

Evans School Policy Analysis and Research (EPAR)

Professor Leigh Anderson, PI and Lead Faculty

Associate Professor Mary Kay Gugerty, Lead Faculty

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Executive Summary

There is a long-standing debate on how development organizations, NGOs, and governments can best allocate scarce resources to those in need.¹ As opposed to universal allocation of resources, a more targeted approach attempts to minimize program costs while maximizing the benefits among those with the greatest need or market opportunity.² However, there are theoretical and practical drawbacks to targeting. Interventions may target the mean of a group despite high variability within the group, and the costs associated with data collection and analysis may be prohibitive in practice.³ Drawing on literature from several sectors, this brief presents two categories of beneficiary targeting in the development context:

- **Administrative targeting** is distinguished by externally assigned categories and eligibility, with segmentation occurring prior to an intervention. It includes *individual and household assessment*, as well as *categorical* and *geographic* indicators. Methods of administrative targeting include means tests, geographic targeting, agro-ecological zones, development domains, farming systems, value-cost ratios, commodity sector, problem-focused targeting, and community-based targeting. Administrative targeting necessarily relies on observable characteristics.
- **Self-targeting** involves providing a benefit or intervention that is available to all, but is specifically designed to only attract a target population. Hence segmentation occurs through self-selection after an intervention.

The paper is divided into (1) a brief overview of targeting and segmentation in development, (2) a summary of reasons for targeting and (3) theoretical and practical critiques of targeting, and (4) a discussion of targeting methods in research and practice, including examples from the literature.

Implementation examples cited in this body of research include food aid program targeting by self-reported household income in Egypt; fertilizer use in low-potential zones of Uganda; and seven strategic initiatives to improve drought and disease resistance among individual crops in Asia and Sub-Saharan Africa.

Note on Methodology

Literature cited in this brief includes peer-reviewed research, program reports, and working papers. Literature was found using Google Scholar, Web of Science, AgEcon, USAID's Development Experience Clearinghouse, ScienceDirect, JSTOR, and the HarvestChoice and Generation Challenge Programme websites. Various combinations of the following search terms were used: targeting, segmentation, development, development domains, resource management domains, means test, market, administrative, farming system, agro-ecological zone, priority-setting, and agriculture. Major authors and works cited include: Waddington, Dixon, Hyman, and Vicente (2010), De Groote, Andam, Hall, Munyua, Ngigi, and Spielman (2009); Omano,

NOTE: The findings and conclusions contained within this material are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

Diao, Wood, Chamberlin, You, Benin, Wood-Sichra, and Tatwangire (2007); Krishna (2007); Pender, Jagger, Nkonya, Sserunkuuma (1998 and 2004); and Belsey and Kanbur (1993).

1. Overview of Targeting/Segmentation

In its most basic form, client targeting or segmentation is the process of partitioning an entire market or population into “differentially responsive segments.”⁴ The terms *client targeting* and *segmentation* are sometimes used interchangeably, but each term pertains to a slightly different process.

According to Mooij (1998) *client targeting* is the “identification and selection of certain groups or households or even individuals, and the distribution of benefits to them.”⁵ To date, client targeting has been the most common method of dividing potential beneficiaries.⁶ Client targeting is considered administrative in cases where the target population is externally defined based on some criterion or set of criteria.⁷ Within administrative client targeting, commonly used criteria include geography, socio-economic status, farming system, or other observable variables.⁸ Administrative targeting can be done at varying scales, depending on whether the variables are measured at the individual, community, or regional level.

Self-targeting is the non-administrative subset of client targeting and refers specifically to designing a product or service “to appeal to different segments or sub-groups of the market,”⁹ and then allowing individuals to self-select. While segmentation is quite popular in other sectors, such as the pharmaceutical industry, it has only recently gained traction in agricultural development.¹⁰

2. Reasons for Targeting/Segmentation

Four major reasons are cited in the literature for using targeting/segmentation. First, these approaches can distribute resources in a more equitable or efficient manner than untargeted interventions.¹¹ Though the targeting process itself requires resources, untargeted interventions may allow benefits to accrue to those who are relatively better off, rather than focusing resources on those in the greatest need.¹² A growing emphasis on pro-poor interventions has increased interest in segmentation/targeting.¹³

Second, targeting/segmentation is believed to help better match interventions to potential beneficiary needs and preferences. By considering characteristics important to a beneficiary group, organizations can potentially provide goods and services more likely to be adopted by beneficiaries. For instance, smallholders in SSA prefer a drier sweet potato; advances in breeding a drier version of the nutrient-rich orange-fleshed sweet potato have increased the likelihood that smallholders will adopt the new variety.¹⁴

Third, targeting/segmentation can hone an organization’s strategy. When trying to reach a large and heterogeneous population, it allows an organization to think about different strategies for different groups within the target population. For instance, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is using a combination of farming system and agro-ecological zone segmentation to prioritize research, policy outreach, and regional cooperation efforts.¹⁵

Lastly, targeting/segmentation can be important for measuring outcomes. Changing how the target population is segmented can greatly affect how progress is measured. For example, a food subsidy program in Tunisia found that only 8% of the benefits were accruing to beneficiaries in the poorest quintile, while 17% of the benefits were accruing to the wealthiest quintile. After the subsidy was reformed to target the neediest groups, the portion of benefits accruing to the lowest-income quintile jumped to 25% while the portion accruing to the richest quintile dropped slightly to 14%.¹⁶ Targeting by income quintile allowed program evaluators to have a better understanding of the program’s impact.

3. Theoretical and Practical Criticisms of Targeting/Segmentation

Theoretical Criticisms

A 2007 critique of targeting practices notes that poverty is a dynamic phenomenon; some households fall into poverty as

others are moving up the income ladder away from poverty.¹⁷ There is no 'fixed stock' of individuals or households to identify, and without constant updating of beneficiary rolls (at significant administrative cost) there is a likelihood that even an initially well-targeted intervention will eventually be compromised by leakage and exclusion.¹⁸

Waddington et al. (2010) suggest that targeting is essentially attempting to average out certain characteristics over a farm, village, farming system, or other unit. However, the spatial and temporal variation within each unit can be substantial and significant, even when the unit is as small as a single field.¹⁹ Targeting efforts may therefore miss the mark, even if they are well-designed for the average characteristics of a region or group.

These criticisms apply to many sampling, stratification, and econometric techniques, however, that are static by nature and based on summary statistics – usually sample means. Segments can be more or less unique and robust, depending on how they are selected (for example, externally versus statistically) and the goals of the segmentation. An early study in Botswana used household- and farm-level characteristics to create groupings relevant to technology adoption²⁰, but later research noted that the typology lacked stability in that it was highly sensitive to changes in criteria.²¹ While this does not necessarily indicate that the early model was invalid, it does limit the applicability in a practical sense.

Practical Criticisms

The reality of implementing a targeted approach to beneficiaries presents several challenges. Cornia and Stewart (1993) identified two types of errors that are common with imperfectly targeted interventions: excessive coverage, also known as “leakages,” and exclusion of eligible groups.²² A large part of the targeting/segmentation literature is devoted to exploring ways to reduce these errors and improve overall equity and efficiency of resource use.

A number of studies suggest that targeting beneficiaries at the household level requires extremely detailed information that is often difficult to collect.²³ Increasing data resolution can improve program results, but may also increase administrative costs. In an early review of the literature, Besley and Kanbur (1990) note “as more and more categories are introduced, then the targeting achieved by indicators becomes finer and poverty is reduced. On the other hand, more categories raise administrative costs, though we did not find any explicit benefit cost estimates of these tradeoffs.”²⁴

The *paradox of targeting* refers to the process of losing political support for an intervention as targeting becomes more specific.²⁵ As Hanson et al. (2006) explain, “setting a broader target group may be necessary to ‘buy off’ potential opponents of a narrowly targeted scheme and avoid social division.”²⁶ Political and equity comparisons across segmentation methods are raised in the literature, though not directly addressed.

As in other aspects of agricultural development, sparse data and data quality limit the potential of targeting/segmentation methods. Many of the variables of interest to agricultural development either are not available or require arbitrary cut-off points or groupings that may not be meaningful. Household-level income data, for instance, are not always available in less-developed regions, and it can be difficult to accurately assess the cut-off for neediness across varying regions and contexts.

Using data to identify groups is not straightforward. The cluster and factor analysis that underlie some segmentation approaches²⁷ are based on statistical techniques designed to explain as much of the underlying variation in the data as possible. The success in identifying a cluster that represents a valid and meaningful market segment rests with the underlying theory that informs the data collection and analysis (e.g., survey instrument, sampling strategy, and variables chosen).

4. Methods and Models for Targeting/Segmentation in Agriculture

Methods

Targeting efforts in agricultural development and development in general can be considered on two levels. First, there is strategic targeting, used as a method of priority-setting for research and interventions at the institutional level. Targeting in this context can be considered in some ways theoretical, as models are often based on indicators (such as household- or individual-

level characteristics) for which data are not readily available. For example, the CGIAR network, the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), and CAADP have adopted some of these targeting methods to help guide research priorities based on farming system or agro-ecological zone.²⁸

Second, there is targeting as part of the implementation process for specific interventions. Targeting in this context is more likely to rely on easily observable variables such as geographic region, and models are therefore more likely to trade specificity for feasibility. For example, a given intervention might be available to every resident of a high-poverty district.

The following section will present the most commonly used segmenting approaches with examples of their use in development. In the examples cited here, the more complex models are generally used as research and strategic frameworks, while the simpler models are more likely to be used in program implementation. The availability of literature on geographic and categorical segmentation was more extensive compared to other methodologies.

Whether for theoretical or practical purposes, targeting approaches are often divided into four methods, the first three of which fall into the administrative category: individual assessment, categorical or geographical indicators, community targeting, and self-selection.²⁹ However, these approaches are not mutually exclusive and multiple methods are often applied simultaneously.³⁰ A short description of each method follows.

- *Individual or household assessment*: This method involves identifying individuals within a population, usually through a means test.³¹ While this is the only way to “perfectly target” interventions, gathering information on each potential beneficiary through household or individual surveys is highly resource-intensive.³²
- *Categorical/geographic indicators*: This approach involves identifying potential beneficiaries based on generally observable characteristics or by characteristics of a geographic area.³³ Combining geographical targeting with other targeting criteria is the most common method of targeting in developing countries.³⁴
- *Community-based targeting*: With this approach, individuals or institutions within a community identify appropriate beneficiaries. This participatory approach has the advantage of tapping into local knowledge, but is easily skewed if participants have an incentive to provide inaccurate information.³⁵
- *Self-Selection*: Self-selection is also known as market segmentation and involves a benefit that is universally available and designed to particularly attract a target population. For instance, a program might impose time constraints, such as a food-for-work program, which will not attract individuals who can work at a higher wage outside of the program.³⁶ An advantage to this approach is that it does not require administrative costs to exclude beneficiaries.³⁷ This method does not appear to be common as a stand-alone method in the agricultural development context.

Individual or Household Assessment Models

The Farmer Focus initiative has used *individual assessment* segmentation methods.³⁸ The preliminary research identified seven segments (e.g., strategic followers, entrepreneurs, swift copy cats) in the Tanzania sample and five in the Mali sample. In both countries, segmentation is based on attitudinal traits such as risk tolerance, attitudes towards group leadership, farming aspirations and preference for tradition, as well as some traditional economic variables such as market access.

Early results indicate significant differences between the countries on facets such as intra-household decision making, information-seeking, and attitudes towards farm expansion and modernization. Demographics also vary markedly between the two study regions. However, the relatively small sample sizes from both examples limit conclusions at this stage—a difficulty which highlights the resource intensity of individual assessment targeting. A large-scale version of this survey, with a revised instrument, is currently in the field.

Jolly (1988, p. 256) suggests that models that incorporate household-level socioeconomic variables are not easily mapped. However, if socioeconomics are defined at the village or district rather than household level, mapping becomes more feasible.

There is a loss of precision inherent in expanding the unit of analysis, but the improvements in data access and model applicability may be an acceptable trade-off.

A food aid program in Egypt uses self-reported household income as a determinant for program eligibility, but the targeting is not effective.³⁹ There is a clear incentive to overstate income and no mechanism for verification. Non-poor and formerly poor households therefore receive large portions of food aid. A 2002 report suggested the implementation of a proxy means test based on household size, education, and assets.⁴⁰ The means test demonstrated reliability and validity, but the administrative costs and obstacles to implementation are significant. World Bank researchers have suggested a similar approach in Bangladesh, but the same implementation constraints remain.⁴¹

Categorical and Geographic Models: Definitions and Examples

Geographic Targeting

Geographic targeting is perhaps the most commonly implemented form of targeting. While using geography as the sole eligibility criterion can be simplistic, it is highly feasible and requires little in the way of administrative costs. For example, poverty alleviation programs in India are targeted at the state level. Bigman (2002) suggests that errors of inclusion and exclusion can be reduced by targeting at the district level, with particular focus on districts with a high percentage of low-income households.⁴²

Agro-ecological Zones

HarvestChoice defines agro-ecological zones (AEZs) as geographic domains with similar climatic and agricultural characteristics (including radiation, rainfall, temperature, and humidity). They note that:

Many agricultural production systems, technologies and practices are often associated with specific AEZs, or their performance is relatively uniform within individual AEZs. AEZs therefore provide a useful spatial framework for, amongst other things, thinking about the potential for innovations to spill over from one country or continent to another.⁴³

AEZs are widely used in research. For example, a recent analysis of responses to fertilizer use in Uganda by AEZ found that the low-potential zones did not experience enough of a productivity gain to encourage adoption of expensive fertilizer inputs.⁴⁴ In contrast, productivity increases in the high-potential zones were robust and consistent enough to encourage adoption of fertilizing practices in these areas. The response variation between high- and low-productivity zones supports the usefulness of segmenting by AEZ in some contexts.

Development Domains

In contrast to individual or strictly geographic assessment, *development domains* or *development pathways* are areas for which a given development strategy is likely to have similar relevance.⁴⁵ This segmentation method involves collecting and/or using existing data to develop algorithms or categorical variables that identify homogenous areas.⁴⁶ Development domains have the potential to inform implementation design, but have thus far been predominantly used in the research context.

In Omano et al. (2007) for example, eight development domains across ten eastern and central African (ECA) countries were established based on several observable factors including: child malnutrition; consumption and trade patterns; biophysical crop suitability; distribution of lands, crop and cattle; irrigation; and presence of nonagricultural markets. Data sources for selected variables are noted in Table 1. Each domain was assigned a high/low designation based on aggregating these factors into three primary variables: agricultural potential, market access, and population density.⁴⁷

The authors used two models to estimate the effect of improved agricultural sub-sector growth and increased R&D investment on gross domestic product (GDP), agricultural domestic product (AgGDP), and poverty reduction across the eight

development domains. The first model was an economy-wide multimarket model (EMM) simulating the cumulative impact of a 50% reduction in marketing costs and a 50% improvement to market access. Model analyses were based on country-level data such as commodity subsector yields and growth rates, market margins for imports and exports, demand per capita, producer and consumer prices, and per capita income.⁴⁸ The second model estimated the costs and benefits of an arbitrary 1% increase in technology R&D investment on producers and consumers.⁴⁹ Using data on the share of production and consumption for 33 commodities, estimated gross economic benefits were calculated and ranked according to their absolute size and the equality of their distribution.

The authors concluded that improvements in the high agricultural potential, low market access, and low population density domain (HLL) would have the greatest overall impact on ECA-regional GDP, AgGDP and poverty. This conclusion was supported by both the increased R&D and improved market access models. Results from the R&D impact model also suggest that raising the productivity of sorghum and millet within the HLL domain could yield the greatest overall benefit (compared to other commodities) to consumers and producers.^{50 51}

Table 1: Sources of data for Omano et al. development domains

Variable	Source
Topography and land cover	Global Land Cover 2000 Project, U.S. National Geospatial-Intelligence Agency, U.S. National Aeronautics and Space Administration
Population density/ human settlement	Center for International Earth Science Information Network, IFPRI
Road infrastructure	U.S. National Imagery and Mapping Agency, IFPRI
Rainfall and climate	University of East Anglia
Regional soil and protected area	Compiled from national sources by the United Nations Food and Agriculture Organization (FAO), UNWFP World Conservation Monitoring Centre
National agricultural production and trade	FAO, World Bank's World Development Indicators

Source: Omano et al., 2007, p. 9–10

Examples of the potential strategic priorities and development implications for the HLL domain that follow from this approach are highlighted below.

- *Strategic Priorities:* Productivity growth through extension system expansion, research, weed and pest control, soil and water management, and biotechnology awareness campaigns. Market improvement via credit, information and infrastructure development. Linkages with non-agriculture sectors such as storage, processing, and distribution.
- *Agricultural Livelihood Options:* Intensification of nonperishable crops (high-input cereals, oilseeds, tea, coffee), livestock intensification, and improved grazing areas.
- *Example ECA Locations:* Southern Sudan, Central Uganda, Kenya, Tanzania, most of Central DRC, areas of Ethiopia and Madagascar.⁵²

Pender et al. (1998) identify six development domains based on agroclimatic zone (primarily rainfall), market access, and population density. The authors examine the probability of specific income generating activities (*development pathways*) based on several local factors, such as the presence of government programs or improvements to rural market access. The study uses factor analysis to identify the development pathways and least squares regressions to test for pathway determinants. Significant results are highlighted in Table 2. The authors warn this study may have been subject to reliability and validity limitations including recall, misrepresentation, and possible reverse causality.⁵³

Kruseman et al. (2006) use development domains similar to those outlined in Pender et al. (1998) to find that livelihood and crop diversity within domains is increased with higher market access, access to credit, and higher population density. Crop

diversity is also higher in domains with more NGO or other institutional presence. Homogeneity in development domains, on the other hand, is linked to high elevation, poor soils, and low market access.⁵⁴ Some development domains may therefore be more appropriate for targeting than others.

Quiros et. al (2009) have developed an open-source tool for the classification of agricultural domains, with a particular focus on livestock systems. Their Geographic Overlaying dataBase and query Library for Ex-anTe impact assessment (GOBLET) allows users to characterize spatial domains based on variables such as agricultural productivity, market access or number of livestock in an area.

Notenbaert et. al (2008) used a development domains approach to select representative sites for ILRI, IFPRI, and CIMMYT maize-livestock systems research. They used a geographic information system to select domains where:

- Farmers keep livestock and source a significant amount of their fodder needs from maize.
- Farmers are already using improved cultivars (hybrids and OPVs). It is hypothesized that farmers may change their choice of improved cultivar to obtain preferred fodder characteristics.
- There is an existing delivery pathway whereby farmers can access new varieties.

With these criteria, they hoped to address both the agro-ecological and the socioeconomic factors that might affect the success of their initiative.

You and Johnson (2010) also use development domains for modeling research, estimating market responses and welfare gains from new technologies for 15 commodities across 12 development domains in SSA. In their model, a large portion of gains accrue to relatively low-potential domains, because those domains demonstrate the largest yield gap across a range of commodities and therefore have the greatest potential for productivity improvement.⁵⁵ Chamberlin et. al (2006) also use development domains to propose segmentation of beneficiaries in Ethiopia. Their domains are designed to have explanatory power across a variety of livelihood strategies, with the goal of maximizing the relevance in a range of Ethiopian settings.⁵⁶

Table 2: Determinants of development pathways (least squares regressions)

Development Pathway	Development Domain Characteristics	Explanatory Variables: Other
Increase in cereal	Bimodal medium rainfall agro-climatic zone***R High population density**R	Number of community-based organizations ***R
Increase in bananas and coffee	Bimodal low rainfall* High agro-climatic zones*	Decreased distance to rural market*
Increase in nonfarm activities	Bimodal low rainfall decreases the likelihood* High population density*	Decreased distance to rural market** R Decreased distance to tarmac road*** R Number of NGO programs***
Increase in horticulture	Bimodal medium rainfall** High population density*	Irrigation in village** R
Increase in cotton	No significant domain; authors suspect market prices are likely more important	Number of community-based organizations*
Stable coffee production	Bimodal high rainfall** R Eastern highlands*** High market access*** R	Number of government programs* Number of community-based organizations***

Source: Adapted from Pender et al., 2004, p.778. ^R Means the coefficient is of the same sign and statistically significant at the 10% level in two-state least squares regressions to predict change in ln(no. of households) and numbers of programs/organizations. ***Significant at 1% level. **Significant at 5% level. *Significant at 10% level.

Farming Systems

Similar to development domains, *farming systems* can also help prioritize strategies for reducing poverty among the rural poor.⁵⁷ Farming systems are characterized by The Food and Agriculture Organization (FAO)⁵⁸ as a collection of individual farm

systems that have similar market and household constraints and opportunities, comparable environmental factors and natural resource bases, and for which similar agricultural development interventions would be suitable. The FAO has defined and mapped 63 farming systems worldwide and used the resulting report to update the World Bank Rural Development Strategy.⁵⁹ Many papers have used farming systems to explore how challenges and opportunities map to these systems.⁶⁰

Waddington et al. (2010) use this approach to define constraint sets for six crops in 13 high-poverty farming systems across sub-Saharan Africa and South and East Asia. Drought was identified as one of most important constraints to productivity among rural, poor farmers.⁶¹ Drawing upon this research, the Generation Challenge Programme (GCP) recently developed seven crop improvement initiatives to improve the drought-resistance of cereals, legumes, roots and tubers across 15 countries with a high (above 2.5M) prevalence of childhood stunting. The initiatives, briefly summarized in Table 3, will be supported through 2013.⁶² The GCP hypothesizes that improved cultivars will have the greatest impact on crop yields, and hence childhood nutrition.⁶³

Over half of the GCP's estimated \$15M USD budget will be allocated to projects supporting phenotypic characterization, molecular breeding, data management for future analyses, and human and infrastructure capacity building. Data quantifying the success of this approach are not yet publicly available.

Table 3: Seven Generation Challenge Programme Initiatives for improving drought-resistant cultivars

Initiative	Countries	Current Projects*
Cassava	Ghana, Nigeria, Tanzania	Disseminate farmer-preferred, pest and disease resistant varieties
Chickpeas	Ethiopia, Kenya	Develop a single-nucleotide polymorphism platform for molecular breeding
Cowpeas	Burkina Faso, Senegal, Mozambique	Increase cowpea productivity for marginal environments via improved drought-resistant phenotyping
Rice	Mali, Nigeria, Burkina Faso	Explore genetic variation; improve genetic traits through Marker Assisted Recurrent Selection (MARS)
Sorghum	Mali	Improve grain yield on acid soils by identifying factors that lead to drought and aluminum tolerance
Wheat	China, India	Field evaluation of wheat-barley under different water schemes
Cereal Yields	Indonesia, Kenya, Zambia	Establish a molecular breeding program based on aluminum tolerance

Source: Adapted from http://www.generationcp.org/cis_home. *All projects not listed.

Problem Focus

Using a problem focus as the central characteristic of a domain involves classifying an issue by constraints and potential.⁶⁴ Krishna (2007) refers to this as a “targeting reasons, not people” in order to highlight the fact that initiatives are ultimately directed towards issues (such as poverty or low crop yield) rather than towards specific people. The focus on constraints is similar to a farming systems or AEZ approach, but it involves stratification rather than mapping: the ultimate set of target beneficiaries will share similar constraints and will likely share some characteristics, but they are not static and they may not be divisible by observables such as geographic location. This reasons-based approach addresses several shortcomings of other targeting methods⁶⁵—such as spatial and temporal variation, and static beneficiary classification—but implementation difficulties remain relevant.

Value-Cost Ratio

The HarvestChoice program modeled the value cost ratio (VCR) of various fertilizer policies in East Africa by layering simulated fertilizer transport costs, market access, fertilizer response rates, and farm gate maize prices.⁶⁶ The resulting map shows 10 km x 10 km pixel-level VCRs. HarvestChoice suggests that policies to encourage fertilizer use should be implemented only in areas with VCRs greater than four, in order to accommodate risk while providing incentives to farmers.⁶⁷

Thus far, the VCR classification has not been widely implemented.

Commodity Subsectors

Omano et al. (2007) used six different models to estimate the relative importance of 33 commodities and 15 commodity groups to overall AgGDP, GDP, development domain, and economic surplus (spillover effects). Using an arbitrary one percent increase in productivity-enhancing R&D as the test improvement, growth in the staples subsector was shown to have the greatest cumulative effect on GDP gains, followed by growth in livestock, vegetable and fruit production.⁶⁸

When looking at individual commodities *by domain*, sorghum and millet growth within the HLL domain were estimated to yield the greatest return on R&D investment and the maximum benefit to consumers and technology adopters. Milk had the highest aggregate impact *across all domains*, followed by oilseeds, sorghum and millet. Finally, cassava was projected to have a considerable influence on economic surplus.⁶⁹ The projected effects are not necessarily distributed evenly across regions or countries; more work is needed to determine how benefits would accrue at the local level.

Researchers from ILRI have used the commodity approach to suggest targeted initiatives for the dairy sub-sector in Uganda.⁷⁰ Some areas of Uganda have milk production surpluses relative to demand, while others have milk deficits. The authors identify deficit and surplus regions, suggesting that initiatives in surplus regions focus on market access while initiatives in deficit regions focus on improving production.

Community-Based Targeting

Another mechanism for segmenting poor farmers is *direct identification at the community level*, in which community members or institutions make decisions about the eligibility of certain households or groups.⁷¹ The advantage is that community members are likely to have rich and accurate knowledge of poverty at the local level. However, that knowledge may not be used appropriately; Krishna (2007) notes that if elite community members drive the decision-making process, inequality within the community may worsen.⁷²

In 2008, the Kenya Ministry of Agriculture led an analysis of the national seed sector to determine stakeholder receptiveness to using market segmentation strategies for improved maize cultivars. Feedback was solicited from individual stakeholder interviews ($N=9$); a formal stakeholder questionnaire ($N=18$); and group discussions with seed companies, scientific representatives, and government and NGO officials ($N=39$).⁷³ Most respondents were currently identifying poor, smallholder farmers via direct information provided by four channels that were not mutually exclusive: local administration and development district officers, community based organizations, NGOs, and agro-dealers. Intervention mechanisms varied by stakeholder. For example, seed companies provided volume and price discounts as well as differentiated seed package options to lower income clients. In general, direct identification was viewed as moderately effective. The high cost associated with information gathering was to some extent balanced by the benefits of limited leakage.⁷⁴

De Groote et al. (2009) propose stakeholders use a tiered pricing strategy in combination with community based targeting to increase maize seed technology adoption among poor, rural smallholders. They suggest a pilot study that compares the costs and benefits of implementing this scheme. The goal of said study would be to provide smallholder farmers with access to controlled quantities (e.g. no more than 15kg/household) of new maize varieties at a range of discounted prices based on need (e.g. anywhere between a 20 to 50 percent discount). Discounts would be provided in the form of a cash voucher. The study would examine the impact of tiered pricing, or increased purchasing power, on seed adoption. One noted drawback of this mechanism is potential leakage.⁷⁵ This, as well as coverage and efficiency of the program could be measured by:

- *Coverage*: The number or proportion of the targeted poor population participating in the program, the total amount of maize seed purchased by each participant; or the rate of arbitrage.
- *Leakage*: The number or proportion of non-poor farmers participating in the program, the number or proportion of inputs distributed to the non-poor.

- *Efficiency*: Administrative costs, total amount of cash vouchers distributed, total cost, or cost per targeted farmer reached.

Self-Selected Targeting

Self-selection is based on the theory that for a given intervention, participation costs and incentives will vary across households.⁷⁶ An intervention can therefore be designed to discourage unintended beneficiaries by imposing high participation costs and offering relatively low participation benefits for a non-needy or otherwise non-targeted population. In practice, this can be achieved by imposing time constraints or providing an inferior good. For example, food aid programs in Latin America sometimes require some number of work hours in exchange for a benefit,⁷⁷ and a subsidy in Tunisia increased the share of benefit to the poorest quintile by subsidizing inferior goods such as powdered milk rather than fresh milk.^{78,79} Using self-selection as the primary means of targeting requires careful program design,⁸⁰ but self-selection is almost always a part of any segmentation strategy in the sense that most interventions rely on voluntary participation or adoption.

Conclusion

Beneficiary segmentation has several theoretical advantages. Improved targeting may increase the efficiency and equity of organizational and program efforts⁸¹ and help better match interventions to recipient-preferences, increasing the likelihood of adoption and participation.⁸² Development organizations may improve the focus of both their strategic priorities and budgets through customized targeting methods.⁸³ However, concerns exist regarding the accuracy, reliability, cost, and time-constraints of targeting methodologies.⁸⁴ Creating valid and reliable target groups with implementation potential remains a significant challenge.

Please direct comments or questions about this research to Leigh Anderson, at eparx@u.washington.edu

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