ACTIVITY-BASED COSTING AS AN ALTERNATIVE FOR THE EXISTING COST ACCOUNTING IN PUBLIC UNIVERSITIES IN POLAND – THE AUTHOR’S CONCEPTION OF IMPLEMENTING THIS COST ACCOUNTING AT THE UNIVERSITY

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Abstract

The results of research concerning the usefulness of assessing the cost accounting system at public universities in Poland to effective cost management of their functioning, which was carried out by the author of the article indicated that this system does not meet the requirements of its users. Its assumptions and structure result from:

- On the one hand – from a well-established in the theory of economics full cost accounting, in which all costs incurred in a unit in a given period should be referred to and settled on products and services manufactured,
- On the other hand – from existing legal regulations of these units and from the needs of their financial reporting.

So, the cost accounting system constructed in this way is of limited usefulness for the purposes of costs management of public universities in Poland. Therefore, for these units, it is reasonable to implement more advanced cost accounting, which is the Activity-Based Costing. According to the author of the article, this cost accounting will increase the information resources about factors that generate costs and their structure, and thus create more opportunities for more effective management of these entities.

The main aim of this article is, therefore, to present the assumptions of the authors model of cost accounting in a public university, which contains all elements of the activity-based costing and the procedure for its implementation in the university.

In the article, its three basic parts were distinguished.

In the first part of the article, the assumptions and the structure of the activity-based costing in public university were presented both in the descriptive terms and in the form of the author model of this cost accounting.

In turn, the procedure of the activity-based costing implementation was presented in the second part of the article.

Considerations, which were presented in the final part of the article, concerning the assessment of the usefulness of the developed activity-based costing model for the needs in effective cost management in public universities in Poland are of the essence of the analyzed problem.

The results of research carried out indicate that the implementation of the activity-based costing in public universities in Poland will significantly increase the information resources about costs incurred by them, which will undoubtedly improve the effective functioning of these units.

Keywords: higher education sector, public universities, activity-based costing.

1 INTRODUCTION

The research carried out by the author of the article concerning the assessment of usefulness of the principles of recording, accounting and calculation of unit costs in force in public universities in Poland for the cost management of these units allowed to formulate a conclusion that the cost accounting used by these universities is an insufficient tool for the effective management of costs of universities, mainly due to limited informational possibilities [1]. The critical analysis of this cost accounting system, as well as the results of surveys conducted to assess its usefulness, became the basis for the search for another cost accounting system which would increase the amount of information on both cost generating factors and their structure [2].
The analysis of modern cost accounting systems has shown that in the literature there are systems that allow to generate data on cost in other than traditional information scopes. One of such systems is the activity-based costing which, despite its indisputable advantages, is still used to only a small extent by public universities in Poland [3]. The survey conducted by the author of the article in this respect showed that the lack of interest in the implementation of this cost accounting by universities results mainly from the lack of sufficient information about the possibilities of using the cost accounting for activities at universities and the benefits resulting from it, as well as generally from insufficient knowledge of this cost accounting system. Foreign universities definitely have different experiences in this respect, where this account has been successfully used for many years [4], [5], [6]. This article presents the key issues related to the development and implementation of a model of cost accounting for activities at a public university, which is an example of an alternative solution for collecting data on costs in relation to traditional models.

2 METHODOLOGY

The main research method used to achieve the assumed objectives of this article is a case study for the implementation of activity-based costing at a public university. On the basis of the simulated example, the requirements and procedures for the implementation of the above mentioned cost accounting at the analyzed university were developed. An original model of cost accounting for public universities was developed, which takes into account both the assumptions of cost accounting for activities and the requirements resulting from the legal regulations applicable to these universities. Specific assumptions had to be made for both the model and its numerical verification.

The subject of the research is a public university of an academic character, where both teaching and research activities are conducted. This university is characterized by a faculty structure typical for Polish public universities. The research assumes that the university has five faculties conducting didactic activity on full-time and part-time studies in the first-, second- and third-degree. Apart from the basic organizational units, i.e. faculties, the organizational structure of a higher education institution shall also include inter-departmental and university-level units subordinate to the respective Vice-Rectors, Chancellor and Rector. The developed model was verified on the basis of a numerical example used to calculate unit costs of education, however, due to the limited volume of the article, the results of these calculations will not be presented in here. The assumptions and original model of this cost accounting system as well as a descriptive procedure for its implementation at the university shall be presented.

3 RESULTS

3.1 An original model of cost accounting for a public university with the use of activity-based costing

Activity-based costing is characterized by an innovative approach to analyzing the causes of cost generation. According to this concept, the direct cause of cost generation are not the products or services produced in the unit, but the activities performed in connection with the production of these goods and services. The essence of this cost accounting is the thesis that the products manufactured or services provided by a unit generate demand for the implementation of specific activities and thus generate costs. This means that the key concept in this system is action, treated as a factor determining the generation of costs [7].

The specific approach to cost issues, presented in the concept of activity-based costing, forces the adoption of specific model assumptions, necessary in the process of implementation of this system in real conditions, i.e. in this case in public universities. The specific nature of the activities of these universities, which significantly differentiates them from market sector entities, makes it necessary for the model of activity-based costing developed for them to take into account:

- The types of activities carried out, including didactic, research and economically ring-fenced activities,
- Division of costs into direct and indirect costs in relation to the types of activities carried out at the university,
- Division of direct and indirect costs of didactic activity into full-time, part-time and other didactic activity costs,
Resources, activities and processes separated in the university.

The activity-based costing concept takes into account two basic cost categories, i.e. direct costs and indirect costs. The identification of direct costs and indirect costs depends on the type of accepted cost objects, to which these costs are related. The method presented in the activity-based costing, using cost carriers for resources and activity cost drivers, may cover both direct and indirect costs. Due to the fact that on the basis of source documents it is possible to assign direct costs directly to cost objects, indirect costs are most often subject to accounting using this method. In accordance with the assumptions of the activity-based costing, these costs are settled against cost objects in the scope of activities and processes generating them, and not according to the places of their generation (i.e. organizational units). In public universities, the so-called faculty and university-wide costs are usually considered as indirect costs in relation to the type of didactic activity, research activity as well as economic and separate activity. The accounting of these costs is divided into processes and activities carried out at the university by means of resource cost drivers. It is important that these activities do not have to coincide with the organizational structure of the university. This means that, within a single cost generation center, several activities can be identified that give rise to different costs. If the object of reference for costs in a public university is not the type of activity in a specific faculty, but e.g. students of a specific form, field and degree of study, other groups of costs may also be included in indirect costs. This applies, for example, to the remuneration costs, including markups, of research and teaching staff employed on the basis of an employment contract or through appointment on a given faculty, who conduct teaching courses within the framework of the curriculum in various fields and degrees of full-time and part-time studies.

Figure 1 presents a schematic representation of the author's original model of cost accounting in public universities, using elements of activity-based costing. In this model, the division of university costs into direct and indirect costs was made in relation to the types of activities conducted at individual faculties of the university, i.e. didactic, research and economically ring-fenced activities as well as forms of studies (full-time and part-time) for didactic activities. For the purposes of the model, the following cost reference objects were identified:

- Didactic activity for full-time degree programmes at a given faculty of a public university,
- Didactic activity for part-time degree programmes in a given field and degree of study at a given faculty of a public university,
- Other didactic activities carried out by a given faculty of a public university,
- Research activities carried out at a given faculty of a public university,
- Economically ring-fenced activities carried out in a given faculty of a public university.

Due to the fact that the implementation of the activity-based costing was made for the purpose of calculating unit costs of education in part-time studies at a specific faculty of the analyzed university, both the structure of the model (see Figure 1) as well as the identified direct and indirect costs were assigned to the adopted calculation concept. In particular, the direct costs of education in part-time studies were included in the direct costs of didactic activity:

- Costs of materials consumption, which can be identified on the basis of extensive cost records,
- Remunerations and markups of research and teaching staff employed at the A Faculty on the basis of an employment contract or through appointment, carrying out didactic activities for part-time studies in overtime,
- Remunerations and markups of external employees conducting didactic activities for part-time studies under contracts for specific didactic work,
- Allowances to remunerations (including e.g.: fixed duty allowances for vice-deans of specific forms of studies),
- Remunerations and markups of administrative and technical staff, including e.g. costs of remuneration of dean's office staff servicing part-time studies.

By contrast, apart from faculty costs and university-wide costs, the following were also considered as indirect costs:

- The costs of remunerations of research and teaching staff conducting classes for part-time studies within the scope of didactic curriculum; these costs were considered as indirect costs in relation to the accepted cost objects and will be settled, as well as faculty and university-wide
costs, in accordance with the procedure characteristic for the activity-based costing; for this purpose, key elements of activity-based costing were introduced into the model, i.e. resource cost drivers, activities and activity cost drivers – cf. Figure 1;

- The renumeration costs of teaching staff working as part of a teaching curriculum for part-time programmes; these costs for full-time and part-time programmes will be settled based on an hourly wage for didactic work in a specific form of studies.

![Diagram](source_document.png)

**Figure 1. Simplified model of cost accounting at a public university using elements of activity-based costing.**

*Source: Own elaboration.*

In order to implement the activity-based costing model presented in Figure 1 in a public university, it is necessary to develop a detailed procedure for the implementation of this cost accounting system. These issues will be addressed in the next part of this article.

### 3.2 Procedure for implementation of activity-based costing in a public university

The implementation of the activity-based costing at a public university requires:

- definition of university responsibility centers,
- identification of relevant processes and activities taking place at a university,
- determination of the resource structure type of a university and the value of resource consumption,
- definition of resource cost drivers,
- determination of the costs of the distinguished activities,
- definition of the activity cost drivers,
- settlement of indirect costs of individual activities into cost objects.

Identification of processes and activities carried out at public universities is preceded by the stage of defining the places of their creation, which are considered to be specific organizational units. As the nature of these processes is different, it is easier to understand them by analyzing where they arise.
The cost centers are analyzed in the context of the so-called responsibility centers. These centers are defined as separate areas of an economic unit generating specific costs, revenues, results and having specific resources, in which responsibility for the performance of assigned tasks may be related to their respective managers or a group of managers [8]. The process of identifying responsibility centers in public universities is determined – among other things – by the organizational structure of a given university. This structure determines the number and nature of organizational units to be classified as centers of responsibility for costs, revenues and financial results. At the same time, from the point of view of the concept of activity-base costing, the most important are those organizational units of universities which are defined as cost responsibility centers. An important factor that should also be taken into account in the identification of responsibility centers is the way in which universities are managed, including the centralization or decentralization of financial management. In general, these terms are related to the delegation of decision-making powers to separate organizational units. The analysis of these powers makes it easier to determine not only the number but also the type of responsibility centers.

The next step in the implementation of the activity-based costing at a university is to identify and analyze processes and activities in organizational units of the university identified as specific centers of responsibility for costs, revenues and results. Specific types of processes should be assigned to each of these centers, including basic, auxiliary and management processes. The basic processes should be considered as the leading ones, which are realized within the scope of the conducted didactic, research and economically ring-fenced activity. The specificity of the division of activities conducted at the university determined the basic processes distinguished in these areas. Therefore, in didactic activity, the basic process is the education of students, in research activity – conducting scientific research, and in economically ring-fenced activity – conducting service activity. Each of the above-mentioned basic processes is supported by both auxiliary and management processes. Auxiliary processes support the implementation of basic processes. These processes include admission for studies, organizing the course of studies, accounting for the course of studies, obtaining funds for scientific research, obtaining degrees and titles, organizing scientific internships for employees, etc. On the other hand, management processes are such processes that are related to the management of both the faculty and the entire university, including e.g. human resources management or financial management. Then, each process should be divided into activities, i.e. repetitive activities performed in order to implement a specific process, which lead to the generation of costs. Identification of actions is not only one of the most important, but also the most difficult element of the implementation of activity-based costing. In this system, the activity is considered as a link between the resources of the unit and the cost objects, and this is the key element of the activity-based costing. In public universities, this stage of implementation of the activity-based costing should begin with the identification of the existing organizational structure of the university in terms of processes carried out by separate units, as mentioned earlier. Further on, for each of the groups of processes distinguished at the university, the identification of the activities performed will be necessary. For this purpose, the so-called glossary of activities is created, which makes it possible to logically organize the acquired information, as well as to unify the used nomenclature. This glossary is also the basis for the next steps in the implementation of the activity-based costing.

The next step is to identify the structure type of university resources. This process is significantly facilitated by the analysis of data on the type of incurred costs contained in the accounting records system. The system covers both the accounting ledgers, i.e. journal, general ledger and ancillary ledger accounts, turnover and balance sheets, as well as all resource-related documentation, such as depreciation plans, pay slips, evidence of material consumption, etc. In the cost accounting system, used by most public universities in Poland, knowledge of the generic structure of indirect costs does not play a significant role, as these costs, treated as one category, are transferred to cost objects in an appropriate proportion. This is not the case in the concept of activity-based costing, where the generic structure of the costs in question is important for the correct valuation of products or services. In the case of public universities, the analysis of generic costs is extremely important from the point of view of proper allocation of indirect faculty and university-wide costs. The share of particular types of costs in the above-mentioned indirect costs is one of the key factors determining the amount of unit costs. Therefore, apart from the identification of processes and activities, it is important to separate the resources used for their implementation in this account. In the activity-based costing, the level of generic cost is the actual level of consumption of a given type of resource assigned to an adequate activity. A higher education institution may identify various types of resources, including research and teaching staff, faculty and university administrative staff, teaching and administrative buildings, research equipment, IT systems, office equipment and utilities. The identification of the generic
The structure of the consumption of university resources is made possible by the accounting records of costs in two classification systems – generic and calculation. However, for the purpose of the implemented concept, such a method of recording costs is of little use, as it is not possible to determine the costs of processes and activities identified at the university on the basis of the accounting records. It is therefore necessary to introduce changes in the way in which costs are recorded, by adapting the existing chart of accounts to the requirements of the activity-based costing. In addition to the above-mentioned cost classifications, the new plan of accounts should also take into account the processes and activities identified at the university and their links to specific cost generation centers. Only such a way of recording costs will enable relatively accurate identification of particular groups of resources and the value of their consumption.

After completing the identification of processes and activities as well as determining the value of consumption of individual university resources, it is possible to move to the next stage of implementation of the activity-based costing, which consists in allocating the cost of resources to specific activities. For this purpose, so-called resource cost drivers are used, i.e. appropriately selected measures of the amount of resources used or consumed by subsequent activities [9]. As a result of their application, it is possible to allocate different types of resources between specific activities, resulting in the so-called pool of activity costs. This pool is a set of all generic costs incurred during the implementation of a given activity, thus expressing the total cost of its implementation. Separation of resource cost drivers makes it significantly easier to determine the relationship between the resources identified at the university and the activities. These relationships reflect the dependencies between resources (and consumption thereof) and activities. In this way, it is possible to obtain information on the distribution of demand for resources in the scope of the identified activities.

The established relations between resources and activities as well as the proposed resource cost carriers make it possible to account for the value of resources used for activities which are the subject of the next stage of implementation of activity-based costing at the university. This settlement is reflected in a schematic way by the matrix: resources – activities. The final effect of the above settlements are the activity cost pools, which correspond to the amount of costs generated by individual activities. Because of them, it is also possible to determine the total costs of the processes. The analysis of data contained in the matrix: resources – activities also indicates which of the separated processes and activities generate the highest costs. The information obtained in this way concerning the cost pool of activities at this stage of the procedure of implementing activity-based costing in a public university is a valuable source of knowledge about the costs of producing individual activities. This is extremely useful for university authorities, allowing for effective management of the costs of the identified activities. However, in order to implement the whole concept of activity-based costing, it is necessary to move to the next stage of the procedure, i.e. to settle the cost pools of individual activities to defined cost objects. For this purpose, in the next stage of implementation of the activity-based costing at the university, it is necessary to define the so-called activity cost drivers.

The activity cost driver is an expression of the frequency and intensity of demand from cost objects for activities. The stage of defining activity cost drivers, as well as resource cost drivers, requires drawing up a diagram of dependencies between activities and cost objects. The purpose of this is to indicate which activities are necessary to produce a specific cost object. After analysis, it may turn out that not all measures will take part in the further procedure of unit cost calculation. This is because of the nature of the cost objects that determine the catalog of activities carried out in order to produce them.

Performing the above activities enables to move to the last stage of implementation of the analyzed cost accounting system at a university, i.e. determining the level of demand for cost objects for individual activities and settling the cost pools of activities for separate cost objects. The result is information on the level of costs of individual cost objects.

The above description of the procedure of implementing activity-based costing in a public university in a descriptive form is consistent with the model presented in Fig. 1. It was used by the author of the article in the process of implementing this cost accounting in the example public university in Poland. On the basis of the experience gained, it was also possible to formulate an assessment of the usefulness of activity-based costing for the needs of university cost management, which in a synthetic way is presented in the next part of the article.
3.3 Assessment of the usefulness of activity-based costing in a public university for the needs of university cost management

The verification of the model of activity-based costing at a public university and the procedures for its implementation using a numerical example have enabled the formulation of a key conclusion concerning the assessment of the usefulness of activity-based costing for the university cost management. Namely, the collection of information on the level and structure of costs incurred by public universities generated in connection with the implementation of the activity-based costing is much larger than the information obtained from the traditional cost accounting system as well as reflects the cause and effect relationships between the material and intangible resources held by the university and the amount of their consumption for the needs of the implementation of leading aspects of activity of universities, including didactic activities. The concept of activity-based costing shows that the purpose of analysis and control is to carry out processes and activities at universities, treated as the primary causes of cost generation. Therefore, the main objective of this cost accounting is to provide the information necessary to manage a university in a system of activities and processes. Presentation of the university's activity in terms of processes enables to learn about the structure and frequency of processes and activities carried out in it and it facilitates the evaluation of their effectiveness at various stages of their implementation. This approach helps to obtain a wider range of information on costs and supports decision-making in many areas of university management. Identification and analysis of processes and activities taking place in public universities serves to identify the causes of cost generation and helps to control their level. Moreover, the knowledge of the processes and activities taking place at the university makes it possible to eliminate unnecessary activities and improve ineffective activities.

The processes and activities carried out in a university shall require the involvement of specific material and intangible resources, the consumption of which means incurring costs. The use of activity-based costing at a university allows for a thorough analysis of the structure and level of resources used (which should be used effectively). This in turn is particularly useful in planning and budgeting costs, both for individual educational services (including e.g. lectures, practical classes, projects, laboratory classes and others), as well as for entire educational programmes. As a result of the analysis of the structure of university's resources and information on the level of their use, the university authorities obtain information on the amount of costs of used and unused resources which valuable from the point of view of effective cost management. Such an analysis is a valuable source of information for the university authorities, covering the issues of the existence, development and distribution of production capacities of the university (both used and unused). Therefore, activity-based costing helps to determine the extent to which the activities use the university resources, as a result of which it is possible to determine the number and structure of activities that do not make full use of the resources available. On the basis of information generated in this way, it is possible to improve existing activities or eliminate unnecessary activities. It is worth noting here that the analysis of the level of resources used in a public university is almost the most important element of the implementation of the activity-based costing model. It is the resource consumption costs, as the first element of the model, that affect the accuracy of subsequent calculations. A detailed analysis of the resource consumption costs requires specific changes to be made to the way in which resources are recorded. The specificity of activity-based costing requires a greater degree of detail in the cost recording, which takes into account not only the types of activities conducted at the university, but also responsibility centers, identified processes and activities.

The main purpose of using the activity-based costing is to identify the factors determining the generation of costs and to determine the dependence of these costs on specific parameters of activity. For this reason, in this costing particular attention is paid to the appropriate way of grouping, measuring and allocating costs, in particular indirect costs. In the activity-based costing, there is a move away from a simplified settlement of indirect costs to cost objects on the basis of one contractual allocation key, and a larger and more diversified number of them is used. As a result of this, it is possible to allocate indirect costs more precisely between cost objects. The possibility of using more allocation keys increases the reliability of the calculated unit cost.

The use of activity-based costing also makes it possible to define various cost objects. With regard to public universities, this means that unit costs may be calculated for one student of a particular field, degree and form of study, but also for other cost objects, including the dean, teaching staff, research or investment projects. In this way, both faculty and university authorities obtain cost information on different areas of university activity that cannot be generated on the basis of cost data contained in traditional cost accounting systems. While in traditional systems, this information is highly aggregated,
it is possible to identify in the activity-based costing the activities that are necessary to produce a particular cost object and the level of costs that they generate. Such presentation of cost data enables effective management of costs, including optimization or reduction thereof. This is possible due to the identification of processes and activities carried out at the public university, the detailed analysis of which allows to eliminate activities that are unnecessary or do not bring anticipated results, which in turn leads to an improvement in the functioning of the university.

An undeniable advantage of presenting university activities in terms of processes is also the possibility of budgeting the costs of both individual activities and entire processes. Budgeting provides systematic and reliable information on the costs of individual activities and processes, which is conducive to effective decision-making. A wide range of cost information obtained from the activity-based costing allows for the analysis of the profitability of individual educational services or other cost objects, which creates the possibility of shaping an optimal and attractive educational offer.

4 CONCLUSIONS

To sum up, the implementation of activity-based costing in public universities will undoubtedly increase the efficiency of cost management in these universities. The scope of cost information obtained from this system allows for their current analysis, optimization and control, and thus enables taking quick action to improve the efficiency of the processes identified at the university. This is particularly important in the context of measuring and evaluating the effectiveness of the university's activities, which in its most widespread form focuses – first of all – on controlling and improving the separate responsibility centers on the basis of information about deviations between the plan and execution [10]. Aspects of effectiveness measurement are strongly emphasized in the concept of activity-based costing. They focus on shaping both the optimal structure of processes and activities taking place in public universities, as well as the structure of costs of their implementation. In this context, the notion of efficiency is considered in the context of the so-called economic efficiency, focused above all on cost management of public universities. Advanced procedures for the settlement of costs for activities, used in the activity-based costing, enable the generation of information necessary to make decisions and improve the functioning of a public university. The implementation of activities specified in a university involves the consumption of resources represented by specific types of costs. These activities are implemented with the objective of achieving specified results and the degree of their implementation forms the basis for assessing the effectiveness of each activity. Therefore, due to a thorough knowledge of the structure of processes and activities taking place in all areas of university activity, it is possible to rationalize them also in terms of costs incurred.

REFERENCES
