The accounting system and resource allocation reform in a public university

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Keywords

Accounting, Resource allocation, Accounting systems, Universities, Greece

Abstract

This paper studies the accounting system reform practised in Greek universities since January 2000, and more particularly at the Aristotle University of Thessaloniki (AUTH). It specifically examines the allocation of resources to faculties by university management based on certain criteria. The AUTH is the largest public university in Greece and one of the largest in Europe. Following a study of financial data on variances in expenditure over the past 12 years, the application of a new method for allocating funds to departments is proposed through use of a certain formula. The results from the application of the formula for resource allocation have shown that the latter needs to be modified in order to be considered fairer and be accepted by the academic community.

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1. Introduction

The last decade has seen important changes in the public sector of the economy, generally described as the introduction of "New Public Management". This has involved the adoption of management approaches and organizational structures previously found only in the private sector. The recognition of discrete accounting entities complemented by the use of private sector accounting techniques has been an accompanying feature. Traditional cash-based accounting has been replaced by, or supplemented with, accrual accounting, thus leading to the preparation of an income and expenditure account and balance sheet.

According to the current legislation (Presidential Degree No. 205/98, 1998), from the year 2000, public sector legal entities must apply a double entry accounting system, with the obligation of keeping corresponding ledgers and issuing proper documentation. This category also includes the country's state universities (Venieris and Cohen, 2000). The accounting system reform focuses on the application of the following.

(1) A double entry system (accrual accounting) with the obligation of keeping corresponding ledgers and issuing the proper documentation.
(2) A sectoral accounting plan in three accounting cycles, each functioning autonomously but in parallel with the others:
   - financial accounting,
   - cost and management accounting, and
   - budget accounting.
(3) The issuance of financial statements, i.e. balance sheet, profit and loss accounts, profit distribution, annex.

This paper examines the accounting system and resource allocation reform implemented by the Aristotle University of Thessaloniki (AUTH) since 2000, in comparison to the former system. It specifically examines the allocation of resources to faculties by university management on the basis of certain criteria. For this purpose, accounting data concerning a 12-year period (1990-2001) was used for each faculty, using a multivariate regression analysis.

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This paper is organized as follows. Section 2 reviews research on the accounting system reform in public universities. Section 3 refers to the Aristotle University case. Section 4 underlines the methodologies employed, the variables and the sample data used in the present study. Section 5 includes and discusses the empirical results obtained using regression analysis. Finally, Section 6 provides some concluding remarks and implications.

2. The accounting reform at public universities

In recent years, the modernization of public management has become a topic of major concern Public accounting practices, most often oriented towards recording payments and receipts, must become a genuine management tool in order to make the financial state of the government or a public organization more readily understandable and comprehensive. The new Financial Regulation sets the new legal framework for sound financial management of the EU Budget. This new law requires the Commission to complete its shift to accrual accounting for its general accounts by 2005. The Commission produces two types of accounts.

(1) *The budget accounts*. These give a detailed picture of implementation of the annual budget, and are essential for the work of the budgetary authority.
(2) *The general accounts*. These give a global view of the "economic situation" of the Commission over and above the implementation of the budget, considering the value of assets (such as buildings and loans for example) and other elements (such as depreciation, provisions, etc.). Such accounts are therefore based on accrual accounting principles. The new Financial Regulation lays down an accounting framework based on a *dual* system; the general accounts are based on accrual accounting, whereas the budget implementation remains *cash-based*, that is to say it records expenditure and revenue.

The introduction of Public Sector Accounting in public universities is linked to a number of problems related to the reformed academic accounting legislation, as well as the reformed regulations in the accounting practices and the comparability of the annual reporting (Christiaens and Wielemaker, 2003). Accounting for university performance measurement was examined in a *Symposium of the European Accounting Association Congress* under the mediation of Lapsley (2000). The symposium focused on issues regarding the importance of accounting and performance measurement in universities. The following were the main questions.

(1) How significant has the accounting contribution been to the measurement of performance indicators?
(2) Has the practice of accounting shifted from the traditional stewardship role to a more activating, management role?
(3) Is there evidence of accounting information being used in the strategic management of the university?

This need for effective performance measurement is also emphasized by the dual nature of the central government's involvement:

(1) the provision of funding, and
(2) the need for effective monitoring of the support it provides.

In many universities, serious problems derived from the existing management structures were thought to include the absence of information systems – both general and related to accounting – which would permit the determination, for example, of the comparative cost of each student attending various courses in all levels of the institution. Essential data are available to establish the degree of utilization of the resources available, potential savings, and the elaboration of institutional plans, on a short and long-term basis (Aranjo, 2000). In state management accounting, specifically in the university sector, significant efforts have been made to achieve a successful introduction and implementation of accounting systems with differences from country to country (Aranjo, 2000). Spathis and Ananiadis (2002) examined the impact of the new Accounting Information System in improving efficiency at the AUTH. The users' perceptions, in descending order of importance, focused on the following beneficial factors:

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(1) managerial,
(2) IT infrastructure, and
(3) operational.

An important approach that can improve the efficiency of universities is the modernisation of their accounting systems. Since students in many European countries do not pay fees and therefore universities do not aim at making a profit, the latter cannot apply traditional accounting systems known in commerce and industry without certain modifications. Universities should implement a statement of net value changes of assets rather than an income statement. The activities of universities are not rated in monetary terms by markets; therefore, their cost and performance systems must use quite different and appropriate tools for activity and success performance accounting (Kuepper, 2003).

Fundamentally, the implementation of models from private accounting applications with modifications for university use aim at achieving a more efficient budget (Groves *et al.*, 1994; Jeffries, 1993; Scapens *et al.*, 1994). The primary objective has been to improve accounting information systems and allow the identification and differentiation of the total indirect costs of academic activities. Techniques such as activity-based costing (ABC) were implemented with the purpose of more precisely identifying the cost of each activity (Goddard and Ooi, 1998; Jeffries, 1993; Pendlebury and Algaber, 1997).

The accounting reform from cash to accruals in Flemish universities has been examined by Christiaens and Wielemaker (2003). Empirical tests reveal that there are a lot of accounting problems in the area of reformed regulations, as well as in accounting practices, and that the comparability of the annual reporting is not guaranteed even after years of experience. A survey of cost accounting practises used in Italian Universities was presented by Cinquini *et al.* (2000). The survey has indicated that there is a difference in the speed with which public universities are implementing new accounting techniques. The limited number of universities that have adopted management accounting techniques makes it difficult to highlight a clear relationship between the complexity of the issue (number of students, different degrees etc.) and the adoption of cost accounting techniques.

Crooper and Cook (2000) analysed the progress made by UK universities in implementing ABC, undertaken in 1993 and 1998/99. The collected data suggested that while implementation of ABC systems has been slow, this might be about to change due to pressure exerted by funding bodies and the central government.

2.1 Resource allocation

Since the late 1990s, the public sector in Europe has undergone radical reform of its management and organisation. The changes aimed to improve *inter alia* efficiency, effectiveness and accountability of all public sector entities including universities. The term accountability is generally used to describe the responsibility that those who manage or control resources have towards others. Politicians, lawyers, accountants and all those who manage or adjudicate over public resources are seen as being accountable to the public with regard to the exercise of their responsibilities (Coy and Pratt, 1998). This idea goes back to antiquity. "Therefore, to prevent peculation of the public property, let the transfer of the funds take place in the presence of all the citizens" (Aristotle, 1932, p. 429).

In a specific case study, Coy and Pratt (1998) raised concerns related to resource allocations and the absence of accountability information as critical factors that prevent such issues from being addressed on an informed basis. The absence of reliable, public information led to dissatisfaction and acrimony among the staff. Educationalists should participate actively in financial decisions, since the allocation of resources affects which voice will be heard, and therefore ultimately academic freedom.

The public funding schemes that use merit or performance rating follow Aristotle's equity principle, which states that goods should be divided in proportion to each claimant's contribution to the common cause (Young, 1994). For example, Serban and Burke (1998) argued that, during the 1990s, the interest in the use of performance criteria in higher education increased accountability and improved institutional performance. The merit-based allocation systems also function by equalising

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the capacity of public universities to provide degrees and research: and each unit is given a fair chance to do its best (Alho and Salo, 2000). They consider using a simplified formula-based hierarchical allocation system for university funds, based on sharing of academic degrees and/or scientific publications produced by the various departments. Other resource allocation bases are the number of students and the type of courses followed (Coy and Pratt, 1998).

In evaluating public policies, effectiveness and efficiency are just as important as equity. While efficiency refers to keeping costs down, effectiveness means achieving goals, and dealing with any unanticipated side effects. Questions of equity appear to be resolved through legislation, although the legislative intent may be buried under the complex details (Caudle and Newcomer, 1987; Spencer, 1980, 1982). The efficiency may be enhanced by a formula design that incorporates market incentives (Johnes, 1996; Massy, 1994). However, if the measurement of merit is inaccurate, formula-based allocations may lead to lack of effectiveness and inequity among the recipients, even if they share a common overall goal. From this literature, certain characteristics will be identified with the development of supposedly more rational systems.

3. The Aristotle University

The AUTH is currently the largest public institute of further education in Greece. It consists of 38 departments, comprising of ten Faculties (schools), with an additional three functioning as independent departments. The number of DEP (Teaching and Research Staff), EEP (Scientific Staff) and EDTP (Teaching and Technical Staff) staff amounts to 2,014, 305 and 717, respectively. The active student population is estimated to be over 40,000. The distribution of teaching staff and students across the 41 departments of the university is not even-based; on the contrary, considerable differences are to be observed. Thus, when the study was carried out, the Department of Medicine had 488 DEP members while the Sports Department in Serres had only four. Another example is that of the Law Department, which at the start of the previous academic year accepted 705 first-year students, compared to the Department of Journalism, which registered only 50. The AUTH also has schools which in other areas of the country constitute separate universities.

Bearing in mind the particular characteristics of universities in Greece, and the fact that state universities cannot be compared to other public organisations (DEKO), as their main purpose is not profit maximization, we understand the significance of full utilization of the public resources (financing) made available to the former, in order to accomplish their goals. A thorough exploitation of available resources will be even more efficiently served following the adoption of the double entry system (accrual accounting) and the analytic accounting methodology. Contrary to private firms, the operational input for universities is provided by the state at a rate of 95 per cent. As an output, we consider the total number of active students. In that way, the input is recorded according to public accounting methods, in the cash budget of inputs-outputs, according to its allocation in different categories of expenditure. One of the main factors that affect full utilization of the input is fund absorption. In conjunction with rational funds allocation, high levels of fund absorption achieve a better utilization of available funds. The principal problems for AUTH lie in:

(1) delays by the state in the payment of funds to cover operational costs;
(2) low absorption by faculties, being the result of both the above-mentioned reason and the degree to which expenditure is covered; and
(3) the allocation of expenses between faculties.

Consequently, the financial requirements of the university can potentially only be compared in their complexity to those of all other institutes of further education (AEI) put together. It is clear that the formation of an algorithm for the distribution of the resources provided by the regular budget (RB) of the AUTH between the various schools and departments, which will reflect all the individual requirements of each department, is an exceptionally difficult task. The formula for such an algorithm must consider a number of coefficients, which expresses the various factors affecting the distribution of the RB. Since these factors do not, as a general rule, have the same importance

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in the distribution of resources, it immediately becomes apparent that the task can be achieved by introducing an equal number of weighting coefficients corresponding to each factor. However, in this case, while defining precisely the distribution of resources, the formula has in fact only a theoretical value, since in practice it is impossible to arrive at values for all these weighted coefficients.

Three coefficients of fund allocation are used by the AUTH Algorithm Committee (2000).

Coefficient A. The number of departments in each School. To cater for the special needs of various departments, we introduce the term "Equivalent Department" (EQDP). The EQDP proportion of each school is represented by coefficient A_j.

Coefficient B. The number of professors (PROF) in each school. The proportion of professors per school is represented by coefficient B_j.

Coefficient C. The number of active students (STUD) attending all years of study in each school. The proportion of students per school is represented by coefficient C_j.

Through the use of coefficients A_j, B_j, and C_j, it is possible to determine, using the following formula, the allocation of funds W_j that correspond to each school:

$$W_j = W_A A_j + W_B B_j + W_C C_j$$

where W_A, W_B and W_C are the corresponding weighted coefficients. Through the use of model simulations and by giving various values to the coefficients and checking the variations with regard to the distribution of schools during the previous years (so that they may be as minimal as possible), a joint decision was taken to apply the following values to the coefficients: $W_A = 0.6$, $W_B = 0.2$, and $W_C = 0.2$. A detailed description for the coefficients A_j, B_j and C_j can be found in Appendix.

4. Methodology

This paper has developed from research in the AUTH which examined the implementation of change from historic, centralised systems of resource allocation to devolved, formula-based system. With respect to the accounting system reform of the AUTH, the aims are to examine:

(1) the impact of adopting the new accrual accounting in resource allocation,
(2) the allocation of resources to faculties included in the AUTH regular budget in relation to their particular needs, and
(3) the degree of absorption of funds by faculties in relation to their particular needs.

For these reasons, we examine the criteria that lead to fund allocation and the levels of fund absorption using the double-entry accounting system in accrual basis, which provides a continuous flow of information concerning fund allocation, information that cannot be gathered through the annual financial review. Each university school receives two types of funds:

(1) funds for basic operational costs such as supplies, computers, services, books and journals; and
(2) internal support for research, such as graduate assistantships, university-funded projects, etc.

Funds do not include professors' salaries and other personal and general expenses such as utilities.

With regard to the allocation of AUTH funds, the Algorithm Committee has proposed a corresponding formula which has been used since the year 2000. Aiming to study the allocation of AUTH resources, we applied the used formula to the fund allocation of total budget expenses (TBE) and total actual expenses (TAE) by using the regression analysis method. Data for each faculty from the past 12 years (1990-2001) were used. With the purpose of identifying differences in the allocation of budget expenses and actual expenses, before and after the application of the formula, we divided the data into two periods: before (1990-1999) and after the application (2000-2001).

5. Results and discussion

We use Tables I-III with the data taken from the AUTH. Table I refers to the descriptive statistics regarding all the variables used in Tables II and III. In considering the dependent variables, TBE and TAE, we arrived at the description in the methodology section.

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Table I Descriptive statistics per school (faculty) of AUTH (1990-2001)

Variables	Mean	Std dev	Min	Max
TBE (in thousands Euro)	454	444	6	1,898
TAE (in thousands Euro)	375	351	5	1,291
EQDP	43	48	4	152
PROF	155	173	1	618
STUD	2,944	2,412	30	8,500

Note: $N = 52$

Table II Coefficient estimates from regressions for dependent variable TBE

Variables	1990-2001	1990-1999	2000-2001
Constant	126.111***	118.125***	183.085*
	(3.406)	(3.531)	(1.769)
EQDP	1.854***	1.464**	4.447**
	(2.535)	(2.221)	(2.138)
PROF	1.557***	1.587***	1.192*
	(6.812)	(7.720)	(1.819)
STUD	2.223E-03	−8.809E-03	5.038E-02
	(0.180)	(−0.798)	(1.353)
Adj. R^2	0.597	0.649	0.689
F	75.534***	78.140***	19.424***
N	152	126	26

Notes: ***Significance at 1 per cent level, **5 per cent level, *10 per cent level, and t-statistics in parentheses

Table III Coefficient estimates from regressions for dependent variable TAE

Variables	1990-2001	1990-1999	2000-2001
Constant	81.830***	75.787***	120.317*
	(4.153)	(4.265)	(1.896)
EQDP	2.117***	1.788***	4.057***
	(5.436)	(5.110)	(3.180)
PROF	1.391***	1.451***	2.504***
	(11.438)	(13.291)	(1.007)
STUD	−4.606E-03	−9.002E-03	1.419E-02
	(−0.699)	(−1.535)	(0.621)
Adj. R^2	0.817	0.861	0.777
F	225.693***	259.589***	30.093***
N	152	126	26

Notes: ***Significance at 1 per cent level, **at 5 per cent level, *at 10 per cent level, and t-statistics in parentheses

Table I reports the mean values, standard deviation and min/max values of all variables over the 12-year period (1990-2001). The TBE and TAE are the dependent variables and the EQDP, PROF and STUD are the independent ones for the regression analysis. The magnitude of the impact of EQDP, PROF and STUD on the fund allocation (TBE) for each school of AUTH can be found in Table II. Results from the regression analysis for three specific periods are reported.

The formula is significant for all three periods, the total period (1990-2001), before and after the formula adoption and explains 59.7, 64.9 and 68.9 per cent, respectively, of the variation in TBE by the adjusted R^2. In Table II, the dependent variable TBE, is correlated in a linear way and positively with the independent variables EQDP, and the PROF for the three periods. Both these variables are considered in relation to the allocation of the aggregate funds between the schools and Departments of the University. High levels of equivalency in a Department, and a high number of professors, result in higher levels of financing, and consequently in better fund allocation. The independent variable concerning the STUD is not statistically significant, as it is not considered equally important for the financing of a department, compared to the two previous variables. The positive coefficients are expected for the three periods with regard to EQDP and PROF and not expected with regard to STUD. An increasingly influential and definitive role is currently attributed to the EQDP, i.e. to schools with many years of study like Health Sciences, the Polytechnic School, Geotechnical Sciences, and the School of Fine Arts, along with schools characterized by extensive laboratory work.

According to the above-mentioned results, the distribution coefficients of the formula $W_A = 0.6$, $W_B = 0.2$, and $W_C = 0.2$ are not adhered to in effect, and in particular W_C which concerns the weight of number of students. Consequently, the resources allocated to schools of theoretical science with large number of students are significantly lower in relation to those allocated to technical and science schools. These results are the outcome of the adoption of the formula method for resource allocation over a period of 2 years (2000-2001) at the AUTH, and lead to the conclusion that there is room for improvement of both algorithm and process for its application in practice. In addressing each of the above findings, it was observed that school power remained a significant factor in the

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resource allocation process. The implementation of a devolved formula-based system generated micropolitical activity based on self-interest and created new powerful forces that gained their authority through financial strength as reflected in the resource allocation model. Power resided in those with an ability to understand and manipulate the coefficients of the institutional model.

In order to study the issue of fund absorption, we used the TAE as a dependent variable with the same independent variables (EQDP, PROF, and STUD) for the same three periods. In general, the results were similar to those regarding the TBE.

In Table III, the TAE are positively correlated with the EQDP and the PROF for all periods. The number of students is not significant in this case. The lower variation in TBE by the adjusted R^2 (Adj. $R^2 = 0.777$) for the period 2000-01, in respect to the previous period (Adj. $R^2 = 0.861$), is due to the Ministry of Education's delay in approving the budget and financing, which takes place after the first semester, thus not allowing time for the schools to absorb the total of budgeted funds. This problem is further aggravated by the increased bureaucratic procedures required, due to the sheer size of the AUTH. The low absorption rate during the last 2 years can also be attributed to the transition to the new accrual accounting system coupled with a change of software in the year 2000, which impeded fund absorption by the schools. On the contrary, in 2001-2002 and following the familiarization of the Financial Department's personnel with the new accounting system and the new ERP software, an obvious improvement has been observed and remains to be confirmed by the corresponding values.

6. Concluding remarks

This paper provides insight into the adoption of a new accounting (accrual) system and the parallel application of a formula for resource allocation in a public university (AUTH). The results from the application of the new accounting system point towards the fact that the latter significantly contributes towards:

(1) detailed recording, effective monitoring and exploitation of the university's estate and income-expenditure is linked to the obligation of conducting regular accounts checks and the adoption of modern accounting principles;
(2) savings on social funding by limiting the squandering of funds and by ensuring a fairer distribution according to actual needs;
(3) improvement in the quality and reliability of financial statements and the respective information used to calculate efficiency indicators;
(4) effective control of funds management and also the award of service contracts to the private sector, along with monitoring their quality and quantity by applying internal control of procedures and by facilitating external controls, e.g. through auditors;
(5) improvement in the financial management and decision-making processes followed by the university administration through the provision of reliable accounting information by both segment (schools) and research activity and consolidated financial statements.

Data from three periods have been used to demonstrate how the resource allocation was carried out. The results from the application of the formula for resource allocation have shown that the latter needs to be modified in order to be considered fairer and be accepted by the academic community. The fund allocation formula must include more factors that will rationalize the financing of the various University Schools and Departments, such as scientific publications produced by the university. The allocation system should be based on criteria whose constancy and validity are ensured, since it cannot aspire at improving efficiency if the latter cannot be realistically measured. The different enrolment distribution of students must not affect the allocation of funds and hence, the absorption of available funds. The absorption of funds must be available for evaluation more than once a year, as it stands at present. This factor is a basic criterion for the evaluation of state universities, as it indicates the capacity of an institution to utilize the available funds. However, the application of the new accounting system settles

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this matter, as it provides a sound and thorough picture of the funds' utilization within each month's budget. Each Department or School must assign its financial administration to one individual, so that there are no delays in the absorption of funds due to conflicts of interest, or even inertia. The use of the analytical accounting system (cost accounting) for complete expense allocation to the various cost-drivers, combined with performance measurement of that institution, will signal full exploitation of the invested funds.

6.1 Implications

We believe that this paper, through a sound statistical analysis of data from the past 12 years concerning the financing of the AUTH, proves the necessity and usefulness of the new accrual accounting system. The administration of the university can and should put this methodology into practice, in order to improve human resource management, recourses allocation, and in general to implement more efficient and effective management and administration practices for the overall benefit of the institution.

The findings have a number of implications for institutional managers involved in the implementation of devolved, formula-based systems of resource allocation. They may be summarised as follows.

(1) Despite the rhetoric of "rationality" which accompanies the establishment of developed, formula-based systems of resource allocation, the process remains subject to micropolitical activity, the influence of school power and the preferences and priorities of key change agents. Consequently, institutional managers need to be aware that the implementation of such systems is unlikely to diminish the undercurrent of micropolitical activity that has historically accompanied the process of resource allocation.

(2) The role of facilitation in terms of explaining the details and consequences of the system is increased. There is a danger that some theoretical science-based deans and heads of department will be at a disadvantage compared with their positive science-based colleagues. Consequently, the presentation of the model needs to be easily understood.

(3) A move towards a more numerate, analytical and systematic base for decision-making can place an increased responsibility on institutional managers for the accuracy of that information in the knowledge that those figures will form the basis of micropolitical activity.

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Appendix. Assessing the coefficients

For coefficients B_j and C_j, which represent proportions of professors and students, respectively, the determination is easy. The coefficient A_j is determined as follows.

Coefficient A_j. The variable EQDP includes the number of departments in each faculty. In order, however, to consider the special requirements of the various departments, we introduced the concept of the "Equivalent Number of Departments" γ_j for each school j. For calculating γ_j, the number of study years in each department and its requirements with respect to laboratory equipment are considered. The proportion of Equivalent Departments of each school is represented by coefficient A_j. This coefficient A_j represents the requirements of each school for laboratory equipment and by extension for its maintenance. To this end, a coefficient (equipment coefficient) β_{ji} is set for each Department i of a School j.

In determining the coefficient β_{ji}, the relevant AUTH Algorithm Committee (2000) basically followed the proposal made at the Synod of Rectors, whereby this coefficient should be considered equal to one for departments whose students come from the third and fourth Panhellenic Examination Subject Groups (arts subjects) and equal to five for departments where the students come from the first and second Panhellenic Examination Subject Groups (science subjects). However, this general rule was not applied in the case of specific departments where expenditure on equipment is deemed to be high. Thus, for the History and Archaeology Department, where expenditure on archaeological digs raises costs significantly (approximately 120,000 Euros per year), it is proposed that $\beta_{ji} = 2$. The same value ($\beta_{ji} = 2$) was proposed for the Economics Department of the School of Law and Economics because of that department's apparently great need for equipment, particularly relating to information technology systems. For the School of Fine Arts departments, which spends considerable amount on its teaching requirements (consumable materials, models, etc.), it is again proposed that $\beta_{ji} = 2$. The value $\beta_{ji} = 1.5$ is proposed for the Sports Department. Finally, for the General Department of the Polytechnic School, where requirements are comparatively lower than for other science departments, given that this department has students for only 1 year (though its requirements are calculated on the basis of the β_{ji} coefficients for the other departments), it is proposed that $\beta_{ji} = 2$.