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Performance assessment of Iranian petrochemical companies using sustainable excellence model

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ABSTRACT

Performance assessment of Iranian petrochemical companies based on the H3SE performance excellence model is the purpose of this paper. Reaching this goal, different aspects of the sustainable excellence model and its indices have been introduced, and through Multiple Attribute Decision-Making (MADM) approaches, Iranian petrochemical companies were assessed and ranked. Since the results of MADM are not panacea for all decision making problems and the questionnaire self-assessment approach is not rigorous enough, different techniques have been involved for compensation. In the following, the convergence of MADM rankings has been compared. The findings signify that processes management, leadership, social environmental accountability and staff results are of relative importance in H3SE performance assessment. Moreover, Ethylene Gharb, Zagros, and Bandar Imam companies have the highest rankings. Finally, ranking sensitivity was analyzed. Since the data were collected through questionnaire self-assessment approach, the reliability of this assessment may be doubted.

1. Introduction

The oil industry is one of the leading business industries in Iran. Having the world's largest hydrocarbon reserves (first in gas and third in oil reserves); Iran enjoys an exceptional position in this field (BP Annual report, 2013). Petrochemistry is considered a downstream oil industry, but according to investigators, it still has a bright future 70 years after its birth. Studies suggest that with the current rate of development, the world would face a capacity shortage of 45 million tons in this field by 2016 (Jafari et al., 2007) (see Fig. 1).

Because of its access to petrochemical feedstock, the educated workforce, and regional markets, Iran has both international and regional competitive advantages in this industry. Studies on this industry indicate that Iran has a 2.4% share of global production in petrochemicals, including various types of polymeric products, chemicals, and fertilizers through the development of petrochemical projects. In addition, the annual rankings of the top 100 petrochemical companies in the world by the Institute of Cheminformatics Studies show that the Iran National Petrochemical Company has risen from a ranking of 82 in 2004 to 39th in 2011. Moreover, Iran petrochemical industry's share in global production has increased from 82nd to 12th during the same period (SHANA News Agency, 2013).

Perhaps, the first attempts in this field were by Hippocrates (400 BC), who studied respiratory diseases caused by working in lead and zinc mines. Dealing with environmental–social, safety–security, and hygiene–ergonomic hazards is a feature of the petrochemical industry. Therefore, heavy and hazardous industries have constantly sought a managerial solution to reduce the abovementioned risks. A focus on and profitability factors promises corporate sustainability.

According to "Our Shared Future" report, sustainability is considered the ability to meet current demands without ignoring the needs of future generations (Tsai and Cho, 2009). The scope and terms of this definition were expanded during the Rio Summit in 1992. Since then, "sustainable development" has been discussed as a key concept among the societies. In contrast to the concept of the 3Ps in marketing—Price, Promotion, and Product—the 3Ps in sustainable development are People, Planet, and Profitability. Sustainable business will obviously be realized through the fulfillment of the three principles discussed above, in a balanced way. Thus, those three principles are seen as strategic objectives or business strategies by companies. Leading corporations evaluate and report their social, environmental and economic performances in response to their employees, clients, society and shareholders.

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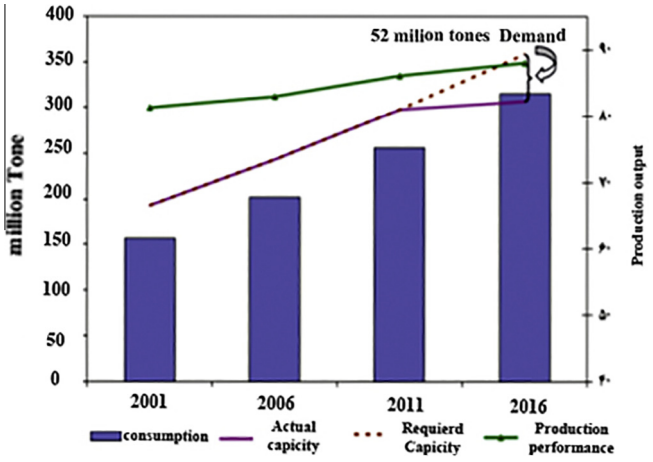

Fig. 1. The world demand forecasting of petrochemical products until 2016 (Jafari et al., 2007).

Therefore, profitable management systems (total quality management approach), people (safety, health, security, and social responsibility), and land (environment) may play a significant role in sustainable development. The current study introduces new frameworks for HSE performance excellence, as well as the path to excellence as an operational approach for promoting sustainable business excellence. The rest of the paper is organized as follows: Section 2 outlines the evolution of safety and occupational health systems. The criteria weighting and MADM[1] methods are discussed in Section 3, in Section 4 we presents extracted weights and MADM ranking results, Finally, Section 5 offers a conclusion.

2. Theoretical framework and literature review

2.1. Sustainable excellence

Petro chemistry is one of the leading industries in terms of profitability and occupation, due to its competitive advantages. Studies show this industry is benefiting from increasing growth. Various management models have been proposed so far by governments and scientific-professional associations in order to improve the quality, safety, health, security, and environmental–social responsibilities of the industry. Among these management systems are ISO9001, ISO14001, OHSAS18000, and SA8000. Of course, the abovementioned management systems could not always be implemented owing to the issues regarding their planning, implementation, monitoring, and updating. Various industries around the world have adopted two strategies in order to cope with these issues. A number of industries have chosen systems based on their organizational interests and legal obligations, while others have turned to hybrid approaches. On the other hand, HSES,[2] HSEE,[3] HSE-MS,[4] IMS,[5] and EMAS[6] are popular models. The integrated performance evaluation systems have attained a special position in the process management of high-risk industries. Integration capabilities, reducing costs, and fewer accidents, are the main reasons behind the managers' interest in adopting such systems. Table 1 shows an overview of these integrated systems.

[1] Multiple Attribute Decision Making.
[2] Health, Safety, Environment, Security.
[3] Health, Safety, Environment, Ergonomics.
[4] Health, Safety, Environment Management System.
[5] Integrated Management System.
[6] Eco-Management and Audit Scheme.

Ghasemi (2013a, 2013b) used the Multi Grounded Theory (a combination of the Meta-Synthesis Approach and Grounded Theory), which resulted in the H3SE[7] model of performance excellence. This model consists of five enabler indices and seven result indices. Considering the model's output, the clients' results criteria could be omitted or merged with the social–environmental results index owing to its low weight. His proposed model is in line with the European Quality Excellence Model and has the capacity to be evaluated and implemented using the RADAR[8] approach. The model derived from the Multi Grounded Theory includes indices, sub-indices, and guidelines to help implement the model. Relative frequency of references to indices in analysis of the Grounded Theory and the Meta-Synthesis Approach is shown in Table 2. It should also be noted that the relative frequency of references in this step is considered as a weighting solution. Other outputs of Multi Grounded Theory include explaining the causal relationship between the indices and determining a central phenomenon in order to depict the story line in this theory. H3SE is a general holistic model consists of 12 criteria, 43 sub criteria and 303 bullet points (see Fig. 2). Appendix A introduced H3SE excellence criteria and sub criteria.

Despite many advantages, EFQM[9] and its adopted models have weaknesses in terms of their structures (scoring method, descriptive nature, ignoring the causal relationships among criteria, and functional nature). Many theories of systems analysis and complexity science, in general, emphasize that, instead of focusing on system components and their function, we should focus on interactions among components in order to understand how these interactions determine not only the components' identities but also that of the system. In other words, a performance measurement system is a series of interdependent components that share a common goal. The totality of a system is something different from the relationships among its components (Danaiefard, 2006). Najmi et al. (2005) also emphasized investigating the causal relationships among the components of a performance measurement system. The concepts described in the Balanced Score Card (BSC) Model to examine the causal relationships between strategies and strategic objectives in a strategy map are also in agreement with them (Kaplan and Norton, 2004). However, the EFQM model pays little attention to the examination of causal relationships between sub-indices (Eskildsen and Dalgard, 2002; Calvo-Mora et al., 2005; Chinda and Mohamed, 2008).

3. Methodology

The model (Fig. 2) generally owes its existence philosophically to an inductive approach toward a successful model (EFQM) in terms of H3SE performance measurement through contingency dimensions and factors (context and focus of research). According to what has been discussed above, the main purpose of this study is to provide a coherent framework to signify the importance of performance dimensions along with causal relationships in the evaluation of sustainable excellence. In other words, the authors provide an innovative solution to improve H3SE performance considering the current and ideal states. They also clarify the causal relationships among performance indices of the H3SE performance excellence model (PEM). Therefore, this study addresses the following questions:

1. What are the main contributing factors in H3SE performance excellence?
2. How important is each of the H3SE performance excellence indices?
3. What is the status of the participating petrochemical companies?

[7] Health, Safety, Security, Social accountability Environment.
[8] Results- Approaches- Deploy- Assess and Refine.
[9] European Foundation for Quality Management.