

## EVALUATING THE CURRENT STATUS OF THE NATIONAL HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM FOR INTEGRATION, HARMONIZATION, AND STANDARDIZATION OF ENVIRONMENTAL PROTECTION

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*Our research focuses on a health and safety management system based on risk identification and analysis.*

*The research is vital due to its relation with GDP. GDP assessment performed in developing countries showed that losses caused by unmanaged HSE (Health, Safety, and Ecology) risks on average resulted in 4.2 % decline in GDP for those countries, with similar losses in various countries in this group. Hidden accidents and incidents caused by uncontrolled HSE result in damages that are about 12 times higher than the cost of direct damage.*

*Our research goal was to substantiate the necessity to create a national authority for managing HSE in one of the country's basic regulatory agencies. Its basic responsibilities will include developing national regulation in the sphere and increase awareness of various organizations that it is vital to identify risks and hazards within the HSE management system.*

*In order to solve the task, a think tank was organized that held regular meetings and included experts from three organizations, namely the Ministry of Health and Medical Education, Ministry of Labor and Social Welfare, and the Environmental Protection Agency located at the top three points of the "HSE triangle".*

*Another important part of our research was results and conclusions based on evaluating the existing situation with the national health, safety, and environment management system; it allowed introducing ten priority research projects. The research indicated that it was also very important to harmonize concepts, examples and methods of dealing with HSE, standardize and harmonize HSE systems at all levels in the country, finding possibility to transfer scientific and technical experience of foreign institutions and domestic institutions, as well as facilitating their maximum participation in sustainable development.*

**Key words:** health, safety, ecology, GDP, hazard, risk, standardization, harmonization.

The establishment of the HSE Management System (HSE-MS) in all sectors and national activities is considered an important factor in managing and meeting the health, safety, environmental and sustainability requirements. To date, HSE management system has been recognized as a vital one in any workplace as its implementation concerns

economics, sustainable development, community and the environment. The important role of the HSE management system is to eliminate or reduce risks, anomalies, accidents, incidents and their consequences. In this study, we analyzed the current status of the national health, safety and environment management system taking into account vital

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tasks related to its integration, harmonization, and standardization of management means, tolls, and criteria. We should note that environmental protection is considered one of its main components.

In particular, nowadays volumes of products made by petrochemical plants as well as variety of them are growing rapidly. Both these facts are undeniable advantages of this economic activity. At the same time, petrochemical enterprises often face various accidents that occur due to equipment failures and it is often a natural phenomenon in national industries, and in particular in hydrocarbon refineries [1–2]. Workers employed at such enterprises are exposed to many dangers at workplaces and it required thorough inspection and management. Should sources of risk associated with it be neglected or underestimated, it can have an irreversible negative impact on sustainability, the environment, health and safety. One of the most important methods for preventing and / or reducing occupational accidents and their unintended consequences is risk diagnosis and subsequent risk assessment. Risk assessment can be effective in identifying risk sources and reasons (components) and developing an appropriate management strategy. The latter is aimed at reducing or even eliminating impacts exerted by hazardous factors in the areas of health, safety and the environment. In order to achieve targets this system is aimed at, an appropriate technique requires that you can assess the existing risks more accurately, more fully and reliably [3].

The Figure 1 shows a diagram based on Deming's Continual Improvement Cycle: the Health, Safety, and Environment Management Systems are interrelated. This interrelation provides not only a significant minimization of risks for the environment, infrastructure, and enterprise personnel, but also enhances their performance through continuous learning from past experiences as well as rigorous benchmarking of competitors.

In fact, management systems have become the main pillars of any organization and

their most vital condition for survival [5]. Risk is defined as a combination of an incident probability and gravity of its potential negative consequences [6]. Risk analysis is a structural process that identifies both the incident's probabilities and the negative consequences imposed by a definite activity [5]. Risk assessment must comprise all phases and activities performed at a workplace and it should be performed before any activities start [7–8].

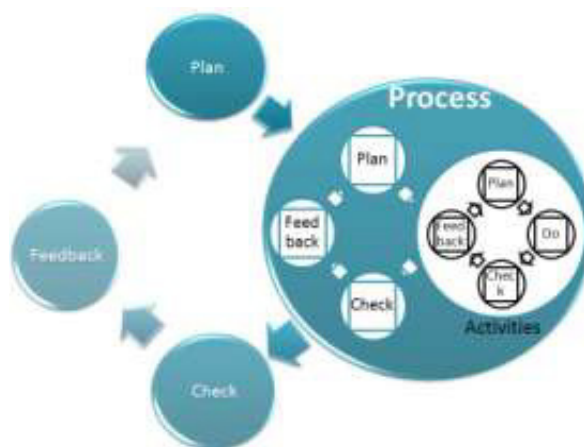


Figure 1. Deming Cycle  
(planning – doing – checking – adjusting)  
for HSE management system [4]

**Data and methods.** One of the key elements in HSE systems is risk management. Risk management and evaluation process start with identifying risks and their potential impacts. Risk assessment and management are critical processes here as they help to find relevant strategies for preventing accidents. Effects produced by environmental hazards are of great concern today. In recent decades, policymakers' attention has been paid to possible consequences their plans could have for the environment and risks of disasters.

The next important area in this field is environmental risk assessment, which can be used as an appropriate tool for assessing effects produced by human activities on the environment. Environmental risk assessment is quantitative and qualitative analysis of potential hazards and coefficients (indexes) related to a project taking into account how sensitive or vulnerable a surrounding environment is.

Different steps in the environmental risk assessment process include risk identification and analysis, exposure assessment, risk assessment, and risk management. So far most studies in our country and abroad have focused on safety aspects of projects (albeit they were often inadequately assessed) and less on environmental aspects. Environmental risk assessment in a HSE management system can be used as a complement to environmental impact assessment [9–10].

Environmental risk assessment includes identifying impacts on the environment, temporal modeling, determining a spatial location of emissions and leakage, and evaluating important ecological components. And here it is important to take into account environmental sensitivities and estimate risk levels compared to existing criteria. Qualitative analysis of potential risks and a coefficient of potential risks have many benefits, including a necessity to pay attention to the principles of prevention, environmental capability-based compliance, economic savings, and compensation for damages [9, 11, 12]. It provides a reliable basis for achieving sustainable development, environmental quality assurance and so on. With ever-expanding industries and scientific advances, new dimensions of environmental impacts and various health and safety implications are emerging each year. As a result, large industries are increasingly moving towards implementing integrated health, safety and environmental management systems and striving to achieve the goals fixed in these systems' vision documents. Environmental performance indicators are key ones applied to determine the effectiveness of health, safety and environmental management systems, as well as environmental impact assessments.

It is clear that development would not be possible without planning. Planning, in its turn, should be based on objective facts and natural potentials as it is only in this case that it will be possible to achieve its predetermined goals. If development fails to keep pace with natural resources, it will lead to

human errors and loss of resources [13–14]. Therefore, in order to minimize the degradation of natural resources and the adverse effects produced by industrial development on the environment, it is best to utilize modern management systems in order to provide sustainable development. It should become an integral component in organizational culture in institutions, organizations and even training centers, as it will help to improve the performance of organizations. And this improvement should be persistent.

**Results and discussion.** To achieve the set goals, think tanks were organized and there were regular meetings of three organizations, namely the Ministry of Health and Medical Education, Ministry of Labor and Social Welfare, and the Environmental Protection Agency located at the top three points of the HSE triangle. The above mentioned allowed evaluating the current status of the National Health Safety (NHS) and environment management system; as a result, ten priority research projects were introduced (as listed below in Table 1).

Other goals were to harmonize concepts, examples and methods of dealing with HSE, standardize and harmonize HSE systems at all levels of the country, determine whether it was possible to transfer scientific and technical experience of foreign institutions and domestic institutions, and to facilitate their maximum participation in sustainable development.

Priority projects were aimed at solving the following basic tasks:

- enhancing a role of commitment and leadership in achieving efficiency of HSE Management Systems deployed at Ministries and Organizations;
- analyzing efficiency of individual HSE management systems in organizational excellence and development;
- providing improvement in an internal situation regarding safety, health, and environment including reduction of costs as well as risks and consequent growth in Gross Domestic Product;

Table 1

## Ten priority research projects in National Health Safety and Environment

Number	Priority research projects	Organizations involved
1	The Role of Commitment and Leadership	All ministries and organizations
2	Efficiency of HSE Management Systems Deployed at Ministries and Organizations	All ministries and organizations
3	Efficiency of individual HSE	Organizational excellence
4	Internal Safety, Health, and Environment	All ministries and organizations
5	Deviations caused by environmental non-prioritization in global HSE standards	All ministries and organizations
6	Bayesian model on HSE risks	Ministry of health and medical education and ministry of co-operation, labor and social welfare
7	Impact of HSE management system in the oil industry	Oil and gas industry
8	HSE management system evaluation indicators	All ministries and organizations
9	Life Cycle Analysis and Measuring Green Productivity	All ministries and organizations
10	Cross-cutting thinking or Nexus thinking	Council for Health and Food Safety

– analyzing LCA (Process Life Cycle) in environmental protection within large national projects in HSE management system;

– assessing deviations from global HSE standards caused by environmental non-prioritization from the perspective of regulatory rules and the role of the media;

– Bayesian model analysis on HSE risks in three main HSE trustee organizations (Ministry of Health and Medical Education and Ministry of Co-operation, Labor and Social Welfare, and the Environmental Protection Agency) applied due to significant interaction between health risks, safety, and the environment;

– investigating influence produced by HSE management system on the oil industry and its direct and indirect impacts on environmental protection;

– developing HSE management system evaluation indicators in the country for standardization, integration, and protection of key components of health, safety and the environment;

– analyzing process life cycle and measuring green productivity in the National De-

partment of Environmental Protection within the framework of examining zinc melting industry;

– promoting and adopting "cross-cutting thinking" or Nexus thinking in National Health, Safety and Environment system.

"Nexus thinking" means considering and understanding water, food and energy and their interactions taking into account their interaction, as they should not be isolated from each other. It is a holistic, strategic thinking style that considers long-term consequences throughout the relationship, balancing social, economic and environmental goals. Nexus thinking allows looking at a bigger picture: considering the whole catchment or river basin, boundary issues, multiple uses (present and future), and cumulative effects. It also includes thinking in agencies that have responsibility for water, food and energy.

One of the tasks this High Council has to perform is to "coordinate executive agencies" and, since health and food security are intertwined with occupational safety and environmental issues [15–21], they can be placed on the agenda of this council (Figure 2).

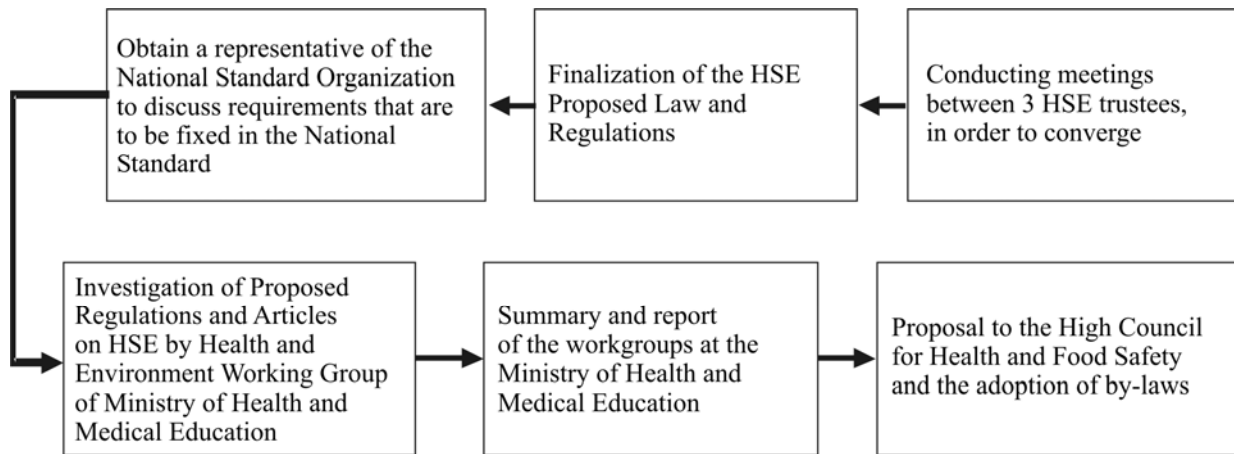


Figure 2. Flowchart procedures for approval by the Supreme Council for Health and Food Safety

**Conclusion.** As the industry is advancing, related risks will increase with its progress and many adverse effects will occur. If these risks are not controlled, it may result in numerous negative consequences. This study examines the position of risk and risk analysis in various standards and how risk assessment and risk analysis are performed. In industries and organizations accidents are always likely to occur due to risks that are inherent for an industry and lack of managing them. ISO in its global standards for organizations have set out guidelines and standards for risk identification and risk management. By adhering to these standards, we can identify and manage risks in any industry and it can help reduce disasters. Some research suggestions for domestic HSE-system are as follows:

- enhancing organizations knowledge about management of change, asset integration and PFM safety management system. Should there be any changes in an organization, including work processes, materials, structures, equipment, or labor, an organization should have the knowledge how to manage such changes;
- providing organizations with more comprehensive data regarding the above mentioned ISO standards;

- implementing ISO systems in industries and organizations;
- using specific knowledge related to ISO systems implementation;
- conducting training courses on risk management and standardization.

The current status of the National Health Safety (NHS) and environment management system was evaluated, and ten priorities in research projects were introduced. Other goals were to understand how to harmonize concepts, examples and methods of dealing with HSE, standardize and harmonize HSE systems at all levels of the country, determine whether it was possible to transfer scientific and technical experience of foreign institutions and domestic institutions, and to facilitate their maximum participation in sustainable development.

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