# OPTIONS FOR COST ANALYSIS

by Paul Brinkman

Many kinds of cost analysis are possible. Indeed, given the variety of purposes, methods, and types of cost, the number of permutations is virtually unlimited. In broad terms, one can disaggregate the universe of cost studies by distinguishing whether their primary purpose is to determine costs or to explain costs or to evaluate costs. Of course, costs cannot be explained or evaluated until they have been determined, and the difference between explanation and evaluation is not large. Still, the distinctions are useful in thinking about and planning for possible cost studies.

Cost determination studies are essentially exercises in 1) finding suitable records of pertinent expenditures or of material and human resource usage, and 2) allocating those expenditures or resources to cost objectives (such as a department, activity, or outcome). Accountants refer to procedures for undertaking these activities as "cost finding principles." It is important to grasp the implication in that phrase. Cost data typically do not lie about waiting to be used--they have to be found, or determined. This basic circumstance and the fact that allocation is so often needed in the process of determination are the reasons behind the adage that prices and expenditures are facts, costs are opinions.

The activity of determining costs is sometimes referred to as "constructing costs." As such, it resembles developing a budget by listing required resources and their respective prices. An important difference between a budget and a cost study is that the latter may (depending on the cost objective) reach out well beyond the confines of a particular budget center to include expenditures or resources that may appear in the financial records as part of some other budget center(s).

An important methodological consideration for any proposed cost analysis is the nature and degree of required allocations. In some instances, there is general agreement as to how to allocate a particular type of cost. In other instances, there is little or no agreement. The less the agreement, the more vulnerable and open to challenge are the results. For example, a cost study that sets out to determine costs per credit hour for graduate education will typically be easier and less subject to challenge than one that sets out to determine credit-hour costs for masters versus doctoral education--because of the additional and usually quite difficult task of allocating resources used to produce masters versus doctoral credits. Similarly, a cost study that focuses on direct costs only will usually be less subject to question on allocational grounds than one that attempts to determine full costs (direct plus indirect). This does not mean that the more difficult analyses should be avoided. It does mean that there should be good reason to do them.

Sometimes, and this might frequently be the case in a state board, the allocation will have already been done by someone else (for example, someone at the institutional level). In this case, an early step in any subsequent analysis is to ascertain how the allocation was done.

Explanatory cost analyses are designed to make costs more understandable, to figure out why they behave the way they do. The ultimate objective can be the understanding itself, as might appeal to the researcher, or the control that often comes with greater understanding, which is of interest to those who have policy making or managerial responsibilities. The analytical approaches in these studies generally take one of three forms: inferential statistical techniques, a direct examination of potential causes of historic costs (call it "managerial analysis"), and modeling, or engineering like, techniques.

The primary statistical technique is some form of multiple regression, which is used to estimate a particular form of what economists call the "cost function." In the most typical version of this approach, costs (total or average) are regressed on measures of output, prices, and technical conditions. The primary objective is to understand the relationship between costs and the volume of output. Prices and technical conditions (for example, case mix for hospital costs, program mix for instructional costs) are in the equation because they are intervening variables; the statistical technique allows the effects of these variables to be neutralized.

Although it is used mostly in an explanatory mode, the regression approach is also useful for determining costs. It offers a way to estimate parameters, such as marginal costs, or the costs of jointly produced services, that are otherwise very difficult to determine. However, the nature of the technique is such that the determination can never be anything other than an estimate. By driving a plane through a multidimensional scatter of points, regression analysis develops data about average behavior. Other forms of statistical analysis focus on the boundaries of the scatter plot. These studies are generally known as frontier analyses. They typically employ linear programming techniques. The lack of good data on, and agreement about, higher educational outcomes is one reason why these studies are quite rare. Obviously, there are implications for basing policy on average behavior versus frontier behavior.

Perhaps the best known example of an approach to managerial cost analysis was developed by cost accountants interested in higher education (Robinson, Ray, and Turk, 1977). They showed how historical costs could be usefully understood in terms of the effects of volume, decisions or policies, and the environment. For example, an increase in average costs per student in a particular department might have been the result of a drop in enrollment or a decision to add to the faculty complement or an increase in the cost of supplies.

Cost models can be simple or complex. The essential idea is to first disassemble the whole into its parts, and then to examine the consequences for costs of reassembling the whole in alternative ways. The "whole" could be a curriculum, or some large component thereof, as is the case in the best known example of this approach to cost analysis, the work done by Bowen and Douglass (1971) on various ways of providing a liberal arts curriculum. The first series of computer-based simulation models, such as TRADES, CAMPUS, and RRPM, which were popular during the 1970s, are in a sense a type of cost analysis, or at least can be used as such, and the same can be said for EDUCOM's EFPM, a financial modeling language, which dominated the early 1980s. At present there are innumerable microcomputer software products that can be used to facilitate the simulation, or "what if," approach to understanding cost behavior.

Evaluative Cost Studies often share many of the same procedures with explanatory cost studies. The difference is more one of intent than of method, with one exception and that is the role played by outcomes. The question of outcomes lingers about explanatory studies but is front and center in evaluative studies. This is not to say that it is not finessed in the latter as well as in the former–in part because decisions must often be made in the absence of full knowledge. But psychologically it is often more difficult to do so in the evaluative than in the explanatory context.

Efficiency studies are the generic form of what is meant here by evaluative cost studies. Efficiency is measured as cost per unit of outcome. Cost studies are perhaps most often thought of in connection with the concept of efficiency, or conversely, inefficiency and waste. In reality, actual tests of efficiency are difficult to accomplish in a strict sense because they require measurement of outcomes and because higher education outcomes are notoriously difficult to define, much less measure. Oftentimes, however, outcomes are handled reasonably

well through proxies and assumptions. The purist may argue that one is left more with the structure of an efficiency measure than its substance, but that may be sufficient for some management purposes. An illustration: A coordinating board routinely determines costs per student credit hour for undergraduate instructional programs for all of the institutions within its purview. Programs that fall outside of certain cost parameters, such as a range about the mean value, are subject to further scrutiny. In this instance credit hours earned is used as a proxy for outcomes and it is assumed that credit hours are equivalent representations of outcomes (or output) across operating units.

Several variations of the generic efficiency study can be distinguished. For example, a study can be designed explicitly to compare the costs of alternative courses of action with the expressed purpose of assisting in the choice between them. An illustration: A state board compares the cost of buying slots in a program offered by a university in the independent sector with the cost of developing a similar program in a public sector university. Alternatively, to carry the last illustration further, the board could formally and rigorously address all of the respective outcomes of the two choices as well as the costs. If they were to translate those outcomes into dollar terms, the study would be labeled a "cost-benefit" analysis. If the board elected instead to assess outcomes with some common measure of effectiveness (such as a test score), the study would be labeled a "cost-effectiveness" analysis, using fairly standard terminology (Levin 1983).

The purpose of a cost study is closely related to what is called the "cost objective," or the subject matter of the cost analysis. Three types of objectives are predominant: functions or activities, organizational units, or resources (objects of expenditure). Functions can be defined broadly or narrowly and can relate to any portion of the activities included within higher education. For example, institutional support, a fund accounting category, represents a broad category of activities. Institutional cash management, which falls within institutional support, is much narrower and is unlikely to be a category within most accounting systems--which does not mean it could not or should not be the subject of a cost analysis. Organizational units are often the subject of cost studies. These same units tend to be budget centers; thus expenditure and resource data are often readily available--depending on the type of cost to be analyzed (for example they would be more readily available for direct rather than for full costs). Cost studies by function or by organizational unit may present costs in the form of resources (inputs) as well as, or instead of, expenditures, but the resources themselves can also be the objective of the study. For example, one might examine the change in average faculty salaries over time. Or one might examine the ratio of support staff to faculty, or the change over a decade in the share of educational costs going to non-personnel items.

Largely unexplored except in implicit ways, higher education goals or state goals for higher education could, at least in principle, be the cost objective. For instance, a state board could attempt to determine the cost of efforts to provide access or to further regional economic development. Taking a state perspective on costs, rather than an institutional perspective, makes a difference with respect to the cost objective. There are issues of particular concern to the state, such as state goals for higher education, that are less interesting to institutions or take a different form when looked at from the perspective of an individual institution. Access and economic development come most immediately to mind. These broad goals would have to be reasonably well defined and broken down into their components before an analytic costing strategy would have much chance of emerging. For instance, access could be defined in reference to a particular type of institution, a particular type of program, or, more interestingly, to a particular type of student. Economic development, a term that tends to be as vague as it is popular, could be made specific in terms of manpower goals (entry level, upgrading,

retraining), resource goals (information, guidance, testing, calibration), and research goals (basic knowledge, new technologies, new products). The envisioned study would be a cost determination effort with lots of allocational issues to resolve. A successful study would be helpful in assessing the real effort being put forth in support of state goals.

If one were to embark on the task of explaining or understanding costs--with a mind to enhancing the prospects for containing them--there are three locations in which to look for factors that might be influencing costs: institutions, the higher education community, and the larger environment, with cultural and material factors operating within each of the locations. This six-fold structure could be used as a framework for addressing one of the more interesting phenomenon of the day, which is the relatively large increase in administrative costs that has occurred in many institutions in this decade. Finding appropriate units of workload would be a challenging aspect of such an undertaking.

The current emphasis on assessment may mean that somewhere in the future evaluative cost studies in the form of cost-effectiveness analyses may become more feasible than at present. If so, such analyses would seem to be a reasonable direction to pursue for boards that are active in program review, or that have to make choices or recommendations as to where certain programs are offered (remediation programs, for example, might be an appropriate target for this type of analysis).

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