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Socio-Economic Considerations of Genetically Modified Maize Adoption:
The Case of the Philippines

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Country Context

In March 2006, the Government of the Philippines issued Executive Order No. 514, which established the National Biosafety Framework, prescribed guidelines for its implementation, and strengthened the National Committee on Biosafety of the Philippines (NCBP). It mandates the NCBP to "issue guidelines consistent with internationally accepted standards relating to the conduct of social, economic, ethical, cultural and other assessments, as appropriate, prior to decisions to commercialize products of modern biotechnology."

The Philippines is considered a biotech mega-country, growing over 50,000 hectares (ha) of GM crops. As of 2007, about 300,000 ha had been planted with GM maize. The area devoted to herbicide tolerant (HT) and insect resistant (IR) traits increased from 11,000 ha in 2004 to 67,000 ha in 2007.

This case study aims to pilot components of a "good practices" methodology for researchers working to generate useful information about the social and economic impacts of Bt maize, genetically modified (GM) for IR, on small-scale farmers. The case study will support the NCBP in meeting its mandate.

Research Questions

This case study combines in-depth social and economic analysis. The research team seeks to answer the following fundamental questions at this early stage of adoption:

- Does quality of life differ for Bt and non-Bt maize farmers?
- Is Bt maize more profitable than the equivalent, non-Bt maize hybrid?
- Does planting Bt maize reduce the use of hazardous pesticides and yield losses?
- Is the use of Bt maize neutral to farm size, labor use, and income?
- What are different farmers willing to pay for Bt and other variety attributes?

Methods

Field work was conducted in the Province of Isabela in Northern Luzon and the Province of South Cotabato in Mindanao from July 2007 to April 2008. Based on secondary data and interviews with key informants, these sites were known to have both adopters and non-adopters of Bt maize. A total of 466 small-scale growers of Bt and non-Bt maize were randomly selected in 16 villages. Farmers were classified as small-scale when planting 3 ha and below in Isabela and 5 ha and below in South Cotabato.

Focus group discussions were undertaken to draw out qualitative information about knowledge-building processes, intergenerational transfers of knowledge, farming skills, and the capacity of farmers to choose between Bt and non-Bt maize. The outcomes of these discussions also helped shape the survey instruments used to interview individuals. Sampled farmers were interviewed face to face with pre-tested questionnaires and visual aids. Key informant interviews were used to compile information about seed supply channels.

The choice of analytical tools in the social assessment was guided by the need, identified in a meeting of the research team with the NCBP, to investigate impacts on quality of life using the Millennium Development Goal indicators. The team sociologist designed a social development monitoring tool, using examples developed by organizations such as Education Watch. An ex post assessment of differences in quality of life could not be conducted because no previous baseline data existed. Researchers will evaluate social impact by matching Bt and non-Bt maize growers with similar characteristics and comparing indicators of quality of life.

The choice of analytical tools in the economic assessment was based on a systematic review of state-of-the-art methods used in published work. An economic surplus model with stochastic simulation will be used to estimate the total magnitude and distribution of economic benefits from Bt maize adoption returns among consumers, producers, and innovators. The model is augmented by stochastic simulation to more realistically account for *variability* in technical and economic parameters such as yields, prices, and the technology fee. The team will estimate a production function with damage abatement to separate the effects of the Bt trait on abating pest damage from the effect of the improved germplasm on yields. Failing to employ this approach can lead to biased estimates of impact. An econometric analysis using instrumental variables regression will separate the impact of the technology itself from the impacts of other variables that help determine adoption. For example, it is often the case that farmers who adopt first are more efficient or have more access to capital and information. Thus, the observed difference in economic benefits between these adopters and non-adopters is biased. Researchers have also conducted a stated preference choice experiment to estimate farmer willingness to pay for variety attributes. This approach minimizes various types of biases associated with contingent valuation and can also be used to estimate the value of multiple attributes of goods.

Approach	Unit of Analysis	Examples of Impact Indicator
Social	Household	Change in: food security and diversity, livelihoods, gender distribution of labor in maize production, power and control, perceived quality of life, mortality and morbidity, access to financial services, education, potable water, sanitation facilities, communication facilities
Economic	Farm	Change in yield, yield losses to pests, pesticide use, labor use, income, relative deprivation, willingness to pay for seed
	Sector	Change in producer, consumer, innovator, and total economic surplus

Preliminary Observations

The models and tools used for economic analysis are perceived to be effective tools for measuring the impacts on small-scale farmers, but they are more narrowly focused than the tools used for social analysis. Social analysis has the advantage of covering a broad range of concerns related to mapping and measuring social development. However, it is limited because social impacts are determined by comparing the quality of life of Bt and non-Bt corn farmers at one point in time. A preferred approach (difference-in-difference) compares quality of life for the two groups both before and after adoption. This study can serve as the baseline for such an analysis in the future. With a quantitative research approach aimed at determining social impacts on small-scale farmers, it is possible to examine social variables that serve as indicators of the elements of quality of life. Qualitative tools of analysis proved to be useful in gaining an in-depth understanding of the social transformations in communities when small-scale farmers adopt Bt maize.

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