

A framework for assessing cost management system changes: the case of activity-based costing implementation at food industry

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ABSTRACT

An opportunity to investigate the technical and organizational effect of management accounting system changes has appeared with companies' adoption of activity-based costing (ABC). This paper presents an empirical investigation to study the effects of ABC system for case study from food industry in Iran. From this case, the paper develops a framework for assessing ABC implementation and hypotheses about factors that influence implementation. The study detects five cost centers and for each cost center, it determines different cost drivers. The results of our survey has detected that implementation of ABC system not only helps precise allocation of overhead costs but also helps internal management companies for better planning and control of production, making better decisions for company's profits.

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1. Introduction

During the past few years, there have been tremendous efforts on using activity-based cost (ABC) method for better allocation of cost components and making strategic decisions (Anderson, 2002; Tsai et al., 2014). Langmaak et al. (2013), for instance, presented a generic factory cost model that could estimate different costs at multiple levels of any manufacturing plant. Jing and Songqing (2011) analyzed the importance of implementing ABC to the environmental costs based on the traditional techniques of environmental cost allocation, concentrating on introducing how environmental costs account by ABC, thus provided useful information for decision-making use. According to Qingge (2012), ABC is a new technique of financial cost management with more precise and sufficient cost information by taking the research and development (R&D) costs as the accounting starting point and after-sale service costs as the terminal point and covering the whole producing and operating process and the whole activities chain and value chain to serve the internal management and decision.

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Qian and Ben-Arieh (2008) presented a cost-estimation model that links ABC with parametric cost representations of the design and development phases of machined rotational components. It also presented several parametric techniques applicable at design time by using parts' feature geometry. They provided a comparison of different parametric cost techniques, reflecting on the accuracy of the different approaches.

Tsai et al. (2012) proposed an integrated concept, ABC system, to solve the problem of environmental and cost evaluation. They included a case study of an existing pulp and paper firm in Taiwan to demonstrate that the ABC method could estimate emissions of waste and the environmental expenses of a final product more precisely than traditional methods do. The method seems, therefore, to provide information for implementation in existing environmental accounting systems and help managers use environmental expenses into their decision-making processes.

Berling (2008) considered the problem of selecting the holding cost in inventory models. Traditionally, the cost of holding inventory was expected to increase linearly with a rate that is equal to a percentage of the product value. They presented a more sophisticated model of the cost of holding inventory based on a microeconomic framework. They derived a technique for detecting an appropriate holding cost per unit and time unit, h , which can be implemented in existing heuristics/formulas based on the ideas behind ABC.

Tornberg et al. (2002) investigated the possibilities of ABC and the modeling of design, purchasing and manufacturing processes in providing useful cost data for product designers. The idea was that ABC and process modeling might provide an effective tool for the evaluation of various design options. The study was executed in a large Finnish manufacturing firm. First, the most costly components of one product's sub-assembly were investigated in order to determine the activities required to produce the components and to measure their ABC expenses. Second, the processes were modeled with graphic flowcharts from product design, purchasing, and manufacturing departments. Finally, they examined the application of ABC information and process models to product designing practices. The results of the study implied that ABC technique and process modeling could provide a good starting point in heading toward more cost-conscious design. This way the designers could learn the relationships between the activities executed in the firm and their associated expenses. The development of a parametric cost estimation model based on ABC and process modeling provided a challenge for future study.

2. The proposed study

This paper presents an empirical investigation to study the effects of ABC system for case study from food industry in Iran. From this case, the paper develops a framework for assessing ABC implementation and hypotheses about factors that influence implementation. The study detects five cost centers and for each cost center, it determines different cost drivers. There are three hypotheses associated with the proposed study of this paper,

1. There is a difference between the information of cost of products provided in ABC method and traditional system.
2. ABC system provides better quality information compared with traditional method.
3. ABC system provides better financial information.

The proposed study of this paper designs a questionnaire in Likert scale consists of 8 questions for the hypotheses of the survey. Cronbach alpha has been calculated as 0.87, which is well above the minimum desirable level of 0.7. The study has been accomplished during the year of 2012 in one of Iranian food makers producing 8 products. The questionnaire was distributed among all 35 employees

who worked for this food making plant. Fig. 1 demonstrates the results of personal characteristics of the participants.

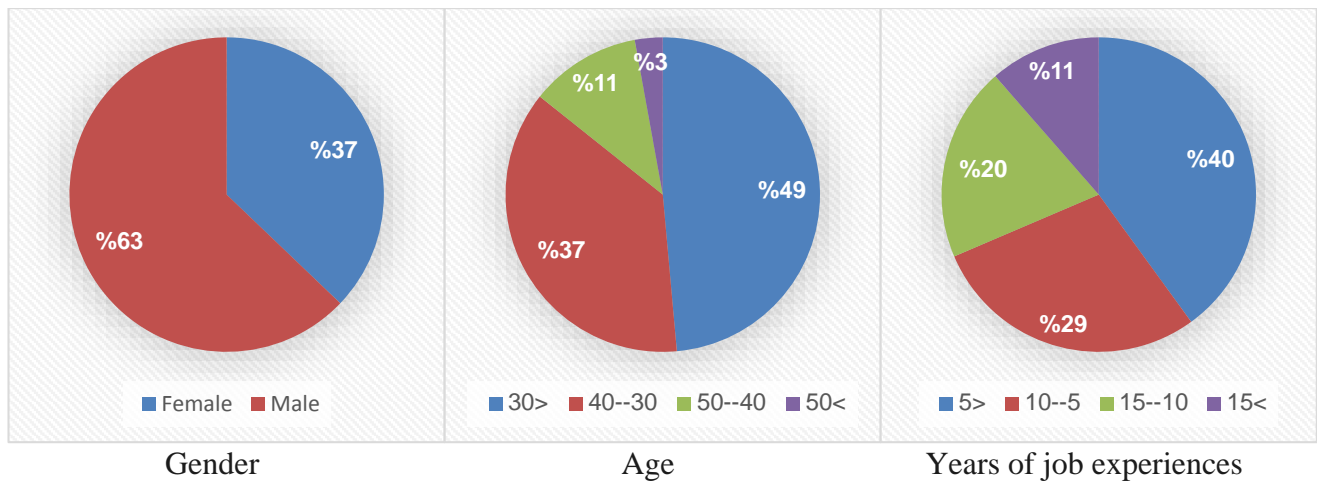


Fig. 1. Personal characteristics of the participants

As we can observe from the results of Fig. 1, about two-third of the participants were male. In addition, the worker were mainly middle-age and they have less than 10 years of job experiences. In order to examine the hypotheses of the survey, we need to first make sure the data were normally distributed. This has accomplished through Kolmogorov-Smirnov test. Table 1 shows details of our findings.

Table 1

The summary of Kolmogorov-Smirnov test

Variable	First hypothesis	Second hypothesis	Third hypothesis
Number	12	12	12
Mean	44.3	45.3	49.3
Standard deviation	67	39.1	64
Maximum absolute deviation	150	200	143
Maximum positive deviation	148	191	78
Minimum positive deviation	-150	-200	-143
Kolmogorov-Smirnov test	943	319.1	128.1
Sig	0.157	0.059	0.122

As we can observe from the results of Table 1, all components of the survey associated with three hypotheses are normally distributed when the level of significance is one percent. Therefore, we can use parametric tests such as t-student test to verify the hypotheses of the survey.

3. The results

In this section, we present details of our findings on testing various hypotheses of the survey.

3.1. The first hypothesis

The first hypothesis of this survey investigates whether there is a difference between the information of cost of products provided in ABC method and traditional system. Table 2 presents details of our findings.

Table 2

The summary of testing the first hypothesis of the survey

Hypothesis	Number	Mean	Standard deviation	t-value	P _v	Result
First	12	3.612	0.60798	19.725	0.000	Confirmed

As we can observe from the results of Table 2, t-value is statistically meaningful when the level of significance is one percent and we can confirm the first hypothesis of the survey. In addition, Table 3 shows details of the implementation of Freedman test to verify which product benefited the most from the implementation of ABC technique.

Table 3

The summary of the implementation of Freedman test

Product	1	2	3	4	5	6	7	8
Mean rank	3.47	3.76	3.87	3.26	2.76	3.66	2.83	2.98
Rank	4	2	1	5	8	3	7	6

Chi-Square = 73.810 P-value = 0.000 df = 5

As we can observe from the results of Table 3, the third product, Citrus, was benefited the most from the implementation of ABC system in terms of information followed by the second product, Cherry, and sixth product, Pickles.

3.2. The second hypothesis

The second hypothesis of this survey investigates whether or not ABC system can provide better quality information compared with traditional method. Table 4 presents details of our findings.

Table 4

The summary of testing the second hypothesis of the survey

Hypothesis	Number	Mean	Standard deviation	t-value	P _v	Result
Second	12	3.2977	0.65429	8.917	0.000	Confirmed

As we can observe from the results of Table 4, t-value is statistically meaningful when the level of significance is one percent and we can confirm the second hypothesis of the survey. In addition, Table 5 shows details of the implementation of Freedman test to verify which product benefited the most from the implementation of ABC technique in terms of providing better information.

Table 5

The summary of the implementation of Freedman test

Product	1	2	3	4	5	6	7	8
Mean rank	3.54	3.38	3.23	3.66	3.01	4.05	3.78	3.12
Rank	4	5	6	3	8	1	2	7

Chi-Square = 107.184 P-value = 0.000 df = 5

As we can observe from the results of Table 5, the sixth product, Pickles, was benefited the most from the implementation of ABC system in terms of providing better information followed by the seventh product, Citron, and fourth product, Eat.

3.3. The third hypothesis

The third hypothesis of this survey investigates whether or not ABC system can provide better financial information compared with traditional method. Table 6 presents details of our findings.

Table 6

The summary of testing the third hypothesis of the survey

Hypothesis	Number	Mean	Standard deviation	t-value	P _v	Result
tT	12	3.5802	0.54579	20.832	0.000	Confirmed

As we can observe from the results of Table 6, t-value is statistically meaningful when the level of significance is one percent and we can confirm the third hypothesis of the survey. In addition, Table 7 shows details of the implementation of Freedman test to verify which product benefited the most from the implementation of ABC technique in terms of providing better financial information.

Table 7

The summary of Freedman test for ranking products in terms of financial figures

Product	1	2	3	4	5	6	7	8
Mean rank	2.87	3.43	3.61	2.99	2.55	3.01	2.71	2.91
Rank	6	2	1	4	8	3	7	5

Chi-Square = 106.021 P-value = 0.000 df = 5

As we can observe from the results of Table 7, the third product, Citrus, was benefited the most from the implementation of ABC system in terms of providing better financial information followed by the second product, Cherry, and sixth product, Pickles.

4. Discussion and conclusion

In this paper, we have presented an empirical investigation to study the effects of changing cost accounting system from traditional method to activity based cost method in one of food makers in Iran. The survey has detected five cost centers including quality control, equipment, technician, inventory and general administration. The cost driver for quality control system was based on the number of sampling executed for each product. The cost drivers for equipment and technician are based on the number of hours of work accomplished for each product. Finally, the cost drivers for inventory and general administration are based on production unit. The results show that ABC system was a revolution in the costing system and applying it not only leads us to accurate allocation of cost drivers but also it helps management team make better decisions about the programming and control of productions and in obtaining the profit.

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