

## Interaction Effects Of Management Accounting Systems And Process Quality Management On Product Quality Performance. Case Study: Manufacturing Companies In Tehran Security Exchange

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**Abstract:** This study investigates the interaction effects of management accounting systems and quality management process on product quality performance. Different kinds of scales have been used in this study, one scale for measuring process quality management, three scales for measuring management accounting systems (goals, feedback and incentives). Internal and External quality are also used for measuring product quality performance as the dependent variables. The statistic sample of this study is 70 manufacturing companies listed in Tehran Stock Exchange during the five-years period (1384 to 1388). Results indicate positive and significant effects of the interactions of process quality management with all three scales measuring quality of management accounting systems on internal quality and also indicate positive and significant effects of the interaction of process quality management and quality incentives on external quality product.

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**Keywords:** Quality Management Process; Goal – Feedback; Incentives; Product Quality Performance.

### 1. Introduction

Previous research (Axelsson et al., 2002; Linderman et al., 2006; Wruck and Jensen, 1994), suggest that management accounting systems such as aims, feedback and incentives should be used as the stimulant mechanisms to encourage workers in a path which increase both the organization and worker's welfare up to a maximum level. On this basis, workers should know what they are doing (feedback in order to learn) and they should know what will be specified for them to do (purpose) and should be encouraged for their attempts (goal)(Chong and Eggleton, 2007). The three factors including quality purposes feedback and motivations of quality which mentioned above to increase management accounting systems, are in fact considered to create positions to encourage workers to achieve good and desirable results(Manoochchri, 1988). A goal can be defined a purpose or a level of efficiency for which an individual or an organization is working to reach. Feedback is the intention to meet several missions and usually includes information about the level of performance or the method or efficiency where performance processes have been executed. For example, an instruction defines special behaviors as a feedback, which should be carried out. Incentives are defined as diagnostic and encourage systems to improve the quality of a group or an individual.

To measure the product quality, it can be divided into two classifications:1-Internal quality of the product; 2-External quality of the product. Internal quality of a product means study and examination of a finished product before sale, inside an organization and the product quality in this level depends upon the

quality of production process. On the other hand, external quality of a product contributes to the quality of finished products, in view points of customers when using the product(Ahire et al., 1996; Ahire and Rana, 1995; Grandzol and Gershon, 1998; Hardie, 1998; Hedberg and Jonsson, 1987; Sarkar, 1997). Of the other factors which can affect the product quality and lead to different results in various companies is the size of company and industry. Size of a company which is measured by using number of employees is a possible important factor which can lead to other alternative effects. For instance, smaller companies have more constant organizational structures and communicative informal channels. Therefore, since smaller factories can be controlled better, quality techniques such as process quality management and project management are more applicable for them(Mellemvik et al., 1988; Sprinkle, 2000).

Hence, companies with different number of staff and similar quality management systems reach to different levels of the product quality. Kind of the industry can also have a balance effect on the quality. For example, agreement innovations have been correlated with structural specifications of an industry(Reeves and Bednar, 1994). Industries are different in terms of kind of product and production processes. For instance, chemical industries mainly use group or continuous manufacturing processes, whereas automobile or computer manufacturing companies strongly depend on assembly line of parts production. Chong and Eggleton(2007) suggest that one of the main goals of a salary or payment incentive program should be the stimulation of individuals to increase attempts to improve efficiency. On this basis,

Jafari et al(2008) believe that organizations can assign some bonus for the staff because of their achievement to higher levels of quality.

Sarkar(1997) in a research titled: "modern industrial techniques: information incentive and execution" , after studying the tools and new techniques used in industry to increase proportion of enterprise market stated that improvement of process quality increases when the information distribution at work has led to encourage workers and this shows the relation between process quality and feedback. Sprinkle(2000), in his study titled" effect of incentive contracts on learning and performance", studied the effect of bonus payment on learning level and efficiency of staff in production processes. He found that the workers' performance is improved by a payment or salary based on bonus and the amount of their activity levels also increases and this will result in the product quality. Tuttle and Harrel(2001) in a study titled " effect of unit goal priorities, economic incentives and temporary feedback on the programmed attempts of professional information systems" applied the students in the role of workers and showed that announcement of the goal priorities to the workers can affect the priorities which they consider to reach their goals. Linderman et al(2006), in a research titled " six sigma: effect of goals to improve and progress the group ", generally studied the execution of six sigma in different work groups and its effects to improve efficiency of the group. In this research it is discussed, with an emphasis on the special role of qualified goals that relying on the goals as a setting factor of human activity is unavoidable through stimulation of project improve teams. Mehregan(1994) determined the way of relationship between the stimulation factor and its effect on work and production quality through different factors affect on quality, in his research titled" designation of an incentive model for production line workers in order to improve the product quality". By presenting a third degree equation, he showed that quality does not increase by increasing the motivation and only in some domains of this third degree-curve, the quality depends upon the increase in motivation and by increasing the motivation, the quality growth decreases gradually and after a while it stops and descends. Rezai(2004), in a research titled "effect of TQM execution system on occupational satisfaction, organizational commitment and incentives of the staff advance", studied the most important principle f TQM .i.e. customer satisfaction and considers the staff as the customers of the organization. The research results show that performance of TQM system in the target organization has not affected the job satisfaction, organizational commitment and the staff motivation to advance. Mehrani and Nonahal

Nahr(2007), in a research titled" role of management accounting to increase the efficiency of business companies", studied the effect of establishment and application of systems and modern methods of management accounting in Iranian companies. According to this study, the experimental research carried out in Iran, showed the effectiveness application of modern systems and methods of management accounting to increase the efficiency of most companies.

According to what mentioned above, the main question of this study is whether the interaction between TQM and three elements of quality goals, quality feedback and quality incentives is related to the external quality of the products?

## 2. Research method

In this study which is descriptive and gauging, data about the quality goals, quality feedback and quality incentives and also internal and external quality of the product are gathered through sending questionnaires for company managers or one of their board of directors' members as an effect determination method.

### 2.1. Research hypothesis

Regarding to the theoretical fundamentals of the study and in order to answer the main question, the research hypos are tested empirically and codified as follow:

- 1- Interaction between process quality management and quality goals.
  - a) is related to the internal product quality
  - b) is related to the external product quality
- 2 -Interaction between process quality management and quality feedback
  - a) is related to the internal product quality
  - b) is related to the external product quality
- 3 -Interaction between process quality management and quality incentives:
  - a) is related to the internal product quality
  - b) is related to the external product quality

### 2.2. Statistical population and subject of the study

Focus of its study is on production process and product quality. Statistical population of this study is the managers of companies which were accepted in Tehran stock market and were actively working at least from 2005 to 2009, i.e. during a five-year period. Since the population number is high (252 people) and it is not possible to study all of them, 70 companies were totally selected as subjects, using scientific methods of sample size determination and then a number of selected subjects from each industry was measured by using classifying sampling method proportioned to the size of each class. In order to measure and quantify data of questionnaires, Likert 7- rank scale was used in which 1 to 7 scores will be

given to each question. Two variables are also assumed as control variables: 1) Company size and 2) kind of industry.

Finally two regression models are used to test the hypos: 1) first model evaluates effect of company size variables, kind of industry process quality management, goals, feedback and incentives on internal and external quality and the second model examines the mutual effect of process management quality and incentives on the product quality efficiency in addition to examine the variables in the first model. Therefore, the main model of the research is the second model.

In these two models, variables are defined as follow:

$$(1) Perf_i = \alpha_0 + \alpha_1 SIZE + \alpha_2 IND + \beta_1 Process + \beta_2 Goals + \beta_3 Fback + \beta_4 Inc + \varepsilon$$

$$(2) Perf_i = \alpha_0 + \alpha_1 SIZE + \alpha_2 IND + \beta_1 Process + \beta_2 Goals + \beta_3 Fback + \beta_4 Inc + \beta_5 Process \times Goals + \beta_6 Process \times Fback + \beta_7 Process \times Inc + \varepsilon$$

*Perf<sub>i</sub>*: internal or external quality of the product.

*SIZE*: size of the company which is measured based on the number of employees

*IND*: industry

*Process*: process quality management

*Goals*: quality goals

*Fback*: quality feedback

*Inc*: quality incentives

$\varepsilon$ : error statement

In this study, to make sure the model meaningfulness, *f* Fisher test and to test the hypos *t* student test were used ,respectively and data processing was done by SPSS software.

### 3. Research results

Table(1) and (2) briefly show statistical results obtained from hypo tests. Generally, on one hand, findings show the positive and meaningful effects of process quality management, by the three measurement scales of management accounting systems on internal quality and, on the other hand, only shows the interaction between the process quality and quality incentives on external quality of the product.

Table 1. Regression Analysis Of Internal Quality

Variable	Equation (1) - without interaction			Equation (2) - with interaction		
	Standardised Beta	t	Sig.	Standardised Beta	t	Sig.
Goals	-0.062	-0.531	0.597	-0.11	-0.111	0.912
Feedback	0.044	0.388	0.699	-0.315	-0.405	0.687
Incentives	-0.077	-0.670	0.505	2.314	2.102	0.040
Process	0.546	4.911	0.000	2.133	1.646	0.105
Goals × Process				3.057	2.137	0.042
Feedback × Process				3.420	2.335	0.009
Incentives × Process				-3.081	-2.241	0.029
INDUSTRY	0.090	0.869	0.388	0.022	0.215	0.830
Determination coefficient	0.330			0.412		
F-value	6.291			5.354		
p-value	0.000			0.000		

Table 2. Regression Analysis Of External Quality

Variable	Equation (1) - without interaction			Equation (2) - with interaction		
	Standardised Beta	t	Sig.	Standardised Beta	t	Sig.
Goals	0.449	3.886	0.000	-0.546	-0.559	0.578
Feedback	-0.469	-4.145	0.000	0.323	0.421	0.675
Incentives	-0.005	-0.042	0.967	2.980	2.745	0.008
Process	0.168	1.514	0.135	2.167	1.696	0.095
Goals × Process				1.563	1.040	0.302
Feedback × Process				-1.475	-1.195	0.327
Incentives × Process				-3.83	-2.825	0.006
INDUSTRY	0.082	0.791	0.432	0.028	0.272	0.787
Determination coefficient	0.336			0.429		
F-value	6.470			5.719		
p-value	0.000			0.000		

#### 4. Discussion

In addition to observing the measurements related to justify or fail the hypotheses in these tables, it can be recognized that by adding variables which show the interaction of accounting management system and quality management, determination coefficient has been increased for both internal and external quality independent variables. This amount has increased from 33% to 41% for internal quality, and from 33.6% to 42.9% for external quality which has improved results and enhanced explanation power of the model.

#### 5. Conclusion

In this study, effect of the interaction between management accounting system and process quality management was examined based on the product quality efficiency. Results of the test show that the interaction between process quality management and all three measurement scales of accounting management systems, will have positive and meaningful influence on internal quality of the product which are compatible with theoretical fundamentals. On the other hand, results only show a positive and meaningful effect between process quality management and quality incentives, on the external quality of the product which are compatible with theoretical fundamentals of the study. However, interaction between process quality management with two other variables, i.e. goals and quality feedback, do not affect the external quality changes. Regarding to the results obtained from data processing, the study suggestions are as follow:

1) It is suggested that manufacture companies try to prepare and codify goals and long-term programs about the number and waste cost of repetitions and also deficient products in production system, in order to improve product quality in terms of producer, by creating an interaction between accounting management systems and process quality management. To do this, by using information systems and its feedback toward the employees, they inform them about the results of their performance and provide instructions and advice to drive or correct the functional methods. Moreover, regarding to the study results and in order to implement these guides by employees and achieve a desirable quality in the view point of the organization, it is suggested that to recognize the provided goals in producing high quality products by workers and their encouragement, justifying and encouragement systems of the employees (Individual and group) in the organization should be implemented.

2) It is suggested that manufacturing companies apply interactional justifying and encouragement

systems of the employees and process quality management, as one of the approved methods.

3) Generally, regarding to this fact that the role of confirming and encouragement of employees has been justified in interaction with process quality management, in order to achieve desirable quality both in terms of customers and manufactures, manufacturing companies should focus their consideration to create and perform interaction between confirmation and encouragement system and process quality management.

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