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Review article

A review of occupational accidents and HSE management system role in their reduction

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ABSTRACT

In recent years, there are technological growth and the acceleration of industrial development. Although this rapid progress plays a significant role in increasing productivity and economic prosperity, but it also creates new challenges such as health, safety and environment issues. These issues are most evident in developing countries because in order to increase production, regardless of preventive safety principles, standards, working hours, training workers and the use of proper personal protective equipment to workers are addressing excessive pressure on workers. The most people of the world (58%), spend one-third of their life in the workplace. According to the ILO hundreds of thousands of workers are seeing serious injury. Hamalaynyn et al. 98 estimated that about 350,000 fatal occupational accidents and 264 million work-related non-fatal accidents occur. However, economic valuation and pricing of the life is nothing in the last three decades and has been done using new methods. Health, safety and environment management system which is responsible for all matters relating to occupational health, environment and industrial safety of industries. HSE plays a great role in developing of countries

through the basics of systematic and various factors related to health, safety and the environment. Applying the principles of HSE management can reduce costs of the employee's absence, employee's claim and product low quality etc. Implementation of these principles is significant in two aspects: 1. Determining the causes of accidents, diseases and injuries and 2. The impact of these principles on the organization economy. In fact, HSE is an added value for organizations.

1. Introduction

In recent years, there are technology growth and the acceleration of industrial development. Although this rapid progress plays a significant role in increasing productivity and economic prosperity, but it also creates new challenges such as health, safety and environment issues (Snashall, 2005). These challenges are one of the main concerns of communities. Some of these challenges are: More than 2.1 million people are killed each year as a result of occupational accidents in the world, financial losses equivalent to 4% of annual gross domestic product of each country due to accidents, environmental crises, lack of access to safe drinking water etc. (Snashall, 2005; Alizadeh, 2015). These issues are more evident in developing countries because in order to increase production, regardless of preventive safety principles, standards, working hours, training workers and the use of proper personal protective equipment to workers are addressing excessive pressure on workers (Snashall, 2005; Alizadeh et al., 2013). The most people of the world (58%), spend one-third of their life in the workplace. According to the ILO hundreds of thousands of workers are seeing serious injury. Hamalaynyn et al. 98 estimated that about 350,000 fatal occupational accidents and 264 million work-related non-fatal accidents occur (Hämäläinen et al., 2006).

ILO is defined occupational accident as follows**:** Occupational accident is an unplanned and unexpected event due to the work that led to the death, illness or injury of one worker or more. The economic costs of occupational accidents are very high. The economic costs of accidents can be direct (such as damage to materials and health insurance costs) or indirect (such as disruption of work, retraining replacement workers, reducing the quality and efficiency product) costs. Some authors have been estimated the indirect costs several times more than the direct costs. Occupational accidents have a significant impact on human communities and have high costs on the social system of a country and are leading to high levels of absenteeism and low productivity (Macedo and Silva, 2005). Iran that is in the process of development and industrialization is not an exception in this issue. According to official statistics in 2003, 14114 accidents occurred and 268 people have died as a result of these accidents (Security, 2004). These accidents bring great harm to the community, organizations and individuals. The unfortunate consequence of occupational accidents is premature death of workforce (Kjellén, 2000).

2. Economic valuation

After the end of world war II, the concept of investment in human resources was expanded and it became clear that investment in human resources, follows rapid return on investment (Hopkins, 1999). Nowdays the most economists consider human resources as a national wealth. They believe that the human resources are a major asset for communities and organisations. Milton Friedman (Nobel Prize winner in 1976) believes that total wealth includes all types of income, resources and services and one of these sources of income is the productive power of labor. Therefore, skill, ability, knowledge and health of each individual is in fact a wealth and as assets, these charactristics of workforce shoukd use in economic activities. Some scientists believe that if the human be treated like a physical capital, we are ignoring the human personality and degrade them to the a simple machine level. However, economic valuation and pricing of the life is nothing in the last three decades and has been done using new methods (Atrkar Roshan and Alizadeh, 2015).

Today it has been made significant progress in safety and health at work and occupational diseases prevention. Using the principles of occupational health and safety and improve the comfort and well-being in the workplace, occupational accidents and disease-related mortality rates have declined. Basically, work-related

accidents are important from the perspective of human, social and economic. Factors affecting the decrease in work-related accidents, such as safety management systems, safety attitudes and behaviors and review of safety plans and determining the role of each of them, help us for offering the right solution to reduce work-related accidents and set to pave the way to achieve this goal as soon as possible and with a lower cost through effective investment in priorities. Unfortunately, the issue of safety in most countries is not part of the original application and infrastructure programs. It must be admitted as long as the health and safety programs don't prioritize, this problem will not solve and will make a lot of resources wasted (Ghorbani, 1997).

In terms of cost valuation there are two views of economic and accounting. In accounting perspective the costs of office or explicit (direct) costs are taken into account but in economic perspective both of hidden costs and direct costs are taken into account (Sobhan, 1993). It should be noted that for people, more costs such as pain are uneconomic costs. So calculation of the cost in terms of human and moral disaster for the people has a main priority rather than organizations and communities (Mohammadi, 2010). So far, three major analysis method has been used for economic evaluation in the health sector: Cost-effectiveness analysis, cost-utility analysis and cost-benefit analysis. Understanding and awareness of the strengths and weaknesses of each of these methods, has led to greater researchers use of cost-benefit approach (Mohammadi, 2010).

3. Health, safety and environment management system: HSEMS

Health, safety and environment management system which is responsible for all matters relating to occupational health, environment and industrial safety of industries. HSE playes a great role for developing of countries through the basics of systematic and various factors related to health, safety and the environment. The philosophy and attitude has the following strategies (Mohammadfam, 2009):

- Strategies to minimize industry adverse effects on the environment;
- Strategies to increase the industry desired effects;
- Strategies to provide comprehensive safety for all employees and organization, equipment and facilities;
- Strategies to minimize accidents and damage;
- Strategies to reduce unsafe acts and conditions;
- Strategies to promote health and improve the environment throughout the organization;
- Strategies to protect the environment.

In 1984 Shell began to manage safety in companies and organizations with the new rules in this field. This leads to significant reductions in accidents in the second half of the 80s. After the occurrence of major accidents, safety was increasingly considered. Then, with the development of systemic thinking, aspects of safety management developed to health, safety and environment management system in the early 1990s. This management model is shown in Figure1 (OPG, 1984; Farshad et al., 2006; Sahat Fardi, 2016). In this study, HSE plans and programs of the major cities have been investigated and compared with each other (Sahat Fardi, 2016).

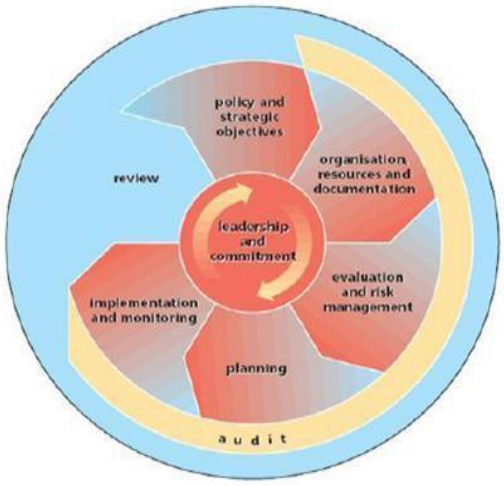

Fig. 1. HSE management system model (OPG, 1984).

Health, safety and the environment concepts have long been considered in various industries as separate concepts, but today, these concepts are under a single management as a systematic and comprehensive management. Integrated HSE management system with a new approach and systematic development of creative and cultural context explains the interaction of health, safety and the environment concepts. This system systematically evaluates the defects, potential hazards, incidents and problems and offers prevention-based methods (Mohammadfam, 2009). It is worth for noting that today environmental and health and safety management systems have special significance. Implementation of principles and requirements of these standards in manufacturing and service organizations around the world is constantly expanding. Today many organizations know the effective role of these standards in organizational effectiveness and their beneficial role in achieving the organization's goals.

HSE management system is an integrated system which through the definition and implementation of it in an organization, the health and safety and environment are considered simultaneously (Mohammadfam, 2009). Sarkhil et al. surveyed the establishment of HSE management system role on the green economy of organizations. They concluded that emplementation of health, safety and environment management system can help to industries and organizations comply with the legal requirements, protection of workforce, reduction of accidents and safety control and environmental protection. As well as complying of the fundamental principles and requirements of this management system can reduce direct and indirect costs of contamination of the environment (Sarkhil, 2013).

Fam et al. studied the role of a model for calculating the cost of work-related accidents. Based on the results the work-related accidents and diseases impose a lot of costs on people, industry and national economy. The costs is estimated at around 48.5 billion dollars per year. To realize all these costs it needs to be done economic evaluations in order to plan effective strategies to control and reduce them. Today increasing in accidents and diseases has led that governments and managers of leading organizations establish the HSE management systems in all sectors of industry and services (Mohammadfam, 2009).

Examining the different perspectives on productivity, suggests that in all of them the manpower is a common element as a determining factor in productivity. On the other hand, in the HSE management the human resources are considered as the most important factor that affect the health, safety and the environment. Therefore, any factor that could lead to the preservation of human resources, in fact, improve the HSE and organization productivity and this represents a direct relationship between productivity and the HSE. In other words, lack of attention to issues of health, safety and the environment increases the accidents rate, illnesses, injuries and damage to the environment and this will lead to lower productivity. So in today's world, it is an undeniable fact that the good HSE increases the organizational efficiency and ultimately economic growth will occur (Alizadeh, 2015). Applying the principles of HSE management can reduce costs of the employee’s absence, employee's claim and product low quality etc. Implementation of these principles is significant in two aspects: 1. determining the causes of accidents, diseases and injuries and 2. the impact of these principles on the organization economy. In fact, HSE is an added value for organizations (Chi et al., 2009).

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