

Full Length Research Paper

A comparative study of activity-based costing system and the traditional system: A case study of Refah Bank

Mehdi Alinezhad Sarokolaei^{1*}, Mohammadreza Ebrati¹, Vahid Taghizadeh Khanghah¹ and Mina Ebrati²

¹Department of Accounting, Tabriz Branch, Islamic Azad University, Tabriz, Iran.

²Department of Accounting, University of Alzahra, Tehran, Iran.

Accepted 5 October, 2012

The goal of the present research is to study the activity-based costing system and the traditional system based on the volume comparatively in order to calculate the cost of the deposits in Refah Bank in Iran. Thus, first the deposit costs were calculated by using the volume based costing and then activity-based costing system was used to calculate the cost of deposits. In this research, the data from the whole branches of Refah Bank of Iran was used instead of focusing on the data gained from a limited number of branches. Also, regarding the existence of four different kinds of deposits, four different hypotheses were devised. Additionally, in an independent hypothesis, hypothesis 5, we studied the meaningfulness of the relationship between the ratio of staff's activities and the ratio of indirect costs of the deposits. The results show that there is not a meaningful difference between the cost calculated by activity-based costing and traditional method for current and saving deposits. But regarding the accounting calculations and the figure of cost ranking, there is a significant difference and activity-based costing system is absolutely more efficient than the traditional one. Also, the results of the research show that there is a meaningful difference between the cost calculated by activity-based costing and traditional system for long-term and other deposits. Also, the results of the research show that there is a meaningful relationship between the ratios of staff activities with overhead cost ratio for each of the deposits.

Key words: Activity-based costing (ABC), volume based costing, direct and indirect cost, over head appropriation bases.

INTRODUCTION

Regarding the changes in technology and modifications of the methods and viewpoints in recent decades, the organizations have concluded that in order to continue their existence and present services to the customers, they should improve their methods and processes and lower the costs to revive in the market, while they continually increase their quality. To achieve this goal, the organizations should revise their accounting and management methods. This need on the one hand and the need to develop new viewpoints in accounting and management on the other hand have revolutionized

presenting new methods of cost calculations.

Also in banking industry, electronic banking and banking industry development forces us to modify our country's traditional systems in all banks of the country as it was done in most banks in Europe and America. Using activity-based costing method helps the banks and financial entities to achieve a better knowledge of different services and different sections. Activity-based costing method is one of new costing methods in which the cost data from one hand and differentiation of valuable activities from invalid activities on the other hand are considered valuable in cost management process.

Activity-based costing (ABC) system compared with traditional costing systems is easily capable to calculate and assess the effect of new methods on calculating

*Corresponding author. E-mail: mehdi12_may@yahoo.com.

services' costs because it uses different principles. Also, ABC system considers the new philosophies of managers in product costing. The new philosophy of managers emphasizes on more satisfactions of the customers and competition with other organizations internationally. Despite the traditional costing methods, ABC can also be used in sophisticated and unusual service systems. Although this method was first developed in outstanding production organizations, its positive results inspired servicing organizations such as banks and financial entities and even research centers to use it and useful and suitable results were achieved afterwards. In these cases, the system uses two types of new cost variables which are as follows: the cost related to the intricacy of services and the cost of service variety in cost structure. These outstanding characteristics have caused the gradual increase of the users of this system and different usages of it in a way that, nowadays the organizations internationally consider achieving and making benefits of the capabilities of this method which is considered to be an outstanding advantage for their organizations.

Activity-based costing system helps to calculate the cost of units and sections and deposits of the banks exactly and correctly and creates more efficiency and effectiveness. Using this system forces the financial entities to achieve an exact view of the profitability of the sections and their different services. Although costing system is developed in production industries, the need for this system is felt more in banking industries because the products and services of the banks are more varied and they become complicated more and more every day. Also, the overhead cost is increasing everyday in a way that half of the costs in Iranian banks are due to the overhead cost.

Research purposes

The most important research purposes for the present study are as follows:

1. Presenting a suitable system and a base for calculating cost of commanding units and sections of line units.
2. Presenting a suitable system to calculate cost of bank deposits.
3. Presenting a suitable system for overhead cost absorption and finding the suitable cost stimulus for all bank activities.
4. Identifying the true cost of bank deposits and recognizing cheap and expensive financial resources.

Research hypotheses

In order to answer the questions of: Is there a meaningful difference between the cost calculated using activity-

based costing method and cost calculated using traditional method for each one of the deposits or not? And is there a meaningful relationship between the ratio of staff activities with the ratio of indirect expenditures (overhead) or not? The following hypotheses were posed:

H₁: There is a meaningful difference between the cost calculated using activity-based costing method and cost calculated using volume based costing system (traditional) for current deposits.

H₂: There is a meaningful difference between the cost calculated using activity-based costing method and cost calculated using volume based costing system (traditional) for saving deposits.

H₃: There is a meaningful difference between the cost calculated using activity-based costing method and cost calculated using volume based costing system (traditional) for long-term deposits.

H₄: There is a meaningful difference between the cost calculated using activity-based costing method and cost calculated using volume based costing system (traditional) for other types of deposits.

H₅: There is a meaningful relationship between the ratios of staff activities with the ratio of indirect expenditures' (overhead) cost for each one of the deposits.

LITERATURE REVIEW

Several researches have been done about implementing activity-based costing in different industries and also in banking industry in different countries and some of them will be briefly outlined in this paper. Partovi (1991) presented an estimation model to identify the overhead cost appropriated into the products in activity-based costing system in an article entitled: "An analytic hierarchy approach to activity-based costing". He determined overhead costs for each product using an analytic hierarchical system. The proposed model used different overhead cost categories, as well as managers' subjective judgements for times when the needed data are not available. The results showed that the proposed model allows the managers to design new and cost effective activity-based costing systems through which they can direct the activities better and more suitably in order to achieve the strategic goals. Additionally, the model suggested can help managers to observe and compare overhead appropriation differences between different activity-based costing systems (Partovi, 1991).

Mersereau (1999) carried out his research project entitled: "Controlling the cost of plastic", in national bank card service bureau of Canada and showed that in credit card service section, activity-based costing system is the best strategic management tool to measure service delivering cost.

Dean et al. (1999) studied and assessed new technologies in costing in the earliest stage of product

designing in a paper entitled: "Product and process cost estimation with fuzzy multi-attribute utility theory". They tried to design and propose a criterion assessment model of costing for each product. The results showed that this model is more effective than the traditional cost models because it does not need collecting a large number of historical data and can consider the characteristics of the elements in lack of assurance conditions and when they are naturally imperfect. In addition, regarding the use of fuzzy theory in the model, the abstractness in assessing the product costs and the process decreases.

Shekari (2000) studied activity-based costing in increasing the optimization in Siman-e-Fars company in a research paper entitled: "Studying the application of activity-based costing in increasing the optimization (A case study: Siman-e-Fars company)". He designed and proposed activity-based costing system, after studying and analyzing the current system of costing in that company and recognizing its strong points and weak points. Then by using the table of determining value-added and the criterion for activity appropriation, he determined activities with value-added and without value-added by using the definition for value-added in activity-based costing system. Finally, he determined the yield of service activity centers and manufacturing centers by using activity-based costing and it was shown that activity-based costing system has saved a lot and it has increased the profitability of the company. Thus, by omitting unnecessary activities and without value-added, the yield of the activity centers and the company as a whole increased (Shekari, 2000).

In 2001, Smith and Harper carried out a research entitled: "AMIfs bank cost analysis model (BCAM) implementing activity – based management in a financial institution". In this research, the activities of the bank were divided into four parts and cost calculation was done using ABC method (Smith and Harper 2001).

Kim et al. (2002) carried out a research entitled: "ABC and organizational change: an institutional perspective". This article investigates about the implementation of an activity-based costing system in bartering part of a multinational English bank. Since the project team was simultaneously working as change representatives (optimization consultants and human resource engineers), their internal relationships were studied through the movement and stabilization of the routines and structured methods. The amount and nature of organizational change is assessed regarding the use of the formal change as opposed with the informal change dilemma, the revolutionary change opposed with the gradual change and the progressive change opposed with retreat change (Bronze and Scoppenz, 2002). The conflicts between the need to ABC implementation as the organizational routines and thus the guaranteed reproduction with less routine ideals but more revolutionary ones of ABM are identified. ABC team was successful in implementing a less radical ABC in which new bonds

were made between costs and products, but it did not result in strategic change of the top management of the bank (Soin et al., 2002).

In a paper entitled: "The fragmented communication structure within the accounting academia: the case of activity – based costing research genres", Kari et al. (2002) differentiated three kinds of ABC researches (counseling researches, basic researches, and critical researches) in accounting academy and analyzed the nature and their internal and external communication patterns. Overall, the field of ABC research appears to be fragmented. They concluded that the discussion circles within the accounting academia appear to be estranged to an extent to which the arguments of researchers representing different approaches do not frequently meet each other, resulting in the unfruitful development of knowledge (Lukka and Granlund, 2002).

Arab and Nasser (2003), studied the possibility of designing cost calculation model of bank deposits using activity-based costing method in Refah Bank, Central Branch of Tehran in an article entitled: "The possibility of designing cost calculation model of bank deposits: A case study of Refah Bank". In this paper, costs were divided into two groups of direct and indirect costs and were appropriated based on the cost stimulants and two-dimensional costing was used in which first the costs are appropriated to the activities and then they are appropriated from activities into deposits. The results show that a significant difference will be created in cost of different services regarding the calculated figures or the expected ones by the bank managers, if a one-dimensional costing system is used (Arab and Naseri, 2003).

Nachtman and Needy (2003) presented a research paper entitled: "Methods for handling uncertainty in activity-based costing systems" and studied the different methods of applying activity-based costing in uncertainty conditions. They tried to identify the most appropriate method by analyzing for profit cost methods as follows: interval mathematics, Monte Carlo simulation with triangularly distributed input parameters, Monte Carlo simulation with normally distributed input parameters, and fuzzy set theory. The results showed that fuzzy set theory is more effective and more applicable compared with other methods due to the following reasons: applying activity-based system in uncertainty conditions because of less calculation operations' volume, ease of application, lack of basic statistical presuppositions, useful and direct results, maintaining standard activity-based costing results, and finally the capability to be updated and maintained (Nachtmann and Needy, 2003).

In 2004 and in an article entitled: "Can e-banking services be profitable?", Lustsik (2004) measured the cost service delivering in electronic banking field by using ABC method in Tartu University and showed that electronic banking can achieve a higher level of profitability compared with the traditional banking systems.

Lana et al. (2007), in a paper entitled: "The implementation of activity-based costing in China: An innovation action research approach", studied the success of the implementation of activity-based costing in Chinese Xu Ji Electrics Company for the period of 2001 to 2005 and this research created a unique opportunity to study some success factors which was related to implementation of ABC in Chinese cultural and organizational environment. The findings showed that the top management was recognized to be the factor of success in ABC researches and it is considered as the obvious success factor in this organization. Findings show that top management which is identified as the key factor in successfulness of ABC researches is obviously the main success reason in this organization. Additionally, the culture in Fuji company entails the reductive stimulus in management innovation (for example, economic value-added, balanced credit cards and six sigma) and hierarchical ordering and the relationship structure along with the active participation of scholars is considered to be an important factor in achieving a high spread level of this concept of accounting in the organization. Also, this reveals a different perspective of internal resistance against the change which contradicts with the facts presented in the present ABC researches (Lana et al., 2007).

Anvari and Rezayat (2007) studied the comparative assessment of Islamic Contraction bank facilities' profitability using activity-based costing method in Tosey-e-Saderat bank in 2007 in a paper entitled: "The comparative assessment of Islamic Contraction bank facilities' profitability using activity-based costing method and traditional costing method: A case study of Tosey-e-Saderat bank". They concluded that in traditional method the cost of non-profit deposits is less than civil participation and credit sales while civil participation and credit sales have been equal in cost and also using activity-based costing helps to calculate the exact costs of each one of the activities (studying, approving, paying, supervising and liquidating activities) which help the improvement of organizational activities' efficiency.

Krug et al. (2008) presented a paper entitled: "Activity-based costing evaluation of [18F]-Fludeoxy Glucose production", and assessed the production of (F-FDG), using Positron Emission Tomography (PET) by using activity-based costing system. The cost of performing positron emission tomography service is extremely affected by the radio drug used and its price often varies from 300 to 500 Euros for each dose used for the patient. They collected the data related to capital expenditures and performance costs and then categorized these cost data into 5 groups of salary and wages of staff, equipments, used materials, overhead, and costs related to the location. Then they used sensitivity analysis to identify the main elements of cost. After identifying the main activities needed in order to produce the drug and the related stimulants, activity-based costing system was

implemented and analyzed. The results of administering this model showed that the cost of producing this drug for each dose without considering the costs of delivery is between 155 to 177 Euros for each two times of administration and it is between 210 to 237 Euros for a single time administration. Additionally, the main costs related to the production of this drug include 36% of wage and 27% equipments. Thus, using activity-based costing model which makes the use of models such as total quality management optimization possible, will result in a more appropriate costing and presents a suitable strategy for the management towards optimum use of the resources (Krug et al., 2008).

Yereli (2009) presented an article entitled: "Activity-based costing and its application in a Turkish University hospital", and studied the application of activity-based costing in a Turkish hospital and compared the results with the traditional costing system. She calculated the cost of gall bladder surgery by using both methods and then compared the results. The results showed that the cost of this surgery by using the new system regarding in dollar, and by using the traditional system compared with the activity-based costing was between 965 and 1053 and between 535 and 599 dollars, respectively. These results show that activity-based costing can prepare more appropriate data and can help the managers in analyzing the prices and better decision-makings about budgetting and strategic programming (Yereli, 2009).

Ploquin and Dunscombe (2009) carried out a research entitled: "A cost-outcome analysis of image-guided patient repositioning in the radiation treatment of cancer of Prostate" and analyzed and calculated the cost of different types of Prostate cancer radiotherapies. They used activity-based costing model to calculate and analyze the final cost of image-guided patient repositioning, certain elements of imaging by directing the status of the patient in each of the three-dimensional conformal radiation therapy and intensity-modulated radiation therapy for Prostate cancer. In this research, the outputs were quantified according to the equivalent and the same shaped dose. The results showed that imaging with monitoring the status of the patient based on the principles and presuppositions used in the research have shown few advantages, while by using clinical operations, increasing service and using imaging capabilities with monitoring the status of the patient we can increase its profitability without enforcing a significant cost. Additionally, performing imaging by monitoring the status of the patient by using intensity-modulated radiation therapy showed more advantages over three-dimensional conformal radiation therapy and it appropriated a less percentage of service cost for itself (Ploquin and Peter, 2009).

Namazi and Heshmati (2009) designed a budgeting system and fuzzy activity-based costing in order to develop a flexible strategy in assessing the performance and managerial controlling of information technology

projects in a research paper entitled: "Designing a model of assessing information technology projects by using a fuzzy activity-based budgeting method". They proposed the following stages:

1. Model possibility assessment.
2. Activities' definitions.
3. Collecting fuzzy data.
4. Designing a budgeting model based on fuzzy activity.
5. Resource analysis and equilibrating the needs with the consumption resources.
6. Assessing information technology projects regarding the resource consumption amounts (Namazi and Heshmati, 2009).

Lee et al. (2010) presented their article entitled: "The influence of change agents' behavioral intention on the usage of the activity based costing management system and firm performance", the positive effect of change representatives on the performance of ABC/M systems" in the year 2010. This paper discusses about the unified theory of acceptance and use of UTAUT technology to study the behavioral ideas of change agents in implementing activity-based costing system/management (ABC/M). ABC/M is an important managing system which emphasizes on the appropriation of overhead costs based on the price stimulants in order to supply suitable information to improve decision-making. Usually, the top management and most of administrative managers play the role of implementing the change. Behavioral ideas are identified as an act or an innovative viewpoint to enhance ABC/M. Since using ABC/M and the fostering conditions for the amount of ABC/M systems' application has been less evident, the questionnaires were distributed regarding the Information Technology (IT) perspective. Also, the goal of this research has been to verify the usefulness of using ABC/M system to improve the performance. The experimental results gained from 100 certified responses collected show that performance expectation and social effect has a direct effect on the agents' behavior. Change agents' behaviors and fostering conditions are important structures which affect the application of ABC/M systems. Also, the amount of ABC/M application has a meaningful relationship with financial and non-financial performance. The results approve that UTAUT model is applicable in measuring change agents' behavioral expectations in implementing of the current ABC/M systems. Also, this research reveals the positive effect of change agents on the performance of ABC/M systems (Lee, 2010).

Hoozee and Bruggeman (2010) presented a research paper in 2010 entitled: "*Identifying operational improvements during the design process of a time – driven ABC system: The role of collective worker participation and leadership style*". The results showed how the participation of staff and leadership method affect the emergence of operational improvements during

the process of designing time-oriented activity-based costing system in the research field. Especially in the company under investigation, costing is started in different inventories and two designing processes were differentiated. In first type, the participation of the whole organization especially in the lowest levels developed the discussion about the entry parameters of costing model. Additionally, when these discussions were carried out about costing data in groups, in which a superior body directed the activities by using a leadership method with considering the people and respecting them, operational improvements happened. In the second type, the operational staffs were not included in designing process. They were afraid of the new costing system because it was used to realize the acceptance and thus performance improvements did not appear.

Thus, in order to enforce performance improvement during time-oriented ABC system designing process, the participation of all staff and suitable leadership methods seem to be necessary (Lee, 2010). Gujral et al. (2010) used activity-based costing method as a tool for costing in Hemato-Pathology lab in a research entitled: "Activity-based costing methodology as a tool for costing in hematopathology laboratory". First the data needed were collected through the hospital's accounting system and interviewing the staff. Then the related costs were analyzed and the direct and indirect costs were identified and were appropriated according to the definite percentages and stimulants. The results of research implementation showed that MPO test has the least cost (32 Rs.) and immunophenotyping has the most cost among others with 4056 Rs. Furthermore, the analysis showed that the cost of each CBC test is 77 Rs. For each hour and investigating, the skull shape is 496 Rs. Since the pathologist invests most of his time on this test, it is more costly. Finally, using activity-based costing results in a more accurate and clearer data about service costs. This method helps the laboratories to redesign their cost structure or at least get a more appropriate understanding of the economy dominant over the laboratory management (Gujral et al., 2010).

Pike et al. (2011) presented a paper entitled: "Activity – based costing user satisfaction and type of system: A research note". This paper examines user perception of activity-based costing performance for three different types of system in a major information and communication provider in South East Asia. Few prior ABC studies have considered the effect of system type on ABC performance. The study draws on a survey of 54 developers and 181 users of 16 different ABC systems within the organization to produce five performance constructs (cost accuracy, cost-benefit trade-off, ABC impact, information use, and decision action). The results show that both the development inputs and user performance perceptions varied with the type of system (embedded, stand alone, ad-hoc). While embedded systems enjoyed far stronger inputs (for example, top

management support, rewards and recognition, task significance) and greater development team cohesion than stand-alone systems, they were perceived by users to perform significantly less well. These findings suggest that system type is an important factor in assessing ABC performance (Pike et al., 2011).

RESEARCH METHOD AND DATA COLLECTION

The present research is an applied research, regarding the goal and a descriptive research regarding data collection and it is a case study. To calculate activity-based costing, first the overhead cost and the cost of commanding units and all sections of the branches were appropriated using a suitable cost criterion among bank deposits which include current and saving and long-term (ordinary and especial, long-term of one or five years) deposits and other deposits (received deposits as different vouchers, prepayment for documentary facilities, dealing prepayment, credit sale prepayment and...).

To test the research hypotheses, first the cost calculated by using traditional method and activity-based method for hypotheses 1 to 4 were studied by using Mann-Whitney U test and SPSS software and then Spearman's correlation coefficient test was applied to test hypothesis 5 and in order to collect data needed for our research, the following resources were utilized:

1. Financial statements ended at 2010 and notes along with the financial statement.
2. The data in commanding units and bank branches.
3. Interviews with skillful bank scholars.

Research range

The range of our research includes all activities of sections of the branches and commanding units of the bank and all deposits and financial supply resources of Refah Bank system in the year 2010. In the research, we try to present a suitable pattern to calculate the sections and units and bank-e-Refah deposit costs which is considered as one the most important business banks in Iran regarding the amount of its activity and performances in our countries' economy.

Cost in Refah bank

The cost of bank deposits is the sum if all costs incurred by the bank to support itself financially and all bank resources in all banks include saving non-profit deposits, current non-profit deposits and long-term deposits and other types of deposits. The cost is not exactly defined in Refah bank because it is only the direct cost of each deposit in each unit or certain part which is clear. Also, indirect cost is defined as a whole.

Different types of cost in Refah bank

Each of bank deposits which are defined as a financial supply resource and the continuation of the bank life depend on it and this deserves costs as follows:

a. Direct cost: direct cost in a bank is the one which is traceable to a deposit and banking services and include profits paid to long-term deposit owners and rewards conferred to saving non-profit

deposits.

b. Indirect cost: it is not the cost which is directly traceable to a service or bank deposit and includes all bank costs except the profit paid to long-term deposit owners and the rewards conferred to non-profit saving deposits and they are considered to be overhead (indirect) costs.

Costing method in Refah bank

In the present research, two methods for costing were studied in Refah bank as follows:

1. Volume based costing (traditional).
2. Activity-based costing method.

First method: Volume based costing system

In volume based costing system (traditional), the overhead cost of deposits are appropriated to current, saving, long-term and other deposits based on the percentage of the deposits and the rate of overhead absorption for all deposits is 4/5%.

To calculate the cost of all deposits by using traditional method, direct and indirect cost are added together and thus the total cost of the bank is defined in this way. Since the profit received from central bank for lawful deposits with them is a trivial amount regarding the total resources of the bank, the banks consider it as a cost reducer. Thus in the present research this amount of profit received is subtracted from the total cost of the bank and the cost of deposits has been calculated by using the traditional method.

The process of costing based on deposits' volume (traditional) is better than the present process used in banks in Iran, although it has some defects and disadvantages. It absorbs the bank's overhead cost by using a flowing stimulus, but in the present process of the banks there is no account called overhead and all indirect expenditures are subtracted from the performance profit of the bank.

Based on the process of costing based on deposits' volume (traditional), current deposits include 29% of overhead cost and 14% of total cost for the bank, saving deposits include 14% of overhead cost and 9% of total cost for the bank, long-term deposits include; 34% of overhead cost and 66% of total cost for the bank, and other deposits include %23 of overhead cost and %11 of total cost for the bank. There is no pattern for total cost of the deposits in the process of costing used by Refah bank. However, the traditional method has lots of disadvantages and it is not suitable for electronic banking and global competitive level and thus another method should be introduced to be used in Refah bank and other big banks which have significant role in country's economy.

Second method: Activity-based costing in Refah bank

The administrative phases of activity-based costing in Refah bank include:

First phase: Forming an implementation group and desi-gning ABC system: To administer this system different parts and different skills are used.

Second phase: Identifying the activities of line units (the branches) or performance protection. Those activities performed in bank branches under the supervision of administrative managers and are controlled by the top managers of the branches are controlled by line units. The activities of line units or performance

Table 1. Information about deposits in Refah bank.

Deposit type	Deposit ratio (%)	Activity in each deposit ratio (%)	Direct cost ratio (%)	Organizational units' indirect cost ratio (%)	Line units' indirect cost ratio (%)	Total indirect cost ratio (%)	Total direct and indirect ratio (%)
Current	29	55	0	54	58	57	29
Saving	14	25	5	25	24	24	15
Long-term	34	15	95	15	16	16	55
Other deposits	23	5	0	6	2	3	1
Total	100	100	100	100	100	100	100

protection include: branch management, facilities bureau, tellers bureau, drafts bureau, cheque faxing bureau, book-keeping bureau, foreign currency bureau, especial services bureau and sanitation and health care bureau

Third phase: Identifying organizational units' activities or organizational protection. All activities performed in non-performance units of the bank to protect the activities of line units' activities are organizational units' activities of the bank which include: superintendent unit, provision unit, education unit, inspection unit, new services unit (technical protection of ATMs), new services unit (related to electronic paying cards), new services unit (technical protection of card readers and sale terminal), law unit, recreation and welfare of the staff unit, treasury and exchanges unit, statistics and bank data unit, goods distribution and press purchase unit, telephone operator, sanitation and health care.

Fourth phase: Categorizing indirect cost (overhead) in cost resources based on a suitable cost stimulus.

Fifth phase: Indirect cost appropriation based on a suitable cost stimulus for activities and regarding the consumption of each deposit for deposit accounts.

In present research the overhead absorption rate, over-head appropriation bases and the total cost of organizational units and the bureaus of the branches are recognized. Also the ratio of each one of the deposits are appropriated from the overhead cost of each organizational unit and each bureau of line units based on the suitable cost stimulus for each of current, saving, long-term and other deposits.

Table 1 shows deposit ratios, activity ratios, direct cost ratio, indirect cost ratio for organizational units, line units indirect cost ratio, indirect total cost ratio, and the ratio of the sum of direct and indirect total cost in Refah bank. According to the table, current deposits comprise the most indirect cost (57%) and saving deposits rank second regarding indirect cost and form 24% of indirect cost. However, long-term deposits which appropriate the most resources to themselves only comprise 16% of indirect cost. Other deposits which are ignored by banks comprise 23% of the resources while they appropriate only 3% of indirect cost and they do not have direct cost and they are the best bank resources.

According the Table 1, current deposits' cost is much more than that of the sum of saving and other deposits integration while it was supposed that current deposits' costs should be almost less regarding the fact that they do not have direct cost. Long-term deposit comprises only 16% of indirect cost, but since it comprises 95% of direct cost it still appropriates the most cost. It is considered highly important because it has a great role in bank resources. Based on the table, the ratio of current deposits' indirect cost regarding their resources is much more than the ratio of other deposits' indirect cost (saving, long-term, other deposits). Thus, the bank management should devise a new process to decrease the bank's indirect cost.

Model designing and calculating the cost of each type of deposit

a. The cost of current deposits:

$$Cbdc = cddc + \sum(oarou \times ssoa \times cdpocou) + \sum(oarlu \times ssoa \times cdpoclu) - pcbld$$

where, Cbdc: Current bank deposits' cost, Cddc: current deposits' direct cost, Oarou: overhead absorption rate for each organizational unit, Ssoa: suitable stimulus for overhead absorption, Cdpocou: current deposits' percentage regarding the overhead cost of each one of organizational units, Oarlu: overhead absorption rate for each of line units, Ssoa: suitable stimulus for overhead absorption, cdpoclu: current deposits' percentage regarding the overhead cost of each one of line units, pcbld: the profit received from central bank for lawful current deposits made.

b. The cost of saving deposits:

$$Sbdc = Sddc + \sum(oarou \times ssoa \times sdpocou) + \sum(oarlu \times ssoa \times sdpoclu) - pcbld$$

where, Sbdc: Saving bank deposits' cost, Sddc: saving deposits' direct cost, Oarou: overhead absorption rate for each organizational unit, Ssoa: suitable stimulus for overhead absorption, Sdpocou: saving deposits' percentage regarding the overhead cost of each one of organizational units, Oarlu: overhead absorption rate for each of line units, ssoa : suitable stimulus for overhead absorption, sdpoclu: saving deposits' percentage regarding the overhead cost of each one of line units, pcbld: the profit received from central bank for lawful saving deposits made.

c. The cost of long-term deposits:

$$Lbdc = Lddc + \sum(oarou \times ssoa \times Ldpocou) + \sum(oarlu \times ssoa \times Ldpoclu) - pcbld$$

where, Lbdc: Long-term bank deposits' cost, Lddc: long-term deposits' direct cost, Oarou: overhead absorption rate for each organizational unit, Ssoa: suitable stimulus for overhead absorption, Ldpocou: long-term deposits' percentage regarding the overhead cost of each one of organizational units, Oarlu: overhead absorption rate for each of line units, Ssoa: suitable stimulus for overhead absorption, Ldpoclu: Long – term deposits' percentage regarding the overhead cost of each one of line units, Pcbld: the profit received from central bank for lawful long – term deposits made.

d. The cost of other deposits:

$$Obdc = Oddc + \sum(oarou \times ssoa \times Odpcou) + \sum(oarlu \times ssoa \times Odpcclu) - pcbld$$

Table 2. The difference between cost using traditional system and ABC system in percent.

Deposit type	Cost percentage by using traditional system (%)	Cost percentage by using ABC system (%)
Current	14	29
Saving	9	15
Long-term	66	55
Other	11	1
Total	100	100

Table 3. Kolmogroph-Smirnof's test to identify the normalness of variables' distribution.

Variables	No.	Average	Standard deviation	Test	Meaningfulness level
Current deposits	56	37134/36	51917/96	1/78	0/003
Saving deposits	56	15521/89	24697/43	1/98	0/001
Long-term deposits	56	21480/35	34548/20	2/11	0/000
Other deposits	56	11223/80	21289/90	2/23	0/000

Table 4. Statistical results of hypothesis 1.

System	No.	Mean	Changes' range	Ranks' average	U	Sig.
ABC	28	17930/50	286434	32/43	282	0/071
Traditional	28	12393/50	151095	24/57		

where, Obdc: Other bank deposits' cost, Oddc: other deposits' direct cost, Oarou: overhead absorption rate for each organizational unit, Ssoa: suitable stimulus for overhead absorption, Odpocou: other deposits' percentage regarding the overhead cost of each one of organizational units, Oarlu: overhead absorption rate for each of line units, Ssoa: suitable stimulus for overhead absorption, Odpoclu: other deposits' percentage regarding the overhead cost of each one of line units, Pcblo: the profit received from central bank for lawful other deposits made (Table 2).

ANALYSIS OF THE HYPOTHESES

To test the hypotheses, Mann-Whitney U test for hypotheses 1 to 4 was used and for hypothesis 5 Spearman's test was used, after collecting data and calculating the cost by using both traditional and ABC system.

Kolmogroph-Smirnof's test to identify the normalness of variables' distribution

In order to select appropriate statistical tests to analyze the collected data, we should assess the variables' normal distribution and Kolmogroph-Smirnof's test was used in this research to achieve this goal. Regarding the data in Table 3, we can see that the meaningfulness level of the test in the foregoing has been less than 0/05 for all of the variables. Thus, we can conclude that the distribution of all the variables has been abnormal and

the non-parametric test was used for these variables.

Hypothesis 1: There is a meaningful difference between cost calculated for current deposits by using ABC and traditional systems

According to data shown in Table 4 and Mann-Whitney U test's figures, we can see that the average cost rates calculated for current deposits by using ABC system is 32.43 and by using traditional system it is 24.57. According to the criterion $U=282$ and meaningfulness level of $p=0.07$ and assurance level of 95%, the average rate of cost for current deposits using both ABC and traditional system has not shown meaningful differences ($p>0.05$).

Hypothesis 2: There is a meaningful difference between cost calculated for saving deposits by using ABC and traditional systems

According to data shown in Table 5 and Mann-Whitney U test's figures, we can see that the average cost rates calculated for saving deposits by using ABC system is 30.30 and by using traditional system it is 26.70. According to the criterion, $U=341.50$ and meaningfulness level of $p=0.408$ and assurance level of 95%, the average rate of cost for saving deposits using both ABC and

Table 5. Statistical results of hypothesis 2.

System	No.	Mean	Changes' range	Ranks' average	U	Sig.
ABC	28	5764/50	130482	30/30	341/50	0/408
Traditional	28	5983	72943	26/70		

Table 6. Statistical results of hypothesis 3.

System	No.	Mean	Changes' range	Ranks' average	U	Sig.
ABC	28	3653	113636	22/71	230	0/008
Traditional	28	14530	177145	34/29		

Table 7. Statistical results of hypothesis 4.

System	No.	Mean	Changes' range	Ranks' average	U	Sig.
ABC	28	486/50	23940	18/57	114	0/000
Traditional	28	9829/50	119833	38/43		

Table 8. Statistical results of hypothesis 5.

Variables	Overhead cost ratio
Staff activities' ratios	$r=0/976$, $p=0/000$, $n=16$

traditional system has not shown meaningful differences ($p>0/05$).

Hypothesis 3: There is a meaningful difference between cost calculated for long-term deposits by using ABC and traditional systems

According to data shown in Table 6 and Mann-Whitney U test's figures, we can see that the average cost rates calculated for saving deposits by using ABC system is 22.71 and by using traditional system it is 34.29. According to the criterion $U=230$ and meaningfulness level of $p=0.008$ and assurance level of 97%, the average rate of cost for long-term deposits, using ABC and traditional systems, has shown meaningful differences and the amount for traditional system has shown to be more than that of ABC system ($p<0/01$).

Hypothesis 4: There is a meaningful difference between cost calculated for other deposits by using ABC and traditional systems

According to data shown in Table 7 and Mann-Whitney U test's figures, we can see that the average cost rates calculated for saving deposits by using ABC system is 18.57 and by using traditional system it is 38.43.

According to the criterion $U=114$ and meaningfulness level of $p=0/000$ and assurance level of 99%, the average rate of cost for other deposits, using ABC and traditional systems, has shown meaningful differences and the amount for traditional system has shown to be more than that of ABC system ($p<0/001$).

Hypothesis 5: There is a meaningful relationship between the ratios of staff activities with the ratios of overhead cost for each of deposits

According to data in Table 8, and based on Spearman's correlation coefficient test, it can be seen that there is a meaningful direct correlation between the ratios of staffs' activities and overhead cost ratios in a way that the correlation coefficient equals $r=0/976$ and meaningfulness level is $p=0/000$ ($p<0/001$) and the assurance level is 99%. This correlation shows that the effect of the ratios of staff activities on the ratio of overhead cost has been positive. Thus, we can conclude that by increasing the ratios of staff activities, overhead cost ratio will also increase.

The reason to use non-parametric Mann-Whitney U test for the first four hypotheses is that their data distribution is not normal. Thus, we used the mentioned test and Kolmogoroff's test has been used to recognize the normalness or abnormality of the data. Also, regarding the 5th hypothesis, the reason to use non-parametric test was due to low volumes of the samples.

Conclusions

In this research, we tried to study the designing and

implementation possibility of activity-based costing system in Refah bank as a superior system and compare it with traditional system. Here we tried to design activity-based costing model for current, saving, long-term and other deposits in Refah bank and calculated the cost of this bank's deposits for the year 2010. We tested 5 hypotheses in this research in which the first and second one were carried out by using Mann-Whitney U test and there we showed that there is not a meaningful difference for cost calculated using ABC and traditional systems for current and saving deposits. Also, the results of the third and fourth hypotheses tested showed that there exists a meaningful difference between the cost calculated by ABC system and the cost calculated by traditional system for long-term and other deposits. The 5th hypothesis tested by using Spearman test showed that there exists a meaningful relationship between staff activities for each deposit and the ratio of overhead cost and it is a direct relationship.

Regarding the fact that ABC system identifies the cost of deposits more exactly compared with the traditional system, changing the interest rate of deposits and the facilities conferred and careful identification of bank service's commission especially for different types of vouchers, issuing different types of bank cheques, cheque fax, drafts, issuing Refah card, ... seems to be absolutely necessary in Refah bank.

REFERENCES

- Anvari RAA, Rezayat E (2007). *The comparative assessment of profitability of Islamic bank contractions using activity-based and traditional costing systems: A case study of Tosee-y-Saderat bank in Iran*. Accounting and Auditing studies, 14th year, (48), 25-28
- Arab MYM, Naseri M (2003). *The study of possibility of designing a model for calculating bank deposits' cost by using ABC system: A case study of Refah bank*. Account. Audit. stud. 10(34):11-13.
- Dean TPK, Zhang CW, Ben AD (1999). *Product and Process Cost Estimation with Fuzzy Multi- Attribute Utility Theory*. The Eng.Econ.44.(4):303-331.
- Gujral S, Dongre K, Bhindare S, Subramanian PG, Narayan HKV, Mahajan A, Batura R, Hingnekar C, Chabbria M, Nair CN (2010). *Activity-Based Costing Methodology as Tool for Costing in Hematopathology Laboratory*. Indian. J. Pathol. Microbiol.53 (1):68-74.
- Hoozee S, Bruggeman W (2010). *Identifying operational improvements during the design process of a time – driven ABC system: The role of collective worker participation and leadership style*. 21(3): 185-198.
- Krug B, Van Z, Annie P, Anne-Sophie C, Ralph T, Vander B (2008). *Activity-Based Costing Evaluation of [18F]-Fludeoxy Glucose Production*. Europ. J. Nuclear Med. Mol. Image. 35: 80-88.
- Lana YJ, Liu, Fei P (2007). *The implementation of Activity- Based Costing in China: An innovation action research approach*, Br. Account. Rev. 39(3):249-264.
- Lee CL, Yen O, Peng, KC, Wu HC (2010). *The influence of change agents' behavioral intention on the usage of the activity based costing management system and firm performance: The perspective of unified theory of acceptance and use of technology* 26(2): 314-324.
- Lukka K, Granlund M (2002). *The fragmented communication structure within the accounting academia: the case of activity – based costing research genres* 27(1-2):165-190.
- Lustsik O (2004). *Can e- bnking services be profitable*. University of Tartu.
- Mersereau A (1999). *Controlling the cost of plastic*", CMA Management August, pp.27-30.
- Nachtmann H, Needy KL (2003). *Methods for Handling Uncertainty in Activity Based Costing Systems*. Eng. Econ. 48(3):259-282.
- Namazi M, Heshmati R (2009). *Designing a model of assessing information technology projects by using a fuzzy activity-based budgeting method*". 3rd. International Conference on operational budgeting, 7th & 8th of July, Tehran.
- Partovi FY (1991). *An Analytic Hierarchy Approach to Activity-Based Costing*. Int. J. Production Econ. 22:151-161.
- Pike RH, Mike E, Tayles N Naha AM (2011). *Activity – based costing user satisfaction and type of system: A research note*". Br. Account. Rev. 43(1):65-72
- Ploquin N, Peter D (2009). *A Cost-outcome Analysis of Image-Guided Patient Repositioning in the Radiation Treatment of Cancer of the Prostate*. Radiother. Oncol. 93:25-31.
- Shekari A (2000). *Studying the application of activity-based costing in increasing the optimization (A case study: Siman-e-Fars company)*". MA dissertation in Industrial Management, Shiraz University.
- Smith JT, Harper C (2001). *AMIfs bank cost analysis model (BCAM) implementing activity – based management in a financial institution*. Bank Cost. Manag. Account. 14:2
- Soin K, seal W, Cullen J (2002). *ABC and organizational change: an institutional perspective*. 13(2):249-271.
- Yereli AN (2009). *Activity-Based Costing and Its Application in a Turkish University Hospital*." Association of Perioperative Registered Nurses 89(3):573-591.