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APPLICATION OF PROGRAM LOGIC MODEL TO AGRICULTURAL TECHNOLOGY TRANSFER PROGRAMS

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Abstract: Program logic models have provided a method of schematically presenting program objectives and the underlying cause-effect relationships between activities and outcomes. This article presents a model that explicitly recognizes the ultimate societal-level benefits, and also accommodates identification of outputs, performance indicators, and targets for all levels of objectives. The model is illustrated with a hypothetical agricultural technology transfer program, and some anecdotal observations are presented from the author's work with public-sector program managers and staff.

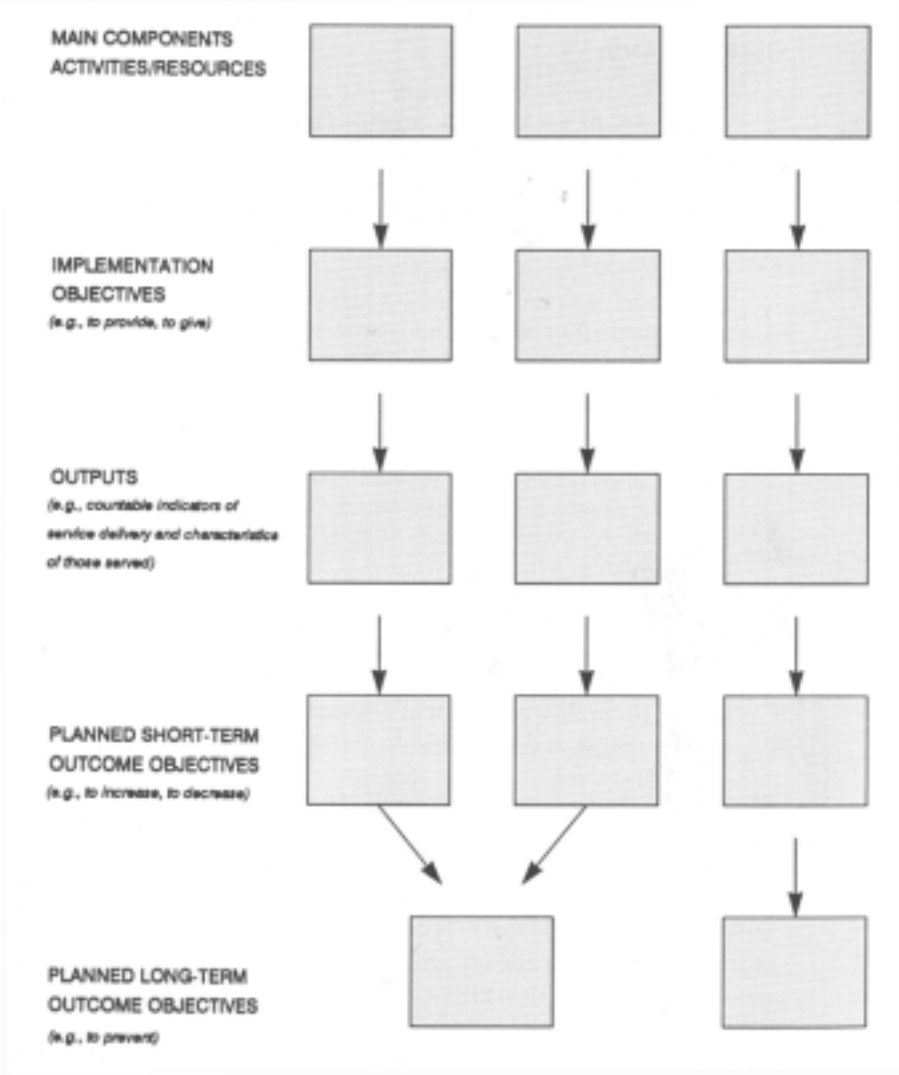
Résumé: La modélisation logique de programmes est une méthode servant à illustrer de façon schématique les objectifs et les relations de causes à effets que comportent les activités et leurs résultats. La présente étude offre un modèle qui reconnaît explicitement les avantages ultimes pour la société en même temps qu'elle permet d'identifier les rendements, les indicateurs de la performance et les cibles à tous les niveaux d'objectifs. On a illustré le modèle grâce à un programme hypothétique de transfert de technologie agricole ainsi qu'à des observations anecdotiques recueillies par l'auteur au cours de son travail auprès de gestionnaires et d'employés du secteur public.

Program logic models, in various evolutionary manifestations from the early 1960s to the present, have afforded a method of schematically presenting program objectives and the underlying cause-effect relationships between program activities and objectives. Rush and Ogborne (1991) trace this evolution and introduce a model that has implementation and outcome objectives separated by program outputs (Figure 1).

The traditional adoption and diffusion model, underlying most agricultural technology transfer programs, identifies five stages in the

process individuals go through in adopting new technology: awareness, information-gathering, evaluation, trial and adoption (Blackburn, 1989). Conceptually, these are easily divided into short- and long-term outcomes, with awareness and knowledge change achievable in the short term and behavior/practice change being

Figure 1
Basic Structure of Rush and Ogborne's Program Logic Model



longer term. An underlying assumption in these models is that achieving the desired changes will lead to benefits for society (e.g., economic, social, or environmental). The auditor general of Canada (1993) makes it clear that explicit recognition of these societal-level results is an important element for public-sector programs.

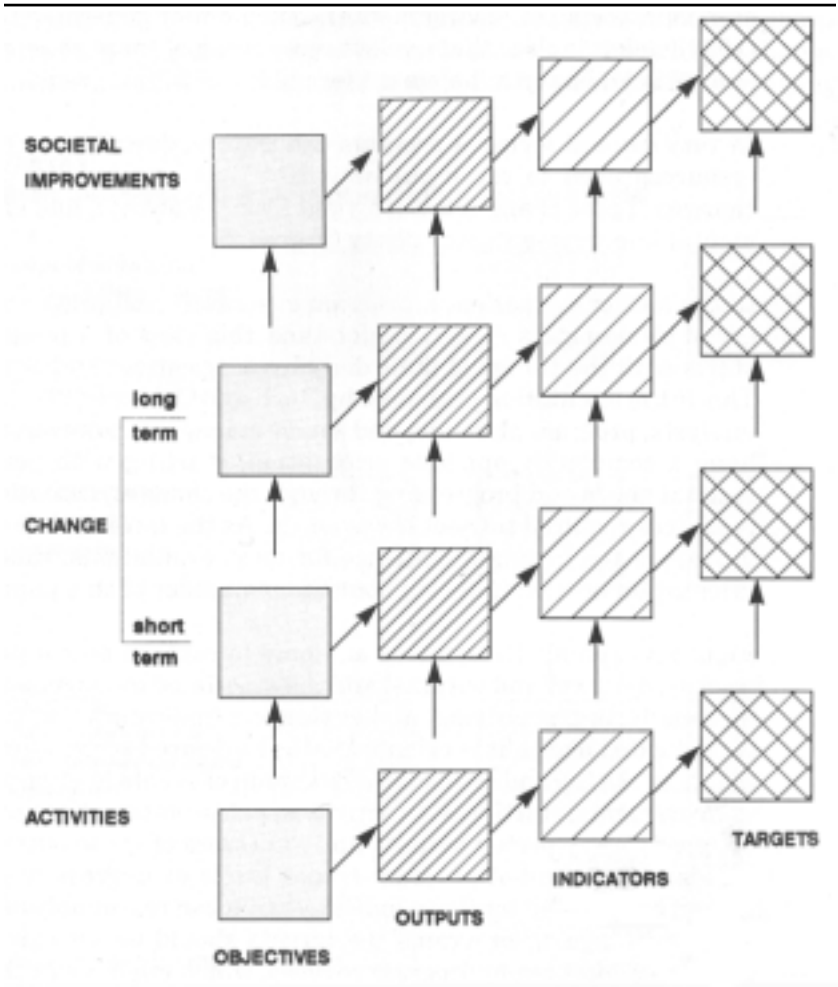
In very general terms, a program can thus be described as a set of resources used to carry out activities that bring about desired changes. These changes in turn yield social, economic, and environmental improvements for society (Figure 2).

In the author's experience, program evaluators and program delivery staff/managers readily understand this view of a program. It starts with the things of their daily lives, resources and activities. This is the orientation presented by Rush and Ogborne (1991). Policy analysts, program planners, and senior managers, however, tend to have a completely opposite orientation, starting with perceived societal needs and progressing through the changes, activities, and resources required to meet those needs. As the latter group of individuals is the ultimate audience for most evaluations, this is the orientation presented throughout the remainder of this paper.

Figure 3 expands the general anatomy to capture how a program works (objectives and outputs) and the associated management tools for monitoring, modifying, and evaluating (indicators and targets). As indicated above, it is oriented with the desired societal improvements at the top and the cause-effect chain of events leading to those improvements, starting with activities, at the bottom. For each level of objectives, expected outputs and indicators of those outputs can be identified. End-of-program target levels or degrees of change should be specified for those indicators that can reasonably be measured. For ongoing programs the targets should be set chronologically to support major program reviews, which might be at three- to five-year intervals.

Figure 2
Gross Anatomy of a Program

Figure 3
Gross Anatomy and Physiology of a Program



TERMINOLOGY

Arriving at a common understanding of terminology has been a necessary first step in working with program staff to construct a logic model. Objectives, outputs, indicators, and targets at the activity level have tended to be viewed by program staff as *operational* elements. At the short- and long-term-change levels they have been recognized as *impacts* of carrying out the activities. At the societal

improvement level two terms have evolved: *program goal* has been associated with objectives, and outputs, indicators, and targets were viewed as *effects* of the program impacts. Figure 4 presents a list of these terms with their equivalents from the generic model illustrated in Figure 3.

APPLICATION

Real-life programs tend to have several *components*, each addressing a different area of change with unique activities and resources, and thus having unique objectives, outputs, indicators, and targets. The minimum unifying element for components of a program is the program goal, and the minimum differentiation is short-term objectives. Components will sometimes share long-term objectives.

Having multiple components to accommodate expands Figure 3 into a three-dimensional matrix, with *levels* (operational, impact, goal/effects) on the vertical axis, *layers* (objectives, outputs, indicators, targets) on the third-dimension axis extending to the back, and *program components* on the horizontal axis. For presentation purposes, this can be divided into a series of related two-dimensional matrices, along either the levels or the components axis. Dividing along the levels axis presents a complete view of program components at each level, and dividing along the components axis presents a view of all layers for each program component. Figures 5–7 illustrate the application of this model with a fictional, sustainable agriculture program, using the layer division approach.

Figure 4
Equivalent Terms for Levels in Cause-Effect Chain

Figure 5 presents the program goal, impact objectives, and operational objectives for the two program activities, research and extension. Research creates new technology and knowledge. Extension transfers the knowledge to farmers, who then adopt the new technology, thereby creating a more sustainable agricultural production system.

Figure 5
Sustainable Agriculture Program Goal and Objectives

Figure 6 presents the operational outputs, short- and long-term impacts, and program effects for each of the program activities. In generic terms, these are all outputs related to the corresponding cell in Figure 5.

Figure 7 presents both the results indicators and targets for the two program activities, again corresponding cell by cell to the previous matrix. This figure is often viewed by program staff as the most

Figure 6
Sustainable Agriculture Program Outputs, Impacts and Effects

important, because it sets up the criteria by which success will be measured. The relative importance of results indicators at different levels will generally change over time. Operational results will be most significant and program effect indicators the least significant at the beginning of a program, but this ranking will be reversed by the end. This should be reflected by the amount of progress toward

Figure 7
Sustainable Agriculture Program Results Indicators and Targets (*)

* (Items in brackets are end of program targets.)

program targets expected in each planning period, and documented in successive operational plans.

OBSERVATIONS

The following observations are based on the author's work in program planning and evaluation and in constructing logic models with program staff and management of four Ontario government ministries and one federal government department.

1. Program logic models are constructed, for the first time, to facilitate program evaluation.
2. It always takes more time than anticipated to construct and verify a program logic model.
3. Constructing the logic model often creates, for the first time, a common understanding of the program objectives and expected benefits among program staff and managers. All staff involved agree that the model would have been much more valuable if done at the beginning of the program.
4. Operational objectives and outputs are critical to program staff, as these are the elements they can directly influence.
5. Distinguishing between program *impacts* and *effects* can be a challenge. Do not overemphasize the importance of the words. Use whatever works to communicate the distinction between knowledge/behavior change and ultimate societal benefits.
6. The appropriate level of detail (aggregation of activities into components) depends on the intended use of the model. Clear identification of intended use at the beginning can help avoid the general tendency toward excessive detail and reduce the time required to construct the model.
7. Orientation of the model (program goal at the top or the bottom) should be consistent with that of the intended audience.
8. Programs tend to be dynamic, changing in response to new knowledge and circumstances. Particularly with ongoing programs, a logic model could describe what the program was originally intended to be, what it is, or what it might be in its next iteration. Any one or more of these could be legitimate and useful outputs of an evaluation, as long as the distinction is clear.
9. The implied time dimension going from operational through short- and long-term impact to effects can be misleading in

two respects. First, it can mislead because operational activities are carried out, and may change, throughout the life of a program. Resist the temptation to depict this by mixing operational elements with short- and long-term impacts. The second area of confusion is the fact that some people will be at the adoption stage when others are still at the awareness stage. Again, avoid mixing short- and long-term impact concepts. Recognize that there is a time dimension within each program level, and that activities/achievements can be happening at all levels at the same time.

10. Constructing a program logic model instills in program staff and managers a structured framework for thinking about programs that they find carries over into other programs and areas of their work. In time this could prove to be a significant factor in improving the efficiency and effectiveness of public-sector programs.

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