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Reviewing and Improving Health Safety Environment Management Program Using SWOT Analytical Planning

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Abstract: *As strategic planning and management are of the most important axes of management systems in an organization, strategic planning and management can have a positive effectiveness in the control of the technical and non-technical parameters of the system at all levels and in the final results and outcomes of the organization for superior management of the system in any organization. One of the most commonly integrated management systems is HSE management system. This management system tries to integrate health, safety, and environment, management systems and guide them in an integrated and controlled way. The study was an attempt to make MAPNA Group more capable of proper management of HSE system. The study tried to identify and analyze the internal factors (strengths and weaknesses) and external factors (opportunities and threats) affecting HSE system and prioritize them to develop, examine and implement HSE requirements in MAPNA - Jahrom power plant and to present management strategies and develop appropriate strategies. This was done using field measures, interview with competent personnel and studying the related research. Finally, SWOT management model was used to deal with all the internal and external factors to extract, review and develop proper management strategies to strengthen the opportunities and strengths and to analyze and reduce the weaknesses and threats.*

Keywords: *MAPNA, HSE, SWOT, Strengths, Weaknesses, Opportunities and Threats*

INTRODUCTION

Safety, health and environment management issues are the main branches of HSE system (Mirsepasi, 1995). HSE management should use more of applied sciences, which ends in better understanding of the interactions between people and the environment, to develop strategies that reduce that reduce or moderate the problems and to exploit opportunities better. Running HSE model is not specific to oil companies and can be implemented in any organization according to the complexity of safety and health risks and environmental sphere of the activities (Najizadeh, 2006).

Reviewing, developing, and establishing health, safety and environmental management system (HSEMS) are considered as the critical management goals of each organization to obtain sustainable development, increase productivity, and create the necessary context to run all activities in a safe environment, without accidents and elimination of human and environmental waste. With the establishment of HSEMS and considering all its

principles and elements, we will witness reduction in the costs incurred upon the industry due to occupational diseases, incidents and environmental damage. The goal of establishing HSEMS is reaching a targeted management tool based on the existing standards that can accurately specify and effectively control the potential and actual risks in occupational health, safety and the environment.

Strengths, weaknesses, opportunities and threats matrix is one of the most famous models of strategic planning and management. SWOT is a systematic analysis for identification of internal factors (strengths and weaknesses) and external factors (opportunities and threats) of each company and organization, able to provide a strategy that creates the best integration and interaction among these factors. The model tries to identify the environmental trends of the system, the threats and opportunities of the external environment, and the strengths and weaknesses of the internal environment to elaborate and revise the appropriate strategies for using the opportunities and prepare them for the elimination of threats considering the strength and weakness within the system.

JCCPP in Fars is one of the combined cycles of Iran with a production capacity of 1444 MWs. The plant is located on an area of approximately 100 hectares. The post capacity of this plant is 230 KWs.

A study dealt with the strategic elements of waste management in Rasht using SWOT and formation of QSPM matrix. Examining the external and internal factors matrix showed that waste management in Rasht was poor regarding the internal factors, whereas the evaluation of external factors showed it could work well considering the points obtained by strengthening opportunities and eliminating threats (Abedinzadeh et al., 2010). A study was conducted entitled "Examining the hazard and risk evaluation of construction to production phases of the developing projects for the of the oil and gas industry in Iranian Offshore Oil Company," where HSE management at different stages of the project implementation was identified and management measures were examined to reduce and eliminate HSE risks (Abrishami et al., 2007). In another study, SWOT model was used to develop a strategy for managing HSE in Ahwaz Pipeline Company. In the matrices, the sum of the internal factors of the company was 2.88, showing the average status of the company in internal factors. The sum of external factors was 3.15, showing the favorable status of the company in external factors. In 2006, a study attempted to explain the advantages and disadvantages of the potable water disinfection system by ozonation. In doing so, SWOT analysis was utilized to specify the management strategies and using QSPM matrix the specified strategies were ranked and prioritized (Hoveidi, 2006). A study to develop optimal strategies in the cities based on oil and gas industries regarding the strengths, weaknesses, opportunities and threats of Dongonbadan using SWOT analysis showed that as an oil-dependent city, Dongonbadan faces strategic challenges between costs and benefits (Ghadami et al., 2010).

A study entitled "SWOT analysis in the National Energy Section for Sustainable Energy Development in Macedonia," examined the status quo and future plans for sustainable energy development. The results showed that the most critical problems in the energy sector are domestic scarce resources, inexpensive power, inefficiency in energy generation and enough institutional and human capacities (Markouska et al., 2009). In a study, the strengths, weaknesses, opportunities and threats of bio-energy generation were analyzed in the marginal lands in China (Liu et al., 2011). A study examined the effectiveness of regulation for coastal areas in India for coastal area management (Jitendra et al., 2012). A study examined the performance and optimization of HSE management systems and the ambiguities of integrated fuzzy approach in a power plant manufacturer, where the managers identified the weaknesses and strengths in HSE management system and specified a set of objectives to enhance the plans for HSE management system (Azadeh et al., 2012). A study was conducted to examine the Indian oil and gas industry using SWOT analysis. The study examined the oil production, consumption and imports in India, where the strengths, weaknesses, opportunities and threats of this industry were specified. The strengths were major exploration and innovation, the weaknesses were inadequate infrastructure, unawareness of the safety issues, the opportunities were domestic demand for energy, imports of liquid gas, and the threats were increased competition and the change in national energy policies (Vogg, 2012).

The study identifies the most important spheres of the internal factors of the company as well as the most important external factors using SWOT analysis, based on which one can compile and review HSEMS more accurately.

Methodology

The study was applied. Data collection tool was field visits, interviews, books and the papers available. After the initial studies, the facilities were visited whose purpose was to study HSE unit of MAPNA Group at JCCPP. SWOT analysis steps:

1) provision of the list of major opportunities available outside the company environment
2) Provision of the list of major threats outside the company environment
3) Provision of the list of major strengths within the company
4) Provision of the list of the main weaknesses within the company (Items 1 and 2 can be implemented through provision of external factors evaluation matrix through examinations outside the company. Items 3 and 4 can be implemented by provision of the internal factor evaluation matrix by internal company reviews)
5) Comparison of the internal strengths and external opportunities of the company together and providing proper strategies for them in SO strategy group
6) Comparison of internal weaknesses with existing opportunities outside the company and provision of suitable strategies for them in WO strategy group
7) Comparing internal strengths with the external threats of the company and delivering implementable strategies in ST strategy group
8) Comparing internal weaknesses with the company's external threats and delivering implementable strategies suitable for them in WT strategy group

For SWOT analysis, first need to prepare matrices of internal factor evaluation (IFE) and external factor evaluation (EFE) by examining the environment, the internal environment and external environment of the company. IFE matrix is the result of a strategic examination of the internal factors of the organization. The matrix develops and evaluates the main strengths and weaknesses of a firm. Moreover, it is an approach to organize internal factors and classify them into two categories of strengths and weakness and a way of evaluating the management of a company in responding to these specific factors according to their expected importance for the firm.

For preparing EFE matrix, the critical external factors, encompassing the factors creating opportunity or threatening the organization, were listed. Every factor was assigned a weight coefficient from zero (insignificant) and one (very important). The opinions of managers and experts of the organization were used to specify the weight of each factor and make decisions on the ones with high or low significance. The sum of these coefficients should be one. Each factor was assigned a rank from 1 to 4. Four shows that the response has been excellent, and 1 means that the response has been so weak. The average is 2.5. In case the number reaches 4, it shows that the organization responds perfectly to the factors threatening it. One shows that the company has not been able to exploit the factors creating the opportunity or the situation or avoid the ones threatening it (Moharramnejad, 2006).

Results

After the examinations, the internal factors (strengths and weaknesses) and external factors (opportunities and threats) of the firm were singled out and the internal strengths and weaknesses were inserted to IFE matrix, with the opportunities and threats inserted into EFE matrix and then were analyzed (Table 1).

Table 1: IFE and EFE matrices

Internal factors	Strength	Weight coefficient	Score	Weighted score
	Holding meetings of the committees related to HSE system at specified intervals	0.027	3.75	0.101
	The existence of fire extinguisher capsules at certain intervals	0.032	3.75	0.12
	Performing the examinations of the official and contract employees	0.027	3.25	0.088
	Monitoring the harmful factors and environmental pollutants	0.037	3.25	0.120
	Reporting the incidents	0.035	3.75	0.131
	Investigating the causes of the incidents	0.037	3.25	0.120
	Setting ambulances and medical assistants as emergency relief groups at the time of incident	0.029	3.75	0.109
	Following HSE rules and requirements related to the organization's activities	0.032	3.25	0.104
	Planning and implementation of training related to the organization's activities	0.027	3.75	0.101
	Conducting SHE inspections at specified intervals	0.027	3	0.081
	Using new technologies in the company	0.035	3.75	0.131
	The presence of related professionals	0.037	3.5	0.13
	Presenting remedial action and solutions for the incidents	0.048	3	0.144
	Developing emergency response plans	0.035	3.25	0.114
	The presence of safety instructions for working with chemicals	0.053	3.25	0.172
	Controlling the tools and machines used at specified intervals	0.035	4	0.14
	Vaccinating the employees to prevent potential diseases	0.032	3	0.096
	Appropriate actions to deal with heat and cold	0.032	3	0.096
	The presence of a ventilation system in the workshops	0.027	3.5	0.095
	Using proper incentive and punitive measures	0.021	3.5	0.074
	Scientific interaction with scientific assemblies	0.037	3.5	0.13
	Weaknesses	Weight coefficient	Score	Weighted score
	Lack of enough measures in risk management	0.027	1.25	0.034
	Procedural equipment defect	0.035	1.5	0.053
	Absence of a program for conducting periodic examinations of contract personnel	0.047	2.25	0.106
	Absence of absorbents and sound insulators to control the noise pollution	0.041	2.25	0.092
	Lack of control and coping with the existing vibrations	0.045	2	0.09
	Lack of enough training programs	0.035	1	0.035
	Failure to allocate adequate resources (financial, human) to HSE	0.035	2	0.07
	Lack of enough attention to ergonomic issues	0.032	1.5	0.048
	The sum of the scores of the internal factors	1		2.92
	Opportunities	Weight coefficient	Score	Weighted score
	The presence of standards related to HSE system	0.036	0.253	0.117
	The presence of a legal requirement for the insurance and financial support of all employees	0.051	0.253	0.166
	Possibility of increasing company credit regarding performance among neighbors	0.051	0.753	0.191
	Development of HSE Culture	0.036	3	0.108
	The needs of the stakeholder groups and focus on them	0.051	0.753	0.191
	Happiness because of the reflection of the company's good performance from the media	0.036	0.253	0.117

External factors	The possibility of partnership with similar domestic and foreign producers	0.036	4	0.144
	Conducting national and international seminars and conferences related to HSE issues	0.051	3.53	0.178
	Possibility of increasing the firm's competitive ability by HSE performance	0.047	3.75	0.176
	The possibility to change the attitude of the customers based on the organization performance in HSE	0.062	4	0.248
	The possibility to build trust and communication among the neighbors	0.062	4	0.248
	Threats	Weight coefficient	Score	Weighted score
	Lack of constructive interaction between HSE and other organizational units	0.047	1.25	0.059
	Weather conditions in the region and effecting the HSE performance	0.044	1.5	0.066
	Penalties because of the organization's inadequate performance and supervision	0.047	2.5	0.117
	Waste of resources due to improper performance	0.047	2	0.094
	The pressure of regulatory organizations on HSE issues	0.062	2.25	0.14
	Communicating and enforcing health and safety regulations according to international standards by the government	0.036	1.25	0.045
	Lack of attention to the design of training ergonomic issues during recruitment	0.051	2	0.102
	Creating a bad public opinion and wasting opportunities due to improper performance	0.047	1.75	0.082
	Failure to implement HSE management system properly	0.044	1.5	0.066
	Delay in performing HSE programs	0.055	1	0.055
	Sum of the external factors	1		2.71

Table 2 shows the results of matching EFE matrix to specify the strategies.

Table 2: SWOT Matrix

	Strengths	Weaknesses
Internal factors	1. Holding meetings of the committees related to HSE system at specified intervals 2. The existence of fire extinguisher capsules at certain intervals 3. Performing the examinations of the official and contract employees 4. Monitoring the harmful factors and environmental pollutants 5. Reporting the incidents 6. Investigating the causes of the incidents 7. Setting ambulances and medical assistants as emergency relief groups at the time of incident 8. Following HSE rules and requirements related to the organization's activities 9. Planning and implementation of training related to the organization's activities 10. Conducting SHE inspections at specified intervals 11. Using new technologies in the company 12. The presence of related professionals 13. Presenting remedial action and solutions for the incidents 14. Developing emergency response plans 15. The presence of safety instructions for working with chemicals 16. Controlling the tools and machines used at specified intervals	1. Lack of enough measures in risk management 2. Procedural equipment defect 3. Absence of a program for conducting periodic examinations of contract personnel 4. Absence of absorbents and sound insulators to control the noise pollution 5. Lack of control and coping with the existing vibrations 6. Lack of enough training programs 7. Failure to allocate adequate resources (financial, human) to HSE 8. Lack of enough attention to ergonomic issues 9. The sum of the scores of the internal factors

	17. Vaccinating the employees to prevent potential diseases 18. Appropriate actions to deal with heat and cold 19. The presence of a ventilation system in the workshops 20. Using proper incentive and punitive measures 21. Scientific interaction with scientific assemblies	

External factors	Opportunities	Aggressive strategies	Conservative strategies
		St1: The attempts to meet the needs of stakeholders by planning, establishing relevant committees and using modern technologies in the company St2: Increasing collaboration with domestic and foreign similar and neighboring producers in operation of HSE systems St3: Running HSE-related standards to strengthen control measures associated with HSE and promoting and enhancing the safety and health of the personnel St4: Requiring the presence and attendance of the experts in scientific assemblies, conferences and seminars associated with HSE topics St5: Increasing the competitive ability of the company by HSE performance at the national level using knowledge-based forces And the related qualifications St6: Planning and implementation of HSE-related training with the growth of HSE culture at national and international conferences St7: Trust building and communication among neighbors by implementing HSE-related measures St8: Persuading the media to support the company and show its good performance	St9: The efforts to reach optimal risk management to comply with the existing standards St10: The efforts to gain governmental support and attention to remove procedural equipment defects St11: The efforts to gain financial support from related assemblies to compensate for the lack of financial resources by desirable performance St12: Focus on ergonomic issues and efforts to adjust to the existing standards in this regard St13: The efforts to control the noise pollution and counteract vibration using the existing standards
	Threats	Competitive strategies	Defensive strategies
		St14: Creating communication and interaction with HSE discussion-centers and using their information systems to learn about the rules and regulations before they are recognized St15: Empowering authorities and professionals to implement proper HSE management system St16: Reducing the negative effects of bad weather conditions by implementing appropriate measures to combat heat St17: Increasing productivity and resource utilization to reduce the pressure of the regulatory agencies with the help of specialized forces St18: Timely implementation and preventing delay in conducting HSE system programs St19: Raising the power of the personnel in related businesses through the implementation of ergonomic requirements during recruitment and training of on-line ergonomic issues St20: Avoiding fines and penalties by monitoring harmful factors and environmental pollutants and conducting inspections at specified intervals	St 21: For proper implementation of HSE management system, allocate sufficient resources to HSE system St22: Improving HSE training programs to expedite the implementation of HSE-related programs St23: Developing program for conducting periodic examinations of contractor forces to ensure their health St24: Controlling noise pollution and vibrations available to reduce pressure from regulatory bodies

Discussion and Conclusion

The results specified the priority of internal and external factors after determining the weight and scores of each of the factors by IFE and EFE matrices. The results related to the prioritization of internal and external factors are shown in Tables 3 to 6.

Table 3: The results related to prioritizing relative internal factors (strengths)

Priority of the factors	**The factors**
Priority 1	Holding meetings of the committees related to HSE system at specified intervals
Priority 2	The existence of fire extinguisher capsules at certain intervals
Priority 3	Performing the examinations of the official and contract employees
Priority 4	Monitoring the harmful factors and environmental pollutants
Priority 5	Reporting the incidents
Priority 6	Investigating the causes of the incidents
Priority 7	Setting ambulances and medical assistants as emergency relief groups at the time of incident
Priority 8	Following HSE rules and requirements related to the organization's activities
Priority 9	Planning and implementation of training related to the organization's activities
Priority 10	Conducting SHE inspections at specified intervals
Priority 11	Using new technologies in the company
Priority 12	The presence of related professionals
Priority 13	Presenting remedial action and solutions for the incidents
Priority 14	Developing emergency response plans
Priority 15	The presence of safety instructions for working with chemicals
Priority 16	Controlling the tools and machines used at specified intervals
Priority 17	Vaccinating the employees to prevent potential diseases
Priority 18	Appropriate actions to deal with heat and cold
Priority 19	The presence of a ventilation system in the workshops
Priority 20	Using proper incentive and punitive measures
Priority 21	Scientific interaction with scientific assemblies

Table 4: The results related to the relative priority of internal factors (weaknesses)

Priority of the factors	The factors
Priority 1	Lack of enough measures in risk management
Priority 2	Procedural equipment defect
Priority 3	Absence of a program for conducting periodic examinations of contract personnel
Priority 4	Absence of absorbents and sound insulators to control the noise pollution
Priority 5	Lack of control and coping with the existing vibrations
Priority 6	Lack of enough training programs
Priority 7	Failure to allocate adequate resources (financial, human) to HSE
Priority 8	Lack of enough attention to ergonomic issues

Table 5: The results related to the relative priority of internal factors (opportunities)

Priority of the factors	The factors
Priority 1	The presence of standards related to HSE system
Priority 2	The presence of a legal requirement for the insurance and financial support of all employees
Priority 3	Possibility of increasing company credit regarding performance among neighbors
Priority 4	Development of HSE Culture
Priority 5	The needs of the stakeholder groups and focus on them
Priority 6	Happiness because of the reflection of the company's good performance from the media
Priority 7	The possibility of partnership with similar domestic and foreign producers
Priority 8	Conducting national and international seminars and conferences related to HSE issues
Priority 9	Possibility of increasing the firm's competitive ability by HSE performance
Priority 10	The possibility to change the attitude of the customers based on the organization performance in HSE
Priority 11	The possibility to build trust and communication among the neighbors

Table 6: The results related to prioritizing the relative internal factors (threats)

Priority factors	The factors
Priority 1	Lack of constructive interaction between HSE and other organizational units
Priority 2	Weather conditions in the region and effecting the HSE performance
Priority 3	Penalties because of the organization's inadequate performance and supervision
Priority 4	Waste of resources due to improper performance
Priority 5	The pressure of regulatory organizations on HSE issues
Priority 6	Communicating and enforcing health and safety regulations according to international standards by the government
Priority 7	Lack of attention to the design of training ergonomic issues during recruitment
Priority 8	Creating a bad public opinion and wasting opportunities due to improper performance
Priority 9	Failure to implement HSE management system properly
Priority 10	Delay in performing HSE programs

Through the comparison of the strategies presented in this study with other studies, one can see a study entitled "Strategic planning for development of environmental protection in HSE program of Iranian oil industry that has used SWOT method. While identification of the weaknesses, strengths, opportunities and threats of the environmental sphere in HSE program, we dealt with the effective role of SWOT in identifying and measuring functional indices in strategic planning and management. In a study that aimed at evaluating the risks and measuring the risks of construction to production phases of developing projects for the oil and gas industry in Iranian Offshore Oil Company, the management measures were presented to reduce and eliminate risks. In a study by Ghadami et al. to determine the strategies for developing cities dependent on the oil extraction industry, SWOT analysis showed that the strategy for the development of conversion industries and oil-dependent industries is the best way to escape the possible crisis. In another study by Nouri et al. entitled "Environmental evaluation of the industrial development strategies of Iran" using Strategic Factors Analysis (SWOT) approach, the strategy for interacting with foreign companies to gain access to international markets and attract investment was examined and finding foreign markets and absorbing direct investment were stated as the best strategies.

It is noteworthy that that the sum of the internal factors became 2.92 and the sum of external factors 2.71, showing that the current state of the company is in a good state that can, of course, improve its weaknesses, increase its strengths, benefit from the opportunities and defeat the threats through strengths and opportunities.

In order to provide an HSE management program using SWOT management model, the managers will have a comprehensive and reasonable look at all environmental factors to manage each organization properly, and using this model prevents many of the factors affecting each system from being ignored. One of the capabilities of this model in strategic management of any organization or company is offering the best possible strategies according to the current conditions of the organization or company. This prevents the additional and management costs to overcome the management problems of the organs. Moreover, it makes it possible for each company to be in the same position and implement the developed strategies along its other activities to deal with the faults

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