A FRAMEWORK FOR IDENTIFYING THE INDICATORS FOR THE IMPACT EVALUATION OF THE GAINEX PROGRAM

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Abstract

This paper attempts to provide a framework in identifying the indicators for the impact evaluation of development programs. The suggested framework is then applied to a particular development program undertaken by the Department of Science and Technology (DOST) called Gain Export Program (GAINEX).

The ultimate purpose of the framework developed in this paper is to provide a system of evaluating each project, anticipate data requirements needed for a pipeline project most likely to be approved by an implementing agency, and facilitate project monitoring vis-à-vis its stated objectives.

I. Introduction

Program monitoring and evaluation is an essential function of program management because it provides a basis for decision making, it makes managers accountable in the use of resources, and it guides future development as a result of lessons provided by experience.

This paper attempts to provide a framework for identifying the indicators for the impact evaluation of development programs. Section II gives a brief description of conceptual issues on measuring impact. Section III describes the link between SMEs and technology. Section IV discusses the program indicators. Section V gives an illustration of project indicators to be monitored and evaluated. Section VI elaborates on the problems and issues on measuring performance indicators. And Section VII presents the conclusions.

II. Some Conceptual Issues

The conceptualization and implementation of development programs are evaluated on their potential impact. Although the literature on program and project assessment, monitoring and evaluation is vast and intersects various disciplines, the focus of this section is to highlight the characteristics of some traditional impact measures.

Feasibility studies are the common measures

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of program impact. However, the limitation of feasibility studies is that it usually ignores the distributional impact of a program. It is also unable to tackle program and projects with multiple objectives[1], and its over-dependence on market-determined prices of inputs and outputs leads to a concept of efficiency that is closely tied to the status quo (Lim and Prieto, 1979). Community profile which is a description of social system in a potential location of programs is another measure of impact. It provides a valuable mechanism for a thorough understanding of the system involved. The third measure would be social indicators. They are used on the assumption that traditional economic indicators are unable to measure the social and welfare impact of a program. For instance, a program may have succeeded in raising the per capita income in a community, but the incidence of malnutrition, unemployment, and poverty has increased simultaneously with the income measure. And the fourth measure is case studies which provide an in-depth documentation of impact as well as better understanding of interactions, but its results cannot be replicated or generalized to a wider population (Alburo, 1981).

The impact indicators suggested in this paper are a combination of economic and social indicators. They are chosen in terms of its ability to satisfy the criteria for measuring the relevance, performance, and success of a program. These require the following tasks: (1) the measurement of effect variables on intended beneficiaries, (2) the definition of unit of measurement and selection of time frame in order to isolate changes taking place among impact variables, and (3) the choice of a method to be able to attribute to a specific intervention (in whole or in part) the program and project effects (UNDP, 1997; Alburo, 1981).

The approach to program evaluation adopted in this paper avoids the shortcomings of past approaches by using multiple indicators to program evaluation. For instance, the use of both economic and social indicators captures the dimensions that are neglected by using only one type of indicator.

III. Technology and SMEs

Small and Medium Enterprises (SMEs) play and important role in the Philippine economy. In 1993, SMEs contributed 68.3% of total jobs generated by all types of business establishments (Yushita, 1996). More than 90% of the total number of enterprises belong to SMEs (Salazar, 1996) accounting for approximately 20% of total output (Hooley and Ahmad, 1989). The government recognizes the importance of SMEs in economic development by providing support in terms of training, credit facility, and marketing assistance. The most popular route of technology transfer from foreign companies to SMEs in the Philippines is through the suppliers of machinery and equipment. This is particularly true among SMEs in the metalworking industry. In the garment industry, the most popular mode of technology transfer to SMEs is through subcontracting arrangement where the mother company provide local subcontractors some technical know-how through specific guidelines on the use of sewing machines for a given type of product. In most instances, the mother company in a subcontracting arrangement is simply a provider of raw materials and marketing infrastructure rather than technology. In the food industry, SMEs acquire technology through learning-by-doing approach.

SMEs face several problems to acquire technology or to engage in R&D. Among these problems are: (1) lack of funds, (2) insufficient information, (3) lack of skills in evaluating alternative technologies, (4) lack of technical know-how to shift to more advanced technologies, (5) inadequate mechanism for transfer of technologies, and (6) inertia of entrepreneurs because of no perceived or actual need for technology.

Common factors affecting the choice of technology at the SME level are: (1) objectives of the firms are such that long-term planning and strategic concerns are less important than coping with day-to-day operations. Management decisions are more intuitive (trial and error) rather than analytical. Thus, simple imitation based on observation is common especially in relatively simple activities, (2) capability of the enterprise to source, evaluate, and adjust to new technologies, (3) capability of entrepreneurs to assess and anticipate market trends which may require a change in technology, (4) access to credit, suitable premises and other infrastructure, and (5) macropolicies which also affect technology choice at the firm level through the overall socioeconomic, political, and legal forces.

The current policy debate focuses on whether policy intervention employed to demonstrate the feasibility of demand-driven technology acquisition is more relevant compared to a policy of providing seed money for venture finance institutions which aim to assist and promote SMEs in the advanced technology areas (Magpantay, 1997). The performance of an existing venture finance company in the country indicates that there are more seed money and no qualified S&T SMEs have availed of it because the screening system is based on tangible asset collateral. The experience of other countries has shown that scientists and engineers in major companies that benefit from technology transfer and skill training in these firms are the usual founders and initiators of technology-based SME ventures in emerging and industrial markets. Appreciation of currencies, increasing land rents, and maturity of conventional product markets have transformed the role of SMEs from simply providing new job opportunities and promoting local industries to developing supporting industries which provide effective sources of parts and components to local and foreign final product manufacturers. This is the market that makes technology-based SMEs viable in developing economies. Encouraging or prioritizing SMEs in the advanced technology areas to locate in Science and Technology Parks might support the supply-push strategy, but its viability is not sustainable unless a market for its innovations exists and local firms go through the learning process.

IV. Program Indicators

In the process of determining the indicators for program monitoring and evaluation, the three interrelated dimensions of relevance, performance, and success must form the substantive focus of results-oriented monitoring and evaluation of development programs (UNDP, 1997). Table 1 defines the three dimensions and indicates the criteria of success for each dimension.

The framework suggested in Table 1 is applied to a development program of the Department of Science and Technology (DOST) called Gain Export (GAINEX) Program. Table 2 presents the possible indicators for the GAINEX Program.

The GAINEX Program was adopted by the DOST to address the export winner component of the Science and Technology Agenda for National Development (STAND). Under funding assistance from the United Nationals Development Programme (UNDP) it focused its activities on three export winners, namely, fruits, marine products, and metal fabrication. Dynamic technological initiatives and demand driven efforts were made towards making these three export industries internationally competitive.

The three dimensions of relevance, performance, and success are adopted as the monitoring and evaluation framework of the GAINEX program because it examines the degree to which the objectives of the program remain pertinent, compares the progress being made relative to its objective, and monitors the results of the program with reference to its development objectives. For instance, the objective of achieving international competitiveness of the fruits, marine products, and metal fabrication industries remains valid even under an environment of high oil prices and depreciating foreign currencies affecting the Asian region. Measures of performance and success are important in order to provide a common framework for evaluating succeeding industries that would be included in the GAINEX Program.

In achieving the goal to strengthen the technological capabilities of export-oriented SMEs for international competitiveness, the GAINEX Program selects the set of activities that satisfies the following policy thrusts of DOST:

1) Public-private partnership in technology research, development, utilization, acquisition, and dissemination.

2) Public-private cooperation and consultation in determining the priorities and directions of R & D, human resource development, deployment of Science and Technology (S& T) infrastructure, technical assistance and institutional arrangement.

3) Establishment and expansion of market-driven S & T services and facilities.

4) S & T policy guidance, technological assessment, monitoring and forecasting.

The UNDP programme support for the implementation of the GAINEX program specifies that monitoring will be made on an annual basis which is consistent with the yearly frequency of data collection for all indicators identified in Table 2. The conduct of baseline survey is needed to measure the indicators of success of a development program (i.e. GAINEX Program) which are used to monitor and evaluate progress on an annual basis.

The literature on impact assessment (UNDP, 1997; UNDP, 1995; Alburo, 1981) has utilized simple statistical tools to analyze data in order to judge the impact of a program. These methods include index number, ratios, proportions, simple tabulations, growth rates, test of differences between means, dispersion and frequency distributions. These tools are useful in determining whether measures are significantly different from situations before program or project. In addition, UN/ESCAP (1989) provides a framework for a qualitative assessment of the technological capability of an industry in a given country.

Indicators specified in Table 2 cover the following concerns: target groups and objectives (e.g. fostering government-private

sector cooperation), effectiveness, efficiency, impact, sustainability, and contribution to capacity development after the termination of the GAINEX Program.

The indicator on the increase in the number of private firms (e.g. SMEs) benefiting or involved in government-private strategic alliances is intended to indicate the relevance of the GAINEX Program to its target beneficiaries. The indicators on growth in the size of related industry clusters and number of jobs created by export-oriented SMEs are measures of effectiveness. Efficiency is measured in terms of the cost of technological intervention per job created.

Impact indicators are represented by productivity measure and increase in income from jobs created in fruits, metals, and marine industries. Sustainability indicators are represented by: (1) the number of viable SMEs (in fruits, metals and marine industries) two or more years after the completion of the GAINEX program, and (2) the number of persons, associations, and enterprises affected or influenced by the GAINEX program. The measure on enhanced capability of DOST to manage the GAINEX Program is intended to measure contribution to capacity development.

The GAINEX Program is a government initiative in support of vitalizing innovation systems and fostering product differentiation among private sector enterprises. Therefore, the objective measure against which the indicators can be compared should not be based on any external, absolute or "benchmarking" standard. Rather it should be based on the standard of success as formulated in the GAINEX Program. The GAINEX Program defines success if government interventions will result to actual increase in the variable monitored, actual increase in R & D expenditures, actual productivity improvement, actual quality improvement, and so on (Sharif, 1995). The project can be relevant if there is an actual increase in the number of private sector enterprises involved in the program, regardless of the total number of enterprises that can be potentially reached. In addition, there are existing data of the total number of enterprises that could be reasonably reached. The evaluation of the indicators should be understood in this context. The paper does not use a simple cost indicator. Instead, it uses a cost-effectiveness indicator. The project with a decreasing trend in cost-per-job-effectiveness indicator or has the best cost-effectiveness indicator among projects is considered a desirable project. Lastly, total factor productivity (TFP) measures are always evaluated in terms of before-and-after test not against a certain benchmark. A country, community, or project that has a TFP of 3% means that it has improved the standard of living by 3%, regardless of how fast the other countries, communities or projects are growing[2].

V. Project Indicators

In the selection of project indicators, the following criteria are considered (Gonzalo, 1979): (1) the indicator should capture the social benefits or social cost brought about by the project on a given issue or area, (2) the indicator is simple and easily monitored (3) the indicator is numerically defined and impact (positive or negative) is easily determined by any change in its numerical value, and (4) data requirements can be satisfied by standard sources (e.g. surveys or government statistics). Project indicators are shown in Table 3.

One of the capability-building targets of the GAINEX Program is to develop and upgrade existing skills to create a better environment for innovation. The Management of Technology (MOT) project aims to satisfy this target by: (a) designing and implementing short-term training programs to improve awareness, understanding, and practice of MOT in industry and government, (b) developing technological capability to manage demand-driven technologies, and (c) building the institutional capability of DOST to conduct S & T policy analysis, assessment, monitoring, and forecasting. The expected outputs of the project are: (a) the conduct of training programs designed for (i) management personnel of executing/implementing agencies and private sector project cooperators who are directly involved in the GAINEX Program, and (ii) SME personnel in fruit, metal fabrication, and marine industries; (b) the impact assessment of the training programs with recommendations on how to replicate the pilot training programs in other SME export industries, and (c) development of instructional materials such as local case studies on MOT for use in the teaching of MOT in local institutions.

The design and conduct of MOT training programs to target clientele must be supplemented by information on the quality in the delivery of MOT services, on the scope of services provided, and on the nature of collaboration between DOST and MOT institutions.

The management of technology (MOT) project proposal assumes that there is a need for short-term training and seminars on MOT. But it does not answer the question why the government has to intervene. Are there private institutions which can deliver these services for a fee without any government or foreign donor subsidy? The indicators identified in Table 3 for MOT are focused on "justifiable intervention" such as development of instructional materials on MOT, building competence for MOT institutions, and building capability for industry-government-academe linkage on MOT-related activities.

Lastly, in the Management of Technology (MOT) Project, the relevance indicator on the number of government employees taking MOT seminars is measured by the absolute number of training participants (and growth rates). The number of SME personnel undergoing MOT training is measured by the ratio of participants to targetted export-oriented SME personnel. And the performance indicator on cost-effectiveness per MOT trainee is measured by the ratio of cost per trainee relative to the salary he receives during the training period.

VI. Problems and Issues

The preference for specific, measurable and relevant indicators has also created some problems. One problem is the difficulty of attaining controlled conditions in order to measure the impact of the GAINEX Program. Thus, the effect of external factors can complicate the interpretation of the effect of policy interventions being examined. At best, our suggested measures are best-effort approximations to the true effect.

There is also a need to understand the processes by which policy interventions are affecting the intended objectives or targets. And another concern is to develop a model to capture and appreciate the interactions among the program or project indicators.

The distinction between direct impact and indirect impact is another methodological problem. The immediate effects of the program or project on the objectives or targets are considered direct impact. Indirect impacts are secondary effects which are affected by intervening variables. In this paper, the indicators identified are not just to measure impact, but also to capture other criteria such as relevance to objectives, effectiveness, efficiency, timeliness, sustainability, and contribution to capacity development.

The issue of identifying assumptions and risks related to any given project is an important concern in project monitoring and evaluation. Thus, in addition to the list of program and project indicators, sources of data, and methods of analysis suggested in this paper, the question of how to use these indicators or how to explain differences between target and performance will depend on what initial assumptions were made and what risks are faced by the GAINEX program.

Feasibility studies are useful measures of project impact especially on economic and financial viability of MOT projects. Furthermore, since the MOT project examined here has multiple objectives, feasibility studies may not be able to capture total project impact.

A critical research problem is the dearth of material on identifying indicators for monitoring and evaluation of programs and projects in developing countries.

Moreover, the kinds of analytical techniques that can be applied are to a greater extent determined by the nature and availability of data. In this paper, the construction and formulation of program and project indicators are heavily dependent on the availability of project data and baseline survey. Qualitative data are useful in developing community profiles, case studies, and institutional analysis which are part of the evaluation methods suggested in this paper.

These problems and issues will definitely affect the interpretation of the suggested project and program indicators. To minimize the distortive effects of these methodological problems on the resulting indicators, the effect of external factors can be addressed by specifying the risks and assumptions related to a given project. For instance, under the assumption of an inflation rate of 8.5% and an exchange rate of P45.35 to a dollar, will the project look good if inflation rate is actually 4.7% and exchange rate at P48.50 per dollar? However, both direct and indirect impacts are captured by the approach suggested in this study. For instance, direct impact is captured by the productivity improvement observed among SMEs in the target export industries as a result of the demand-driven technological development and transfer policies of the GAINEX Program. The indirect effect refers to the increase in investment flowing to a technologically dynamic and highly productive SMEs in the fruits, marine products, and metal-fabrication industries. Thus, this perspective of formulating development indicators should provide a good approximation of the true effect.

VII. Conclusions

The approach of this paper is simply to identify the indicators that will provide the critical link between the program or project objectives and the types of data that need to

be collected and analyzed through monitoring and evaluation. UNDP (1997) suggests this framework.

As an initial attempt to identify program and project indicators for the GAINEX Program, the ultimate intention of this paper is to provide a framework to evaluate each project and to anticipate the data requirements needed for a pipeline project most likely to be approved by DOST and UNDP. This framework is useful for monitoring purposes. For evaluation purposes, the framework will have to identify assumptions and risks inherent in the projects to be able to explain whether deviations between performance and target indicate failure or success.

Despite conceptual and measurement difficulties, monitoring and evaluation indicators provide a basis for understanding social, economic, and environmental interventions, and to generate estimates and analyses as basis for policy decisions.

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Table 1
Three Dimensions of Program Assessment

Definition	Criteria
1. Relevance: Examines the degree to which the objectives of a program remain valid and pertinent either as originally planned or as subsequently modified owing to changing circumstances.	• Development issues, problems and priorities at the local/national/regional/global levels • Target groups • Direct beneficiaries
2. Performance: Looks at the progress that is being made by the program relative to its objective.	• Effectiveness • Efficiency • Timelines of inputs and results
3. Success: Refers to the results of the program with reference to the development objectives or long-term goals.	• Impact • Sustainability • Contribution to capacity development

Source: UNDP, Results-Oriented Monitoring and Evaluation (1997).

Table 2
Program Indicators for GAINEX Program

Dimension	Indicators	Sources of Data	Frequency	Methods of Data Analysis
A. Relevance	• Number of private sector enterprises involved in government-private sector cooperative R&D undertakings	Survey Data/ Industry Associations	Yearly	- Number of Cooperative Activities - Scope and Nature of Collaboration
B. Performance	• Growth in the size of related industry clusters	Survey Data/ Industry Associations	Yearly	Ratio of local content to total product lines
	• Number of jobs created by export-oriented SMEs	DTI-SMEDC	Yearly	Absolute figures and growth rates
	• Cost of technological intervention per job created	DOST, UNDP, NSO	Yearly	Ratio of cost of policy intervention to total jobs created in targeted sectors
C. Success	• Increase in productivity	NSO	Yearly	Ratio of output to total inputs in targeted sectors
	• Increase in technology-based SMEs that have been profitable 2 years or more after the GAINEX Program	Survey Data	Yearly	- Growth in Output - Rate of Return on Investment
	• Quality of Delivery of Services	Survey Data	Yearly	Length of Time Elapsed Between Design and Delivery of Improved Varieties.
	• Increase in people's income from jobs created by fruits, marine and metals industries 2 years or more after the GAINEX Program	Survey Data	Yearly	Index Numbers
	• Actual number of additional persons, associations, and organizations covered by various activities of GAINEX	DOST-UNDP	Yearly	Absolute figures and growth rates
	• Enhanced capability of DOST to manage the GAINEX Program	DOST-UNDP	Yearly	Proportion of in-house policy studies and operational guidelines

Table 3
Management of Technology Project Indicators

Dimension	Indicator	Sources of Data	Frequency	Methods of Data Analysis
A. Relevance	• Number of gov't. employees taking MOT seminars	Project Data	Yearly	Absolute figures and growth rates
	• Number of SME personnel undergoing MOT training	Project Data	Yearly	Ratio of Participants to Targeted SME Personnel
B. Performance	• MOT case studies	Project Data	Yearly	Case Analysis
	• Cost-effectiveness per MOT trainee	Project Data	Yearly	Ratio of Cost Per Trainee to Salary Received During Training Period
	• Locally developed MOT training materials	DOST-UNDP	Yearly	Content Analysis
C. Success	• Technology management strategies of MOT-trained SMEs	Project Data	Yearly	Strategic Analysis
	• Incidence of self-generating MOT training programs	Survey Data	Yearly	Case Study
	• Capability of DOST-PES to conduct S&T policy analysis, assessment, monitoring and forecasting	Interviews	Yearly	Institutional Evaluation
	• Industry-government-academe MOT linkage program and cooperative undertakings three years later	Interviews	Yearly	Institutional Evaluation

ENDNOTES

[1] Encarnacion (1979) argues that projects with multiple objectives can be tackled by employing the lexicographic utility function where objectives can be ordered according to priority or importance and the objective function is optimized subject to the condition that more important objectives are attained.

[2] See UNDP (1997) for a more detailed description of the program-indicator framework used in Table 2.