

Activity-Based Costing Method to Determine the Cost of Educational Services at Mazandaran University of Medical Sciences in 2015

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ABSTRACT

Background: The educational service is expensive. Having the right financial information is one of the most important tools for managing financial resources. Extracting expenditures in an organization based on ABC Activity-based costing) is one of the important ways to access the correct financial information.

Aim: To determine the cost of educational services at the Mazandaran University of Medical Sciences.

Methods: In this cross-sectional study, the activity-based costing (ABC) method was utilized for cost evaluation at all faculties affiliated to Mazandaran University of Medical Sciences and Healthcare Services. After identifying activity centers, the available accounting documents of the university were used for costing each center. The data was extracted by financial documents available in ROOZAMAD software of financial office in Mazandaran University of Medical Sciences.

Findings: Educational costs at Mazandaran University of Medical Sciences amounted 959,635,057,161 IRR (\$ 32,442,023) in 2015. 50.5% of the costs were for the Medical Faculty. The highest costs were related to salaries and benefits (bonuses) of faculty and non-faculty members.

Conclusion: ABC is one of the most important pricing methods for health services that can help policymaker and this method is one of the most accurate techniques for estimating the cost of different healthcare services.

Keywords: Activity-based cost, Medical Education, Faculty, University of Medical Sciences

INTRODUCTION

Universities, as educational institutions, are considered as an effective sector in every country that affect the performance of other sectors. This is of greater importance in countries where the nongovernmental education sector is active due to the intense competition in providing high-quality services¹. Financial performance is an important management component for every organization. It is considered as a tool for achieving efficiency, effectiveness and cost savings². According to literature, there are various types of costs in medical education and other majors. In fact, they vary from one university to another even in one country. In Iran, these costs are lower than in developed countries. However, they are still considerable in comparison with the national per capita income³. Regarding goals and expectations, budgeting methods have technically evolved into various forms including traditionally conventional budgeting, incremental budgeting, program budgeting, zero-based budgeting, operating budgeting, and the system for planning, programming, and budgeting. Accordingly, operating budgeting has received much attention because of an emphasis on performance evaluation criteria, and determination of product costs, and effectiveness and efficiency through budgeting analytical tools³. Accurate information, especially financial and cost information, plays a key role in decision making. Hence, it is essential to develop and deploy a costing system capable of identifying and detecting expenditures for accurate determination of the costs of services. The need for such a system gains greater importance every day. At the same time, modern costing methods and activity-based

costing systems can be employed to provide information which can then be utilized for developing scientific management, available resource planning, and making optimal use of financial resources in society. In Iran, the importance of using accurate information in decision-making and the necessity of making costs and revenues transparent in different sectors have recently received much attention⁴. Although the high costs of medical education in the medical community have long been recognized, no formal study has been conducted to assess the cost of medical training in Iran. On the other hand, these issues have been well studied in other countries, such as the United States, Germany, Singapore^{5,6,7}. There were 54 public medical universities in Iran⁸ and Mazandaran University of Medical Sciences is one of them. In this regard, majors and educational programs with higher costs can be analyzed by obtaining cost information. As a result, it is possible to identify costly centers and sources of expenditures. Thus, appropriate decisions can be made to decrease the costs so that the cost control process can be executed properly. This study aims at determining the cost of educational services at the Medical Faculty of Mazandaran University of Medical Sciences to help university directors in making proper decisions on available financial resources.

METHODS

Activity-based costing (ABC) is a method for measuring the cost of activities and activity is defined work can be done in an organization by utilizing the necessary resources. In this cross-sectional study, the activity-based costing (ABC)

method was employed to collect information. The data was extracted by financial documents available in ROOZAMAD software of financial office in Mazandaran University of Medical Sciences(in all units of Mazandaran University of Medical Sciences, financial documents are paid and registered according to this system).After identifying and extracting the figures, the ABC method was used for determining the fixed and variable personnel and non-personnel costs in education, research, logistics, maintenance, and civil development sectors based on cost sharing. In addition to the accurate cost determination, this method is able to identify costs accurately and allocate them to activities to provide decision-makers with useful information⁹. In this method, the costs of activities are divided into four major categories of direct, indirect, depreciation and development costs. Direct costs are those related to tasks and activities at a center and usually change with workloads. In contrast, indirect costs do not change with workloads. The direct costs include the following items: salaries and wages of education-research and administrative-logistics departments, education-research overtime, part-time and full-time payments, miscellaneous costs, debts and costs of demise and marriage and insurance premiums. These costs are shared by using certain coefficients such as the number of times, the product of the number of final services by time, and the standard utilized for service in outputs. The indirect costs include the following items: current administrative, logistics, and non-personnel costs, water, electricity, gas, phone, maintenance, laboratory consumption costs, IT consumption costs, current student consumption costs (i.e., administrative consumption materials, forms, test equipment, etc.), and depreciation costs. Annual depreciation costs should be analyzed to determine the depreciation costs of capital goods and equipment. Capital goods include tables, chairs and medical equipment. In this section, the annual depreciation can be determined by using the purchase price, residual value, and the useful life of the equipment. Regarding the activity-based costing, it is first necessary to define and identify activity centers accurately. Activity centers are selected from each sector based on a specific function and objective. In fact, the

product of every sector can be determined in relation to its function and objective to define a basis for cost determination¹⁰. The experts were asked for their opinions to design certain forms for data collection. Then, the validity and reliability of the prepared forms were confirmed by the faculty members. The accounting documents were analyzed to determine the costs of centers in Roozamad accounting software. In addition, the cost of each activity in any center was determined in Microsoft Excel 2013. The IRR-to-Dollar exchange rate was determined in accordance with the average dollar exchange rate reported by the Central Bank of the Islamic Republic of Iran (1 dollar = 29580 IRR).

Ethics: The study was approved by the Ethical Committee of Mazandaran University of Medical Sciences.

Statistics: The data of each cost center was calculated using Excel 2013 software.

RESULTS

During the research period, Mazandaran University of Medical Sciences consisted of 10 faculties, 402 faculty members, and 6787 students. Table 1 lists the costs of activities at the faculties affiliated to Mazandaran University of Medical Sciences in 2015. The cost of education amounted 959,635,057,161 IRR (32,442,023 dollars) in 2015. The Medical Faculty had the highest cost (16,376,513 dollars). Pharmacy Faculty ranked the second costly faculty (3,822,988 dollars). According to Fig. 1, 50.5% of the costs in Mazandaran University of Medical Sciences belong to the Medical Faculty. As seen in Fig. 2, 80% of personnel costs pertained to faculty and non-faculty members.

Table 2 shows certain criteria including the number of students, the number of passed credits, the held class hours, the number of faculty members, the working hours of faculty members, the number of non-faculty members, the working hours of non-faculty members, and the costs of the executed activities. The annual cost of every student amounted to 4,780 dollars. The lowest cost was observed at Behshahr Nursing Faculty (464 dollars per student), whereas the highest cost was measured at the Medical Faculty (10,828 dollars per student).

Table 1: The Costs of Activities at Faculties of Mazandaran University of Medical Sciences in 2015

Cost	Medical Faculty	Para-medical Faculty	Health Faculty	Pharmacy Faculty	Faculty of Nursing and Midwifery	Ramsar International Faculty	Dentistry Faculty	Amol Para-medical Faculty	Amol Nursing Faculty	Behshahr Nursing Faculty	Total
Personnel Cost (IRR)	4113850 09532	38339330 626	70304 39460 2	87304789 152	679788384 12	2602457 1070	3426798 5287	6393342 782	2493045 9994	324006789 3	770168 789350
Personnel Cost (dollar)	1390753 9	1296123	23767 54	2951480	2298135	879803	1158485	216137	842815	109536	260368 08
Costs of Logistics Services (IRR)	6093114 414	37123337 07	52589 02195	65107272 73	265926461 6	1675108 0668	1502317 8424	1370814 688	1762827 268	869723874	600119 67121
Costs of Logistics Services (dollar)	205988	125501	17778 6	220106	89901	566298	507883	46343	59595	29402	202880 2
Supplementary Cost (IRR)	4789928 68	22270087 3	39347 1680	74190630	85695024	5750254 95	5272546 880	1962751 74	1064610 80	76471620	748183 1324
Supplementary Cost (dollar)	16193	7529	13302	2508	2897	19440	178247	6635	3599	2585	252935

Miscellaneous Costs (IRR)	6646014 5706	48989280 73	11548 73444 9	19490082 035	145860997 66	1289620 591	7756677 64	4860058 92	2433101 090	4084000	121972 469366
Miscellaneous Costs (dollar)	2246793	165616	39042 4	658894	493107	43598	26223	16430	82255	138	412347 8
Total Cost (IRR)	4844172 62519	47173293 278	87505 50292 5	11337978 9089	853098978 18	4464029 7824	5533937 8355	8446438 536	2923284 9432	419034738 7	959635 057161
Total Cost (dollar)	1637651 3	1594770	29582 66	3832988	2884040	1509138	1870838	285546	988264	141662	324420 24

Table 2: The Indices of Cost Centers and the Costs of Activities Performed at Mazandaran University of Medical Sciences in 2015

Subject	Medical Faculty	Para-medical Faculty	Nursing and Midwifery	Health Faculty	Pharmacy Faculty	Ramsar International Faculty	Dentistry Faculty	Amol Para-medical Faculty	Amol Nursing Faculty	Behshahr Nursing Faculty	Total
No of student	1507	965	558	1503	652	529	218	532	242	81	6787
Ratio of Cost to student (IRR)	3203013 48	47098614	152885122	570741 00	17125254 4	84386196	253850359	15876764	1207968 98	51732684	1413 9311 3
Ratio of Cost to student (dollar)	10828	1592	5169	1929	5789	2853	8582	537	4084	1749	4780
Total credits	1253	1167	555	953	340	408	240	464	132	96	5608
Ratio of Cost to Credits (IRR)	3852307 52	38946155	153711528	900526 70	32847922 6	10933982 2	230580743	18203531	2214609 81	43649452	1711 2593 0
Ratio of Cost to Credits (dollar)	13023	1317	5196	3044	11105	3696	7795	615	7487	1476	5785
94 credits	609	292	160	321	92	63	40	142	33	24	1775
Ratio of Cost to 94 Courses (IRR)	7930662 89	15578461 9	533186861	267420 166	12076647 63	70964404 5	138348445 9	59692145	8858439 22	17459780 8	5406 2965 5
Ratio of Cost to 94 credits (dollar)	26811	5267	18025	9041	40827	23991	46771	2018	29947	5903	1827 7
Class Hours	9560	39901	5600	1068	3609	6911	4080	10896	3700	1925	8724 9
Ratio of Cost to Class Hrs (IRR)	5049101 8	1139088	15233910	803205 73	30940964	6459675	13563573	775187	7900770	2176804	1099 8833
Ratio of Cost to Class Hours (dollar)	1707	39	515	2715	1046	218	459	26	267	74	372

Fig. 1: The Share of Each Faculty of Mazandaran University of Medical Sciences in Total Costs in 2015

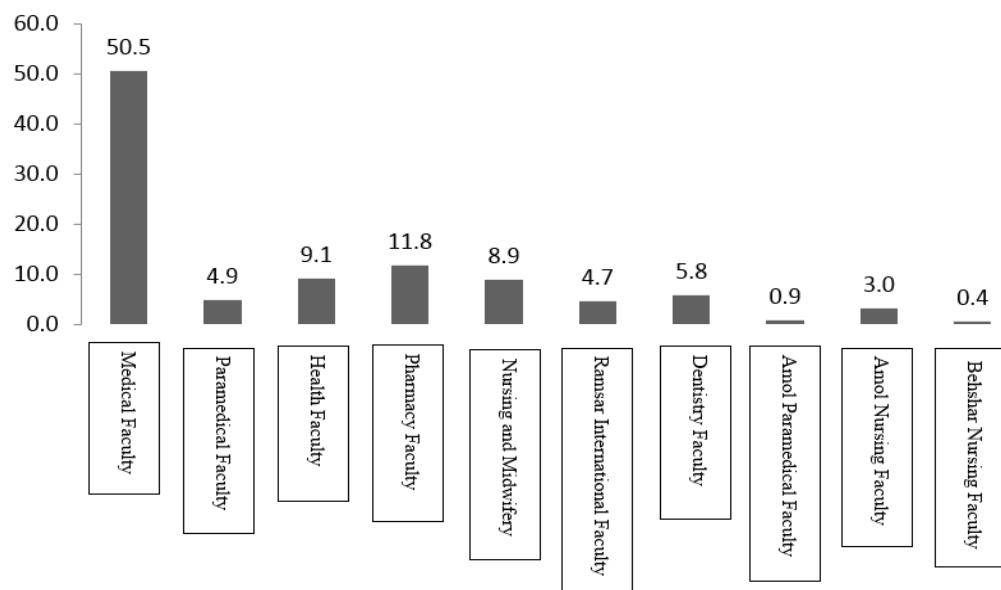
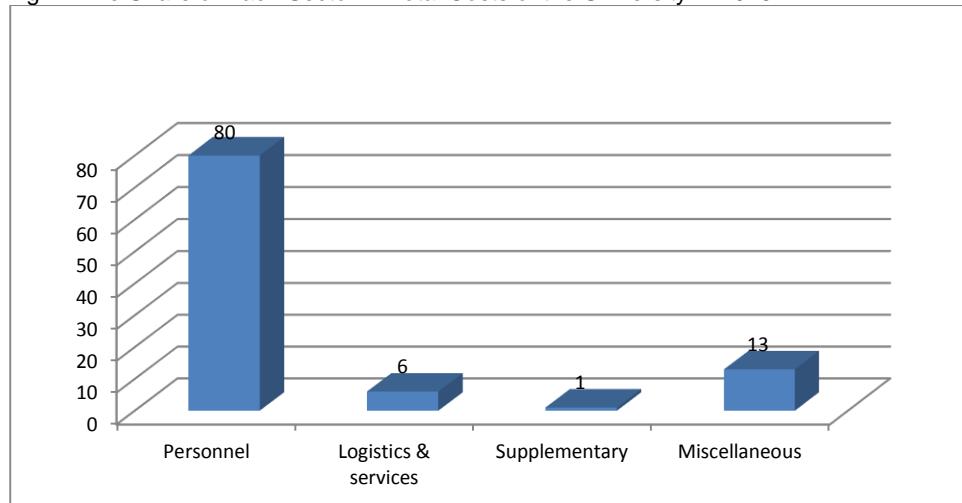


Fig. 2: The Share of Each Sector in Total Costs of the University in 2015



DISCUSSION

In the recent decade, the activity-based costing (ABC) method has been used as an economic analysis technique in different healthcare fields in Iran. Although ABC has not been employed extensively in medical education¹¹, this study can be considered as one of the most comprehensive research on medical education aimed at evaluating the cost of educational services at Mazandaran University of Medical Sciences. According to the results, the highest costs were related to the salaries and benefits (bonuses) of faculty and non-faculty members in 2015. The findings emphasized the expensive nature of medical education, thus, effective human resource recruitment should be managed properly to achieve optimal financial resources and cost management. The results of this study on the expensiveness of medical education were consistent with those obtained by Walsh *et al*¹¹. According to literature, the annual cost for training a general practitioner

student amounts 357, 150, and 70 thousand dollars annually at the University of Virginia, University of Texas, and Thailand University of Medical Education, respectively³. In all these three cases, training was expensive than that in Mazandaran University of Medical Sciences. This can be attributed to the use of more advanced and more expensive educational infrastructures in developed countries.

Ahmad Rajabi conducted a comparative study on the costs of training students in medical majors at Universities of Shiraz, Fasa, and Yazd in 2011 and found significant differences in the costs of training students in different medical majors at different universities. The differences depended mainly on educational equipment, a combination of theoretical and practical courses, and the number of students. They also found that nearly 40% of the cost was allocated to indirect educational services⁹. Therefore, such comparative studies of education costing should be

conducted at other medical universities in Iran to identify the factors affecting the difference in the costs of education at different universities. Saman Ghasempour carried out another comparative study entitled *Employing the ABC Method to Estimate the Cost of Training Students at the Paramedical Faculty of Tehran University of Medical Sciences* in 2012. According to the results, the costs of Ph.D, master, and bachelor programs were 118, 76, and 42 million IRR, respectively¹². In comparison with this study, the cost of training a GP student was much higher than that of paramedical majors on average even in higher educations. Such a difference is definitely related to the different natures of majors and costly clinical educations in professional doctorate programs. It is not very common to use the ABC method for cost analysis in medical education in Iran. Most studies in this area have been conducted in different fields of healthcare services. Some of these studies are reviewed here. Bahadori et al. (2011) carried out a case study at a health center affiliated to Tehran University of Medical Sciences using the ABC method to analyze the costs of 80 different first aid services¹³. Moreover, Yari et al. used the ABC method at the Health Center of Kurdistan in 2014. In addition to estimating direct and indirect costs, they found that more than 76% of the costs came from the implementation of the rural family physician program. Finally, they concluded that the annual allocated budget of first aid services, especially for the rural population, was insufficient, thus, the insufficiency could affect such services¹⁴. Mahdi Javid et al. (2013) conducted a cross-sectional study to compare the traditional costing and the activity-based costing at Kashani Hospital in Tehran. They found that the ABC method provides more accurate estimates of costs¹⁵. In addition to the extensive use of the ABC method in healthcare fields in Iran, this method can also be used for estimating the costs of services provided for university students. Ramin Rahim Nia et al. (2011) carried out a cross-sectional study to determine the costs of services provided for students in Cultural Student Deputy at Tehran University of Medical Sciences using the ABC method. According to their results, only 40% of student budget rows was allocated by the government resulting in the poor quality of student services⁴. We believe that Mazandaran University of Medical Sciences as one public university in Iran can evaluate options for reducing the cost of medical education such as e-learning resource for non-clinical courses and reducing the duration of undergraduate medical education.

CONCLUSION

Undoubtedly, the activity-based costing method is one of the most accurate techniques for estimating the cost of different healthcare services. It can help planners and policymakers inaccurate design of financial plans. Accordingly, it is essential to estimate education costs, something which has unfortunately been paid little attention. Thus, it is recommended to carry out more

studies on cost management at similar faculties affiliated to universities of medical sciences.

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