WHAT DOES IT COST A UNIVERSITY TO EDUCATE ONE STUDENT?

ANDREA SANTIAGO, GERARDO LARGOZA, AND MITZIE IRENE CONCHADA
De La Salle University Manila

A dilemma administrators continually face is whether to continue offering degree programs despite low student uptake, especially because producing reliable cost data to aid decision making can prove difficult. Often, a university determines a standard cost per credit or unit and uses this figure as a basis for computing the total cost of running a degree program. This is then compared to a revenue stream and the difference, whether positive or negative, is used in decision making. However, this method of computing costs, although appealing for its simplicity, may fail to capture the effects of economies that may arise as one school or college services another. In this paper, we use a basic cost accounting methodology applied to the higher education system of the Philippines to compute for a cost per degree per student for a sample of public and private universities. Although the methodology is more time consuming, the computed figures are deemed closer to actual costs and, thus, we argue, are more reliable as inputs to financial decision making.

Introduction

For the long-term sustainability of an institution, effective fund management is essential. In developing countries such as the Philippines, the need for judicious resource use is magnified as the demand for quality improvement increases alongside a rapidly growing student population. Whether this improvement in quality entails more space, better equipment, or more qualified professors, availability of funding is often the critical constraint. Administrators in public institutions request more and more funds from higher education officials each year, while in private institutions, pressure is felt in the clamor for increased tuition fees and/or intensified fund-raising targeted at wealthy alumni. In the absence of sufficient funding, administrators are often faced with no choice but to close selected degree programs—those seen as "unprofitable"—to alleviate resource demand.

While we stress that no education decision should ever be made solely on the basis of economic considerations, accurate cost data may nevertheless help authorities avoid inefficient and wasteful choices. In the Philippines, rough estimates of program costs have been calculated by Preddey and Nuqui (2001). Using a highly simplified method, university costs were spread over the student population, resulting in an average annual cost per degree per student. It is a methodology widely used (Bowen, 1987; Coombs & Hallak, 1987; Dyke, 2000) but the simplicity in its calculations does not allow one to consider the cost implications of resource sharing that may be pervasive within higher education institutions (HEIs). Examples of resource sharing that would not be imputed into degree cost calculations would be shared faculty (those teaching in more than one department), shared laboratory facilities, and service departments and colleges (those that administer courses required by all students). A chemistry laboratory, while primarily benefiting science majors, is also used by the rest of the student population that are required to take chemistry courses as part of their general education. In such cases, costs should naturally be shared by all users, not just by those within the chemistry department. The more extensive such arrangements are within HEIs, the greater the limitations of the simplified method become—a matter we wish to address in this paper.

Philippine Higher Education System

The Philippine higher education system rests essentially in a private sector with close to 90 percent of HEIs owned and managed by sectarian and nonsectarian groups who receive no financial support from government. At this rate, the Philippines ranks among the top countries in the world in terms of the proportion of private investment in education (Guruz, 2003; UNESCO/OECD, 2003). To date, the database of the Commission on Higher Education (CHED), which has jurisdiction over tertiary and advanced education, reveals there are more than 2.5 million students enrolled in the 1,526 higher education institutions in the country.

Quality is always an issue when evaluating degree programs and their cost-effectiveness. Since its creation in 1994, the CHED began to identify degree programs with exceptional quality standards and dubbed the programs as either Centers of Excellence (COE) or Centers of Development (COD). CHED's records reveal there are 275 programs of 85 HEIs that have been declared either COEs or CODs.

Besides the CHED, the higher education sector has developed quality assurance mechanisms. There are four accrediting bodies and one umbrella organization, the Federation of Accrediting Associations in the Philippines (FAAP). The agencies that accredit private HEIs are the Philippine Accrediting Association of Schools, Colleges, and Universities (PAASCU) for Catholic schools, the Philippine Association of Colleges and Universities—Commission on Accreditation (PACU-COA) for nonsectarian schools, and the Association of Christian Schools and Colleges-Accrediting Agency Inc. (ACSC-AAI). For public HEIs, there is the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP). The accrediting agencies use a combination of self-reporting, peer evaluation, and on-site visits to determine the quality of programs, faculty, staff, and facilities.

While there exist accrediting bodies, the current system in the country calls only for voluntary accreditation. Institutions that participate do so for prestige and to obtain some privileges attached to accreditation levels, such as autonomy from CHED supervision from CHED the higher accreditation levels.

Research Context

The development of a new cost methodology has its roots in the desire of the Philippine government through the Commission on Higher Education to reform its philosophy on education spending along the principles of normative financing. Normative financing is a method used to allocate funds to public education institutions based on planned estimates of the number of student places needed to fulfill social targets. Thus, instead of public institutions preparing and submitting their budgets based on their current and projected needs, the government plays a more active and rational role. They can determine how many student places an institution should be allotted and provide the corresponding funds based on a normative degree cost (i.e., how much it would cost to fund a student throughout a given degree program). It is a method increasingly used in countries like Australia, New Zealand, and the United Kingdom (Preddey & Nuqui, 2001).

In the Philippines, 114 state universities and colleges share a budget of a little under US$300 million (CHED, 2003). It is a small amount considering that seven public universities in the capital city already draw 35 percent of the pie. At present, the majority of the universities receive only enough to cover the salaries and benefits of faculty and staff (PCER, 2000). This leaves very little for operating expenditures such as utilities, consumable supplies, and library facilities, and a lot less for the purchase of equipment or the expansion of facilities. Under these conditions, the quality of education suffers.

It has been suggested that public universities should aim to be more self-supporting by either linking with donor institutions from the private sector or simply raising tuition fees. The latter is probably more politically untenable in the Philippines than it would be elsewhere as it would deprive members of a large marginalized sector of society of the education they need to improve their economic standing (PCER, 2000). Thus, legislators are often compelled to approve higher education budgets; yet, continued national deficit spending has made real increases few and far between.

Private educational institutions also feel the pressure to achieve cost efficiency. Over 1,300 private higher educational institutions in the Philippines are meeting the needs of about 2.0 million Filipinos (CHED, 2003). The poor economic conditions in the country have dampened moves to increase tuition fees to meet the financial requirements of these HEIs. As such, students have limited access to state-of-the-art technology, and faculty members are made to handle large classes and be in the classroom 20 hours a week so that funds can be spread out better. Under these circumstances, quality again suffers.

When an institution reaches the point at which funds are not forthcoming, programs begin to be closed down. But which programs should be phased out? This paper provides one basis for making that decision—degree costs. Although the initial intent of the research was to develop a model to compute a norm for degree costs for allocation

purposes at the national level, we learned that the process of determining costs at the university level has proved very useful for administrators. When repeated over several years, the patterns in costs bring to light cross-subsidies across programs as well as economies gained by offering these programs.

Conceptual Framework

In a study of Aduol (2001), a model was developed to estimate the student unit cost in Kenyan universities, taking into account not only teaching costs but university costs as well. This study considers many of the variables used by Aduol but takes a cost-accounting approach to estimating such unit cost, thereby using actual past cost data and going into greater detail. It stems from two studies: Dyke's 2000 study that sought to dissect departmental expenditures so that only relevant direct and indirect costs are used appropriately; and Middaugh, Graham, and Shahid's 2003 study that evaluated instructional costs on a per discipline basis only. This study implemented an even finer degree of cost segregation by computing costs on a per-subject, per-unit basis for each student.

In cost accounting, the objective is to properly allocate the total cost of production across the units produced. If there were only one product, then unit costs could easily be determined, as fixed costs are spread over the number of units and the resulting figure could be added to unit variable costs. With multiple products, however, the cost accounting procedure becomes a little more complicated.

Using the same concept, we determined a way of allocating fixed costs to particular degrees offered by the different schools and colleges within a university. Essentially, the financial expenditures in a given year for a university were categorized as those that could, as far as practicable, be directly associated to a degree and those that could not. Direct costs are generally teaching costs as well as those related to service delivery. Those costs that were not directly related to a degree such as library facilities, medical and dental services, and many more, were considered unallocated. All unallocated expenditures were then lumped together and considered indirect teaching expenses that were equally distributed among all students during the period of study. Nonrecurring expenses such as equipment purchases and other capital outlay projects were not included in the study. The mathematical representation is shown as Formula 1.

Formula 1:
Total Degree Cost Per Student = Σ direct teaching per subject + Σ direct operating per term + Σ indirect cost per year

The allocation of direct costs chiefly considers faculty "loading" (i.e., assignment of teaching loads to professors), a cost factor also important to Middaugh, Graham, and Shahid (2003). However, instead of simply dividing the direct teaching costs per discipline by the total number of students served, the salaries of professors are distributed across actual teaching load for the year under study and then divided by the number of students enrolled in their classes. The lower the faculty rank, the more classes taught (generally), and the larger the class size, the lower the student cost per subject. Formulas 2, 3, and 4 best describe this.

Formula 2:
Direct Teaching = Σ subject costs
Formula 3:
Subject Cost = average of faculty cost per course per student unit
Formula 4:
Faculty Cost per Course per Student Unit = actual faculty salary for given year * proportion of time spent on teaching / number of courses taught in given year / actual number of students enrolled in course / actual number of units in course
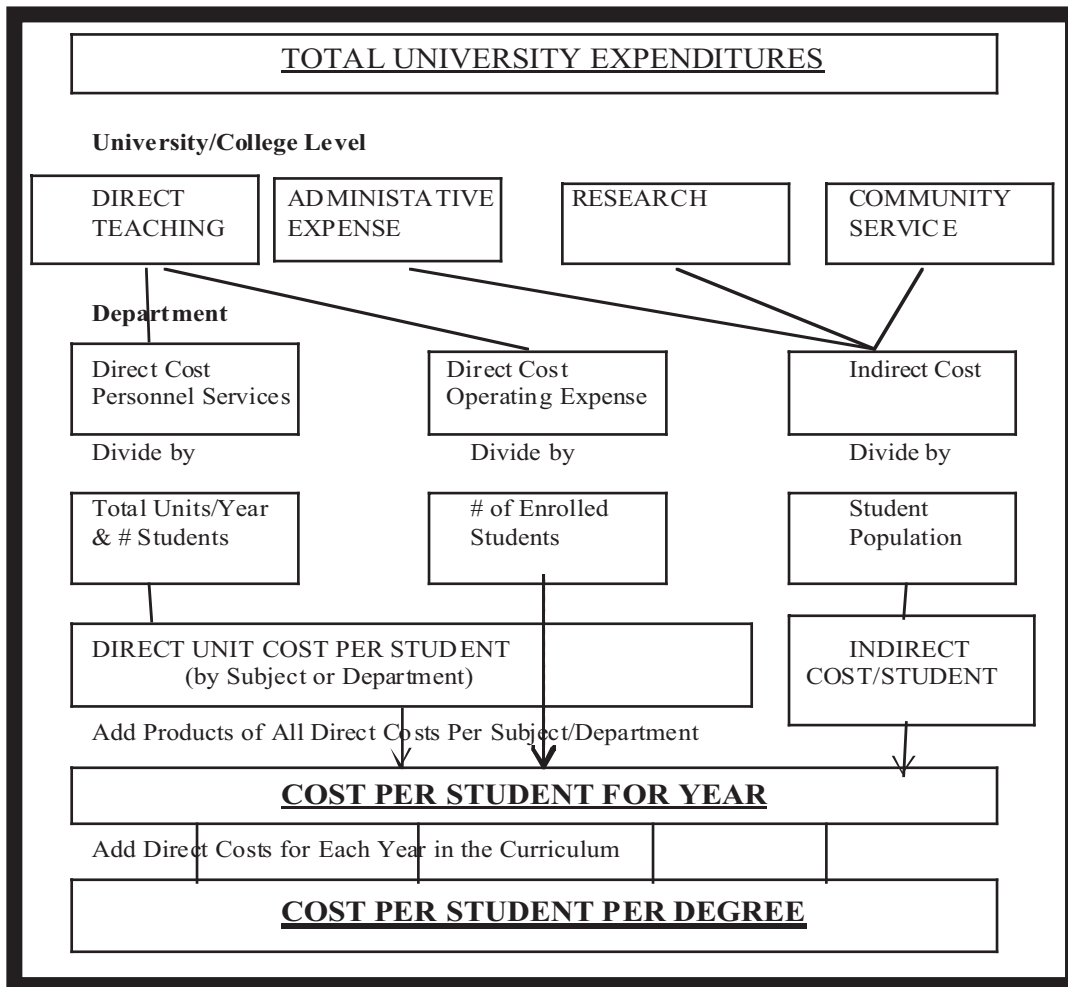
Figure 1 (page 4) illustrates the conceptual framework we used to determine degree costs per student. This approach required us to identify the following: an average cost per unit for each subject a student would have to take to attain a degree; an average share in the direct maintenance and operating expenses of departments by students who enroll in subjects offered by that department; and an average share in all other yearly costs to run a university divided by the total number of student enrolled in the university.

Cost Accounting Model for the Academe

The initial step in implementing the model involved a focused group discussion. Representatives from the finance and information systems departments of four universities in Manila were invited to explain their accounting and information systems. This was necessary to determine the kind of data that could be retrieved and the time it would take to extract data. The discussions pointed to five sources of data: the finance department for financial statements, the human resources department for faculty listing, the university registrar office for course offerings and number of enrollees, the vice-president of academics office (or its equivalent) for faculty loading, and the different department heads for curricula.

Initially, there were many methods considered to allocate teaching expenses to specific degree programs. To

Figure 1. Conceptual Framework for Obtaining Cost per Student per Degree

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┌─────────────────────────────────────────────────────────────────────────┐
│  ┌─────────────────────────────────────────────────────────────────┐    │
│  │            TOTAL UNIVERSITY EXPENDITURES                          │    │
│  └─────────────────────────────────────────────────────────────────┘    │
│                                                                           │
│   University/College Level                                                │
│  ┌──────────────┐ ┌──────────────┐  ┌──────────────┐ ┌──────────────┐   │
│  │ DIRECT       │ │ ADMINISTATIVE│  │ RESEARCH     │ │ COMMUNITY    │   │
│  │ TEACHING     │ │ EXPENSE      │  │              │ │ SERVICE      │   │
│  └──────────────┘ └──────────────┘  └──────────────┘ └──────────────┘   │
│                                                                           │
│   Department                                                              │
│  ┌──────────────┐      ┌──────────────┐        ┌──────────────┐          │
│  │ Direct Cost  │      │ Direct Cost  │        │ Indirect Cost│          │
│  │ Personnel    │      │ Operating    │        │              │          │
│  │ Services     │      │ Expense      │        │              │          │
│  └──────────────┘      └──────────────┘        └──────────────┘          │
│    Divide by             Divide by                Divide by              │
│  ┌──────────────┐      ┌──────────────┐        ┌──────────────┐          │
│  │ Total Units/ │      │ # of Enrolled│        │ Student      │          │
│  │ Year         │      │ Students     │        │ Population   │          │
│  │ & # Students │      │              │        │              │          │
│  └──────────────┘      └──────────────┘        └──────────────┘          │
│  ┌────────────────────────────────┐            ┌──────────────┐          │
│  │ DIRECT UNIT COST PER STUDENT    │            │ INDIRECT     │          │
│  │   (by Subject or Department)    │            │ COST/STUDENT │          │
│  └────────────────────────────────┘            └──────────────┘          │
│   Add Products of All Direct Costs Per Subject/Department                 │
│  ┌─────────────────────────────────────────────────────────────────┐    │
│  │            COST PER STUDENT FOR YEAR                             │    │
│  └─────────────────────────────────────────────────────────────────┘    │
│   Add Direct Costs for Each Year in the Curriculum                        │
│  ┌─────────────────────────────────────────────────────────────────┐    │
│  │            COST PER STUDENT PER DEGREE                           │    │
│  └─────────────────────────────────────────────────────────────────┘    │
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guide our choice of the best model for calculating costs, we considered the following constraints:

• Not all institutions presented expenditures on a per department level. Thus, it would be more difficult to determine a cost per department for some HEIs than for others.

• There were "shared" faculty members in many departments. Some faculty members taught in multiple programs and in multiple departments, colleges, and campuses. In most instances, their salaries were retained in the mother unit and not distributed to the different programs. Thus, to simply divide a unit's expenses by the number of faculty employed therein would not take this important nuance into consideration.

• Many faculty members did more than teach full-time. Besides advising students, faculty members were also given administrative assignments. Moreover, faculty were expected to render research and extension hours. For some institutions, production (spending hours in agriculture and fishery activities) was part of the workload. Consequently, the model had to clearly show the portions of salaries that could be considered part of direct teaching expenses. Other expenses for research, extension, and production had to be reflected and financed using a different formula.

• Students shifted courses and others repeated subjects due to failures and withdrawals. The model had to be able to prevent double-counting students when calculating department populations.

• Students of differing majors could take courses "serviced" by particular departments, especially general education courses. Thus, the derived model had to specifically identify the costs for a particular degree regardless of where the subjects were offered.

• Laboratories and research centers were also established by departments to primarily support students taking their major degree there. However, non-majors also used these facilities in the process

of completing their degrees. For instance a science laboratory could be used by a management student taking chemistry for a term. Therefore the model had to take into account how the costs for maintaining the facilities could be properly allocated to the students who benefited from them.

• Capital outlay expenditures, including equipment purchases, are considered one-time expenses. Thus, the model had to exclude these expenditures.

Taking all matters into account, the model used for this study went down to the subject level. An average direct teaching cost (personnel services only) was determined for each subject offered by an institution, using teaching workloads. This meant that each paid hour of a faculty had to be accounted for as having been spent either on teaching, advising, researching, engaging in community service, or other activity. The costs for each subject were added together based on the program of a student.

To account for operating expenses, the department's expenditures were divided by the total number of students served by the unit. This computation resulted in a direct maintenance and operating expense for each department and for each student. Thus, every subject taken by that student would absorb the direct operating costs of the department where the subject was offered. Finally, all unaccounted expenses for the year was shared equally by the student population and added as a yearly expense of the student. Indirect expenses are shown only as a yearly expense by virtue of its formula. A sample computation is shown in Table 1.

Typically, the breakdown of the cost per degree per student would look like Table 2 (page 6).

Table 1. Sample Computation for a Degree in the First Year in $U.S.					
Sample First Year					
Subject	Unit	Cost / Unit	Teaching	Operating	Indirect
First Semester					
English 1	3	10.06	30.20	5.07	
Mathematics 1	3	9.49	28.47	5.07	
Filipino 1	3	8.10	24.29	4.81	
Social Science 1	3	12.39	37.17	5.07	
Natural Science 1	3	9.28	27.86	5.07	
Humanities 1	3	6.77	20.32	5.07	
History 1	3	12.39	37.17	5.07	
Physical Education 1	2	7.28	14.56	3.00	
Total	23		220.03	38.25	
Second Semester					
English 2	3	10.06	30.20	5.07	
Filipino 2	3	8.10	24.29	4.81	
Mathematics 1 A	3	9.49	28.47	5.07	
Education 11	3	8.33	24.99	5.07	
Social Science 2	3	12.39	37.17	5.07	
Natural Science 1 B	3	9.28	27.86	5.07	
Humanities 1 A	3	6.77	20.32	5.07	
Physical Education	2	7.28	14.56	3.00	
Total	23		207.86	38.23	214.69
Total for the first year					
		First Term	Second Term		Total
Teaching		220.04	207.86		427.90
Operating		38.23	38.23		76.46
Indirect cost			214.69		214.69
Total		258.27	460.78		719.05

The average cost per unit per subject per student can, of course, be computed in different ways, from the simplest to the most complex. Intuitively, the simplest formula can arrive at cost estimates quicker, but makes many assumptions and consequently provides only the roughest estimate of unit costs. It is usually computed as direct teaching costs by total student credits. On the other extreme is the complex methodology that entails more personnel efforts to extract data, minimizing assumptions and thereby presenting more realistic estimates of unit costs. We explain the different formulae and their effect on unit costs in a separate study (Santiago et al., 2002). Also explained in that study are the specific steps used to arrive at cost computations.

Table 2. Sample Presentation of a Cost per Degree per Student in \$U.S.				
Bachelor of Science in Home Technology				
Year	Direct Teaching	Direct Operating	Indirect Costs	Total/Year
First Year	380.79	71.02	214.69	666.50
Second Year	618.75	81.17	214.69	914.61
Third Year	886.21	71.02	214.69	1,171.92
Fourth Year	578.29	46.66	214.69	838.64
Total	2,464.04	269.87	858.76	3,591.67

Cost Model Application Experience

The cost accounting method for higher education institutions was first tested on four HEIs located in the national capital region of the Philippines. Two of these education institutions were publicly owned and managed while the other two were privately owned and managed. The four were different in quality level and student population size.

After the pilot study, we fine-tuned the methodology and applied it to a sample of public and private higher education institutions spread throughout the Philippines. The results are presented in a separate paper (Santiago et al., 2004). A total of 29 universities participated in the study using the same framework. In selecting the institutions, the team considered quality indicators, student population size, and accessibility of data. Because the study involved reviewing the financial statements and student and faculty data for a given year, it was important that top administrators as well as the staff involved were willing to share the data. Table 3 (page 7) summarizes the information gathered from the institutions.

Data gathered from the universities are then encoded into templates. We designed seven worksheets that captured all data needed to compute the cost per degree per student (see Table 4, page 8). The worksheets were linked together to minimize errors in copying figures.

For each of the participating universities, we carried out the following:

- Comparison of the different unit cost per faculty member within a department. Variance possibly due to faculty rank, allocation of faculty hours, classification of subjects (basic or major), and class size.

- Comparison of the different unit costs per department within a college. Variance possibly due to composition of faculty members, number of course offerings, and class size.
- Comparison of the different unit costs per college for the entire university. Variance possibly due to composition of faculty members, nature of major, and the like.
- Comparison of the different unit costs per department with other departments. Variance possibly due to composition of faculty members, number of enrolled students, additional maintenance and other operating expenses for the laboratory, and the like.
- Evaluation of efficiencies and standards of quality. For instance, class sizes, use of space, as well as investment in facilities.
- Evaluation of the quality of education considering the acceptance and rejection rates into the university, percentage of passing rates as compared to national passing rates for government licensure examinations, accreditation levels by the Commission on Higher Education, as well as research output.
- Evaluation of the additional expenses that would be incurred to upgrade the standard of quality for each department, the college, or for the university in general.
- Evaluation of other factors that may affect efficiency and quality and access to donor grants.

Discussion of Findings

It was interesting to observe the reaction of university administrators when we presented our cost findings to them. Many became defensive and began to rationalize the large costs for certain degree programs. Others appeared

Table 3. Information Required from Universities	
Type of Information	Description of Data Required
General Information	Institution name, respondent, contact details, structure of the institution in terms of campuses, colleges, and departments. Flowcharts of each degree offered.
Student Information	Enrollment per degree (broken down per number of students at each year level – freshmen, sophomore, juniors, seniors [QU: Should this be "per student per year"? –]) and grouped per campus, college, and department. Graduation data for the last 5 years, including professional licensure results. Also the survey asked for information regarding the number of applicants to the university and the percentage acceptance and rejection rate.
Faculty Information	Faculty qualifications, including status of employment and years of service, grouped per campus, college, and department. Typical weekly schedule per faculty as well as their respective faculty loading for the terms required by the study.
Class Information	Description of all the classes in terms of number of units, class size, room used, professor who handled course, and whether the class was a lecture or laboratory.
Personnel Services	Information on compensation of each faculty member, broken down into components (fixed salary and benefits).
Operating Expenses	Breakdown of expenses for each campus, college, and department, showing specifically where resources are spent. Alternatively, an institution could submit a detailed financial statement.
Administration Data	The number of personnel in administration and their qualifications and status of employment for each major administrative area.
Capital Outlay	Description of the physical structures of the university.
Equipment	Description of the major equipments of the university.
Projected Expenses	Information on the expected expenditures for equipment and capital outlay.

cautious and sought further recomputations. Those who began to understand the relationship between programs and administrative functions were able to rethink approaches to allocating university resources.

Private Universities

Using the cost accounting model in determining total degree costs per students has revealed different insights for each university. In a particular sample private university, for instance, the following patterns emerged:

Patterns in Personnel Costs. The average personnel cost per subject that an economics major incurs is US$15 , while for a chemistry major, it is US$32. Nothing about this is unusual; it merely reflects the higher proportion of PhD-holders in the chemistry department. Since benefits are prorated according to tenure, departments with more long-staying staff are also going to experience higher wage bills.

Looking closer at the individual accounts, we note that the three most expensive subjects an economics major takes are Public Finance (US$56), Operations Research (US$39) and Economic Development (US$26). Again, this is to be expected because all three are "major" subjects and are generally given to more senior faculty members. The smaller class size is a product of students failing prerequisites and are not eligible to take these more advanced courses.

The three least expensive subjects in the Economics program, on the other hand, are expectedly "general" or "basic" courses: Science 4 (US$6), Science 3 (US$8) and Algebra 1 (US$9). This is because relatively junior instructors are usually assigned to handle these courses and it is common for these subjects to feature near-maximum student counts of close to 40.

For a Chemistry major, the three most expensive subjects are Research 3 (US$150), Research 2 (US$133) and Physics 6 (US$71). These, in fact, rank among the 10 most expensive courses taught in the sample university. However startling the figures may seem at first, they are simply the result of highly paid senior professors handling very small classes. Research subjects are taken toward the end of the program when, presumably, most of the original majors have been screened out.

Table 4. Description of Worksheets	
Worksheet Number	**Description of Worksheet Contents**
Worksheet 1	Allocation of weekly time per family (residency form) arranged per campus, then per college.
Worksheet 2	Faculty loading data for two terms and one summer indicating course codes, number of units, and class size. Data sorted per course code and grouped per principal subject. For example English 101 and 102 were grouped together under English.
Worksheet 3	Summary of the computation in Worksheet 2. This presents the average teaching cost per unit per student.
Worksheet 4	Computation of direct operating expenses per student.
Worksheet 5	Computation of indirect costs per student.
Worksheet 6	Computation of degree costs.
Worksheet 7	Summary of degree costs showing total teaching, operating, and indirect costs per degree, arranged per campus and per college.

Chemistry's three least expensive subjects are likewise basic ones: General Psychology (US$9), Filipino 1 (US$12) and Chemistry Elective (US$12).

Patterns in Maintenance and Other Operating Expenses. Three variables clearly determine the size of the department's maintenance and other operating expenses: first, the existence (and number) of in-house research and publication institutes—their costs are considered part of operating expenses; second, the number of programs offered by the department, as the administration of each program entails its own costs; and third, the number of majors (or, in the case of first-years, prospective majors) registered with the department.

Departments have to walk a tightrope. On one hand, additional programs and extension services help increase the departmental profile, and this, in turn, may have a salutary effect on enrollment, especially if the programs are considered innovative. As we examine the figures across departments in the university, for instance, we notice that three out of the four highest operating figures belong to the Biology Department (US$17 per student per course), the Chemistry Department (US$11 per student per course)

and the Physics Department (US$9 per student per course)—which have more "traditional" courses, while those departments that offer new degree programs more often have lower operating expenses. For instance, Business Management costs US$4 per student per course and Marketing Management costs US$5 per student per course.

Yet new programs are a challenge to sustain, especially given a very unpredictable (some have said distorted) set of student preferences. Many departments in recent years have had financially painful experiences with "donor-driven" programs. A typical story would involve an international donor giving seed money to establish a program, new course offerings being advertised, and student counts rising in the first few years then tapering off as student preferences change. The department then suffers from very high operating expenses until the last major of the defunct program graduates.

Because the sample university is private and internalizes all costs, numerous in-house mechanisms exist that are designed to maintain levels of efficiency and to control costs. Some of these include rules on the dissolution of classes (the minimum number is 14 for undergraduate subjects and 6 for graduate subjects), and the offering of subjects (the fully computerized enrollment process allows each dean's office to track student enlistment; subjects are opened only when demand reaches a threshold level). Other policies spell out penalties (such as phasing out or reducing departmental budgets) for keeping unsustainable programs. The university level has directives for maintaining optimal full-time and part-time faculty ratios as well as salary caps designed to guide hiring practices. Departments are also classified according to size—"large" or "very large" departments (based on the number of faculty and course offerings). With this classification, departments are given proportionately higher operating budgets each year.

Behavior of Costs over the Program and the Need for Cross-Subsidies. There are implications to the university as one traces the movement of costs as a student proceeds through a given program. In this example a Chemistry degree costs 1.55 times an Economics degree. In future studies, the fact that the Chemistry Department for this university is a recognized Center of Excellence by the Commission on Higher Education and the Economics

Department is not should be noted, as estimates should control for quality.

Returning to the data above, the composite Economics student costs US$896 to educate during the first year US$951 and US$873 for the second and third years respectively. The figures are quite stable and reflect the impact of higher personnel costs as a student takes major subjects. The pattern for Chemistry is slightly different—US$1,164 for the first year, US$1,143 for the second, US$1,534 for the third, and US$1,376 for the final term. The markedly higher cost of the third year reflects the impact of extremely expensive research subjects taken by the student.

What is interesting to note is evidence of cross-subsidies that operate quite extensively within this private university. We see this in the fact that the average tuition for an Economics student is about US$1,636 a year—almost twice the actual cost of the program. On the other hand, a Chemistry student pays roughly US$1,818 a year in fees—not enough to cover actual costs if we adjust for the fact that the Chemistry Department has very few majors (as opposed to those who merely take chemistry subjects). To keep fees manageable and stable, this private university uses revenues from low-cost, high-enrollment colleges like Business and Liberal Arts to augment those of high-cost low-enrollment ones like Science.

Public Universities

For a sample public university, we find a similar computation of the cost of various degree offerings. Examining two degree programs, we draw the following observations: **Composition of Program Costs.** Given that the average tuition fee per term at this state university is about US$4, it is interesting to look at the actual costs incurred running a quality faculty training program, considered a Center of Excellence by the Commission on Higher Education.

We note immediately that scale appears to be the primary determinant of per unit costs. Large differences in the number of sections carried by each department as well as total enrollment within the college account for the discrepancies in per unit personnel costs. With more time-series data, it would be possible to construct a cost function using these figures, but, at the moment, we are limited to analyzing the spread of the cost values.

Analysis of this university's cost structure reveals three important characteristics of the cost structure: first, the relative stability of most accounts. Unlike the private university, both departmental operating expenses and personnel costs do not fluctuate by more than a few hundred pesos in either direction. The most frequently recurring per unit costs, for instance, are US$35 for, say, English courses and

US$38 for science subjects. It seems that there is little or no variation in the costs of the subjects taught, regardless of whether they are basic or advanced courses.

We surmise that this flatness of costs is due to the relative lack of market incentives for performance within the institution. The salary scales in public universities tend to be flatter than those in private universities as a result of budget constraints, and this allows those with tenure to "catch up" with those who may have come in with higher academic ranks. The result would be a departmental wage bill that is evenly distributed across lecturers.

A second characteristic of the cost structure is the efficiency implications of this situation. Should repetitions of this exercise be carried out in the future, the data will indicate that this state university incurs much lower personnel costs than a comparable private institution. If we accept the idea that educational quality is costly, then we can only conclude that a significant part of the university's "efficiency burden" is borne by faculty members who are paid less than the median wage for degree programs.

A third pattern that may be seen is the relatively high personnel costs for math subjects in all programs. Math subjects cost twice as much as nonmath courses across the board (for some education courses, they cost eight times as much as nonmath courses). There are two possible explanations for this. First would be the higher academic qualifications of those handling math and related subjects; the other reason could be the increased number of units given to math subjects—a quick examination, after all, would show that the per unit costs do not differ substantially from the other offerings.

Relatively Large Indirect Costs. The figures also indicate per student indirect costs that amount to roughly three times the level of personnel costs (US$388 as compared to about US$91 for operating expenses). This suggests that if all costs of this state university were to be internalized, the bulk of the expenses would go to the maintenance of facilities and services. In a sense, this can be expected; it is less likely that savings can be obtained from property, plant, and equipment than it can from, say, a fixed but low salary scale, especially when this sort of capital has historically been maintained at a relatively small expense.

Overall, the costs of these high-quality degrees (as certified by the Commission on Higher Education) indicate that the market (i.e., private institution) price of education hovers around US$364 to US$455 a semester for essentially a nonlaboratory program. These are static figures and do not reflect either generally increasing prices nor future quality targets.

Public Provision. Another important question that must be addressed is the level of government provision for education that has strong public goods characteristics, such as teaching. A well-established economic principle states that individuals should pay for courses whose returns are primarily private. The primary example of this is a business degree. There are degree programs that manifest strong externalities or spillovers (i.e., benefits to society and not just to the individual). Science and technology courses are good examples of this for the research they create, but teaching also falls under this category because there is a pressing social need for not just instructors but instructors of high caliber.

Education authorities must still determine whether the normative financing framework takes the narrower view of efficiency—that is to say, the balancing of private costs and benefits. If so, then there probably exist good reasons to scale down funding for many state universities, given the slackness with which they manage resources.

But if the social welfare principle is followed instead, one can then make the argument in favor of much larger endowments to courses taught at state universities, because the institution is "underpaid" for the services it provides. In this case, the monetary value of the social benefit should be used to balance the cost of maintaining facilities, paying personnel, and supporting all other activities related to operating the university.

Computations such as those found in this paper raise more questions than provide answers, given the number of obvious qualifications. First, neither research nor extension services are considered in our formula so the final figure is to be treated as the sum of purely instructional and maintenance activities—with no room for improvements in the quality of services. To the extent that the authorities set their own research agenda and targets for accreditation, the appropriate cost adjustments must be made.

Second, personnel costs are entirely dependent on the willingness of faculty members to accept present wage scales. It would appear that the sample university probably pays its personnel lower than the median rate—a situation that is hardly sustainable.

Third, we must again point out that market distortions on the demand side are likely to affect cost computations as well. Take the well-documented preference for law degrees in the Philippines (CHED, 2003), which may, in part, explain the overwhelming number of students enrolled in the College of Arts and Sciences. On one hand, the college benefits from this large population, as costs per unit tend to be quite low. It does not follow, however, that this figure should be interpreted as a sign of the college's

"efficiency." Rather, the low cost can itself be viewed as a reason for the course being oversubscribed.

Conclusion and Practical Implications

The aforementioned discussion of findings, while done only in one country, show the varied insights that can be generated by a methodology that applies cost accounting principles. Essentially, the presentation of actual costs highlights peculiarities for each degree program. Understanding the relationship of costs aids education administrators in assessing the financial viability of the programs. Although financial data should not be the only reason used when deciding on the merits of a program, they, nonetheless, provide defensible arguments for supporting or discontinuing program offerings.

Findings show that the costs per subject are greatly affected by class sizes. While there are studies that reveal that smaller class sizes lead to a better quality of education, one must accept that this necessarily results in higher service delivery costs, as does the use of more senior and tenured faculty. Consequently, iterations can be undertaken using the cost analysis model to determine the appropriate class size and faculty mix given possible limitations in financing sources.

Finally, a systems approach should be taken when deciding among several programs. Determining unit costs will obviously be affected if a program is contracted since fewer students will enroll in general education courses thus affecting their unit cost. Degree costs of other programs would naturally change with any change in parameters.

Limitations

Due to a limited budget, the cost analysis model was applied to only one academic school year per participating higher education institution in the Philippines. Consequently, when computing costs per subject for subsequent years, the figures used were static. There was no inflationary factor that was imputed in arriving at costs for each subsequent year of student education. However, costs are not stagnant and a multiplier should be included when using the formula for normative financing. Otherwise, it is best to perform the cost analysis to cover the average length of a degree program.

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