

PERFORMANCE MEASUREMENT OF HEALTH, SAFETY AND ENVIRONMENT (HSE) OF EXECUTIVE CONTRACTORS IN WATER AND WASTEWATER ORGANIZATION IN GUILAN PROVINCE USING QUALITY COEFFICIENT MODEL (Q), BASED ON DEMING CYCLE

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Abstract

The main objective of this study was performance measurement of health, safety and environment (HSE) of executive contractors in water and wastewater organization in Guilan Province (Iran) using quality coefficient model (Q), based on Deming cycle which includes measuring the impact of commensurability between planning and implementation, the commensurability between planning and monitoring, the commensurability between planning and reform measures, the commensurability between the implementation and monitoring, the commensurability between the implementation and measures as well as the commensurability of monitoring and the reform measures on quality of contractors performance measurement. In this regard in addition to data collection of documents related to projects and their managers was discussed to categorize and analyze the data. Research hypotheses were analyzed using SPSS software and then test the significance of the β coefficients of regression equations, all hypotheses were confirmed.

Keywords: Performance Measurement, Deming Cycle, Health, Safety and Environment (HSE), Contractors and Quality Coefficient (Q)

1. Introduction

Performance measurement is considered an important and vital task of human resource management in facilitating organizational effectiveness. In recent years, much attention has been focused to the role of performance measurement, because its proponents believe that an effective performance measurement system can give a huge advantage for organizations and their employees. However, attention to performance measurement in recent years has been particularly significant and several components are used to measure performance (Taleghani & et al, 2013; Bakhsheshi Tanyani, Gilaninia, 2015). In the public sector of Iran and the government by implementation of its employee performance measurement system aimed at improving current status of measurement system among managers, supervisors, experts and staff (Tabarsa, 2008). Each organization to determine the utility and quality of their activities, especially in complex and dynamic environment has an urgent need to measurement system. On the other hand the lack of a system of evaluation and control is considered the means of lack of communicating with the environment inside and outside in the organization that its consequences is organization senility and ultimately death of it. Possible occurrence of the phenomenon of organizational death due to lack of sudden occurrence of it do not feel by the senior managers of organizations. However studies show that lack of feedback possible completing necessary reforms to business growth, development and improvement of the

organization activities will be impossible, end of this phenomenon is organizational death (Adeli, 2005: 125). Issue of performance measurement for many years has led to the challenge for researchers and users. Business organizations of financial indicators was used as a means of the performance measurement in the past; until "Kaplan and Norton" in the early 1980s after review and evaluation of management accounting systems have been shown many of the inefficiencies of this information to performance measurement of organizations that this inefficiency caused by the increasing complexity of organizations, environment dynamics and market competition (Kaplan & Norton, 1992, pp.9-71).

2. Statement of problem

Due to the extent of water and sanitation projects in Guilan province to enhance indicators of benefit from clean water and utilizes the services to improved sanitation and as a result of the growing contractor's activity of water and wastewater organization in Guilan province is required that in order to maintain the health, safety and welfare of the people, company is considered full attention to executives standards compliance as forefront of construction activities. But how to manage the contractors is significant in this regard. The most basic goals and plans of water and wastewater organization in Guilan include change the view that how contractor activities aren't related to the employer and only the results is important. Since if contractor cannot properly control and manage, lead to irreparable human and financial losses that its consequences will affect the employer and even society (Mivehchi, 2009). In the current situation, safety in particular on building sites of contractors in water and wastewater organization of Guilan is not very suitable and satisfactory. An overview shows that several factors have caused this situation. Little experience in the field of safety requirements in the workplace and places of execution of projects, inattention and in many cases neglect of employer representatives and devices for monitoring safety issues, lack of safety culture and measurement models because executives become familiar with methods and approaches in securing and control measures have been evaluated as the main reasons for this situation. Despite the legal requirements for observance of safety in the workplace and location of project implementation, frequently received reports in the field of work-related accidents. Many of these accidents lead to serious injury or even death of people that cannot be compensated (Mivehchi, 2009). To count contractors say that to observe safety regulations is led to slow and delays in project implementation and is unfortunate that representatives of the employer and the monitoring device also endorsed it and justify the performance of contractors. It is essential to note that experience has shown that contractors who do not pay attention the culture of safety is often not appropriate quality of work and their implementation. In other words, people that are not committed to safety, health and human life thus don't have commitment to quality of work. Although water and wastewater organization of Guilan has done relatively good practices in the field of requiring contractors to comply with safety regulations but felt more needs to create culture, building capacity, training and having awareness and to assess (talebi,et al,2011)the performance of contractors in this field more than ever. Based on the observations, the overwhelming majority of workers were alienated with appropriate strategies, requirements and safety regulations; in most cases the appropriate personal safety equipment will not be available to workers, trenching and drilling location are released without any protection and safety signs, in many cases, workshop managers and representatives of the monitoring device are without any information in this field or know these actions as an obstacle to do the work. Health, safety and environment (HSE) is Intersectoral branch of science that is used to resolve current concerns in the field of safety, health and welfare of people at work. It is a tool for control

and improving the performance of health, safety and working environment in all industrial and non-industrial development programs, in fact, it is an integrated system and unified that all human resources and equipment, and financial in supporting of each other are used for the health and environment without any accidents and injuries (Taghdisi, 2006).

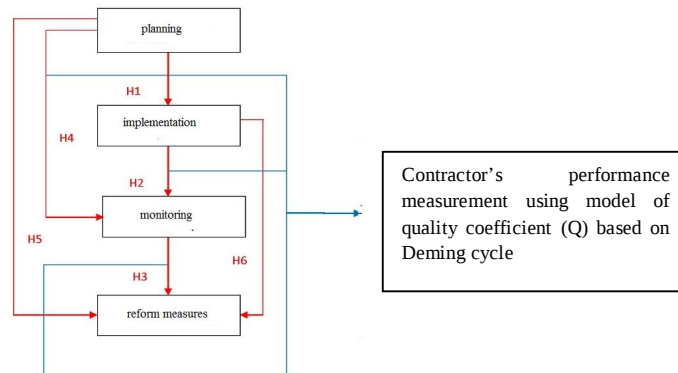


Figure 1: Conceptual model of research (derived from the Deming cycle and author, 2014)

3. Research Hypotheses

3.1. Main Hypothesis

The commensurability between the components of Deming cycle impact on the quality of contractors' performance measurement using quality coefficient method (Q).

3.2. Sub-Hypotheses

1. The commensurability between planning and implementation impacts on the quality of contractors' performance measurement using quality coefficient method (Q).
2. The commensurability between planning and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).
3. The commensurability between planning and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).
4. The commensurability between implementation and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).
5. The commensurability between implementation and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).
6. The commensurability between monitoring and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

4. Research Methodology

Current study on the basis of the target is applied and according to describe hypotheses the research methodology in study is causal. The population in this research is all contractors of water and wastewater organization in Guilan Province. Sampling method is simple random sampling. Due the limited number of population, statistical sample of this research is calculated according to Cochran's formulas. Water and Wastewater organization of Guilan province has 338 contractors in studied time period, According to this issue; a sample size was calculated 180 using Cochran formula. A questionnaire was used as research tool. In this study, content validity was used to assess the validity of questionnaire. Retest method was used to determine the reliability of questionnaire. In this study, test-retest coefficient was achieved more than 0.9 for all further measures thus questionnaire was reliable. Regression analysis was used to test hypotheses.

5. Research Findings

First hypothesis: The commensurability between planning and implementation impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of first hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between planning and implementation impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 1) regression test of first hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
First hypothesis	0.899	8.64	1.14	0.418	0.796	0.000	confirmed

Second hypothesis: The commensurability between planning and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of second hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between planning and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 1) regression test of second hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
Second hypothesis	0.647	11.332	0.613	0.986	0.419	0.000	confirmed

Third hypothesis: The commensurability between planning and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of third hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between planning and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 3) regression test of third hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
Third hypothesis	0.647	11.332	0.613	0.986	0.419	0.000	confirmed

Fourth hypothesis: The commensurability between implementation and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of fourth hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between implementation and

monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 4) regression test of fourth hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
Fourth hypothesis	0.591	9.762	0.595	0.937	0.349	0.000	confirmed

Fifth hypothesis: The commensurability between implementation and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of fifth hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between implementation and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 5) regression test of fifth hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
Fifth hypothesis	0.591	9.762	0.595	0.937	0.349	0.000	confirmed

Sixth hypothesis: The commensurability between monitoring and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

- Results of sixth hypothesis test show that sig= 0.000 and this value is lower than $\alpha=0.05$, thus research hypothesis is confirmed and the commensurability between monitoring and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

Table 6) regression test of sixth hypothesis

	Correlation coefficient	t-value	B	constant	R ²	Sig	Result
Sixth hypothesis	0.591	9.762	0.595	0.937	0.349	0.000	confirmed

Main hypothesis: The commensurability between the components of Deming cycle impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

H₀: The commensurability between the components of Deming cycle doesn't impact on the quality of contractors' performance measurement using quality coefficient method (Q).

H₁: The commensurability between the components of Deming cycle impacts on the quality of contractors' performance measurement using quality coefficient method (Q).

To test the hypothesis is used multivariate regression. Summary results of the regression analysis are shown in the following table for main hypothesis:

Table 7) Summary of regression analysis (main hypothesis)

	Value
correlation coefficient	0.923
Beta coefficient (the commensurability of planning and implementation)	0.31
Beta coefficient (the commensurability of planning and implementation)	0.87
Beta coefficient (the commensurability of planning and reform measures)	0.088
Beta coefficient (the commensurability of Implementation and monitoring)	0.017
Beta coefficient (the commensurability of Implementation and reform measures)	0.094
Beta coefficient (the commensurability of monitoring and reform measures)	0.003
constant	0.205
R^2	0.848
Sig	0.000
test results	confirmed

Considering sig (0.000) is less than 0.05, thus research hypothesis is confirmed and the commensurability between the components of Deming cycle impacts on the quality of contractors' performance measurement using quality coefficient method (Q). In addition to the above items, according to the coefficient of determination obtained, independent variables explain 84% of the quality of the performance measurement.

6. Conclusion and Recommendations

According to the results obtained of hypothesis tests show that all hypotheses are confirmed, and this result obtained that use of quality coefficient model based on the Deming cycle improves the quality of performance measurement for contractors of water and wastewater organization in Guilan province. Therefore according to the results obtained the following recommendations are presented:

- The commensurability between planning and implementation impacts on the quality of contractors' performance measurement using quality coefficient method (Q). So in this regard it is recommended that it is used group of proper planner mastered on the weaknesses, strengths, advantages and disadvantages of the project because is performed using appropriate operational planning in minimum possible time with appropriate quality.
- Earned value management system enables project managers to identify contrast the time and cost of the project by calculating performance indicators of time and cost of projects and also predict the final cost and completion time of the project. The commensurability between planning and monitoring impacts on the quality of contractors' performance measurement

using quality coefficient method (Q), thus it is recommended that it is used suitable methods and techniques for enhancing the quality of organization planning. This important will increase monitoring that can have the desired effect performance quality of contractors.

- Planning, coordinating and monitoring the activities leading up to the management of resources and expenditures and optimal allocation of water, the preparation of the financial plan and budget of the company, evaluation and control of the budget, review the progress of current programs and construction projects and setting priorities in investment, economic analysis of ongoing progress and exploited is to enhance the productivity indicators and strengthening economic that planning of the organization should be performed with respect to corrective action given that planning and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q). Attention to reform measures and the use of personnel and workers, etc., are considered to improve procedures because this can affect the quality of the performance of contractors and thus improve the performance of the organization.(gilaninia ,et,al, 2013)

- The nature of construction projects so that makes trouble them in accordance with predetermined programs. Therefore progress of projects should be effectively monitored and information of progress understandably and rapidly transferred to decision makers So that they can do corrective measures at the right time because project does not face to delays and followed problems such as costs and incidence of various actions. In accordance with the outcome of this research implementation and monitoring impacts on the quality of contractors' performance measurement using quality coefficient method (Q). So pay attention to the implementation and monitoring in development projects are important issues in development projects that can enhance organizational performance.

- Since the costs of reform measures to reduce the hazards and risks in projects, it is necessary that corrective actions of bottlenecks is prioritized using scientific methods and based on the priorities and credit allocated be taken to correct them that it could led to better implementation of projects and thus enhancing efficiency and performance of the organization.

- Earned value management system is a valuable methodology for analyzing and controlling the performance of the project. Earned value management with the integration of the three dimensions of project time management, project cost management and project limit management provide ability to accurately measure project progress and timely decisions for corrective measures. Earned value management system enables project managers to predict contrast the time and cost of the project by expending the time and cost performance index(biabani,et,al,2012), as well as to the final cost of the project and project completion time. So far, numerous methods are presented for controlling and monitoring the performance of the time and cost of project activities. Based on the research conducted, monitoring and reform measures impacts on the quality of contractors' performance measurement using quality coefficient method (Q). In this regard we recommend to organizations that focus on reform measures within the organization and this could be an influential on performance.

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