Studying the Effect of Establishment Integrated Management System on Organizational Maturity in Fourth Refinery Gas Asaluye

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Received: 22.03.2015; Accepted: 29.05.2015

Abstract. An Integrated Management System (IMS) incorporates many subsystems into a unique system so that the organization can conduct its operations using a single integrated system. This system is the result of unifying Quality Management Systems ISO 9001, Environmental Management Systems ISO 14001, and Occupational Health and Safety Assessment Series (OHSAS 18001). The present paper aims to determine the impact of IMS on process maturity. This study was conducted in 2014 in the Fourth Gas Refinery in Asaluye, where 124 members of the staff were selected at random as the sample. Using extant literature, a questionnaire was developed to measure the impact of IMS. The collected data were analyzed using AMOS and SPSS software packages. The results indicate that IMS and its subsystems including quality management, environmental management, and occupational health and safety have a significant positive impact on process maturity. Furthermore, the means for quality management, environmental management, occupational health and safety, and process maturity are 4.11, 4.17, 4.12, and 4.08 respectively, all of which are acceptable.

Keywords: Integrated Management System, Quality Management System, Environmental Management System, Occupational Health and Safety Management System, Process Maturity

INTRODUCTION

New revolutionary technologies and constant changes in methods of communication in the new century, have forced developing countries to set aside budgets for their short and long-term plans. Manufacturers strive to provide high quality products with low prices, which has forced managers to change their attitudes. They now believe that quality and customers have the highest priority and demand that their products meet international standards. Successful organizations base their activities on Quality Management Systems (ISO 9001). In this system, it is believed that customers ultimately approve products and it is their needs and expectations which must be met. Considering environmental issues can effectively lead to cost reduction since waste is minimized and resources are used optimally. Increasing population and depleted natural resources have led companies to pay more attention to environmental issues. Thus, deploying environmental management systems (ISO 14001) has positive consequences for the organization. Moreover, human resources are considered the most valuable resource in any organization who can substantially lower costs. In other words, safety, health, and quality are complementary. Therefore, organizations need regulations to evaluate and manage risks. The importance of deploying an Occupational Health and Safety System is clear. As a result deploying an Integrated Management System requires deploying a Quality Management System (QMS) and Environmental Management System (EMS), and an Occupational Health and Safety Management System (OHSMS) simultaneously. This paper aims to study the impact of an IMS on process maturity in the Fourth Gas Refinery in Asaluye.
Theoretical Background

Organizational maturity refers to the degree of growth in an organization, which forms its activities and the essence of its existence. According to this definition, goals, policies, procedures for achieving goals vary based on the level of maturity (Mohammad Sirous, 2000). Previous studies have shown that many factors can impact the level of maturity in the organization (Talebpour et al., 2009:16), one of which is compliance with various standards (Alavi, 2000:51).

In the modern world, quality is the undeniable subject of competition in manufacturing and service industries. Therefore, increasing attention has been paid to product quality, process quality along with environmental issues, and safety and health issues. Many organizations have realized the important role of management in leading and coordinating organizational activities. Furthermore, applying modern management tools, managers are able to use the tools provided by the system to effectively and efficiently achieve goals such as employee satisfaction and motivation as well as customer satisfaction by creating products that meet customer requirements. As a result, the organization becomes mature (Sadeghifard & Namazi, 2008:34)

Integrated Management Systems

An Integrated Management System (IMS) is defined as a unified system, which creates a unique set of information, materials, infrastructure, financial and human resources to achieve multiple goals that satisfy various stakeholders (Karapetrovic, 2003: 27). Jackson (2001) argues that an IMS must be firmly based on business needs and values.

Many factors have contributed to the development of multiple systems in many organizations including technological progress, need for aligning management systems with organizational goals, and customer and stakeholder requirements. Many organizations have considered system architectures where various systems are deployed and monitored simultaneously and as a whole. IMS achieves this by coordinating and monitoring three system standards: Quality Management ISO 9001, Occupational Health and Safety Assessment Series 18001, and Environmental Management ISO 14001 (Juran & Gryna, 1998).


Quality Management System

Quality management refers to monitoring the process of manufacturing products in order to ensure designs meet customer requirements. This appraisal covers acquiring raw materials to after-sales service. Accessibility, ease of transportation, low energy costs, ease of training, maintenance, and reuse are among the factors that impact quality (ISIRI, 2001). The key issue in using ISO 9000 is that revisions of the ISO standard must be considered so that systems compatible with EMS and OHSAS can be created (Ketola & Roberts, 2001: 63).

The following are the principles of quality management:

1- Customer-centeredness: Organizations are dependent on their customers and thus need to realize their needs, satisfy them, and go beyond customer expectations.
2- Strategic: Strategists unify organizational goals. They need to create an environment which allows individuals to become involved and achieve their goals.
3- Participation: Individuals, at any level, are indispensable to the organization. Their complete involvement benefits the organization.
4- Process approach: Effective results are achieved when activities and their resources are managed as a process.
5- System approach in management: Identifying, understanding, and managing related processes as a system increases the effectiveness and efficiency of the organization in achieving its goals.

6- Continuous improvement: Continuous improvement in organizational performance needs to be a constant goal.

7- Realistic approach in decision-making: Effective decisions are based on data and information analysis.

8- Beneficial mutual relationships with suppliers: Every organization is dependent on its suppliers and mutual relationships enables the creation of value (West, 2002:23).

Environmental Management System

ISO 14000 is a set of international standards developed for organizations of various sizes. Furthermore, this set provides a set of instructions and technical specifications for environmental performance appraisal (Global Standards Organization, 2006). This set includes Environmental Systems Management (ISO 14001), Environmental Audit (ISO 14010, ISO 14011), Environmental Site Assessment, and Product assessment standards (Defense Environmental Network & Information Exchange, 2006). Key issues in ISO 14001 include Environmental Policy, Environmental Planning, Implementation and operation, Monitoring and corrective measures, Management review, and continuous improvement (Adernitov, 2007:15). EMS create opportunities for continuous improvement, whose size varies according to economic aspects and other criteria in the organization. An EMS is a tool which enables the organization to achieve and control its desired level of environmental performance. Establishing an EMS does not lower environmental problems by itself; considerable attention must be paid deployment and continuous improvement (Ashrafi, 2007: 18).

Occupational Health and Safety Assessment System

As pointed out by Clint (2001), no international standard equivalent of ISO 14001, and ISO 9000: 2000 exist for occupational health and safety. However, various standards cover aspects of the subject, e.g. BS 8800 published in 1996 in England and OHSAS 18001 published in 1999 in the US. OHSAS 18001 covers the principles in BS 8800 and is basically a set of guidelines for occupational health and safety management systems. OHSAS 18001:1999 is the name assigned by the International Standards Organization. This standard covers the requirements of a safety and occupational health system so that an organization is able to control the risks of safety and occupational health and create a safe environment. The OHSAS 18001 standard gained popularity in the late 1990s with organizations around the world reporting safer and healthier environments as well as reduced waste. Generally, an occupational health and safety management system aims to improve health and performance in the organization by preventing damages and risks (Matias & Coelho, 2002:99).

Many factors in the organization can lead to human and material losses in a working environment. Observing health and safety regulations reduces such losses. Safety can be defined as the degree to which risk is averted. Safety engineering is a valuable field which considers the techniques and principles of avoiding risk in working environments for both humans and machines. As a result of these efforts, safe working environments are created leading to increased efficiency and profit. Identifying the factors that cause danger in the environment and finding solutions to mitigate them allows the staff to feel safe in their environment and improves performance. Furthermore, the organization’s image and credibility is enhanced (Lafuente et al., 2013:141).

Many modern organizations use global management systems to coordinate and lead their activities. Each of these systems considers the requirements of a particular group of stakeholders such as customers, employees, owners and shareholders, shareholders, the society, the government, and independent groups. Therefore, in order to satisfy all stakeholders, a comprehensive view of the problem is necessary. This requires OHSAS in order to consider the needs of employees.
Aims

Main aim: Determining the impact of EMS on process maturity in the Fourth Gas Refinery in Asaluyeh.

Secondary aims

1- Measuring the level of process maturity in the Fourth Gas Refinery in Asaluyeh
2- Analyzing the deployment of EMS in the Fourth Gas Refinery in Asaluyeh
3- Analyzing the impact of deploying EMS on process maturity in the Fourth Gas Refinery in Asaluyeh.

Hypotheses

Main Hypothesis: EMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.

Secondary Hypotheses

1- QMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.
2- EMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.
3- OHSAS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.

Methods

Regarding goals this paper is applicative, and considering problem definition and data collection it is a descriptive correlative survey, since it considers the current situation among the employees at the Fourth Gas Refinery in Asaluyeh. The refinery has 190 employees, 124 of which were selected using stratified random sampling. The most important methods of data collection for this study include library research and field studies. A questionnaire is used as the data collection tool, whose face validity was verified by the supervising and counseling professors as well as three other experts in the fields of IMS and organizational maturity. Their comments were applied and after a final revision the validity of the questionnaire was accepted. Cronbach’s alpha was used to determine the reliability of the questionnaire. Based on the variance for each item as well as the total variance, the coefficient was calculated using SPSS, yielding 0.95 for the entire questionnaire.

Findings

• Estimation and Measurement Models Analysis (Confirmatory Factor Analysis)
In order to analyze the acceptability of the measurement models, each model must be analyzed separately. Thus, seven separate models were considered tested. Since factor loadings are generally larger than 0.30 (except items 34 and 35) and based on the value of the partial P index (smaller than 0.05 for all items) we can conclude that the models provide adequate fit. It is noteworthy that in order to verify factor loading for each item, P must be smaller than 0.05.

• Results of Structural Equations Modelling
After confirming the fitness of the models, the second step is to test the hypotheses using structural equations.

Main Hypothesis: EMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.

The overall fit indices for the first hypothesis, which determines the impact of IMS on process maturity, are presented in Table 1.
After confirm the models, critical value and significance level are used in order to test the hypotheses. Critical value is obtained by dividing the regression weight estimation by the standard error. With a significance level of 0.05, the critical value must be larger than 1.96. Smaller values are considered insignificant in the model. Furthermore, significance levels of smaller than 0.05 indicate significant difference between the regression weight and zero, with 0.95 confidence. The first hypothesis along with its regression coefficients and partial indices are shown in the following table.

<table>
<thead>
<tr>
<th>hypothesis</th>
<th>estimate</th>
<th>C.R.</th>
<th>P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Hypothesis</td>
<td>1/04</td>
<td>7/39</td>
<td>0/00</td>
<td>OK</td>
</tr>
</tbody>
</table>

The regression coefficient for this hypothesis equals 1.04. Based on the P value for the hypothesis, which is smaller than 0.05, this hypothesis is supported with 0.95 confidence. In other words, it can be claimed that IMS has a significant positive impact on process maturity.

**Secondary Hypothesis 1**: QMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.

The overall fit indices for the secondary hypothesis 1, which determines the impact of QMS on process maturity, are presented in Table 3.

<table>
<thead>
<tr>
<th>CMIN/DF</th>
<th>P</th>
<th>GFI</th>
<th>AGFI</th>
<th>TLI</th>
<th>PCFI</th>
<th>RMR</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/23</td>
<td>0/012</td>
<td>0/90</td>
<td>0/89</td>
<td>0/93</td>
<td>0/75</td>
<td>0/029</td>
<td>0/96</td>
<td>0/94</td>
<td>0/04</td>
</tr>
<tr>
<td>Between 1.3</td>
<td>0/05&lt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/5&lt;</td>
<td>0/08&gt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/08&gt;</td>
</tr>
</tbody>
</table>

Table 3. Overall fit indices of secondary hypothesis 1.

The regression coefficient for this hypothesis equals 1.16. Based on the P value for the hypothesis, which is smaller than 0.05, this hypothesis is supported with 0.95 confidence. In other words, it can be claimed that QMS has a significant positive impact on process maturity.

**Secondary Hypothesis 2**: EMS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluyeh.

The overall fit indices for the secondary hypothesis 2, which determines the impact of EMS on process maturity, are presented in Table 5.

<table>
<thead>
<tr>
<th>CMIN/DF</th>
<th>P</th>
<th>GFI</th>
<th>AGFI</th>
<th>TLI</th>
<th>PCFI</th>
<th>RMR</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/35</td>
<td>0/003</td>
<td>0/91</td>
<td>0/90</td>
<td>0/90</td>
<td>0/74</td>
<td>0/03</td>
<td>0/94</td>
<td>0/92</td>
<td>0/05</td>
</tr>
<tr>
<td>Between 1.3</td>
<td>0/05&lt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/5&lt;</td>
<td>0/08&gt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/08&gt;</td>
</tr>
</tbody>
</table>
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Table 6. Regression coefficients (Secondary hypothesis 2 test results).

<table>
<thead>
<tr>
<th>hypothesis</th>
<th>estimate</th>
<th>C.R.</th>
<th>P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Hypothesis 2</td>
<td>1/08</td>
<td>3/88</td>
<td>0/00</td>
<td>OK</td>
</tr>
</tbody>
</table>

The regression coefficient for this hypothesis equals 1.08. Based on the P value for the hypothesis, which is smaller than 0.05, this hypothesis is supported with 0.95 confidence. In other words, it can be claimed that EMS has a significant positive impact on process maturity.

Secondary Hypothesis 3: OHSAS has a significant positive impact on process maturity in the Fourth Gas Refinery in Asaluye.

The overall fit indices for the secondary hypothesis 3, which determines the impact of OHSAS on process maturity, are presented in Table 7.

Table 7. Overall fit indices of secondary hypothesis 3.

<table>
<thead>
<tr>
<th>CMIN/DF</th>
<th>P</th>
<th>GFI</th>
<th>AGFI</th>
<th>TLI</th>
<th>PCFI</th>
<th>RMR</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/24</td>
<td>0/033</td>
<td>0/90</td>
<td>0/89</td>
<td>0/94</td>
<td>0/76</td>
<td>0/02</td>
<td>0/92</td>
<td>0/95</td>
<td>0/05</td>
</tr>
<tr>
<td>Between 1,3</td>
<td>0/05&lt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/5&lt;</td>
<td>0/08&gt;</td>
<td>0/90&lt;</td>
<td>0/90&lt;</td>
<td>0/08&gt;</td>
<td></td>
</tr>
</tbody>
</table>

Table 8. Regression coefficients (Secondary hypothesis 3 test results).

<table>
<thead>
<tr>
<th>hypothesis</th>
<th>estimate</th>
<th>C.R.</th>
<th>P</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Hypothesis 3</td>
<td>1/06</td>
<td>4/93</td>
<td>0/00</td>
<td>OK</td>
</tr>
</tbody>
</table>

The regression coefficient for this hypothesis equals 1.06. Based on the P value for the hypothesis, which is smaller than 0.05, this hypothesis is supported with 0.95 confidence. In other words, it can be claimed that OHSAS has a significant positive impact on process maturity.

One-sample t-test

In this test, the postulated hypothesis is considered for the average population. The test is used to determine the level of factors for the sample. If the Sig value is smaller than 0.05, H0 is not supported. Table 9 shows the average of the factors for the entire population. In H0, the average for each factor equals three, while the average factors for each in H1 does not.

Table 9. Factor averages.

<table>
<thead>
<tr>
<th>Test Value = 3</th>
<th>Mean</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
<th>Mean difference</th>
<th>95% confidence interval of the difference</th>
<th>factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lower</td>
<td>upper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>4/11</td>
<td>123</td>
<td>0/00</td>
<td>1/11</td>
<td>1/04, 1/18</td>
<td>QMS</td>
</tr>
<tr>
<td>4/17</td>
<td>123</td>
<td>0/00</td>
<td>1/17</td>
<td>1/08</td>
<td>1/25</td>
<td>EMS</td>
</tr>
<tr>
<td>4/12</td>
<td>123</td>
<td>0/00</td>
<td>1/12</td>
<td>1/05</td>
<td>1/19</td>
<td>OHSAS</td>
</tr>
<tr>
<td>4/08</td>
<td>123</td>
<td>0/00</td>
<td>1/08</td>
<td>1/01</td>
<td>1/15</td>
<td>process maturity</td>
</tr>
</tbody>
</table>

Since the Sig value for each factor is smaller than 0.05 and based on the 0.95 confidence interval, it is concluded that the factors have acceptable averages. The results show the averages for QMS, EMS, OHSAS, and process maturity are 4.11, 4.17, 4.12, and 4.08 respectively.
DISCUSSION AND CONCLUSION

This study, conducted in 2014, aimed to analyze the impact of deploying an Integrated Management System in the Fourth Gas Refinery in Asaluyeh. At first, the components and main variables of the study were identified and analyzed, which yielded a questionnaire to be distributed among the participants. The results show the averages for QMS, EMS, OHSAS, and process maturity are 4.11, 4.17, 4.12, and 4.08 respectively. Structural equations in AMOS were used to test the hypotheses. The impact of IMS on process maturity was calculated to be 1.04. Moreover, the impacts of QMS, EMS, and OHSAS on process maturity were 1.16, 1.08, and 1.06 respectively. All the hypotheses postulated in the study were supported.

REFERENCES