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ACTIVITY-BASED COSTING IN UNIVERSITIES – SECOND STEP OF CALCULATION OF TEACHING COSTS*

Summary: The article is a continuation of consideration contained in an article titled "Activity based costing – first step of calculation of teaching costs". The article describes information regarding the second step of the calculation according to the ABC, points to the problems encountered during project implementation and indicates further actions necessary to implement the activity based management (ABM).

Key words: activity based costing, cost calculation, teaching costs.

1. Introduction

The subject of costs, calculation of costs, and determination of unit cost is especially important for universities. The growing requirements of law [Polish Statute 2005, Art.99; Polish Statute 2004, Art.5], increasing competition among universities to attract students and funds for research are just some of the factors that make the subject of cost management a topical issue at Polish universities. The analysis of costs in an extremely volatile and complex environment of universities is not an easy task. The predominant attempts to address this issue are by the implementation of Activity Based Costing [Cox et al. 1999; Doyle 1994; Granof et al. 2000; Klaus et al. 2007; Klaus, Kowalski 2007]. The experiences around the world support the use of ABC. Australia has the greatest experience in this area as its government, searching for ways to increase the effectiveness of the functioning of public universities and ways to improve the speed of their reaction for environmental changes, started up a project related to finding a proper method of costs calculation. The executor of the project (Ernst & Young firm), after doing the research, proposed to use ABC [Ernst & Young 2000; Ernst&Young 1998]. Although there is no doubt why to apply ABC to manage costs of universities there are not any practical descriptions how to do it and so many problems remain unsolved. In this article an attempt to implement ABC to determine costs of education at the Wrocław University of Technology is presented.

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The article titled ‘Activity based costing – first step of calculation of teaching costs’ describes first four out of seven steps of project connected with account for teaching costs at the Wroclaw University of Technology Department. To remind, the steps taken in the project were:

1. Analyzing all costs of the department, creating resource pools.
2. Modelling costs of support area.
3. Modelling costs of faculty:
 - 3.1. Making a dictionary of activities connected with faculty.
 - 3.2. Estimating costs of activities and processes assigned to faculty.
 - 3.3. Identifying cost objects for activities being realized by faculty.
 - 3.4. Linking activity costs to cost objects.
4. Analyzing and allocating the rest of resources.
5. Identifying recipients of activities – cost objects.
6. Modelling cost flows among cost objects.
7. Reporting and interpreting the results.

This paper presents last three steps of the project, which are related to identifying costs of cost objects (identifying costs of cost objects in ABC is called a second step of calculation, the first step of calculation in ABC is responsible for identifying costs of activities).

2. Step 5. Identifying recipients of activities – cost objects

During defining dictionaries of activities (both for faculty and staff) for all activities cost objects responsible for completion of the activities were set. Finally, it was decided to set cost objects in the model as follows:

- course – means every course being done at the department, recorded in a semester in the didactic base¹,
- course section – means didactics course sections being realized in a range of the course, recorded in the didactic base. Course sections could have been assigned to the term, the didactic room and the faculty member,
- group of listeners – means every group of participants of the course sections. It is assumed that the group of participants is compound of students of the same major, semester, type and mode of study. The participant is a student whose number of album is assigned to the didactic base,
- group of students – means every group of students studying at the department. It is assumed that the group of students is compound of students of the same major, semester, type and mode of study. The student is a person whose number of album is assigned to the didactic base,

¹ “Didactic base” is a database of system supporting didactics. It contains information related to didactic processes, among others about: course sections, courses of the department, classrooms where course sections have taken place, persons who have taken part in course sections, and faculty members.

- PhD student – it is a cost object grouping costs connected with doing PhD studies in the department,
- department – it is cost object grouping costs connected with managing and maintenance of the department,
- university – it is cost object grouping costs connected with the management and maintenance of the university,
- free sessions – means a group of costs related to products of activities or resources which remain to be used for every student studying at the department. In particular, cost of the following objects have been marked: library 1, library 2, computer laboratory, photographic studio, scientific associations, consultation, common space, practices, instructional materials,
- unused capacity – means cost objects representing pools of unused didactic capacity. It is assumed that the unused capacity appears when less students than it has been planned take part, compare [Granof et al. 2000].

The cost objects were defined based on the analysis of the activities of the faculty. For each activity products of the activities have been set and then tried to indicate the direct recipient of the product.

For example:

- the product of the activity “Designing a new course” is a designed program of the course, the activity is realized in favour of the concrete course (cost object – “Course”),
- the products of the activity “Conducting course sections” are realized in course sections, we assumed that costs of the activity can be assigned to the course sections (cost object – “Course section”).

The model distinguishes a student from a listener. (Listener is a student who is taking part in the course section). The separation was important from the point of view of the calculation. Some costs were allocated on the listener and others on the student. This is explained in subsection 3.

In case of cost objects: “Student” and “Listener” resigned from their separate treatment in the model. A manipulation was made which grouped the students and the listeners into similar groups meaning the groups of students and the groups of listeners belong to the same major, semester and the type and mode of study. The solution allows us to significantly reduce numbers of cost objects and increased computational effectiveness of the calculation. Instead of 3537 cost objects representing every student, the model included much less cost objects representing groups of students.

The manipulation has not caused the loss of any information, because it is assumed that a single student does not generate variability in request for the activities or in use of other cost objects. As an example it is assumed that:

- every listener who takes part in a course section equally takes profits from the course section, so all of them will be assigned the same cost,

- every listener equally requires monitoring in instruction progress, so all the listeners will be assigned the same cost connected with the activity,
- every student equally enjoys the use of a library or computer laboratory, so all the students will be assigned the same cost of library/computer laboratory.

Cardinality of the group of listeners and cardinality of the group of students are one of their most important attributes, used in the construction of the allocation.

In the model it was consciously decided to include a lot of types of cost objects. The cost objects present “consume” costs in each element of the teaching process, such as: courses, course sections, listeners, library support or specialist studios. The solution gives us a better reflection of the logic of cost flows/costs consumption and ensured added cost information. For example:

- considered in the model of the cost objects: “Course” and “Course Sections” allowed us at first to assign the step costs of the activity “Designing a new course” to object “Course” and later account the cost on every course section of the course. It is worth highlighting that if activities of course projecting were carried out but because for some reason none of the course sections were activated, costs of the course would not be allocated,
- considered in the model the “Free sessions” cost object allowed us to gain information about the costs of the functioning of the supportive form of the teaching process (for example costs of scientific associations or consultations). In the next step, the costs were allocated on all departmental students, according to the principle that every student can take part in the forms.

3. Step 6. Modelling cost flows among cost objects

The next step of the calculation was an identification of dependence among cost objects and to use them in further accountings. For two fundamental purposes of the calculation two irrespective costs allocations were used (schemes of calculations) among cost objects, marked in Figures 1 appropriately ①, ②.

1. To gain information about the cost of one group of listeners the following procedure was used:

a) costs of courses were allocated on “Course sections” cost objects realized in the frame of the course,

b) costs of course sections were assigned to “Groups of Listeners” who participated in the course sections or on “Unused Capacity” cost object,

c) costs of groups of listeners were assigned to proper “Groups of Students”,

d) in cost objects representing groups of student there were allocated costs of “Free Sessions” cost objects.

2. To gain information about the total costs of courses the following procedure was used:

a) costs directly assigned to cost objects represent groups of listeners added to the pool of cost objects representing course sections, in which the group of listeners took part,

b) costs assigned to course sections added to the costs of courses.

The ways which use costs calculation are shown in Figures 1.

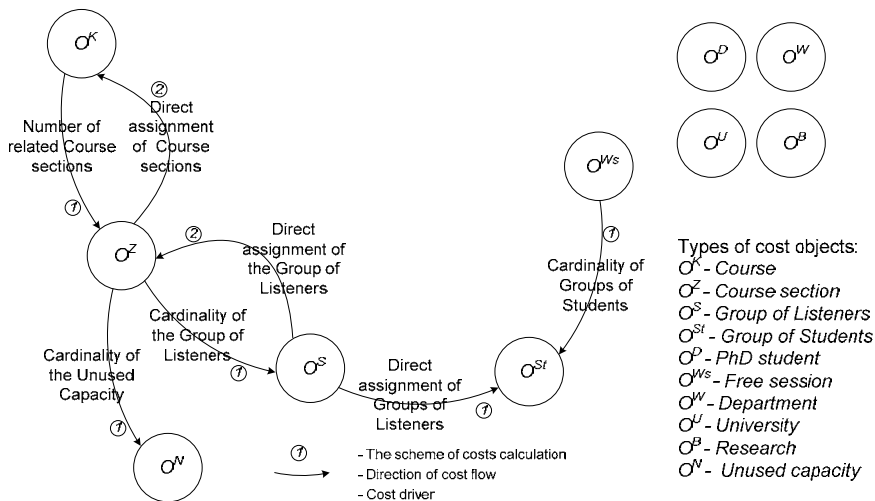


Figure 1. Scheme of cost flows among cost objects.

Source: individual work.

In the figure two used procedures of the allocation are indicated. It is assumed that in one model it is possible and advisable to account costs differently, according to the needs for managerial information entered by organizations. Basics of the calculation – used cost drivers are also indicated. The construction of the cost drivers used on this level is identical as it was in the case of resource cost drivers or activity cost drivers (so, by analogy the cost drivers can be named cost objects cost drivers). The main purpose was to select basics of the calculation which assure proper cause – consequence relations and logic of cost consumption. For example:

- costs of “Course sections” were allocated on “Groups of Listeners” on the basis of cardinality of the groups of listeners. When in the course section the number of listeners which was planned did not attend, adequate part of costs was assigned to cost object representing “Unused capacity”,
- costs of “Free Sessions” cost objects were allocated on cost objects which represent groups of listeners on the base of cardinality of the groups.

4. Step 7. Reporting and interpreting the results

The results which were gained from the calculation allowed us to create a lot of sections of managerial information. The example reports present a range of possible analysis which are shown in Tables 1, 2, 3, 4 and 5².

Table 1. Costs of courses in section of their forms

		FORM OF COURSE			
Course	Name of course	Laboratory	Project	Seminary	Lecture
The Code	Name of the course		16.4		12.6

Source: own study.

Table 2. Costs of selected course, exemplary analysis

Name of course	Name of the course			
Form of course	Teacher	Code of course	Number of students	Cost
Seminary	Code, Name and Surname	Code of the course, date, didactic room	19	2.3

Source: own study.

Table 3. Costs in teaching structure

	Major 1		Major 2		
	Specialty 1	Specialty 2	Specialty 3		
	Undergraduate	Undergraduate	Undergraduate	Postgraduate		
Semester	Full-time	Part-time	Full-time	Full-time	Part-time	
Code of the semester	559,9	129,8	195,3	62,5	23,9	...

Source: own study.

Table 4. Costs in teaching structure, unit costs

	Major 1		Major 2		
	Specialty 1	Specialty 2	Specialty 3		
	Undergraduate	Undergraduate	Undergraduate	Postgraduate		
Semester	Full-time	Part-time	Full-time	Full-time	Part-time	
Code of the semester	4,9	5,8	9,3	3,5	7,9	...

Source: own study.

² The values are not real outcomes of the calculation, they are exemplary amounts (given for the article needs).

Table 5. Costs in teaching structure, exemplary analysis

Major	Major 1	
Specialty	Specialty 1	
Type of study	Postgraduate	
Mode of study	Full-time	
Semester	All	
Element of cost 1	Element of cost 2	Cost
Course 1	Teacher 1	2.3
Course 2	Teacher 2	3.1
...		...
...Course section 1	space	0.7
...Course section 2	space	1.1
...		...
...Consultations		17.6
...		...

Source: individual work.

In many meetings which purpose was to verify the results of the calculation, employers did not identified the needs of managerial information which were not-fulfiled by the model.

5. Continuation of the research

The model of costs calculation was the first serious attempt at using ABC at Wrocław University of Technology. Further steps, in research and practical dimension, will be made to implement the system of costs management based on ABC at the university. The authors notice the following areas of development of the concept:

I. Verification of the dictionary of faculty activities, taking into consideration its completeness for other majors of the university. Identification of differences and similarity in range of activities and time of the activities for each department or majors of the University. Doing the questionnaire research on a wide scale could give interesting characteristics of the teaching process of various scientific disciplines. The results could have significant meaning for the rules of allocation of funds in the didactic area.

II. Extension of the model about outside-didactic activity of universities. The model should be extended to research areas and areas related to professional services. The authors claim that the way ABC calculation is used from costs identification to activities and processes definition, to set cost objects, could be completely employed. The trial of costs allocation of outside-didactic activities is very complicated but interesting. However, as it was already stated, the need for finding tools of research

projects costs management is real and urgent. Knowledge of the costs of research becomes an important aspect for universities. There is a noticeable upward trend connected with the number of projects carried out at universities, particularly European projects, which are subject to stringent regulations in terms of their planning and execution (among others 7th Framework Programme of the European Union). The modelling of professional services area is extremely important for the valuation of the services. Only a detailed analysis allows to specify the real cost of the services. There are invaluable answers to the questions such as: What part of the costs related to scientific activities produce an end result? How are cost-consuming various projects in each scientific discipline? What are the causes of the differences?

III. Operations in direction of optimization of costs in teaching areas. Suggested model gives very detailed costs information. The data need a discerning analysis. The results of the calculation could be a basis for simulations of many tasks in the didactic area.

IV. Extension of the model about outside-financial aspects of costs management. Undoubtedly in the evaluation of the results it is necessary to take into consideration problems connected with teaching quality and teaching efficiency. Consideration of outside-financial aspects of university allows for real measurement of effectiveness understood as a comparison of all effects and all costs.

V. Making a system of budgeting based on a suggested model. Activity Based Budgeting is a natural consequence of work done. On the basis of historical indicators and planned workload it is possible to set essential activities and later resources which will execute them. The system of budgeting which uses the results of calculation gives direct answers for the questions: How much is the start-up of a new major?, What is the minimal level of student fees for a new major?, What is the minimal number of students (at given height of student fee) to ensure achieving BEP?

VI. Using the results of the calculation as information for other systems support university management. The results can be a base for constructions of various measures of the effectiveness in different kinds of university areas. They could support management in the areas such as: dean's offices, technical services, etc. The information which is can be useful for Balanced Scorecards which are introduced by more and more universities (and are used for the measurement of strategic goals of the university). Only full integration of all university systems would allow to have a compact and complete model of university management.

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RACHUNEK KOSZTÓW DZIAŁAŃ W SZKOŁACH WYŻSZYCH – DRUGI ETAP KALKULACJI KOSZTÓW KSZTAŁCENIA

Streszczenie: Artykuł jest kontynuacją rozważań zaprezentowanych w opracowaniu zatytułowanym „Rachunek kosztów działań – pierwszy krok kalkulacji kosztów kształcenia”. Przedstawiono w nim drugi etap procesu implementacji kalkulacji według metody ABC w szkole wyższej oraz problemy, jakie wystąpiły podczas realizacji projektu i propozycje ich rozwiązań. W podsumowaniu zaprezentowano propozycje dalszych badań w obszarze zarządzania kosztami na uczelni wyższej.