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Theoretical and Practical Foundations of Maintaining Management Accounting by Responsibility Centres and Segments in Non-State Higher Education Institutions

Xojiboyev Muxiddin Shodimuxamedovich

1. Associate Professor of the Department of "Accounting and Audit" at the Andijan Institute of Agriculture and Agrotechnologies, Candidate of Economic Sciences.
- * Correspondence: xojiboyevmuhiddin77@gmail.com

Abstract: This article analyzes the theoretical-methodological foundations and practical state of management accounting by responsibility centers and segments in non-state higher education institutions (NHEIs). The study identifies shortcomings of the existing generalized cost allocation system and proposes an updated model based on integrated application of ABC costing, standard costing, and target costing methods.

Keywords: management accounting, responsibility centers, segment accounting, non-state higher education institution, ABC costing, information consolidation, KPI

1. Introduction

Under the conditions of a modern market economy, non-state higher education institutions (NSHEIs) are increasingly becoming financially independent entities. Their operations are financed through tuition-contract payments, additional educational services, scientific research, and revenues from innovative projects. This situation, in turn, intensifies the need to improve the efficiency of resource utilization, ensure precise cost control, and make strategically sound decisions based on scientific analysis [1, 2].

Nevertheless, within the current management accounting system, costs are often recorded in an aggregated manner across the entire institution using the so-called "boiler method" (kotlovoy usul). Such an approach limits the ability to determine the cost of individual educational programs, faculties, or service types, to identify profit centres, and to assess efficiency [3].

In foreign academic schools, activity-based approaches to management accounting—particularly Activity-Based Costing (ABC) and standard-cost systems—have been successfully implemented in educational institutions, as evidenced by the works of Colin Drury, Robert S. Kaplan and Steven R. Anderson, and Charles T. Horngren et al. Uzbek researchers such as Toshmatov and Yusupov (2017), Qodirov and Nazarov, and Umarov have also achieved significant scientific and practical results in adapting these methods to the national education system [4].

However, the issue of comprehensively organizing management accounting by responsibility centres and segments in NSHEIs has not yet been fully resolved. This study was conducted to fill this gap.

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The purpose of the article is to analyze the current state of management accounting by responsibility centres and segments in non-state higher education institutions, identify existing problems, and develop a scientifically grounded mechanism for overcoming them [5].

Literature review

In recent years, special attention has been paid by both Uzbek and foreign scholars to improving the management accounting system in non-state higher education institutions (NSHEIs).

Among Uzbek researchers, Toshmatov B.N. and Yusupov A.R. (2017) were the first to theoretically substantiate the concept of dividing responsibility centres in NSHEIs into cost centres, revenue centres, profit centres, and investment centres. Their classification has served as a methodological foundation for subsequent studies [6].

Xolmatov N.T. examined the interrelationship between management accounting and budgeting systems and adapted the segmental accounting model to higher education institutions. The author demonstrated that the lack of integration among accounting systems reduces the quality of managerial decisions by 30–35%.

Qodirov Sh.I. and Nazarov O.T. in their research, developed a practical model for implementing the Activity-Based Costing (ABC) costing method in Uzbek higher education institutions. They proposed a multi-stage calculation scheme that enables the identification of costs by areas of activity [7].

Umarov H.B. investigated the integration of information technologies and management accounting and modeled a mechanism for consolidating data in NSHEIs based on the Enterprise Resource Planning–Business Intelligence approach. The study recorded a 40–50% increase in information coverage [8].

Razzaqov A.F. and Mirzayev S.K. studied the issue of improving the internal audit system in NSHEIs and substantiated the relationship between risk management and control mechanisms by segments. Their model integrates cost-centre accounting into the internal control system [9].

Eshmatov T.J. applied the standard-cost method and variance analysis model to NSHEIs. The author demonstrated that the introduction of standard costs could reduce institutional expenditures by up to 15–20%.

Karimov B.D. and Sultanov F.R. conducted a profitability analysis by segments in NSHEIs and found that profit margins across different educational fields varied sharply from 4.1% to 65.9%. This finding clearly highlights the importance of segmental accounting [10].

Haydarov M.S. conducted research on the practical outcomes of implementing the Key Performance Indicator system in educational institutions and empirically proved an 18% increase in management efficiency.

In foreign literature, Colin Drury extensively covered the theoretical and methodological foundations of management and cost accounting, emphasizing the importance of accounting by responsibility centres. Robert S. Kaplan and Steven R. Anderson applied the Time-Driven Activity-Based Costing (TDABC) model—which incorporates the time factor—to service sectors, making it directly applicable to the HEI environment.

Charles T. Horngren, Srikant M. Datar, and Madhav V. Rajan presented a systematic methodology of cost accounting for managerial decision-making. Jerry J. Weygandt and Donald E. Kieso broadly discussed the practical implementation of modern management accounting tools [11].

Summarizing the above, it can be emphasized that separate aspects of accounting by responsibility centres and segments have been widely studied in the existing literature. However, the issue of creating an integrated model that comprehensively combines these two directions, including information consolidation and a strategic decision-making mechanism, has not yet been sufficiently developed.

Below are the research directions pursued by domestic and foreign scholars, along with the main conclusions they have reached (see Table 1).

Table 2. Separate Aspects of Accounting by Responsibility Centres and Segments

Source / Author (Year)	Country	Research Area	Main Conclusions
Toshmatov B.N., Yusupov A.R. (2017)	Uzbekistan	Financial management in non-state HEIs	Classification of responsibility centres was proposed
Xolmatov N.T. (2018)	Uzbekistan	Management accounting and budgeting system	Practical model of segmental accounting was developed
Qodirov Sh.I., Nazarov O.T. (2019)	Uzbekistan	Cost accounting in HEIs	Activity-Based Costing (ABC) costing was adapted to HEIs
Umarov H.B. (2020)	Uzbekistan	Integration of information systems and management accounting	Enterprise Resource Planning–Business Intelligence integration model was proposed
Razzaqov A.F., Mirzayev S.K. (2021)	Uzbekistan	Internal audit in educational institutions	Internal control system was improved
Eshmatov T.J. (2022)	Uzbekistan	Standard-cost accounting of expenditures	Standard cost system was modeled
Karimov B.D., Sultanov F.R. (2023)	Uzbekistan	Profitability analysis in non-state HEIs	Profitability indicators by segments were identified
Haydarov M.S. (2024)	Uzbekistan	Implementation of Key Performance Indicator system in educational institutions	18% increase in management efficiency was proven
Colin Drury (2018)	United Kingdom	Management and Cost Accounting	Theoretical foundations of modern costing methods
Robert S. Kaplan, Steven R. Anderson (2019)	United States	Time-Driven Activity-Based Costing	ABC model considering the time factor
Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan (2021)	United States	<i>Cost Accounting: A Managerial Emphasis</i>	Cost accounting and managerial decisions
Jerry J. Weygandt, Donald E. Kieso (2022)	United States	<i>Managerial Accounting: Tools for Business Decision-Making</i>	Practical tools of management accounting

2. Materials and Method

The research was conducted on the basis of financial statements and management accounting data of non-state higher education institutions in Uzbekistan for the period of 2020–2024. The following criteria were applied in selecting the institutions: transparency

of financial information, diversity of operational activities, and the level of development of the management accounting system.

The following methods were used in the study: comparative analysis (comparing the current situation with advanced foreign practices), observation and expert surveys (with heads of financial services of the institutions), as well as economic-mathematical modeling (to calculate resource efficiency indicators). Financial data were processed using variance analysis, regression analysis, and cluster analysis.

In the research, Activity-Based Costing (ABC), the standard-cost system, and target costing methods were adopted as the methodological foundation. In addition, a special system of indicators was developed to assess their adaptability to the environment of non-state higher education institutions (NSHEIs).

3. Results and Discussion

Responsibility Centres System: Current Status

During the research, it was found that although responsibility centres are formally designated in non-state higher education institutions (NSHEIs), most of them do not maintain a fully developed segmental accounting system. In 78.3% of the institutions, costs are recorded in an aggregated manner—without distinguishing operational areas. Such a situation makes it almost impossible to determine which educational program, faculty, or service type is efficient or loss-making.

In practice, the following responsibility centres were observed in NSHEIs: faculties and departments as cost centres; marketing and admissions departments as revenue centres; educational programs (undergraduate, graduate, and additional courses) as profit centres; and rectorates and investment-oriented divisions as investment centres. However, the flow of information among these centres is not sufficiently organized [12].

The most critical problem identified was that expenditures are accounted for in general accounts rather than by individual centres. As a result, the accuracy of managerial decision-making is significantly reduced. This finding fully confirms the conclusions of Xolmatov and Razzaqov & Mirzayev (Table 2).

Table 2. Current State of Accounting by Responsibility Centres and Segments

Area	Current State	Main Problem	Proposed Solution
Cost Centres	Formally exist	Lack of detailed classification	Implement Activity-Based Costing (ABC) costing
Revenue Centres	Partially maintained	Lack of full control	Expand the Key Performance Indicator system
Profit Centres	Rarely applied	Profitability is not determined	Introduce segment accounting
Segment Accounting	Limited	No allocation mechanism	Integrate a Business Intelligence system
Internal Control	Partially functioning	Low level of integration	Integrate with Enterprise Resource Planning systems

Mechanism of Segment-Based Accounting

As a result of the research, it was substantiated that it is appropriate to divide the activities of non-state higher education institutions (NSHEIs) into the following four main segments: (1) the educational services segment (full-time, part-time, and distance education); (2) the additional services segment (courses, trainings, and professional development programs); (3) the scientific activity segment (grants, projects, and publications); and (4) the innovation and technopark activity segment.

The formation of separate revenue and cost modules for each segment enables multidimensional analysis. In particular, this segmentation system is considered essential for correctly assessing the 4.1–65.9% profitability gap identified by Karimov and Sultanov

(2023). Segment-based accounting increases information transparency, enables early identification of risks, and optimizes resource allocation [13].

Modern Costing Methods and Their Application

The research findings indicate that the integrated application of three modern costing methods ensures the highest efficiency in NSHEIs.

The first method is Activity-Based Costing (ABC). Based on the model developed by Qodirov and Nazarov, it becomes possible to determine the actual cost of each educational program, course, or service type. The educational process, scientific activity, and administrative services are separated as distinct activity objects, and costs are accurately calculated for each of them [14].

The second method is the standard-cost system. Standard costs are established for each cost centre, and variance analysis is conducted by comparing actual indicators with the norms. Our research showed that by implementing this method, institutions with high period expenses (66–83%) could reduce expenditures by up to 15–20% [15].

The third method is target costing. This is a method for determining the maximum allowable cost in order to set tuition prices under market conditions and in a competitive environment. It is of particular strategic importance for institutions with low profit margins (4.1%). (Table 3)

Table 3. Modern Costing Methods and Their Application in Non-State Higher Education Institutions (NSHEIs)

Method	Content and Essence	Area of Application	Expected Outcome
Activity-Based Costing (ABC)	Allocation of costs based on activities	Educational programs, courses	Identification of accurate cost and excessive expenses
Standard-Cost	Planning and comparison based on standards	Cost control, variance analysis	Optimization of costs by 15–20%
Target Costing	Determination of maximum cost based on market price	Pricing policy, competitiveness	Identification of an optimal cost level

Mechanism for Consolidating Information Flows

To establish a fully functional management accounting system in non-state higher education institutions (NSHEIs), a mechanism for consolidating information flows is essential. Based on the ERP–Business Intelligence integration approach proposed by Umarov (2020), we developed a four-stage mechanism.

In the first stage, revenues, costs, profits, and other indicators are collected separately by responsibility centres and segments. In the second stage, this information is integrated into a unified data warehouse through Enterprise Resource Planning and Business Intelligence systems. In the third stage, Key Performance Indicators and profitability indicators are calculated, and variance analysis is carried out. In the fourth stage, strategic decisions are made based on internal audit and risk management.

This empirically grounded mechanism, substantiated by Haydarov (2024), was proven to increase management efficiency by 18%. Our research in NSHEIs showed that this figure ranges from 15% to 22%, depending on the level of institutional development.

5. System for Evaluating Resource Efficiency

For evaluating resource efficiency based on costing methods, we relied on the following four main groups of indicators: cost efficiency (cost-to-revenue ratio), cost per student, Return on Assets (ROA), and profit margin. These indicators are calculated and compared across segments and responsibility centres.

The research results revealed significant differences among institutions based on these indicators. In the most efficient institutions, the cost per student was 2.3–2.8 times

lower than in the least efficient institutions. Regression analysis proved that the primary cause of this difference is related to the level of development of the management accounting system ($R^2 = 0,71$).

4. Conclusion

The conducted research has led to the following important conclusions.

First, the current state of management accounting in non-state higher education institutions (NSHEIs) is characterized by the aggregated recording of costs. In 78.3% of institutions, separate accounting is not maintained by lines of activity, segments, or responsibility centres. This situation seriously limits the ability to make accurate managerial decisions.

Second, the integrated application of Activity-Based Costing (ABC), standard-cost, and target costing methods is considered the most appropriate approach for NSHEIs. These methods make it possible to accurately calculate costs, determine the cost price, and evaluate the efficiency of resource utilization.

Third, it was found that a mechanism for consolidating information flows and making strategic decisions based on the Key Performance Indicator system can increase management efficiency by 15–22%. This indicator reaches its maximum level when fully implemented through Enterprise Resource Planning–Business Intelligence integration.

Fourth, segment-based accounting makes it possible to accurately determine the cost of educational services, reconsider low-profitability areas, and efficiently reallocate financial resources. The profitability gap (4.1–65.9%) identified by Karimov and Sultanov (2023) can be properly managed only through this system.

From the perspective of recommendations, the following sequential measures should be implemented for NSHEIs: at the first stage, formally define responsibility centres and introduce a separate accounting system for them; at the second stage, calculate costs by lines of activity based on ABC costing; at the third stage, consolidate information flows through ERP–BI integration; and at the fourth stage, establish a continuous monitoring system based on KPI indicators.

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