Investigating the economic effects of long-term investment in HSE, Oil company in Iran

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ABSTRACT

Introduction: Even with the rising number of diseases and their severity as well as occupational-environmental accidents occurring within organizations, most managers do not still care about the profitability of implementing the health, safety, and environment (HSE) management system requirements.

Material and Methods: Accordingly, the integration of the HSE costs calculated through engineering-economics relations was investigated to evaluate the given profitability using a different approach. For this purpose, costs of diseases and occupational-environmental accidents were computed (n=2207), and then lack of their spending was considered as system income. By determining the correlation and calculating the P-value as well as the associated costs, the regression model was subsequently fitted. Investment in the HSE management system was further examined, and return on investment (ROI) and net present value (NPV) were calculated. Afterwards, the relationship between ROI and disease recurrence rates together with occupational-environmental accidents was explored.

Results: health costs with a P-value=0.03 had a significant effect on disease recurrence rates, so that the incidence rate was equal to 1.432 e-15 as it increased by one unit. The costs of accidents with a P-value=0.048 also had a substantial impact on the occurrence of occupational accidents and a growth by one unit, wherein the accident recurrence rates were 9.183 e. However, no significant association was found between environmental accidents and disease incidence rates.

Conclusion: The results implied that investment in HSE management systems is not just in accordance with implementing profitability requirements, but it should be targeted and based on priorities, influenced by the results of examining root causes of diseases and accidents as well as assessing risks facing organizations.

Keywords: Economic effects, HSE, Occupational Diseases, Occupational and Environmental Incidents, NPV, ROI, Investment

1. INTRODUCTION

There are some obstacles in implementing a coherent health and safety plan, whose financial issues are undoubtedly among the most important ones, whereas 30.4 million lost working days leading to diseases and accidents cause damage in the workplace (1). The total imposed by 10,583 occupational accidents is 95,812,058 thousand Tomans and human per capita for any occupational accident occurring in Iran is 9,053,393 Tomans (2). The amount of the years of life lost (YLL) for death caused by occupational accidents is estimated to be 15.1293 years (3). However, cost studies merely consider the effectiveness of difference between financial benefits and costs of plans from implementing occupational safety and health (OSH) interventions as a reserve (i.e., net profit) and return on investment (ROI), whose economic outcomes include a reduction in absenteeism (4). Therefore, prevention of economic costs induced by diseases and occupational-environmental accidents can have a significant impact on promotion of health, safety, environmental

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sustainability, and organizational growth. Meeting the requirements of health, safety and environment (HSE) management systems can further bring the incidence rate close to zero (5), and consequently have positive effects on investment on profitability of projects (6). In this respect, even small and medium-sized enterprises (SMEs) need to pay much attention to the completion of the OSH requirements in the workplace (7). In addition, the positive impact of this investment on giving a boost to safety culture and safe behavior in workers (8) as well as voluntary investment on safety can become evident in projects through increased safety culture and risk reduction in the workplace (9). So far, numerous studies have been conducted to estimate the economic costs of diseases and occupational/environmental accidents in Iran and worldwide, indicating the success of the establishment of HSE management systems in diminishing production costs (10). In this study, economic costs in the field of industrial HSE along with relationship between economic effects of investment and reduction of occupational-environmental diseases and accidents in the HSE management system in an oil company in Iran was investigated (Fig. 1). The main purpose of this project was to determine the impact of economic investment in each sector and to reflect on the appropriate criteria for future decisions, especially in the domain of HSE management systems.

2. MATERIALS AND METHODS
The integration of the HSE costs calculated through engineering-economics relations was studied to evaluate the profitability of implementing the HSE management system requirements via a different
Figure 1: The Conceptual model
approach. For this purpose, costs of diseases and occupational-environmental accidents were calculated (n=2207), and then lack of their spending was considered as system income. By determining the correlation and calculating the P-value as well as the associated costs, the regression model was subsequently fitted. Investment in the HSE was further examined, and return on investment (ROI) and net present value (NPV) were calculated. Afterwards, the relationship between ROI and recurrence rate of diseases as well as occupational-environmental accidents was explored.

3. RESULTS
The findings revealed that health costs with a P-value=0.03 had a significant effect on disease recurrence rates, so that the incidence rates were 1.432 e-15, as it increased by one unit. The costs of accidents with a P-value=0.048 also had a substantial impact on the incidence of occupational accidents and a growth by one unit, wherein the recurrence rates of accidents was equal to 9.183 e. However, no significant association was found between environmental accidents and disease incidence rates.

4. CONCLUSION
The study results implied that investment in HSE management systems is not just in accordance with implementing profitability requirements, but it should be targeted and based on priorities, influenced by the results of examining root causes of diseases and accidents as well as assessing risks facing organizations.

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