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Cost analysis of education for students in the School of Health of Alborz University of Medical Sciences: An application of activity-based costing technique

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Abstract:

INTRODUCTION: The educational service is expensive and having the right financial information is one of the most important tools for managing financial resources. Therefore, due to the importance of this issue, this study aimed to determine the cost of educational services for medical sciences students at Alborz University of Medical Sciences.

METHODOLOGY: A cross-sectional study was conducted between March 20, 2018, and March 20, 2019, at Alborz University of Medical Sciences. The current and capital cost data were extracted from the university's financial database, and the cost price of services provided was calculated using the activity-based cost model.

RESULTS: The mean annual cost of services per student was $4778, and the mean cost of education per hour was $113. The total cost price of services provided per student at the school was 65% for wages and salary, 26% for depreciation of building and equipment, and 9% for consumable goods and services. Furthermore, the share of different cost centers to the total cost price of services provided per student was 82% for educational services, 11.9% for student welfare services, and 6.1% for research services.

CONCLUSION: Costs of personnel, especially pays to faculty members and the costs of capital expenditures, are the most important costs in higher education institutions. It seems reducing of pay to faculty members through novelty approach of education and evaluation, reducing capital expenditures through use effective of buildings and equipment that can be placed higher education institutions in the path to productivity.

Keywords:

Cost, cost price, health sciences, medical education, student

Introduction

Universities of medical sciences are educational institutions that are considered an effective and important organization in every country and also their activation can be the effect on the performance of other sectors of society.[1] The survival of these institutions is dependent on the provision of quality and low-cost educational services,[2] and as students comprise a key output of these institutions, one of the main questions associated with this goal is the cost of education per student. Calculating the cost price of services provided in these institutions is one of the main criteria for improving the efficiency, control, and transparency of costs.[3]

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One of the main assessable items in educational institutions is the cost of services provided per student.[1] Research suggests that calculating the cost price of services provided to students has been a serious global endeavor since 1980 that has led to the formation of many cost price analysis studies in foreign countries (Australia, the UK, and the US) and domestic universities.[4] In Iran, institutions providing higher education in medical sciences are generally state financed, and the main criterion for budget allocation to these institutions is their number of students.[5] The student-based criterion for budget allocation makes the financing of higher education institutions a challenging task.[6]

Awareness of higher education institutions in medical sciences in relation to the cost price of services provided per student will greatly affect the control of the factors, affecting the cost price, the insourcing or outsourcing of services, and, ultimately, the provision of quality and low-cost education.[7] Without a realistic cost analysis and the calculation of the cost price of services, no effective competition can be expected in the national and global markets.[8] The move toward third- and fourth-generation universities, a sustainable financing system, return on investment, and improved productivity, which is defined as major goals in the reform of medical education in Iran, is contingent on an accurate cost analysis.[1] For have an accuracy analysis of costs in an educational institution should be will study the cost of educating students until from this way can be to provide necessary information for policymakers, decision-makers and planner in higher education institutions for budgeting, cost control and to pursue further goals of organization.[7]

The activity-based costing method is one of the most accurate techniques for estimating the cost of different health-care services. It can help planners and policymakers in accurate design of financial plans.[7,9] This method helps accurately identify all the resources, activities, cost items (products/services), cost stimulants, and student-related activities and eventually allocates costs.[5] The cost of depreciation of assets was calculated using the direct line method and through the university's centralized financial system.[10] This method is the easiest method of calculating depreciation that deducts the scraP value from the total cost price and divides the resulting figure by the number of periods or years.[7]

Although the high costs of medical education in health science have long been recognized, but the lake of formal study has been conducted to assess the cost of education at students of medical sciences in Iran. Therefore, this study aims at determining the cost of educational services for students in the Faculty of Health of Alborz University of Medical Sciences to help university directors in making proper decisions on available financial resources.

Methodology

Design

This study, before the data collection, was approved by Alborz University of Medical Sciences. A cross-sectional design was employed in 2019.

Respondent characteristics and setting and data collection

The school of health was chosen due to its independent administrative and financial structure, which contributed significantly to the extraction of accurate data. The activity-based cost model was used for calculating the cost price of services. To calculate the "cost price of services provided per student" and the "cost price of education per hour," the sum of the estimated costs was divided by the number of the students and the hours of education over the financial period, respectively. The cost of the school's current activities and the cost of personnel wages were extracted from the university's accounting department. The data related to the land area, building, and physical structure of the school were obtained from the drawings in the engineering department, and the data related to the number and details of the school's human resources were extracted from the mechanized human resources system of the personnel office. The data related to the number of students, fields of study, academic levels, and courses provided in each semester were extracted from the curriculum documents available in the school's education office.

In addition to the school of health, the student education, welfare, and research deputies provided concentrated services within the university across all the schools. The cost of services provided by these three of deputies in school of health (the costs were apportioned based on the number of students) were extracted and calculated into the cost price. In addition to the mentioned costs, there was a wide range of costs on other levels that made up a very negligible portion of the total costs and were excluded from the calculations. Based on the IRR/USD exchange rate announced by the Central Bank of Iran at the time of the study, IRR 30,600 was taken to equal USD 1. The ethical considerations of the research included ensuring the confidentiality of the personnel data and briefing the relevant authorities on the objectives and significance of the research. For a better understanding of the data obtained, a good knowledge of the job rotation used in the school, and drawing the conceptual map of the study, the researchers did not only suffice to the direct observation of activities but also held consultations with the school and university authorities and experts. The ethical considerations of the research included ensuring

the confidentiality of the personnel data and briefing the relevant authorities on the objectives and significance of the research; the analysis of the data, the calculations, and the tabulations were performed in Excel 2010.

Results

The School of Health of Alborz University of Medical Sciences has a total area of 2300 m^2 in four floors and has been built on a land area of 660 m^2. This school has various small economical laboratories and workshops for different health disciplines. Table 1 presents the fields of study, academic levels, and number of students at the school of health. This school boasts 14 full-time faculty members (five instructors, seven assistant professors, and two associate professors), 35 part-time teachers, and 31 administrative and service personnel. The mean work experience was 12 years for the faculty members and 7 years for the nonfaculty employees.

A total of 553 course credits (418 theoretical, 65 practical and 50 internship credits) were offered in the two semesters of 2016–2017. If each theoretical credit was covered in 17 h, each practical credit in 34 h, and each internship credit in 51 h, a total of 11,866 h of education was offered in this period.

Table 2 presents the costs at the school of health and the education, student welfare, and research deputies of the school. According to Table 2, personnel wages (65%) have the biggest share of the costs, followed by the depreciation of assets (26%) and the purchase of goods and services (9%). The cost of social welfare and other costs were negligible and made up 0.041% of the total costs incurred by the school.

Table 2 presents the "mean annual cost of services provided per student" and the "mean cost of education per hour," including and excluding depreciation costs. According to Table 2, the student welfare costs contributed to 11.9% of the total costs and covered accommodation (58%), nutrition (31%), transportation (6%), cultural activities (5%), and insurance (0.17%) costs. Following the student welfare costs, the highest costs (6.1%) were incurred in the area of research, covering the faculty's research projects, articles, and domestic and foreign travel (91%) and the students' research projects and articles (9%). Finally, 1.9% of the university's educational costs were incurred by education services, improving the quality of education and the empowerment of teachers.

Table 1: The fields of study, academic levels, and number of students at the school of health in 2018-2019

Field of study	Academic level	Number of students
Health education	Discontinuous MSc	16
Public health	Continuous BSc	83
Occupational health	Continuous BSc	71
Environmental health	Continuous BSc	52
	Discontinuous BSc	50
	Discontinuous MSc	8
Total		280

Discussion

The present study was conducted to investigate the cost price of services provided to the students of health sciences and also the cost of 1 h of education at the School of Health of Alborz University of Medical Sciences. The results showed that the cost price of 1 h of education for the students was $113. Furthermore, the mean annual cost of services provided to each student was $4778. Moreover, the cost price calculated in the present study was very close to that obtained in the study of Shiraz, Yazd, and Fasa universities of medical sciences[2] and fairly close to the cost obtained for the School of medicine of Tehran University of Medical Sciences.[11] Meanwhile, the cost price calculated in the present study was almost twice the cost price calculated in a similar study conducted at the School of Health of Iran University of Medical Sciences.[4] The disparity of results on the calculated cost price of services provided to the students in different studies might owe to factors such as the number of students, building and asset depreciation, student welfare, and research services. After adjusting the figures, based on the inflation rate of different years, the cost price of services provided to each student was found to be very close to the "student per capita cost" figure allocated by the Ministry of Health for university budgets.

According to the present findings, educational services accounted for 82% of the total costs, student welfare services for 11.9%, and research services for 6.1%. Like in many studies, the largest portion of the costs of welfare services pertained to accommodation and nutrition,[12] and the largest portion of research costs pertained to the faculty's research projects, articles, and domestic and foreign travel. In a study conducted at Kerman University of Medical Sciences, educational services, student welfare services, and research made up 71%, 22%, and 7% of the total costs, respectively.[5] In OECD countries, educational services, student welfare services, and research make up 64%, 4%, and 32% of the total costs, respectively.[13] The low share of research costs at the school examined in the present study indicates the greater emphasis of the school on education rather than research.

The school of health has a fairly small building and land area and proportionally small equipment and facilities.

Table 2: The share of costs from the total costs at the school of health and the education, student welfare, and research deputies of the school in 2016-2017

Cost center	Activity	Activity details	Cost stimulant	Cost ($)	Share of cost from the activity costs (%)	Share of cost from the total school costs (%)	Share from the total costs (%)
School of health	Cost of payment to the personnel	Full-time teachers and personnel	Student	652,268	94.4	65	80
		Part-time teachers		37,500	5.4		
		Other payments		1276	0.2		
		Total personnel payments		691,044	100		
	Cost of goods and services	Transportation and communication	Logistics	3036	3	9	
		Maintenance and repair of assets		16,582	16		
		Printing and purchase of publications		10,143	10		
		Administrative affairs		5920	6		
		Water, electricity, and gas		4773	5		
		Current consumables		19,781	20		
		Contracts		41,161	41		
		The total cost of goods and services		101,396	100		
	Welfare costs			23	100	0.002	
	Asset depreciation costs	Building depreciation		256,074	92.2	26	
		Equipment depreciation		21,653	7.8		
		Total depreciation costs		277,727	100		
	Other costs			417	100	0.040	
	Total costs at the school of health		-	1,070,607	-	100	
University	Student welfare	Costs: Student deputy human resources, depreciation, nutrition, accommodation, student insurance, transportation, and cultural activities	Student	159,601	-	-	11.9
	Research	Costs: Research deputy human resources, depreciation, research projects, participation in conferences	Research project	82,080	-	-	6.1
	Education	Costs: Education deputy human resources, depreciation, education services, enhancing the quality of education, empowering the teachers	Student	25,551	-	-	1.9
Total costs at the school and the student welfare, research and education deputies				1,337,838	-	-	100
Mean annual cost of services provided per student			Including depreciation costs				4778
	Excluding depreciation costs				3786		
Mean cost of education per hour			Including depreciation costs				113
	Excluding depreciation costs				89		

Nevertheless, asset depreciation makes up 26% of the total costs incurred by this school. Because asset depreciation costs are not included in the annual state budget and are considered part of the investment and purchased assets, the lost cost opportunity of these assets seems to have been rather neglected. Like in many other studies, the highest depreciation costs pertained to building depreciation followed by equipment depreciation.[9] An institution's efficiency can be improved through the efficient use of assets such as building and equipment, which have high depreciation costs.

According to the results, more than 90% of the students at the studied school of health are undergraduates. The costs of this school are, thus, naturally lower than the costs of schools with master's, PhD, general medicine, and specialty medicine students.[14] It is also worth noting that the cost price of education in fields such as nursing, midwifery, and laboratory sciences is higher than the cost of education in fields such as health.[5] These two features of the school are in and of themselves a reason for the lower cost price at the school of health and ultimately the lower cost of services provided compared to other schools.

Studies show that, in higher education institutions, the share of human resources costs from the total cost ranges from 42% to 81%.[2,4,13] Because the output of activities

performed in educational institutions is mainly service-related rather than related to the production of goods, it is natural for personnel salary and wages to make up the greatest portion of the costs as the main component of services.[12] The present study showed that 65% of the costs at the school of health were incurred by personnel wages, especially teachers' salary.[5] If asset depreciation costs are not included in the total costs, personnel costs will increase from 65% to 87%. The 14:1 student–teacher ratio (including part-time teachers) at the school of health matches the medical education standards of Iran and other countries.[1] Consequently, the high share from costs of payment to the workforce cannot be attributed to the excess workforce.

In OECD countries, the ratio of salary and wage costs for nonfaculty personnel to faculty members was 43%–57%;[13] in the present study, this ratio was 38%–62%. The salary and wage costs made up 91% of the payments for teaching for the full-time faculty members and 9% for the part-time teachers, whereas only 67% of the teaching was performed by faculty members and 33% by part-time teachers. The cost of 1 h of teaching by a salaried faculty member was, therefore, five times that of an hourly paid teacher (although using part-time teachers reduces the payment for teaching, the quality of the provided education likely decreases for several reasons). Because a large portion of schools' costs are incurred by faculty members' salary and wage, the results would have been more efficient if the study did not only examine the faculty members' responsibilities in terms of education but assessed their other duties too, including research, health service provision, and executive activities.[5,15]

Almost 9% of the total costs at the school of health pertained to the purchase of the required "goods and services." The main part of these costs was for personnel transportation and repair and maintenance. These results concur with those obtained in studies conducted at Kerman and Kurdistan universities of medical sciences.[5,16] An interesting finding in this area is the cost of water, electricity, and gas. The present study showed that water, electricity, and gas made up 0.36% of the total cost price of services provided to the students, which is a very negligible amount. According to the Pareto principle, smart cost management gives less priority to these types of costs.[17]

Limitations

The limitations of this study are as follows: first, the total personnel costs estimated did not take account of the costs of the personnel's end-of-service benefits and pension and the employer's insurance premium, which would have added to the cost price if taken into account. Second, in collecting data, there were certain record defects and division and data access restrictions. Third, the school of health was a small school with minimum human resources, personnel work experience, building and land area, and equipment. The total costs of this school are, therefore, naturally lower than the costs of other schools of health whose personnel have greater work experience and are built over a larger land area. Larger schools are thus expected to incur greater annual costs per student than the extracted figure. Nevertheless, because larger schools have more students, their mean annual cost per student is likely to decrease in line with the Economies of Scale theory.

Conclusion

One of the main objectives of this study was the analysis of costs in higher education institutions and drawing the attention of managers to the control of human resources costs, especially payments to faculty members and also capital or depreciation costs. Reducing the payments to faculty members requires the use of modern education and evaluation techniques, the use of information and communication technologies, the integration of classes with shared topics, the reform of the duration of semesters, and the prevention of academic failure in the students. Managers should prevent increasing their investment or depreciation costs by avoiding the admission of nonnative students (who require accommodation and greater welfare facilities), leaving buildings and equipment unused and not generating an income from the available facilities. The findings also show that greater resources should be allocated to research. Finally, there are certain costs whose reduction will have a negligible effect on the quality of the education provided to the students.

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Conflicts of interest

There are no conflicts of interest.

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