentation to improve the adoption of agricultural technology, a consultation was organized in Kenya in May and June 2008 with stakeholders from the seed sector, NGOs, Ministry of Agriculture, agro-dealers and researchers. The consultation included individual visits to 9 stakeholders, a formal meeting with 39 stakeholders, and a formal questionnaire filled in by 18 respondents.

Results indicate that indirect identification of the poor is difficult, since poor and non-poor live in the same areas and use the same technologies.

The consultations show that several organizations in Kenya, including government agencies, non-governmental organizations, and seed companies, supply reduced-cost inputs to the poor, and they commonly use direct identification of the poor. The costs of such exercises seem to be high, but no data are available on costs or the accuracy of the identification. There seems to be no experience with tiered pricing, although stakeholders generally find it interesting.

Most stakeholders showed an interest in experimenting with pro-poor market segmentation for maize seed. The two main market segmentation strategies that are viable are direct targeting, which is likely to be expensive but with limited leakage, and tiered pricing, which is likely to be a lot cheaper but with higher leakage, and which would need a control mechanism to avoid beneficiaries coming back for a second tier. To compare the costs and the benefits of both methods, as well as of different implementation options, a pilot study is needed. The main product of such a study should be maize seed at reduced prices (between 20% and 50%), up to a given quantity per farmer, provided at a discount (between 2 and 15 kg/household). The main tool would be cash vouchers, to be distributed by an independent agency based on direct identification of the target group, or the tiered pricing system, where each farmer receives vouchers for a specified amount. The agro-dealers will redeem their vouchers at an independent financial institution.

Consulting the stakeholders on pro-poor market segmentation of maize seed in Kenya

Introduction

Sub-Saharan Africa is the only region in the world where both the number and proportion of malnourished children is increasing (Rosegrant et al., 2001). Efforts to lift the large numbers of rural poor out of poverty in the region will depend significantly on their ability to access and apply new technologies to their agricultural production practices (Barrett, 2008).

Access to these technologies will, in turn, depend on the introduction of incentive mechanisms that make private investment in breeding, distribution, and marketing systems profitable and sustainable (Naseem et al., 2006). This is particularly relevant with respect to maize, the major food crop in East and Southern Africa.

Unfortunately, while maize yields in Kenya increased in the 1960s and 1970s from 1 to 1.5 tons/ha, they have stagnated since the mid-1980s. Area under maize cultivation has also stayed constant, but population is increasingly rapidly at 2.9% annually (CBS, 2001), resulting in a capita maize production decrease of the same rate.

Both public and private breeding programs are developing new maize varieties to boost yields and output, but evidence suggests that only small amounts reach small-scale, resource-poor farmers due to weak purchasing power, limited access to markets, and other constraints. Innovative market incentives and other supporting mechanisms are needed to make new maize technologies more available to smallholders. One possibility is to distribute improved maize seed in a segmented market scheme that specifically targets smallholders.

Market segmentation schemes, especially vouchers, have been used in other fields of development. For example, vouchers have been used to provide targeted subsidies for malaria control in Tanzania (Mushi et al., 2003), and to improve access to education in Colombia (Angrist et al., 2006; Kremer, 2003). Vouchers have also been used in efforts to improve the use of agricultural inputs. Governments and NGOs such as Catholic Relief Services have implemented seed voucher programs across in Eastern and Southern

Africa, mostly as a disaster relief measure (Kelly et al., 2003; Longley, 2006). In Kenya, previous voucher schemes for agricultural inputs have included the government's National Accelerated Agricultural Inputs Access Program (NAAIAP) and projects run by NGOs such as CRS. In addition, researchers have used fertilizer vouchers to study the adoption behavior of Kenyan farmers, finding that vouchers increase uptake by farmers, even when there is no discount, because vouchers can affect the timing of farmers' decisions (Duflo, 2005). While market segmentation has been explored in the pharmaceutical industry, in agriculture it is relatively new (Lybbert, 2003).

To shed more light on the possibilities of market segmentation for maize seed, a stakeholders consultation was organized, the results of which are presented here. This paper is organized as follows. First a conceptual framework is presented, followed by the methodology of the consultation. The next section covers the results, followed by a presentation of the suggested way forward.

Conceptual framework

In its most basic form, a market segmentation scheme would need an input supplier to provide the technology to a target population, distinct from the rest of the population, with a subsidy provided by a donor (Figure 1). Assume that the input supplier is a rational profit-maximizer, and will minimize the costs of serving this target population. Further assume that a government or donor wants to subsidize the cost of a new technology for the target population for reasons of the public good, to an amount M , but does not have the ability to identify the target population. In this scenario, a third player—a facilitator—is needed to identify the poor and facilitate between the beneficiaries, distributor/supplier, and government/donor. Ideally, this would be organizations, such as NGOs or community-based organizations, which have direct access to, and detailed knowledge about, the target population.

The facilitator's role is to distinguish between poor and non-poor within the target population based on some filtering mechanism (either exogenous criteria, community-based identification, or a combination), and issue a "pass" (i.e., a coupon or voucher) that would allow the poor to purchase the new technology from supplier at some reduced price. The supplier can then redeem the voucher from the facilitator. The amount of

subsidy that reaches the poor can be calculated by multiplying the number of beneficiaries who receive the pass multiplied by the value of the subsidy component times the quantity of input purchased by the beneficiaries. The costs of the arbitrage (A_b) need to be deducted from the donor's funds (M).

In practice, however, the facilitator's filter mechanism is likely to be imperfect. Some beneficiaries might be overlooked, while people from the non-target population might be included. Moreover, some beneficiaries may choose to simply sell their inputs in a secondary market to non-beneficiaries at a higher price (Figure 4).

Given the imperfect nature of the filtering mechanism, the performance of this scenario can be assessed by several different indicators relating to coverage, leakage, and efficiency.

The *coverage* of the program can be assessed by i) the number of poor participating in the program, in absolute terms (a), or as a proportion of the target population (a/A); 2) the amount of inputs purchased by the poor through the program: $a \cdot q_a$ where q_a denotes the average amount purchased per participant; iii) the amount of inputs used by the poor, or the amount purchased minus the amount resold (average q_b) or $a \cdot (q_a - q_b)$

The *leakage* from the program can be assessed by i) the number of non-poor participants, in absolute terms (d) or as a proportion of beneficiaries ($d/(a+d)$); ii) the amount of inputs used by non-poor participants ($d \cdot q_d$) and non-participants ($a \cdot q_b$), in absolute terms, or proportionate to the total amount of inputs disbursed ($d \cdot q_d + a \cdot q_b$) / ($a \cdot q_a + d \cdot q_d$).

The *efficiency* of the program can be assessed by i) the cost of the administration (A) over the total cost: A/M ; ii) the amount of the money disbursed (M) that reaches the poor: $a \cdot s \cdot (q_a - q_b) / M$, where s is the average subsidy per unit input, or $(M - A) / M$; iii) the cost per poor farmer reached.

Methodology

To better understand the options of market segmentation for maize seed in Kenya, an preliminary study (presented elsewhere) analyzed the likely results of different scenarios on poor farmers, based on a previous survey of 1800 farmers. Further, a stakeholder consultation was organized in May and June 2008. Nine stakeholders, representatives of different sectors, were first visited individually, followed by a formal meeting, attended

by 39 stakeholders from the seed sector, NGOs, Ministry of Agriculture, agro-dealers and researchers. The meeting consisted of formal presentations, followed by round table presentations and group discussions. Participants were also asked to fill in a formal questionnaire, to which 18 responses were received, mostly from NGOs (39%) and seed companies (33%).

Results

Options for market segmentation

The poverty map of Kenya shows that the proportion of poor people is highest in the marginal areas such as the drylands and the coast, but the number of poor is much higher in the high-potential areas, because of their high population density. Three major areas with high density of poor people are the North and South of the Lake Victoria basin and the southeastern slopes of Mt. Kenya. Analysis of the farmer survey data show that poor households have only half of the land of non-poor, and produce only 400 kg of maize per year (a tenth of the non-poor). Their maize yields (0.3 tons/ha) is much lower than that of non-poor households (1.5 tons/ha). The total market for improved maize seed is estimated at 21,000 tons, with a market share for the poor of 29% (6,000 tons).

For a successful market segregation program, the poor need to be identified. Direct identification requires establishment of poverty criteria and identification through surveys, expert opinion or a community exercise. Identified identification can be realized through geographical targeting, self-selection by targeting farmers who use particular technologies (seed package size or varieties) or indirect identification through tiered pricing (each farmers can only buy a certain amount at reduced price). Simulations of different scenarios, based on district level data, showed that geographic targeting is difficult. Districts with the highest proportion of poor only grow a limited amount of maize, while districts with higher numbers of poor grow much more maize, but have a high proportion of non-poor, increasing leakage. Self-selection through technology choice is also problematic: all but the very large farmers buy the standard 2 kg seed package, and the type of variety grown is mostly driven by agro-ecological zone, not poverty level.

Experience with market segmentation in Kenya

Individual discussions, presentations, group discussions and the formal survey revealed that many organizations in Kenya are involved in supplying reduced-cost inputs to the poor, and they commonly use direct identification of the poor, often in a community-level exercise. The costs of such exercises seem to be high, but no data are available. Similarly, the accuracy of the identification is not clear.

The government of Kenya has a long and wide experience with providing food aid to the poor, usually through direct identification by government officials. Recently, the Ministry of Agriculture started an ambitious program to reach 2.5 million farmers, the National Accelerated Agricultural Inputs Access Program (NAAIAP). Small input grants (KShs 7000) are provided to poor farmers (with less than 2.5 acres) to cover at least 1 acre of land in the crop and inputs of their choice. Grants are administered through vouchers, issued by a district stakeholder forum, with a group guarantee, and used to purchase inputs from accredited and trained agro-dealers. Agro-dealers redeem the vouchers from a contracted financial services provider. After two seasons beneficiaries will graduate to the next level, where farmers are provided with basic inputs at cost, but with subsidized credit.

The NGOs present at the workshop engage in a wide range of activities, including food relief, work with farmer groups, and increasing farmer productivity. The use of vouchers to provide and distribute agricultural inputs (especially seed and fertilizer), in combination with beneficiary targeting, is very common. Catholic Relief Services (CRS) had developed a voucher-based intervention system that has gained widespread acceptance. This voucher approach is a transparent and participatory approach used to ensure immediate availability of, and access to, basic food and non-food items for vulnerable communities at the household level. Vouchers are market-based and increase the purchasing power of beneficiaries in order to empower them to meet their own needs while improving the local economy. They can be used where markets are functioning or demand subsidies can easily stimulate markets. Effective targeting of beneficiaries is critical in this approach to ensure that the most food-insecure, or vulnerable, households benefit. Most NGOs use some kind of participatory, community-based beneficiary identification.

CRS and other NGOs often use the voucher approach during seed fairs, where input providers are invited to set up shop at a central location. This approach is convenient for farmers, but their choice is limited to what is offered there, and traders need to be available or willing to pay the transport costs. Alternatively, farmers can go directly to accredited agro-dealers, which increases the options but also their costs, especially transport.

Seed companies have extensive experience in market segmentation. Many have international experience, such as in the input subsidy program in Malawi. Most companies have experience in market segmentation, and set lower prices for farmers in low potential areas. Most companies have participated in the voucher system and have provided emergency seed relief. Some, but not all, provide OPV seed at a lower price. Several companies give credit to the agro-dealers, so they can pass on the credit to the farmers. Many companies also organize demonstrations and field days, and some provide small seed packages for try-outs. One company had an explicit market segmentation strategy (although not in Kenya), based on geography, price and product. The market is split in three segments, and price are set according to the potential of the product and its expected return, so clients can choose between high-end and other products.

All participating agro-dealers have worked with NAAIAP to provided seed and fertilizer with voucher to the poor, and also to internally displaced people. They do observe a lack of information on the side of the farmers, who often do not know what type of seed to plant at what time, and move seed to the wrong zone.

None of the participants have experience with tiered pricing, although most find it an interesting concept worth pursuing.

Opinions of Kenyan stakeholders

All participants agreed that maize seed is a top priority for Kenyan farmers, although most would prefer to include fertilizer. There is also the need for training of farmers to improve input use, and credit and the right package size would also help. Farmers should be left to choose the variety they want to purchase. Participants agree the project should target areas with high numbers of rural poor, with high maize production and with high population density. While some favor the marginal areas, this is less interesting to seed companies and distributors. Respondents agree that market

segmentation by district is not practical, since poor and non-poor live in the same areas, and neither is segmentation by variety or package size since poor and non-poor use similar technologies.

Participating scientists generally acknowledged the lack of research in the field, and the need for estimating the costs and benefits of different systems. The research should pay attention to appropriate experimental design, in particular with respect to different discount levels tested, amounts of reduced-cost inputs provided, and the level and type of information provided.

All participants were favorable towards the voucher approach. Seed companies prefer it to the tender system and free hand-outs, and point out the Malawi experience with massive improvement of maize production through subsidized inputs. Problems with voucher systems observed by the seed companies are major leakages, limited number of suppliers in some programs, and lack of updated information the companies need for planning. Many participants have observed the sales of vouchers at low prices in secondary markets, and many mentioned the lack of monitoring and evaluation, and the need for impact assessment. Agro-dealers also like the voucher systems, and prefer cash-based vouchers better than product-based vouchers. Several participants point out that agrodealers need sufficient capacity to redeem a number of vouchers, but the system needs an independent financial organization for efficient and quick redemption of the vouchers to the agro-dealers.

Several seed companies expressed a preference for direct identification of the poor. Several expressed interest in the tiered price system, but maybe for a limited period.

Expert opinion survey

Strategies for market differentiation

The formal survey showed major differences in market segmentation strategies between seed companies, NGOs and agricultural extension (Figure 3). The seed companies use many different strategies: eighty percent of the companies target different clients, market smaller packages of seed for low-income clients, give discounts based on volume and to regular clients, and use differentiated seed marketing strategies. Two thirds use starter kits, and discounts for low-income clients for reimbursements by NGOs or projects. Only one third, however, offers direct price discounts to low-income clients.

NGOs use similar strategies, but in lower numbers. Two thirds use targeting of different clients, in particular through marketing and advertising. Only a third use smaller packages, and differentiated seed marketing strategies. None used discounts for volume. Of the three extension officers, two used the same top strategies of the NGOs: targeting, and marketing and advertising. One of the three used differentiated seed marketing strategies, and another one used starter kits.

Product differentiation for the poor is generally deemed more effective than price reductions (Table 1). All respondents from seed companies and most others consider starter kits and smaller packages as very effective strategies. Opinions on marketing and advertising differ by affiliation: while respondents from NGOs think they are very effective, half of the other respondents consider them only somewhat effective. Price discounts get mixed reviews. Discounts for lower-income clients or beneficiaries are considered very effective by a slight majority, and somewhat effective by the others. All respondents from seed companies consider discounts to regular or reliable clients as only somewhat effective, while their opinion on discounts based on volume range from not effective to very effective.

Methods of identifying the poor

The most common methods of identifying the poor are through the local administration or district development officers, and community-based identification, each used by half the respondents. Other methods are based on information from NGOs and community-based organizations (CBOs), or from agro-dealers (Figure 2).

The use of local administration for the identification of the poor, while common, receives very mixed scores, with more than half of the respondents considering it not effective or only somewhat effective (Table 2). Community-based identification, on the other hand, is considered very or even extremely effective by two thirds of the respondents. Identification based on information from NGOs and CBOs receives mixed reviews, while information from the agro-dealers is generally considered only somewhat effective, even by the seed companies.

Most respondents, especially seed companies and extension officers, consider the sale of seed in small packages to be the best way of transferring improved seed to the poor; NGOs are less enthusiastic and the researchers are not convinced (Table 3). Direct distribution of subsidized seed is the second most appreciated strategy: more than half of the respondents think it is very or extremely effective. A slight minority (38%) think that sales at a discount are a very effective strategy, while a large majority thinks direct distribution of free seed is not effective or only somewhat effective.

Preferred discounts and amount of reduced-cost seed per farmer

Respondents recommended a wide range of discounts for seed to be offered to poor farmers, from 10% to 100%, with an average recommended discount of 47% (Table 4). Seed companies generally recommended higher discounts (57%) than NGOs (38%), although the range was wide in both groups. The number of respondents in the other groups was too small to draw conclusions.

Similarly, respondents recommended a wide range for the amount of seed per farmer that could be offered at a reduced price: from 2 to 10 kg, with an average of 8 kg/farmer (Table 5). Three quarters of respondents favored a limit of 10 kg. The question was open, but the 2 kg and 10 kg package had been discussed most extensively during the workshop.

The way forward

Most stakeholders consulted are interested in developing a pro-poor market segmentation program for maize seed. From the discussions, the main lines of such a program are clear, and so are the points that need further research. The two main market segmentation strategies that are viable are direct targeting, likely expensive but with limited leakage, and tiered pricing, likely to be much cheaper but with higher leakage, and which would need an arbitration mechanism to avoid people coming back for a second tier. To compare the costs and the benefits of both methods, as well as of different implementation options, a pilot study is needed.

The main product of the pilot study should be maize seed at reduced prices, up to a given quantity per farmer, in combination with information provided to the farmer. The study should also determine optimal discount rates (between 20% and 50%), and amounts of seed to be provided at a discount (between 2 and 15 kg/household),

The main tool for the pilot study would be cash vouchers for seed, to be distributed by an independent agency based on direct identification of the target group, or the tiered pricing system, where each farmer received vouchers for a specified amount.

The vouchers would be redeemed by the beneficiaries in the regular agro-dealers distribution network. The agro-dealers will redeem their vouchers at an independent financial institution. The target group should be the rural poor, those who insufficient land and food production and cannot meet their basic needs. The pilot study should use a community-based, inclusive and participatory approach for direct identification of the beneficiary, and a farmer identification system based on national ID cards for the tiered pricing.

The pilot study should focus on the areas with high potential impact - those with high density of poor people.

The pilot study should include a strong monitoring and evaluation component, with an appropriate experimental design to allow, for each option, to quantify the costs and the benefits. The costs should include both administrative and leakage costs, while the benefits should include the number of poor reached, the change in their use of improved seed, and the effect of that seed on their livelihoods.

At the writing of this paper (November 2008), funds for the pilot study have been secured and the study is planned to take place during for the main season of 2008. Its results are expected to lead to recommendations for a large-scale implementation project of pro-poor market segmentation for maize seed.

Acknowledgments

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Figure 1. Basic conceptual framework

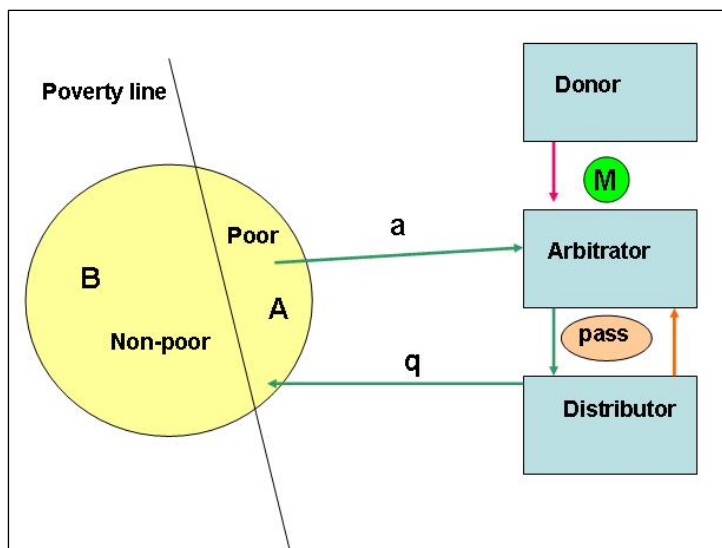


Figure 2. Leakage in the conceptual framework

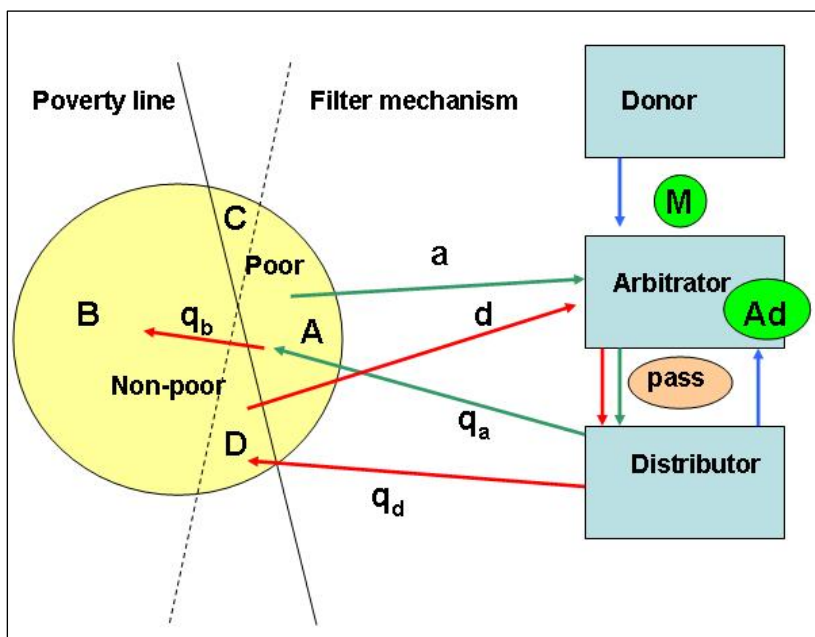


Figure 3. Strategies of market differentiation used by respondents (in %, by affiliation)

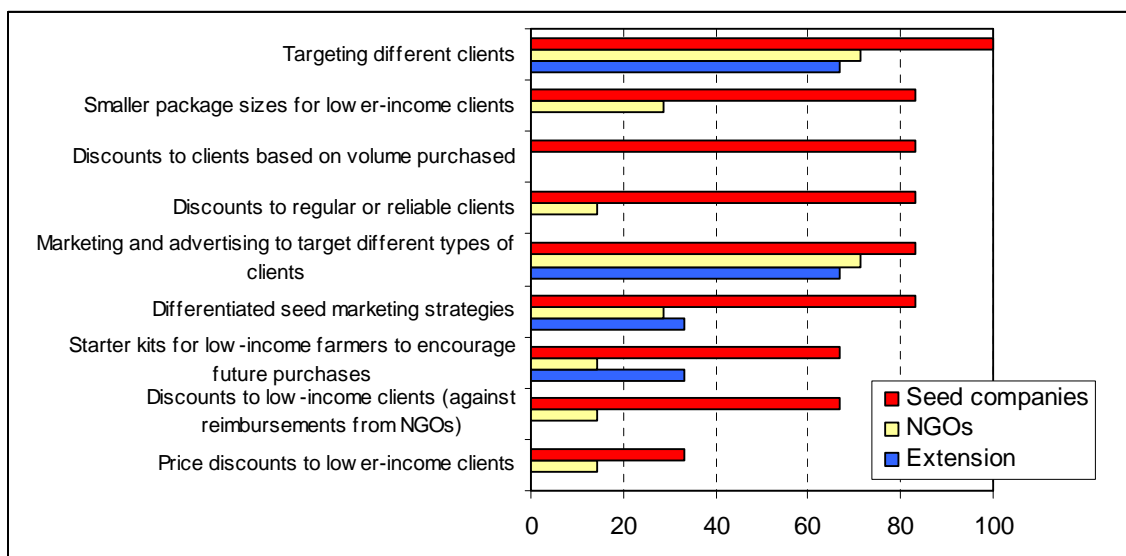


Figure 4. Methods of identification of the poor (% of respondents using)

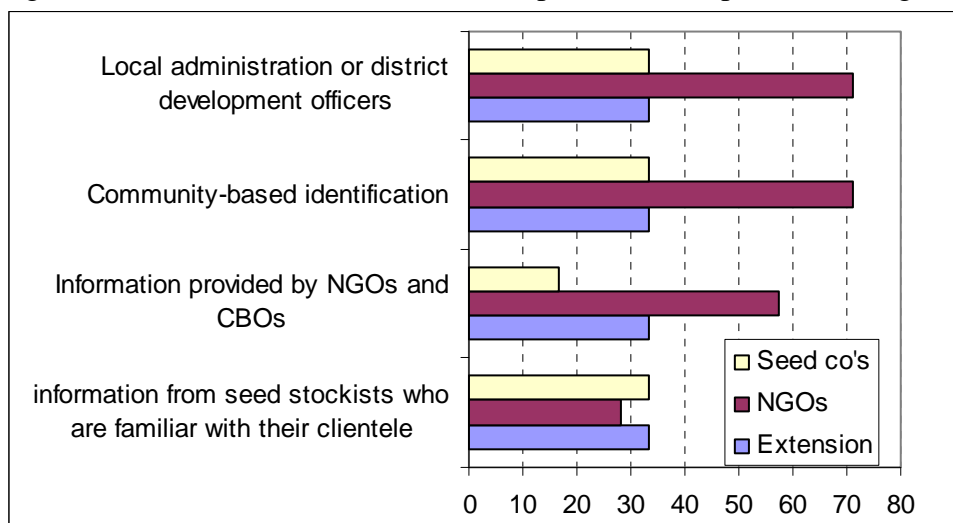


Table 1. Effectiveness of strategies in market differentiation (% of respondents, by affiliation)

Strategy	Organization	Effectiveness (%)				N
		Not	Somewhat	Very	Extremely	
Starter kits for low-income farmers to encourage future purchases	Seed co's	0	0	100	0	4
	Extension	0	0	100	0	2
	NGO	0	0	100	0	1
	Total	0	0	100	0	7
Smaller package sizes for lower-income clients/beneficiaries	Seed co's	0	0	80	25	5
	Extension	0	100	0	0	1
	NGO	0	0	100	0	1
	Total	0	14.3	85.7		7
Marketing and advertising strategy to target different types of clients	Seed co's	0	40	60	0	5
	Extension	0	50	50	0	2
	NGO	0	0	100	0	4
	Total	0	27	72.7	0	11
Price discounts for lower-income clients/beneficiaries	Seed co's	20	40	40	0	5
	NGO	0	0	100	0	2
	Total	14.3	28.6	57.1	0	7
Price discount to regular or reliable clients	Seed co's	0	100	0	0	4
	NGO	0	0	100	0	1
	Total	0	80	20	0	5
Price discount to clients based on the volume purchased	Seed co's	33	33	33	0	3
	Total	33	33	33	0	3
Discounts to low-income clients against reimbursements from NGOs	NGO	0	100	0	0	1
	Total	0	100	0	0	1

Table 2. Effectiveness of methods to identify the poor as perceived by respondents (in % by affiliation)

Method of identification	Organization	Effectiveness				N
		Not	Somewhat	Very	Extremely	
Local administration or district development officers	Seed co's	0	100	0	0	1
	Extension	0	0	0	100	1
	Research	0	50	50	0	2
	NGOs	33	33	17	17	6
	Total	20	40	20	20	10
Community-based identification	Seed co's	0	100	0	0	1
	Extension	0	0	50	50	2
	Research	0	0	100	0	1
	NGOs	0	40	60	0	5
	Total	0	33.3	55.6	11.1	9
Information from NGOs and CBOs	Seed co's	0	0	100	0	1
	Extension	0	0	0	100	1
	Research	0	100	0	0	1
	NGOs	0	33	67	0	3
	Total	0	33.3	50	17.7	6
Information from agro-dealers	Seed co's	0	100	0	0	2
	Extension	0	0	0	100	1
	Research	0	100	0	0	1
	NGO	0	100	0	0	2
	Total	0	83.3	0	16.7	6

Table 3. Strategies to transfer improved seed to the poor

Distribution strategy	Organization	Effectiveness				N
		Not	Somewhat	Very	Extremely	
Sale of seed in small packages (2-5 kg),	Seed co's	0	0	50	50	6
	Extension	0	0	100	0	1
	Research	50	50	0	0	2
	NGO	0	50	50	0	4
	Total	8	23	46	23	13
Direct distribution of subsidized seed	Seed co's	17	17	50	17	6
	Extension	0	50	50	0	2
	NGO	33	17	50	0	6
	Total	21	22	50	7	14
Sale of seed at a discounted price	Seed co's	17	50	33	0	6
	Research	0	50	50	0	2
	NGO	0	60	40	0	6
	Total	8	54	39	0	14
Direct distribution of free seed	Seed co's	17	67	0	17	6
	Extension	0	0	100	0	2
	Research	50	50	0	0	2
	NGO	67	17	17	0	6
	Total	38	38	19	6	16

Table 4. Preferred discount by respondent (in % by affiliation)

Organization	Mean	Recommended percentage discount on retail price								N
		10	25	30	40	50	75	80	100	
Seed companies	57	20	0	0	0	40	20	0	20	5
NGOs	38	29	29	0	14	0	14	14	0	7
Extension	75	0	0	0	0	0	100	0	0	1
Research	40	0	0	50	0	50	0	0	0	2
Total	47	20	13	7	7	20	20	7	7	15

Table 5. Preferred amount of seed to be offered at reduced price (in % of respondents, by affiliation)

Organization	Mean	Seed package size (% of respondents choosing)				N
		2 kg	3.5 kg	5 kg	10 kg	
Seed companies	7	20	20	0	60	5
Extension	10	0	0	0	100	2
Research	8	0	0	50	50	2
NGOs	9	14	0	0	86	7
Total	8	13	7	6	75	16