CHAPTER II

LITERATURE REVIEW

In general, socioeconomic studies cover a wide range of fields and focus on various issues such as changes in household income level, living standard, gender activities, health, farm productivity, etc. as a result of technological change and adoption of agricultural technology. There exist multiple approaches for the assessment of socioeconomic impacts based on the needed level, the objective and types of research.

2.1 The Development of biotechnology

The development of in vitro tissue and cell culture techniques has occurred in parallel with advances in molecular biology and genetic engineering. In vitro techniques make it possible to regenerate a whole plant from a small piece of tissue, and even from a single cell, by growing it in a suitable medium. This is not surprising considering that living organisms start life as a fertilized egg, which is also a single cell. For plants, tissue culture techniques can be of great value for achieving a rapid multiplication of a desirable genotype, for example, a high-yielding clone of coconut (Colen, 1994).

Dent and McGregor (1996) argued in their recent discussions relating to plant biotechnology and some of the areas above present view that a plant, when it is developing, can have a negative impact on sustainable crop production. However, the technology itself will not result in this, but rather it could provide the means for making a significant contribution towards problem-solving in low-input agriculture.

2.2 Concept and Definition of project impact assessment

Project impact is the result or consequence of project operation, performance and effects, for example, increasing yields. The impact relates the results of a project to its long range objectives and goals and indicates the extent to which it has achieved them. It denotes changes in the status of beneficiaries resulting from a project; for example, in family income, nutrition, and living standards. It includes the achievement of wider welfare objectives such as an increase in literacy and wider participation of project beneficiaries in project decision-making. Project impact is furthermore a result of the implementation of the project (Clayton, 1985).

The impact assessment means different things to many different observers of this latter-day phenomenon, but two broad categories can be identified. The first is more concerned with the mechanisms and the process of research. Observers with this perspective are interested in what the direct products of research have been. These might be primarily concrete items, such as new varieties of cultivated plants or new compounds that might have some desirable insecticide or fungicide properties (Anderson and Herdt, 1990).

The assessment of project impact will require a longer time horizon than the other studies. Some impact changes may be detected during the implementation of the project – increased farm incomes may be generated quickly on a very successful project. But in other cases, the full impact will not emerge, in a substantial way, until several years after its full development or completion. Increased literacy or increased capacity for self-sustained development is an obvious example (Clayton, 1985).

Evaluations of project operation, performance, effect and impact is mainly based on the observation and verification of variables or indicators of project inputs, outputs, activities and effects; also of project objectives, external factors of projects and constraints. A first step in this process is therefore, to identify, specify and select the appropriate indicators. Many of the selected indicators will be derived from an inspection of the project objective structure which spells out the planned inputs, activities, outputs, effects and objective of a project (FAO, 1985).

Marion and Wills (1990) assessed the impact of Bovine Somatotropin -- bST (A case study of Wisconsin). The results of this study are of considerable interest. They are sensitive to assumptions concerning (1) the production response to bST; (2) the returns required by farmers to adopted bST; (3) the price that farmers will have to pay for bST; (4) the price of milk when bST is introduced; and (5) the speed and the extent of adoption of the technology.

Shinawatra (1991) estimated changes in net farm income, household income and farmers adoption of new technologies and used them as indicators to assess the effect of farming system research, specifically to find the benefits of the new technology among different groups of farmers in Thailand. The study employed cross sectional data. The methodology is mainly descriptive analysis.

2.3 Purposes of impact study

The purpose of a project is to help bring changes in the future. But the future is unavoidably subject to uncertainty. Even with the most careful study and planning, it is impossible to foresee all the events, which will affect a project once it is underway. It is therefore, important that project designs and procedures will help project managers to

cope with unexpected events. This is normally the role of the monitoring and the evaluation systems (Yi, 1998).

2.4 The methods of impact assessment

There are many studies of return to research in agriculture. These tend to be rather simplistic impact studies focusing on gross productivity gains and the gross costs of the research programs that are presumed to have led to such productivity gains. Such studies have probably been quite important in the wider political process of generation of support for continued investment in public agricultural research (Anderson and Herdt, 1988).

2.4.1 Comparison with and without approach

FAO (1992) defined that project impact can be the difference with and without project. This with and without concept is basic to project analysis. It is important to keep in mind that the situation as it exists today would likely not remain the same in the absence of the project situation when identifying project effects. Changes would likely take place without the project and these need to be estimated.

2.4.2 Economic Surplus

Echeverria (1990) pointed out that the economic surplus approach (consumer-producer surplus and cost-benefit) could be used for assessing the technological change. This method estimates the returns on investment by measuring the change in consumers and producers surplus resulting from the technological change.

In order to measure the benefits likely to accrue from Peru's investment in research and extension (R&E), Ganoza (1990) estimated the change in producer surplus resulting from rightward shift—actual and expected – due to technological change. However, recognizing the shortcomings of the method as a measure of welfare changes, the study also used experiences of previous research.

Echeverria (1990) ascertained that Griliches, Grossfield and Heath, and Evenson and Ayer employed an economic surplus approach to estimates of returns from investments in agricultural research (and extension).

2.4.3. Estimating hedonic price

The hedonic model is used to explain the price of a differentiated product of factor of production. Rosen's (1974) model provide the theoretical basic for the relationship between the price of a consumer good and the characteristic embodied in that good.

Unneverh (1986) evaluated quality characteristics to test the importance of quality measures and to estimate the returns to quality improvement with few additional research resources. By using hedonic price measures, he developed a relatively simple way to rank the potential quality improvements and to demonstrate the importance of those improvements to consumers.

Palmquist (1989) extended the model to differentiated factors of production. However, hedonic models to date have assumed perfect competition and cost information. Both buyers and sellers are aware of potential bids and offers for the differentiated product. In some markets this wealth of information is not available and third-partied may have a role in expediting some transactions.

Echeverria (1990) pointed out that the hedonic or implicit prices of quality characteristics are easy to estimate from market samples. After these estimates have been made, they are then interpreted to provide a measure of the value of different quality characteristics to consumers. These values estimate the returns to research for improving quality and can be used to set research priorities by ranking the importance of potential quality improvements and assessing the benefits of research to improve quality in addition to improving potential yield. Munn and Palmquist (1999) examine private timber sales by using a hedonic model. Timber tracts can be views as differentiated factors of production used in the manufacture of lumber, pulp and paper and other forest products. The hedonic pricing model assumes perfect competition; a market structure with assumed conditions that are often not appropriate for timber markets.

2.4.4 Budget Analysis and profitability

The operating budget can be defined as a realistic statement of income and cost objectives for a year. It is a plan against which the ensuing actual performance is compared so as to achieve control by detecting and correcting off-standard performance. The broad term "budget," with its concept of a plan used to control, is applied to many areas, such as inventory, capital investment, and cash flow. But we are concerned here specifically with the kind of budget that is used by an operation as a whole for a specified period of one year. The budget will include income and operating costs and, by deduction profit. Again, operating costs include all the costs required to perform their functions (Matthews, 1977).

Crump and Umord (1972) evaluated the dairy industry in Thailand. This study applied budget analysis to test profitability on dairy farms. The budget on farms was calculated from such inputs such as cows, feed, labor wages and so on. One of the

measures of the profitability is the cash surplus. It is cash income minus cash expenditure.