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ABSTRACT

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SPACE COSTING IN COLLEGES AND UNIVERSITIES

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ABSTRACT

Colleges and universities have five basic resources: faculty, endowment or state appropriation, tuition, grants and contracts, and physical plant. Of these, the administration and faculty have paid the least attention to the physical plant, except in terms of expansion. But now, with few exceptions, the existing facilities or space on American campuses will have to house the institutions' needs because higher education no longer has, nor can it command, capital for new construction.

Plant operation currently consumes about 8% of an institution's budget (10-12% is not uncommon), of which half is expended on energy. In addition, the deferred maintenance of existing plant, a measure by which many institutions balanced their budget or minimized their deficits, can no longer be postponed. Nationally, an estimated $22 billion to $35 billion worth of maintenance is "now due."

Rising energy costs and aging buildings will require institutions to devote an increasing share of their budget to the physical plant. As space becomes more expensive to maintain and operate, the method by which it is allocated and utilized will become of greater concern to the academic community.

The issue this paper will examine is: Should institutions of higher education cost account space and physical plant operating and maintenance expenses to their academic units or programs? And if so, should fiscal responsibility

include managerial control of the physical environment by those units?

It is believed that if academic departments or colleges were financially responsible for their physical environment, the resources of the university's plant used in support of the academic mission would be more effectively utilized.

Space costing is a philosophical base for cost accounting space, operating, and maintenance expenses to the individual academic unit of an institution. It is a decentralization of the space resource allocation process. It gives the academic manager responsibility for determining the amount of space, and within defined levels, the maintenance the space requires.

Space Costs Money

A college or university is the owner of all institutional space and may be viewed as the "landlord" of its campus. Academic and operating units within the institution may be likened to "tenants" of the university. Academic units have control over "their space" and view it as such but incur no costs for that space and are generally divorced from any involvement with their physical environment.

The institution finances, builds, and maintains the building as well as provides electricity, heat, airconditioning, water, sewage, and other services. All of these are included in the "free rent."

Space has a cost, and that cost is increasing. For instance, institutional managers have watched their utility

and fuel costs increase anywhere between 50% and 100%. This increase absorbs rescurces which could be used for other components of the educational enterprise.

The financial commitment of higher education to its existing plant is staggering. The average value of physical plant for all institutions was $66 billion in 1975-76.[1] The total amount spent on operating and maintaining physical plant was $3 billion in that year, or $363 per full time equivalent (FTE) student.[2] Based on figures of the American Council of Education, it is estimated that 43% or $157 of that amount was spent on energy.[3] From this it is projected that in 1977-78 the energy cost per FTE was $200.

John Hobstetter, Associate Provost for Academic Planning at the University of Pennsylvania, put the issue quite simply: "Space costs money." He continued, "Because universities have traditionally funded their space through charitable contributions, space has come to be regarded as almost a free good."[4] Whether space has been constructed with public or private funds there is a universal truth to Hobstetter's statement.

The Value of Space

Not only does space cost money to construct, operate, and maintain, it has value of and by itself. Space is like money, it changes hands. Tangible and intangible items can be bought with it. As space becomes scarce, its value increases and more resources must be expended in securing it.

Space is also power and is therefore very political. The control of space, as with the control of any resource, gives power to the controller. Man almost by instinct must establish territorial boundaries in which he is safe and has control; thus "my desk" of "my office." Once space is secured, a squatter's right is often assumed, and that right is treated as inviolable.

The amount of space controlled reflects, rightly or wrongly, on one's worth, responsibilities, and importance. It can also reflect cunning, resourcefulness, and an increasing portfolio. An individual who loses space, regardless of the reason, is perceived as having "lost."

Maintaining Flexibility

The growth period of the 1960s and 1970s is over, but institutions are not stagnating. By their very nature, colleges and universities are in a continuous process of self-transformation.

Disciplines grow, change, and spin off new ones. Societal needs change, and higher education is affected by the values that student society currently holds as important. Thus, enrollments rise and fall with perception of future employment potential. Students are sensitive to the potential job market, and these have impacted a variety of programs, such as law, business engineering, and computer science, resulting in shifting of students between comparable disciplines. Decreases in one area are not always matched by increases in another but

there are some interesting patterns. The old question, "What can one do with a history degree?" may have been answered by the growth of political science, and by extension, law. Between 1970 and 1975 the number of degrees granted annually in history dropped by 5,560.[5] In that same period, degrees granted in political science increased by 5,070.[6] The lay-offs in the aerospace industry in the early 1970s probably accounted for the dramatic drop, from 2,750 in 1970 to 1,210 in 1975,[7] in students seeking degrees in that discipline. Degrees earned, however, in civil engineering increased from 6,520 to 8,100 in that same period.[8] As colleges and universities go through a continuous changing process, the physical environment must change to meet new program needs. In periods of prosperity, changing needs are met by expansion of the physical plant. With the current shortage of resources and capital, the words of the vice-president of administration at MIT are very appropriate, "We must learn to turn around within our own skin."

In order to accommodate these changes, space will have to be flexible. In the past flexible space was the avant-garde approach to building facilities. Flexible space today needs to be the philosophy of all institutions. Spce costing is a philosophical subset of flexible space. It is a tool that can be used to achieve flexible space, a tool that may help institutions better manage their plant resources.

Distribution of Resources

Universities and colleges have five basic resources: faculty, endowment or state appropriation, tuition, contracts and grants, and physical plant. The physical plant (space) is a resource that is expended in the academic enterprise and has a direct relation to the cost of instruction and research. The allocation of the resource is tied directly to the overall resource allocation process of the institution.

A broad view of resource distribution in higher education is presented by John Millett, former chancellor of the University of Ohio, who observed that colleges and universities see themselves as preservers, transmitters, and advancers of knowledge, and as such act rationally in the distribution of their resources. But colleges and universities have never defined their rationale for resource allocation, and the allocation of these resources is an exercise of power.

The distribution of resources is either an economic or political process, Millett states. In an economic process, the allocation of resources is determined in a free market relationship. In a political process, the allocation of resources is made by those who govern. It is also called a planning process, wherein the decisions of a few affect the many.

Before 1968, and the beginning of student unrest, the budgets of colleges and universities were made in a political planning process. Budgets were prepared by central academic and administrative officers and approved by the governing

body of the institution. The disruptions of the late 1960s and early 1970s brought faculty and students into the budgetary process in the form of representation on committees and senates. But it is still a political planning process.

This process, Millett argues, has brought about a very complex resource allocation procedure using accommodation, consensus building, and sometimes logrolling. Furthermore, increased student and faculty participation has come about at a time of shrinking income. When budget restraints are required, faculties have been reluctant to make cuts in the academic program. Instead, they have chosen to cut student and other university services.

A market approach to resource allocation allows decisions to be made on the basis of supply and demand, Millett argues. What "sells" is what people need, desire, and are willing to pay for. Millett sees this as simplifying the budgetary process.[9]

A Model for Space Costing

Space costing is a shift from a political space-resource-allocation mechanism to one allowing market forces to come into play. It is a decentralization of the resource-allocation process, but the degree of decentralization is quite variable.

The illustrated model of space costing shown below redistributes the physical resources of the university. It is multifaceted with parts that can be used independently to

suit the academic goals and operating objectives of the institution.

Physical plant resource distribution

Present system
Institution appropriation
$ ↓
President
$ ↓
Vice-president for finance, planning & facilities
$ ↓
Physical plant department
$ ↓
Expended for heat, electricity, maintenance, etc.
↓
Colleges/departments

Space costing model
Institution appropriation
$ ↓
President
$ ↓
Provost/vice-president for academic affairs
$ ↓
Colleges/departments
$ ↓
Physical plant department for heat, electricity, maintenance, etc.

Under this model, space charges would be based on the actual operating and maintenance costs of the facilities. This could also include amortization and insurance. The total costs of these components would be computed on a square foot per building basis. Grounds care can also be included.

For exclusively held space, the charge to the department or college would be the total building costs. For shared space, the costs would be prorated according to the area

occupied. Multiuse space such as classrooms and teaching laboratories would be held by a central office which would charge departments for the percentage of time they occupy it.

An alternative to charging for time used would be to base rates on the desirability of teaching hours. This might help institutions even out the bunching of classes on, say, Tuesday, Wednesday, and Thursday from 10 A.M. to 12 noon, and 1 P.M. to 3 P.M. While the individual costs of space would equal the total charge for space over a semester, classes taught at popular times, would pay more per hour than classes in the early morning, late afternoon, and evenings.

Funding

The funds for space costs would be allocated to the operating budget of the college or department instead of to the physical plant department. With this type of monetary responsibility, the academic manager can more completely see the total cost of meeting the academic objectives of his college or department. Since resources can be substituted, managers become aware of the cost of space and environmental support. This is similar to the experience of many institutions when their telephone bills were broken down and charged to individual instruments instead of being put on one central bill. If the plant department no longer pays the utility bill, its "customers" may heed the conservation measures more closely.

Under this model, the academic unit becomes a client of the physical plant department that would contract for services

such as heat, airconditioning, electricity, water, and sewage, as well as custodial services and maintenance. Since they are paying for service, the units will have leverage with the plant department that they did not have before. (If you are paying $50,000 for services, you make sure you get them.)

Custodial and Maintenance Service

The level of custodial and maintenance services required would be determined by the physical plant department and the academic units. Each party has information and expertise regarding the needs of users, their activities, building requirements, and health and safety codes. From these discussions, an overall approach to operating and maintenance should develop that meets the physical requirements of the users and the longterm integrity of the building and recognizes the budgetary restraints under which these services are provided and required. The academic manager will attempt to get the highest level of service possible for the least costs, and the physical plant director will be concerned with the longterm maintenance of the plant and the constraints on his (and institutional) operations such as collective bargaining agreements with labor.

The plant department should be able to offer several levels of service and provide the one that best meets the user's needs. Routine maintenance would be serviced by the physical plant department with the cost approval of the academic unit. Deferred maintenance must not be allowed to

increase beyond the changeover period, and a special fund for this purpose may be necessary to pay the physical plant department.

Utilities

Utility distribution is a "natural monopoly" of physical plant. Energy conservation now becomes a dual responsibility since the academic units have a budgetary incentive to use only as much energy as necessary to support their program. Therefore the "customers" will benefit from working with the physical plant department in determining what structural, mechanical, and electrical changes will reduce energy consumption. Capital expenditures for energy controls should no longer be seen as competing for other resources since the payback periods and benefits to the institution and the academic divisions are understood and will be of direct benefit to the units.

The physical plant department will no longer be in the position of being mandated to lower energy consumption with no control over the users. Under the proposed system it will be a vendor of energy technology.

Energy consumption is directly related to user activities. For example, a chemistry department has a sealed building requiring six air changes per hour, 24 hours a day, seven days a week, because of the "nature of research." The physical plant administrators attempted to determine if it was needed at night and at weekends, but they failed because of the

chemistry department's territorial feelings and the nature of the special equipment locations. But if the chemistry department were paying for the cost of those air changes, the fans probably would not be running continuously, and if they were it would be because the users felt it was that important and were willing to pay for it.

Finally, plant operation and maintenance can be charged as a direct expense to a research contract, under space costing, for space directly related to research. For example, by directly charging the cost of energy, the institution avoids the upward spiral of indirect cost. At the same time the contracting agency is paying for the energy specifically used for research instead of a percentage of the institution's overall bill. If the accounting is accurate, the direct costing of space should benefit both the institution and the sponsoring agency.

A Room With a View

Another aspect of appraising the "rent" for an institution's space beyond the area and time formula is to give each room a desirability factor. There are a number of possible approaches and variables that can be used to determine "what is space worth?" For example, all offices are not created equal. Some are bigger than others; some have views, some do not; some are old and have charm, others are sterile; some are close to parking; others are close to power centers on campus. Can a dollar value be placed on these intangible yet very tangible space attributes?

A simpler approach developed by Walter Matherly and John Blackburn for Duke University, under an EFL grant, places all space into a free market pool.

"The optimum allocation of space is achieved when full use is made of it and when the cost of the space used by a program just equals the value of the space to the program which uses it. Prices are set at levels which allow for everything to be sold. Buyers purchase only if the price is a fair measure of their desire for it. The prices at which different types of space are offered should be set at a level sufficient to clear the market, i.e., to ensure full use of space, but to leave no buyer unsatisfied.....Space types in short supply will subsequently have to bear relatively high prices.....Space of a less popular type will command relatively lower prices in order to attract enough programs to ensure it full use."[10]

Under this system, rents are charged to the activities and therefore may not equal the costs of space usage. The pricing of classroom space by desirability of location and class times may be another method of preventing bunching of classroom and teaching labbratory utilization.

An alternative method of determining the value of an institution's space is to compare it with similar space in the commercial market. Using the open market allows for easy assessment of intangible factors such as the age and condition of facility, desirability of location, and quality of ambience (views, carpeting, airconditioning, fireplace) of the space.

In a rural setting, the rental fee could be determined on the annual amortization cost of a new facility on a square-foot basis. For income generation, this space-value figure could be used as the basis for computing rental charges to outside nonprofit agencies.[11]

It should be remembered that space costing may not save the institution direct operating funds. Its purpose is to slow down expansionist tendencies and encourage eonomy at the local level through central information and clearance instead of with central referring.

If there are not enough "customers" for a specific building, then the institution should consider alternatives for the space such as rental, divestiture, or closure.

The income to pay for space would come from an appropriation from the general income of the institution to the operating unit. Charges for space are collected by the institution. The value of the transfer of funds lies in the ability of local units to substitute space and rent income for other resources. Space shrinkage by department A will accommodate expansion by department B. The expanding unit (B) will either pay the central account additional money for more space or transfer funds directly to the leasing department (A). In either case department A has income it can use elsewhere.

Examples of Space Costing

Harvard University distributes the costs of space by directly charging for the operation of the physical plant. But the

Harvard situation -- its history, endowment, and resources -- is somewhat unique. Harvard operates on the "every tub on its own bottom" (ETOB) philosophy by which each college, museum, and library is a separate cost center with its own income from endowments, tuition, grants, gifts, and contracts. Services required to support their mission are purchased in a "free market" both within and outside the university.

At Harvard, the colleges contract with Buildings and Grounds (B&G) for the custodial services necessary for their operation. The quantity and level of service for the year is determined jointly by B&G and the college. B&G also acts as a utility that distributes heat and power to the campus and bills the units for their consumption.

B&G feels the cleaning arrangements developed with each unit is an educational process for both parties -- but a time-consuming one. When necessary to cut costs for a college, B&G has even recommended contract cleaning, but under B&G supervision.

The decentralization of the system created some potential maintenance problems when the faculties of the colleges decided to use maintenance reserve accounts to meet other operating needs. But this is what many institutions across the country did in one form or another to meet the fiscal crises of the last few years. Maintenance always seems to get cut first.

Major maintenance and emergencies are decided jointly by B&G and the specific dean. When there is a disagreement on

the necessity of work, there is an informal appeals process to the senior administrators.

If college A uses space in college B, A is charged the operating and maintenance cost of that space. Observers report that the deans care about their buildings (some more than others) like homeowners or landlords. Buildings have even been sold by one college to another.

Duke University Medical Center has chosen the ETOB approach as its method for becoming a national medical-research center. Each clinic and research department, "...is given a piece of turf and they have to keep it hot and supported." Departments are expected to cover their direct and indirect (overhead) cost. The result is "There is no poorly used space." Duke uses the square foot as the vehicle for carrying all indirect costs. This includes physical plant, insurance, amortization, depreciation, and grounds care as well as central university services and administration support. As all costs must be covered by income, the incentive to use only as much space as necessary is strong. Duke does not directly charge indirect expenses. Each department chairman is "made aware" of what his indirect costs are and is expected to meet them.

All plant charges are made on a per building basis. Departments that occupy a whole building know exactly what their operating costs are, including their contribution to ground care and parking maintenance based on the building's gross area. For shared space, the department is charged for the percentage of space occupied.

Departments of the Medical Center can also pledge to provide a percentage of the capital dollars for a new building. This direct investment creates a condominium approach to financing and operation.

The prime motivating factor for Duke Medical Center to charge its units for all environmental and other indirect space costs is that it allows them to recover these costs from research contracts and from third-party reimbursements (Medicare, Medicaid, and Blue Cross, etc.). The Center receives 40% of its income from Medicare and Medicaid. An indirect cost can be reimbursed if it is properly allocated and shown as a legitimate expense of patient care or research support.

The percentage of overhead recovery that an institution receives is not important. What expenses that percentage covers, however, is important.

Brown University uses the cost per square foot as the base for recovering research costs.

Brown currently determines the operating and maintenance costs of each campus building. Each department determines the percentage of its space that is used for research, instruction, and other activities. For example, a research laboratory will be used 100% for research. A general laboratory may be used 50% for research (the percentage may be for time, area, or both). Brown has determined that 32% of its education plant (and 11% of the campus plant) is used for research and covers that percentage of the building's operating and maintenance cost.

The University of Pennsylvania treats space as an indirect expense. Each department is charged "rent" based on the average value per square foot of all campus buildings using their insurance value and spread over a 50-year amortization schedule. This was done to equalize old and new space on campus.

Each college was allocated the money necessary to meet its rent. Beginning in the 1976-77 academic year, each college was funded 95% of its rent. The balance has to come from college sources and is placed into a deferred maintenance fund. The allocation to support the space charge will be reduced gradually, 1% a year, for the next few years. The university reports that a space consciousness is developing slowly, and space exchanges are beginning to occur that give both relinquishing and absorbing units relief.

Weighing the Pros and Cons

Although there are a multitude of benefits for an institution adopting space costing, some aspects of this management system will not suit every user. Before making the first move, an administration should carefully consider the following.

o Maintenance of the physical plant may become uneven. Wealthy units, particularly those with large research contracts, will be able to afford better maintenance than poor departments or colleges.

o Academic managers are more likely to put their resources into people and programs instead of plant, thereby creating

a potential problem with deferred maintenance. An appeals process or review is necessary to settle such problems.

o Academic managers may have to hire operation or plant managers to oversee the system and deal with the physical plant department. This will require additional expense for salary and office.

o Academicians may resist this type of resource allocation. Many will say, "I am an educator, not a janitor." Central administration will have to secure the full cooperation and support of the deans or department heads before moving to cost accounting for environmental resources or the system will fail - badly. Central administration will have to prove to the academic units that it is to their benefit to move in this direction.

o The startup costs for space costing may be high, especially if the campus has to start a space inventory system from scratch.

o If an administration institutes cost accounting with a hidden agenda the result will be devastating. And blame will fall on "that new system." Cost accounting is a tool. It can be used as a plowshare or a sword.

Managerial Consensus

Space costing requires an institution to make a commitment that must originate with top administrators. Following this lead, the staff consensus must be broad, otherwise a space costing system will not be fully effective. Experience shows

that it cannot be pushed onto unwilling academic managers, therefore all preliminary discussions about establishing space costing must include faculty, deans, and/or department heads.

Space costing requires a lot of information to be generated. The administration must ensure that everyone has access to the information or else the academic managers will mistrust it and also mistrust decisions made by the central administration. Duke Medical Center says that a major benefit of its space system is that everyone using it works from the same information base.

Responsibility for the physical plant by academic managers may be viewed as a backward step by the physical plant department. But viewed dispassionately the step is forward since it should lead to better use of the institutions' resources. Under the traditional system there has been little coordination between the plant managers and the users of space but by giving responsibility for plant to the academic managers the gap between user and responsiblity is narrowed, with the expertise of the plant manager being called upon to service the units.

The present impact of plant reductions are often invisible, for they are implemented by central administration and the plant department without involvement of the user. The plant department often operates from a weak political base within the institution and the benefits of good plant management are understood by only a few.

When cuts are required, it is easier for academic administrators to cut plant first. Maintenance is easily postponed even though the cost of it increases every year. Maintenance, it appears, can always be put off another year. Central administration performs a balancing act, attempting to take care of all direct and indirect academic needs. Short-range plant cuts eventually absorb longterm academic resources, and the academic units are not aware of this.

Historically, the physical plant department has not been able to educate the campus, particularly the academic area, as to its mission with the university. The table of organization of the institution keeps the two far apart. Space costing does not change the reporting lines, but it does change the working relationship of plant so that its purpose is clear to the academic units, the costs of its service are clear and understood, and the plant department is seen as responsive and responsible to the academic mission instead of to the buildings.

FOOTNOTES

1 C. George Lind, Digest of Educational Statistics, 1977 Edition (Washington, D.C.: National Center for Education Statistics) Table 137.

2 Ibid., Table 133.

3 Frank J. Atelsek and Irene L. Gomberg, Energy Costs and Energy Conservation Programs in Colleges and Universities 1972-73 and 1974-75, (Washington, D.C.: American Council on Education, 1977), p. 24.

4 John N. Hobstetter, "The Budget System of the University of Pennsylvania," Almanac 20:24 (February 26, 1974).

5 Charles Andersen, Ed., A Fact Book On Higher Education (Washington, D.C.: American Council on Education, 1975) p. 76.291.

6 Ibid., p. 76.292.

7 Ibid., p. 76.318.

8 Ibid., p. 76.316.

9 John D. Millett, Allocation Decisions in Higher Education, (Washington, D.C.: The Academy for Educational Development, 1976).

10 Walter Matherly, Information Needs: Overview, (New York: Educational Facilities Laboratories, 1969), pp. 6-7.

11 John Dunworth and Rupert Cook, "University Teaching Accommodation -- Its Use and Allocation," Higher Education Review, Spring 1975, pp. 59-76.

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