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ABSTRACT

This paper examines effects of combining long-range planning and computer-based modeling in institutions of higher education, with examples from application at Butler University (Indiana). The model was developed due to a need to obtain a 5-year forecast of revenues and expenditures and consists of eight dynamic submodels--one for each of the five academic colleges, an endowment spending submodel, a financial aid submodel, and a main university submodel, all interactively linked. The university submodel is the primary model and incorporates two types of data: (1) planning variables; and (2) summaries of revenues and expenses affected by these variables. The five academic college submodels incorporate expected changes, and such data as retention rates, average number of credit hours per student, class size, and student/faculty ratios. The model is unique in requiring input from both administrative and academic units. Contributions of the model have included enabling the administration to comprehend the effects of student enrollments on tuition revenues, to integrate academic deans into financial planning, to orient newly hired administrators and deans, and to foster participatory planning. (Includes 21 references.) (DB)

Participatory Planning Using Computer-Based Modeling

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Jean Endo
Chair and Editor
Forum Publications Editorial
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ABSTRACT

The concepts of long-range planning and modeling are not new to higher education. However, combining the two for purposes other than looking toward the future is novel. While setting the course for the years ahead may be the primary impetus for planning, creating a process that also promotes discussion between academic and non-academic administrators as well as facilitates new administrators' understanding of the planning process can only enhance an institution's decision to consider implementing computer-based modeling.

Participatory Planning Using Computer-Based Modeling

INTRODUCTION

Most college and university administrators will readily agree that planning, both short- and long-term, is an integral part of the administrative process [Armigo, et. al., 1980; Cope, 1981; Cope, 1987; Millett, 1975; Millett, 1977; Norris and Poulton, 1987; Parekh, 1977]. Planning not only assists in mission clarification, but helps provide institutional direction as well [Enarson, 1975; Keller, 1983; Newsom and Hayes, 1991; Peterson, 1986]. This is especially true for colleges and universities which are undergoing a transition which will, hopefully, lead to wider recognition and a renewed commitment to excellence [Chaffee, 1984; Micek, 1980; Norris and Poulton, 1987; Peterson, 1985]. One component of the planning process used by many colleges and universities is modeling, the use of computerized programs which take existing information and make projections based on past data, complemented by administrative inputs affecting growth or decline in certain areas [Ghosh and Lundy, 1987; Klabbers, 1985; Wholeben, 1985; Wholeben, 1984; Kassicieh and Nowak, 1986]. Models are particularly useful for reflecting the financial dynamics of a college, thereby providing a realistic basis for discussion of educational goals among key policy-makers.

Computer models have been used as tools for decision-making by managers in the business world much longer than in higher education perhaps because "business," out of necessity, is much quicker and more eager to respond to change than are universities [Klabbers, 1985; Wholeben, 1984; Harris, 1983]. Not until the 1970s were computer-based models, specific to the needs of higher education, developed and refined by several

large research universities and passed along as packaged programs for general use among other institutions with any regularity [Harris, 1983]. Such models have allowed college administrators to mathematically define their concept of reality in relevant terms, i.e., enrollment patterns, faculty loads, or budgeting. Today, commercial programs and those produced by professional organizations such as NACUBO (National Association for College and University Business Officiers) or NCHEMS (National Center for Higher Education Management Systems) provide computer-based planning models with various levels of sophistication for users with diverse levels of expertise. Oftentimes, however, inherent in these "packaged" programs are definitions and categories that are not pertinent or easily adaptable to the planning purposes of particular colleges and institutions [Harris, 1983]. When this happens, the institution that wishes to use modeling as part of its management process must develop its own. Such was the case at Butler University, a small, private comprehensive institution in Indianapolis already embarked on a period of major transition.

THE STUDY MODEL

With the President's support, the Vice President for Finance and Director of Institutional Research worked with an outside consultant experienced in computer modeling to construct a financial master plan which would integrate the various components that influence the University budget. The initial purpose was to obtain a five-year forecast of revenues and expenditures; however, the outcome of the process proved much more beneficial than the expected outcome of producing a long-range budget. The model itself became a valuable tool for integrating the University's academic deans into the overall financial aspect of planning. Although the deans were familiar with academic planning on their individual college level, they were somewhat isolated from the university-wide planning process; the model helped to bridge that gap by merging five separate college perspectives into one total picture.

The Model that resulted was really a series of eight dynamic submodels--one for each of five academic colleges, an endowment spending submodel, a financial aid submodel, and a main university submodel, all interactively linked together to project income and expenses for the individual colleges and the university as a whole for five years. The following is a conceptual view of the planning model presented in a flowchart format showing the unique, dynamic nature of the flow of information between and among the submodels.

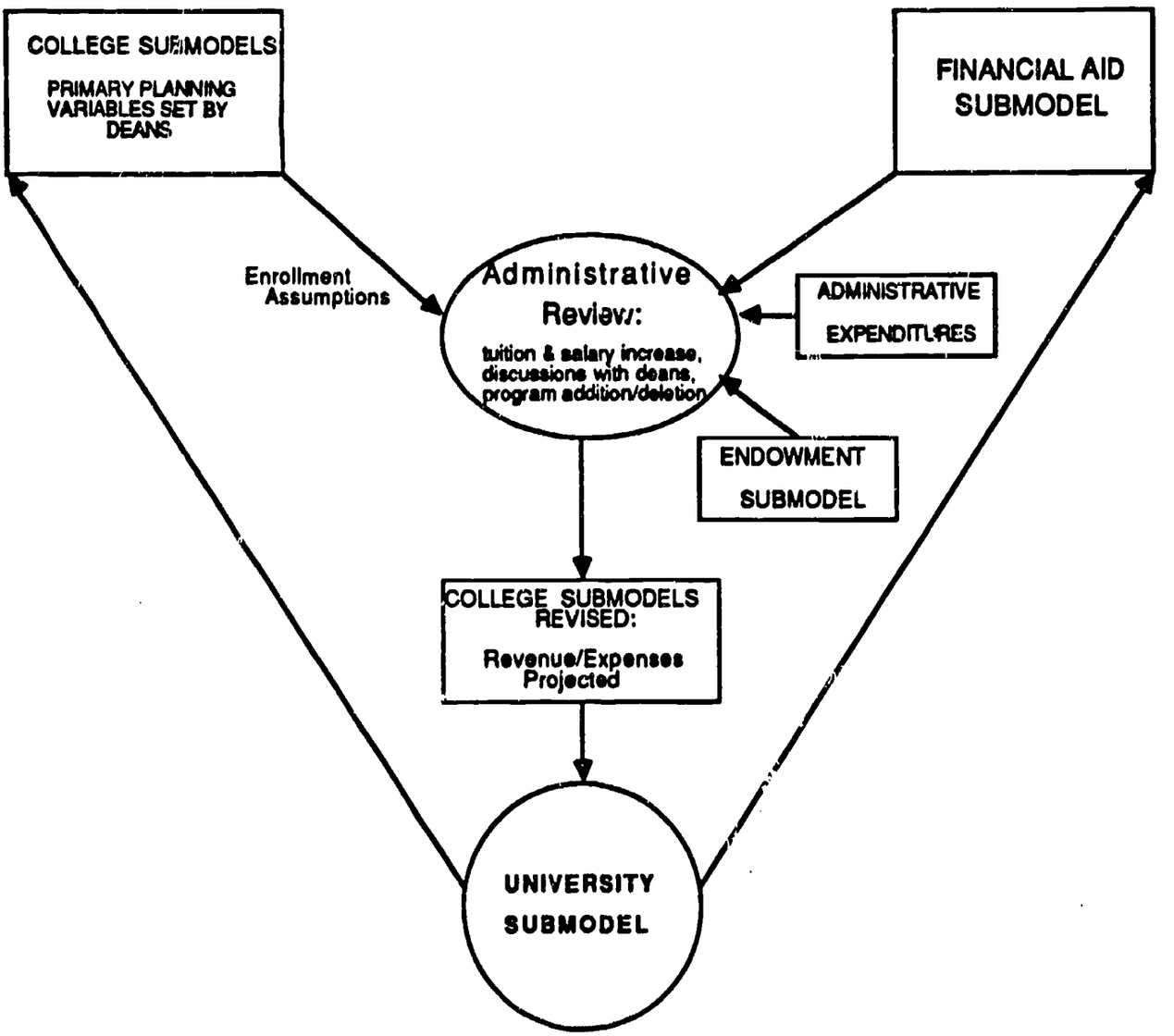

Fig. 1. Conceptual Flow of Planning Model

University Submodel. The University Submodel is the primary model where base-year data [such as enrollment projections, income, and expenditures] and projections for future growth/decline are provided by the administration. This submodel, a kind of University-wide balance sheet, incorporates two types of data: the **planning variables**, which are established by the University Cabinet, and **summaries** of all the revenues and expenses affected by these variables. The planning variables are presented in terms of percentage increases/decreases in the following categories:

New full-time freshmen	Gift and Grant Income
Tuition Rate	Other Auxiliary Income
Room Rate	Athletic Expenses
Board Rate	Utilities
Travel Expenses	Maintenance
Salaries	
Financial Aid % of Tuition	
Operating Expenses	

The variables in the first column are those which directly impact the academic operations of the University via the College Submodels; the ones in the second column impact the administrative side of revenue/expense bottom line.

The **summaries** found in the University Submodel include summary reports of expenditures by administrative area [President, VP for Finance, VP for Administration, VP for Development, VP for Public Affairs, VP for Student Affairs, VP for Academic Affairs, and athletics], auxiliary areas, and utilities; in addition, auxiliary income summaries are included. The administrative reports are not detailed, but show expenses broken down into administration salaries, staff salaries, fringe benefits, and operating expenses. The auxiliary and utility expenditures are merely totals. Besides the above summaries, certain data from the College Submodels are summarized: expenses such as faculty salaries, staff salaries, benefits, student wages, travel, and other operating expenses, as well as tuition/fee income.

Another function of the University Submodel is to incorporate the impact of those students who have not chosen a major and who are not part of any academic college, in terms of the hours/tuition they generate. This Submodel also calculates the percentage of new freshmen, undecided majors and transfer students who will likely become part of each academic college.

College Submodels. If the University Submodel can be considered the brain of this study's model, the five College Submodels can be considered the muscle behind the brain. The College Submodels are driven by the parameters provided in the University Submodel, which include the number of new freshmen, increase in tuition rate, and increases in other college expenses. Further input provided by the five college deans is, in turn, fed back to the University Submodel, which redistributes data back to the College Submodels. The deans are able to enter into their submodel the additional number of faculty members and operating funds they feel are necessary to accommodate the students taking courses in their college during any of the subsequent five years. They can also show how increasing the numbers of their majors can affect University revenues as well as make the case for obtaining more resources for their own college. In addition, the deans are able to recognize the impact on their college of increased enrollments from the other colleges in terms of semester hours generated as a result of providing service courses.

The College Submodels drive the University Submodel tuition projection by using retention rates and average number of hours taken per student (in their own college and in the other four colleges) that are specific to their students. Here, the interactive and unique nature of the model comes into play as one dean's changes in planning variables in his/her own college affects the other four College Submodels. The modifications from all five colleges converge in the University Submodel and are then redistributed back to the colleges in terms of course hours generated in each particular college. This number is then used for planning future staffing needs.

Another function of the College Submodels which assists in college planning is the calculation of average load per faculty member, average class size, total semester credit hours generated and student/faculty ratios. Faculty administrative and research assignments are accommodated, as well, in the formulas in terms of credit hours generated. The actual semester credit hours generated can be compared to an "ideal" number derived from a hypothetical average class size per FTE faculty. Here, a dean has the opportunity to reconcile the output (in semester hours generated) in relation to the input (number of additional faculty requested for future years).

The Financial Aid and Endowment Submodels. These two submodels remain relatively unchanged from year to year, once parameters are set by the administration, and are interactive only with the University Submodel. The Financial Aid Submodel is driven by the number of new freshmen and retention rates university-wide by class. This submodel calculates the funding limit for financial aid expenditures according to a percentage of predicted freshman tuition income. While the Endowment Submodel calculates the amount of income to be made available for current operations, for restricted programs, for maintenance reserves and for capital equipment reserves, the only number that is fed into the University Submodel is the amount available for current fund operations for each year of the model's projection. This sophisticated program is used internally by the Vice President for Finance as part of his office's routine planning process, taking into consideration not only the total return, but the spending rate available after adding back to the corpus a portion of the return in order to maintain the endowment's real value.

OUTCOME

A review of the literature reveals that the planning model used by Butler is somewhat unique in that it goes beyond mere speculation about increased or decreased enrollments and endowments to include academic considerations. The model cannot function

properly without input from both the administrative and the academic units. Where the deans' inputs [prospects for increased enrollments, additional faculty, staff, travel funds and other operating expenses] are not categorically and automatically accepted by those responsible for creating the budget, they provide a foundation from which discussions on program-building can readily emerge. Here again, the issue of solidifying the University's mission and setting college goals within the context of the wider mission comes into play. The model enables all the players involved to see where resources come from, where they go, and how they are used. Should a decision which would strengthen the University's mission by increasing or decreasing support for programs be warranted, the process can be easily examined by modifying formulas within the model.

Although the planning model presented in this discussion is only in its second year, it has already proved valuable in several ways:

- First, the model enables the administration to clearly comprehend the dynamics of student enrollments and their effects on tuition revenues: part-time versus full-time; undergraduate versus graduate; College of Fine Arts students' impact on the Colleges of Liberal Arts and Sciences, Education, and Business and vice versa.
- Second, the model is a useful tool for integrating academic deans into the financial aspect of planning, showing the relationship between enrollments and numbers of FTE faculty in their colleges and the effects of each on income and expenditures.
- Third, the model assists in orienting recently hired deans and other administrators to their new environment; not only are they introduced to the University financial planning process, but they are provided an overview of the entire University as well as their own college vis-à-vis the other academic colleges' roles within the larger University scheme.
- Fourth, the model enhances the total university planning process by supporting participatory planning. The facts are laid out for all to see, with no hidden agendas,

making it clear what image the University wishes to project by the programs it supports--hopefully, an image in accord with its wider mission. From a foundation of factual knowledge stems open dialogue between deans and upper-level administrators about programs and the resources necessary to support those programs at the highest level possible.

The concepts of long-range planning and modeling are not new to higher education. However, combining the two for purposes other than looking toward the future is novel. While setting the course for the years ahead may be the primary impetus for planning, creating a process that also promotes discussion between academic and non-academic administrators as well as facilitates new administrators' understanding of the planning process can only enhance an institution's decision to consider implementing computer-based modeling.

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