

**Investigation the correlation between the elements of HSEMS in Arvandan Gas and Oil Company**<sup>1</sup>Hedayat Allah Kalantari, <sup>2</sup>RamazanMirzaei, <sup>3</sup>Abdolvahab Baghbanian, <sup>4</sup>Sadegh Moghimi Monfared<sup>1</sup>Department of HSE (Ms) , Science and Research Branch, Islamic Azad University, Zahedan, IRAN<sup>2</sup>Health promotion research center, Zahedan University of Medical Sciences (ZUMS), Zahedan, IRAN<sup>3</sup>Health promotion research center, Zahedan University of Medical Sciences (ZUMS), Zahedan, IRAN<sup>4</sup>Department of HSE (Ms), Science and Research Branch, Islamic Azad University, Zahedan, IRAN<sup>1</sup>[hdk\\_1359@yahoo.com](mailto:hdk_1359@yahoo.com)

**Abstract:** Nowadays considering undeniable role of human in improving safety, the HSE culture concept has been found to be very important. So, many strategies are being considered by organizations to improve HSE culture, which not only are used to improve but also to evaluate current state of organizations in terms of HSE culture. On this basis, this evaluation first recognizes problems and needs of this culture then analyzes the ways of improvement. Oil industry as the key industry of Iran economically and in the terms of complexity and risks, needs a procedure powerful enough to recognize, evaluate and control risks and value human resources as the main capital in this industry. For this end this study analyzes the correlation between the elements of HSEMS in Arvandan Gas and Oil Company. We will show that there is a meaningful correlation between seven dimensions of HSEMS.

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**Keywords:** HSE (Health, Safety and Environment), HSEMS (Health, Safety and Environmental Management System), management, Culture, HSE culture

**1. Introduction**

18<sup>th</sup> century was a really unbelievable era in the face of industry so that it got the nickname of industrial revolution era. In this time production was gotten out of small houses and workshops to big factories and risks began to emerge and took victims. In 1912, with the first meeting of engineers and experts of metallization organization in America, safety was introduced as a scientific phenomenon and starting in 1940, safety concepts in America were used[1]. Safety of a system is the process of using managerial skills to recognize and control risks during a project, plan or specific act[2]. So, system's safety could be considered as a regular plan which recognizes the risks before they happen and controls them. But this was only done to improve engineering skills and structures and accentuating safety of the equipment, and there was no sign of any attention to human resources as one the most important parts of any accident. Therefore, it seems that developing a suitable HSE culture is a good step toward risk reduction. Obviously, extending HSE culture firstly corrects individual behaviors and finally results in decreasing individual's errors and dangers. However, a number of factors can affect developing an HSE culture. Results of this study show that management is the most important component in this matter. Actually results of the values, motives and behavior patterns that determine commitment to an organization's plans, form HSE culture.

Studying HSE culture was first introduced in 1980 and the importance of the term was realized after the Chernobyl disaster in 1986[3]. Studies on big accidents such as Chernobyl and Piper alpha showed that in spite of using all engineering and protection factors there is always a potential for accidents to happen in high-risk industries [3]. The considerable point is that errors don't happen as a result of individual mistakes but as a result of a behavioral culture. Although a number of factor play roles in forming an HSE culture, results show that values, motives and behavioral patterns that show commitment to the organization's plans will determine powerfulness of HSE culture in an organization.[4]

**Expressing the problem and the importance of study**

Basically for HSE management different systems are used such as OHSAS18001:2007•HSE-MS, ISO14001:2005, etc. leadership of HSEMS in HSE culture is an important factor due to consistency of HSEMS elements with those of HSE culture improvement for reducing risks. In the oil industry HSEMS is a necessity which is seeking some goals.[5]

**HSE management's goals:**

1 acceptable level of wariness 2 reducing mortality 3 preventing unexpected stops 4 continuous growth 5 thrift 6 revenue stability 7 survival 8 profitability 9 social responsibility 10 satisfactory [6]

Therefore it's necessary to know how important HSEMS to improvement of HSE culture is. Management systems in the world have grown considerably through the last 50 years and many experts believe they have undergone basic changes. All these changes were because of natural resources constraints and the high costs of human resources in today's world. They all happened to increase exploitation in this competitive world of today to meet the needs of customers. Considering human resources as an inseparable part, to develop, repair and maintenance of machines protective actions must be done to prevent accidents. If so, changing management vision and attending systematic thoughts could help removing risks and dangers to improve exploitation.

## 2. Research Literature

### Quality management system

International Standard Organization (ISO) 9001 is developed under supervision of technical committee (ISO/TC 176), quality management and quality assurance and SC2 committee. Later edition of ISO 9001 canceled last editions and made more consistency with 14001; 2004. Applying a quality management system must happen with a strategic decision making vision. Designing and pitching quality management system is affected by the following factors:

- The environment and the variations of risks in that environment
- Variable needs
- Specific goals
- Production
- Available procedures and those that are used
- The size and the structure of organization[7]

ISO 9001; 2008 in the development and pitching processes and also in effectiveness improvement of the quality management system phase encourages the organization to choose a strategy which can meet needs of customers and bring satisfactory.

### Safety management system and job hygiene

All types of organizations are interested in achieving safety and job hygiene through risk control and in accordance with their policies.

They do this through regulations which get more and more strict, developing economic policies and other actions which favor safety and job hygiene and also growing worries from beneficiaries about safety and job hygiene. OHSAS standards which cover safety and job hygiene are developed to meet this need and in this direction are integrated with other requirements of an organization. Last edition of OHSAS happened in 2007 which is more consistent with ISO9001, ISO14001, ILO-OSH and other safety

and job hygiene standards. Also this standard is based on PDCA cycle.[8]

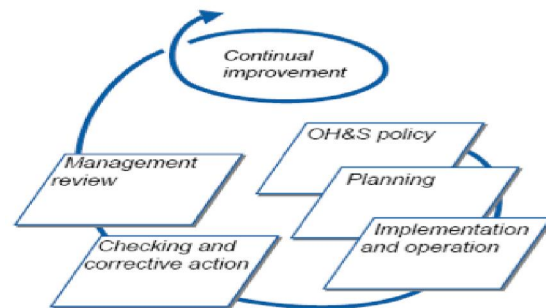


Figure 1: Model of Safety management system and job hygiene

### Environment management system

Growing attention to preservation of the environment through national/regional/ and international regulations and also growing knowledge, expectation and necessities of beneficiaries toward lasting development has caused stimulation and motivation in environment management systems development[9]. Also standardization in international level resulted in consistency and integration in the vision toward environment. ISO 14000 series were devoted to different subjects and made a good ground for organizations to understand the environment concepts to use methods for planning, performing and controlling organizational processes with respect to environment. International standards which entitle environment management are developed to provide the elements of an environmental management system (EMS) to an organization in order to help organizations to achieve economic and environmental goals through integration of them with other managerial necessities. This standard addresses necessities of an EMS for organizations to develop and install their major goals and policies which express the attention to regulations and related information to environment. ISO 14001 first developed by technical committee of ISO/TC 207 and SC1 branch in 1996, and the last edition was in 2004. Also this method is based on PDCA cycle[10].

### HSEMS (Health, Safety and Environmental Management System)

In each system the thoughts determine the intervals after which a system will achieve the objectives. International companies found their experiences and background in HSE as the main factor in controlling dangers in the industries[20,18]. HSE is a part of management system in any organization which like any other system consists of planning, execution, controlling and correction[11]. There are inputs like equipment, material, money,

time, labor and facilities... processes like strategic planning, guiding and leading, managing, recognition and determining, analyzing and assessing, improving the behaviors... and they all lead to some outputs. But the output could be damage or danger if the system is not designed properly.

In 1974, OGP was established by companies cooperating in oil production and their members were introduced in the UN and EU[16]. Adding EMS to OHS and SMS, these two which only covered safety and health were completed and covered HSE.[12]

OGP guidelines introduced some elements for HSE to implant and maintain this system. HSEMS consists of 7 elements[15]. Table (1) is shown in end of article.

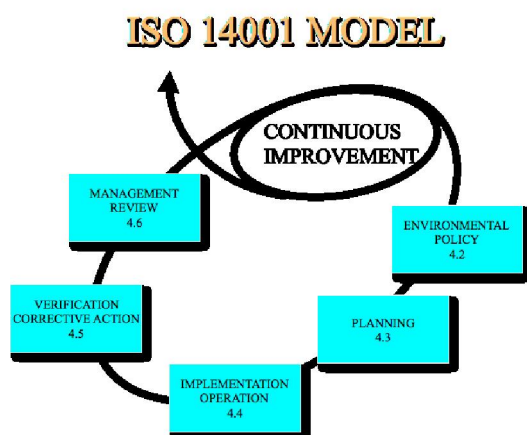


Figure 2: Model of Environment management system

### 1- Leadership and commitment

Senior management makes sure that the objectives are achieved through providing the resources needed for HSEMS. Management should make sure the necessity of HSE is understood for everybody and the actions are supported. HSEMS must be supported according to the items below:

- Believing that the company wants to improve HSE
- Motivating the staff to improve their HSE actions
- Responsibility towards HSE
- All levels are involved in developing HSEMS
- Committing to an effective system in HSEMS[13]

### 2- Policy and strategic objectives

Management must define and document the objectives and policies. And make the followings happen:

- Consistency with the main company
- Consistency with productions and their effects on services and goods

- Consistency with other policies
- Having the same value as other objectives and policies
- Committing to rules and regulations
- If there no standard, setting a rational standard and applying it
- Committing to lower the risk involving in HSE to a minimum
- Committing to efforts that improve HSE performance[14]

### 3- Organization, resources and documentation

This item contains the followings:

#### 3-1-organizational structure and responsibilities:

Execution and performing a successful HSE program is amongst the responsibilities of organizations and all levels of management and leadership must get involved in it. This must be considered while designing the structure and allocation of the resources. To successfully implant HSE plans, organizational chart must contain all responsibilities, tasks, authorities, and communications including:

- Providing labor and resources needed for HSEMS
- Making sure that every plan is consistent with HSE policy before even starting the plan'
- Gathering information about HSE topics and interpreting them
- Recognizing and recording corrective steps and improvement opportunities[14]

#### 3-2- resources

Senior management must make sure that there are adequate resources in order to achieve HSEMS goals. Resource allocation needs to be revised periodically.[16]

#### 3-3 documents

Following documents have got to be provided and controlled by the company:

- Policy, objectives and plan for HSE
- Determining and recording the responsibilities
- Explaining the HSEMS's elements and their interactions
- Connecting and explaining other documents related to the HSEMS
- Recording the results of risk and HSE assessment
- Developing ground rules related to HSE
- Procedures must be developed for special key actions
- Explaining reaction plans and responses in the cases of potential danger[13]

### 4- Risk management and assessment

There is some risk in any human action. This section is devoted to: Recognizing HSE risks and assessing them for every action, service or production and also developing risk lowering steps. Company must have practical methods to systematically identify risks and their effects and equipment needed in risks. Identification range must cover all actions from the beginning. Danger recognition must include the followings:

- In designing, building and developing stages (capital, activity improvement)
- In the normal and abnormal situations which involve emergency stops, repairing, and maintenance
- Potential incidents and situations which follow the following:
- Sabotaging the monitoring system
- Human factors including: destruction in HSEMS
- Potential risks and effects of theirs[14]

#### **5- Planning and operation control**

- This section is devoted to posture of planning the activities related to risk lowering (through assessment and management of risks). This part consists of programming for the new and current activities and managing the changes and developments needed to confront new situations. Company should embody HSE objectives in long-term programs. These programs include:
- Clarifying the objectives
- Clarifying the responsibilities in order to achieve the objectives in every level
- Incentive plans and motivating the staff to learn about HSE culture
- Processes in order to recognize good individual and group activities related to HSE
- Assessment and pursuit mechanisms[8]

#### **6- Execution and perpetuity**

This section explains about how the activities should be executed and continued. Tasks and activities must be clear before planning step. These activities in every level are as following

- Improving guideline objectives and planning senior section's activities in accordance with HSE policies
- Providing and constituting procedures must be done by management and leadership

Management must be responsible for developing and approving tasks in accordance with procedures. Also management must make sure that controlling limitations aren't violated. Stabilizing the processes,

management must guarantee the adequacy of HSE actions

#### **7- Verification and revision**

##### **1-7 Verification**

First the areas in need of verification should be recognized. Verification must include HSEMS and its range of action and its accordance with other executive actions. Verification must become a part of normal monitoring, so organization must consider the followings:

- Labor necessities and the properties of a verification team
- Monitors mustn't be involved in monitored actions in order to have a fair judgment
- The documentation and monitoring methods which could include using questionnaires, check lists, interviews or direct observance
- Accordance or non-accordance of HSEMS elements with necessities defined
- HSEMS's effectiveness in achieving executive norms

##### **2-7 Revision**

Senior management must revise the HSEMS regularly in order to make sure that its plans are still effective. Revision must include the following but shouldn't be limited to these:

- Probable needs to change in policy and objectives and situations and permanent commitment to them
- Allocation of resources in order to implant and maintain HSEMS
- Places and sites according to risk assessment to confront emergencies[14]

According to the ILO's (international labor organization) report researches show emerging risks in safety and job hygiene in the world which is caused by new technologies. For instance, socio-psychological problems like job stress and other mental malformations, exposure to non-ionized rays and age-related diseases in labor which is a new challenge for the labor in developed countries.

Non-official jobs, highly dangerous jobs, temporary contracts and immigrant labors are also a challenge for ILO. However, child labor was addressed in some countries.

Recent challenges in labor department in the world are explosion in oil station in Mexico, survival of 33 miners in San José in Chile which was caused by tunnel slump and imprisoned workers for 69 days and also unsuccessful efforts to save miners in New Zealand, Peru and China....

Fukushima's disaster of explosion in nuclear plant in Japan which was caused by earthquake and Tsunami in March 24<sup>th</sup> this year caused 3.3 to 5.2 of the GDP in Japan to go away.[18]



According to the last studies conducted by ISSA investments in prevention in safety and job hygiene area in all economic institutes shows that the minimum rate of the benefits gained by this kind of investment equals 2.2 units for each unit of investment. It means that for each Rial invested in safety and job hygiene 2.2 Rials of capital will return. This study shows that in some cases this rate will exceed 5 units and also positively affects labor motivation, face and situation of the institute and also while decreasing problems increases the quality of the final production. These studies also show that investing on safety instructions by average gives away an amount of 4.48 units per each unit of investments and investing on PPE (personal protection equipment) will return 3.37 per 1 which is significant.

Non-official economy includes a major part of labors in developing countries. Unfortunately safety and job hygiene regulations are not met in these institutes or there is no enforcement for effective control of them.

Immigrant labors play a key role in economic growth in countries; nevertheless they are one of the challenges facing safety and job hygiene. These people are usually deployed in non-official jobs and in sub-optimal threesome conditions of dirty, dangerous and demeaning (3D). Unofficial statistic shows a high rate of job diseases and accidents in these labors comparing with local labor. For example 15 % of Hispanic workers work in construction in the US while 23.5% of mortal accidents happen to them which are 1.84 times bigger than this rate for non-Hispanic workers.[19]

One of the other challenges in this committee is age-related risks for the labor which in practice plays a key role in risk factors among labors. Due to the increase in labor and other parties' age, this problem must be addressed more carefully. The last statistic published by ILO shows that 13% of young labor are unemployed and some of them inevitably start non-official and 3D jobs which brings more risks for them. To control the risk in aged labor, governments must consider basic strategies for them. Challenges for female labor are the other problem addressed by the committee. Skeletal and muscular diseases due to carrying load by women in poor countries was addressed and governments were required to pay more attention to this problem especially in non-official jobs. Risks due to entering chemicals and new technologies are a new big worry for the labor. New pesticides, diesel fumes, chemical mixtures, new solvents etc. for instance makes it important for the governments to study this field. In the new technologies it has been estimated that by 2020 around 20% of all productions in the world

would be produced by Nano technology (Nano equals  $1000000000^{-1}$  meter or  $80000^{-1}$  the width of human hair). Due to lack of knowledge about the risks related to Nano technologies the evaluation of these effects is impossible and needs extended research which ILO required governments to conduct. Another challenge addressed by ILO is the effects of green jobs in some countries. Workers involved in working above 80 meters of height in wind plants are exposed to the risk and according to the reports made by European risk control center by 2020 due to expansion of these jobs these risks will grow so that they need more and more monitoring and control.

Of matters mentioned in the congress we could name developing safety and job hygiene standards in the members of ILO which was expressed by their publications. For instance while only 13 countries accepted convention of 155 after a decade, in the second decade this amount reached to 34 countries and in the next decade it grew to 57 countries which is a good growth. Also accepting the convention of 187 was accentuated so that it was said that improving the frameworks of the safety and job hygiene systematically could be easily achieved by planning and strategic leadership. For this end, countries are now able to use consulting and technical services for these kinds of plans. Also according to the convention of 187, safety and job hygiene systems must be installed by the members of ILO through cooperation to improve safety and job hygiene culture. Some countries like Russia and Qazaqstan have used these systems through their own standards and with the help of ILO and others did this by the help of regional ILO offices. In Russia some safety and job hygiene systems are monitored by ILO for as much as 5 years which is interesting. According to the ILO's report 98 % of the accidents are preventable. Statistics show 20 % and 62 % decrease in accidents in the last 20 years for Japan and Finland respectively. Major factor in this decrease is the change in workplace conditions for dangerous to safe.

The main purpose of HSEMS in HSE culture is to improve effectiveness and profitability. Aside from these goals followings could be considered as other goals:

1. To gain some information about organizations' status and to find deviations in their safety and job hygiene policies.
2. To recognize and evaluate the risks and effectively lower them.
3. To establish commitment through different organizational levels and necessitate the establishment of HSE culture to success
4. to lower direct and indirect losses due to accidents.

5. To respect human rights
6. To maintain and improve the health level in the society
7. to lower cost and increase effectiveness
8. To protect the environment and move toward stable development

The main purpose of this study is to develop a method for improvement of HSE culture through evaluating the elements of HSEMS in HSE culture in order to improve effectiveness in Arvandan Gas and Oil Company.

### 3. Background of the study in Iran

First official start in safety and job hygiene regulations in Iran was started 1325 by the time of which labor and social affairs ministry started to work. In 1328 these regulations approved as laws according to which Auditing Department was in charge of monitoring safety and job hygiene. This situation went on until 1362 after various meetings by experts and taking the agreement from labor and social affairs ministry the monitoring task was charged by health ministry in order to prevent parallelization and higher quality of services. For this task first professional health office was developed then it changed to professional health department. Professional health department at that time was in charge of improving the health of labor in different professions. After approving a law in Aban 1369 and according to the 85<sup>th</sup> article of this law health, cure and medical educations ministry was put in charge of monitoring health problems of the labor and the workplace. Currently this task is being executed by "workplace health center" of health, cure and medical educations ministry and safety and health research and instruction center in labor ministry is a reference for instructions and consultation.

Researches, conducted on behavioral sciences use T test for determining the desirability level which in methodology uses Likert's 5 scale questionnaires to measure agreement level in individuals. Using single sample T test, and setting the average on 3, recognition, understanding and satisfaction is measured in individuals.

Ali Asghar khani et al did a study to set an index for customer satisfactory in Iran. To measure understanding and the idea of examinees a 5-scale Likert questionnaire was used and to analyze that data and to test statistical hypothesis descriptive statistic like mean and deductive statistic like single sample T tests were use. The average of the answers is related to the satisfaction of the customers which approves or rejects the hypothesis with a reliability of 95% and the sig.

### 4. The background of the study in abroad

The first regulations related to recompense due to physical injuries were established in middle

centuries and the middle ages. Around 1834 English foreign sailing and log office was developed and established safety and risk analysis concepts. In 1877 in Massachusetts laws were established related to machine maintenance and also some laws for employer's responsibility. At the end of the 19<sup>th</sup> century boilers' explosion made American mechanical engineers committee to develop regulation for safety of the boilers' containers. At the beginning of the 1911 in the US safety group and in 1913 national safety association were developed. In 1920 private section started to think about safety plans. In the first years of 1930s in the US prevention plans were designed. At the end of this decade national standards' institute of America published hundreds of booklets for industrial instructions. However, the main core of the safety plans form between 1950 and 1960 with the military nuclear plans[8]. In 1912 with the first meeting of metallization experts' institution, safety was addressed as a scientific phenomenon for the first time and after 1940 safety concepts were used in America. System safety is the process of using managerial and technical skills to recognize and control risks systematically during a project, plan or activity. So, safety could be addressed to as a systematic plan which recognizes and controls risks before they happen. But this was only for improving engineering skills and had nothing to do with equipment safety or human resources safety which is one of the most important factors in any accident. Therefore, in the process of decreasing risks managerial systems were born amongst which HSEMS tries to improve safety, health and environment culture through emphasizing on leadership and commitment, strategic policies and goals, documentation and organization of resources (organizational structure and responsibilities, financial resources, qualification and instruction, contractors, communications, documentation), risk assessment and management, planning (integration of the assets), performing and continuum, auditing and revision. Studying HSE culture first was conducted in 1980 and after Chernobyl disaster in 1986 it began to establish. Studies on big accidents like Chernobyl and Piper alpha showed that despite using all engineering factors and high level of protection, in big industries there is still a potential for dangers. The interesting part is that these dangers don't happen as a result of an individual mistake but a malformed behavioral culture. Although a number of factors are important in developing an HSE culture but results of the studies show that management is the most important part in HSE culture. Actually results of values, motives and behavioral patterns which show and determine commitment to HSE,

form HSE culture. Generally HSE culture is an important factor for the industries and organizations. For example safety culture and behaviors in industries like chemical, construction, and shipping is of a great importance. HSE culture is an anticipator of injuries and job accidents in gas and oil companies. Results show that although HSE culture is not the only factor in safety, it plays a key role in motivating the workers to show safe behaviors. Studies on the reasons of accidents show that 85% of accidents are due to an unsafe behavior and for each accident 331 unsafe behaviors have happened. For a better understanding of HSE culture, understanding organizational concepts is necessary.[11]

In 2000 Copper named HSE in relation with organizational culture and said that safety culture is a subset of the organizational culture. Also HSE culture is a general subset of organizations which is highly affected by internal events and these effects are interactive so that safety affects internal events too. Emergence of social organizations and their incremental growth is one of the obvious characteristics of the civilizations so that considering timely and location problems, special needs and traits causes social organization to grow daily. Clearly every organization needs a kind of management in accordance with its needs to achieve its goals. Dangerous behaviors happen in relation with views, behaviors and cultures.[14]

### 5-Methodology

Form objective aspect this study can be categorized as: historical, descriptive and experimental. Also by its very nature it is: fundamental, theoretical and practical. As current study tries to improve practical knowledge in a certain area (organizational performance and happiness), in other words it's practical, this study is a practical type, and it's a descriptive type considering data gathering method and in descriptive type it can be categorized as padding because the main objective is to understand the best work situation in order to gain competitive advantages.

### 5-1-Hypotheses:

- 1) Between commitment and leadership and other Elements of HSE-Ms there is a significant relationship.
- 2) Between Policy and strategic objectives and other Elements of HSE-Ms there is a significant relationship.
- 3) Between Resource allocation and documentation and other Elements of HSE-Ms there is a significant relationship.
- 4) Between Risk management and risk assessment and other Elements of HSE-Ms there is a significant relationship.

- 5) Between Planning and other Elements of HSE-Ms there is a significant relationship.
- 6) Between Execution and perpetuity and other Elements of HSE-Ms there is a significant relationship.
- 7) Between Verification and revision and other Elements of HSE-Ms there is a significant relationship.

### 6-Population and sampling

Topic territory: since the HSE matter is important both in private and governmental section, this study could be used in all organizations. All the organizations that share a property are a population. The population is all the staff in Arvandan Oil and Gas Company. The locality: this study was a case study in Arvandan Oil and Gas Company. The time territory: this study was conducted in 90-91. 175 people were chosen out of 320 according to the Morgan's table so that their staff number and names were taken and 175 people were chosen randomly. Questionnaires were distributed and 160 were completed properly by staff with different college degrees. The questions were about automation system governing the organization.

### 7-Reliability

One of the most important properties of measurement tools is reliability. Reliability shows the stability and consistency of the concept in question and helps users to judge the measurements. Reliability implies the extent to which the measurement tool results the same in the same situation. Cronbach's alpha is the most commonly used tool to assess the reliability.

Cronbach's alpha is weak below 0.6, acceptable on 0.7 and good above 0.8. The more it's closer to 1 the better it is (Danaeefard 1383, p489-490). Cronbach's alpha for a questionnaire is calculated by SPSS software.

According to the table below the Cronbach's alpha is 0.971 which is above 0.7 so it's acceptable.

Table1: Reliability Statistics

Cronbach's Alpha	N of Items
.871	63

### 8- Analysis of the data form questionnaire

To analyze the hypotheses, H0 and H1 hypotheses are used which are stated as below:

H0: Between commitment and leadership and other Elements of HSE-Ms there is a significant relationship.

H1: Between commitment and leadership and other Elements of HSE-Ms there is not a significant relationship.

### Analyzing hypothesis no.1

This study is done by Pearson Correlation test. If sig is below 0.05 between commitment and leadership and other Elements of HSE-Ms there is a significant relationship. . If sig is above 0.05 between commitment and leadership and other Elements of HSE-Ms there is not a significant relationship. In the table (2) in end of article the Pearson Correlation for HSEMS elements are calculated by SPSS software. See table2.

The correlation between commitment and leadership with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and others and Hypothesis is confirmed. See table3.

#### **Analyzing hypothesis no.2**

The correlation between policy and strategic objectives with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and others and Hypothesis is confirmed. See table4.

#### **Analyzing hypothesis no.3**

The correlation between Organization, resources and documentation with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and other and Hypothesis is confirmed. See table5.

#### **Analyzing hypothesis no.4**

The correlation between sources and risk management with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and others and Hypothesis is confirmed. See table6.

#### **Analyzing hypothesis no.5**

The correlation between planning with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and others and Hypothesis is confirmed. See table 7.

#### **Analyzing hypothesis no.6**

The correlation between implementation and monitoring with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation between this dimension and others and Hypothesis is confirmed. See table8.

#### **Analyzing hypothesis no.7**

The correlation between evaluation and review with other factors is shown in the table below. Sig test for all the elements is zero or below 0.05 which shows that there is meaningful correlation

between this dimension and others and Hypothesis is confirmed. See table9.

### **Results**

Oil industry as a key industry in the country. The industry needs a strong military and the identification, assessment and control of hazards. The oil companies need to put some strategies in the form of SWOT Matrix. Organizations can use this strategy to try to gain competitive advantage and You can use the strengths to exploit opportunities. You should Destroyed weaknesses by opportunities and Use strengths to avoid threats as well. We can minimize weaknesses and can be avoided from threats. See table 10.

HSE professionals need to understand that a cumbersome overprotective procedure is as bad, if not worse, than a procedure that falls short of providing the necessary level of protection.

Inaccuracy or inadequacies of procedures commonly result from lack of knowledge of HSE industry and regulatory standards. For example, when developing an environmental impact assessment procedure, it is critical to be aware of EPA requirements. Similarly, it would be useful to learn of OSHA Standard 1904 when preparing a procedure on Incident Reporting and Investigation.

Invalid procedures are impractical. They tend to have provisions or requirements that are difficult to implement by responsible parties. For example, a permit to work procedure that requires an operator to do preparatory activities for radiography work or conduct gas testing may not be realistic, in light of the operator's current level of competency. There are several reasons for selecting these standards as models for the Company:

The standards ensure that performance of the HSEMS improves over time – continual improvement.

The ISO 14001 Standard for Environmental Management Systems is an accepted international Standard for Environment Management Systems.

The OHSAS 18002:2000 Occupational Health and Safety Management Systems is an accepted international standard for Occupational Health and Safety Management Systems.

The OGP Management System model is a standard for International Oil and Gas Exploration companies.

The API (American Petroleum Institute) Model HSEMS is a voluntary tool for companies interested in developing an HSEMS or enhancing an existing one and is widely used within the Petroleum industry.

The standards are consistent with the key elements found in most management system models.



Table2: Pearson Correlation between Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	resources & documentation	policy and strategic objectives	Commitment and leadership		
0/827**	0/673**	0/473**	0/517**	0/642**	0/769**	0/677**	1	Pearson Correlation	Commitment and leadership
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	N	
0/757**	0/638**	0/503**	0/430**	0/515**	0/697**	1	0/677**	Pearson Correlation	policy and strategic objectives
0	0	0	0	0	0	0	0	Sig دو دامنه	
159	160	160	160	159	160	160	160	N	
0/928**	0/783**	0/641**	0/731**	0/781**	1	0/697**	0/769**	Pearson Correlation	resources & documentation
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	N	
0/855**	0/698**	0/539**	0/738**	1	0/781**	0/515**	0/642**	Pearson Correlation	sources and risk management
0	0	0	0	0	0	0	0	Sig	
159	159	159	159	159	159	159	159	N	
0/809**	0/656**	0/610**	1	0/738**	0/731**	0/430**	0/517**	Pearson Correlation	planning
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	N	
0/756**	0/706**	1	0/610**	0/539**	0/641**	0/503**	0/473**	Pearson Correlation	implementation and monitoring
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	N	
0/881**	1	0/706**	0/656**	0/698**	0/783**	0/638**	0/673**	Pearson Correlation	evaluation and review
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	N	
1	0/881**	0/756**	0/809**	0/855**	0/928**	0/757**	0/827**	Pearson Correlation	HSE
0	0	0	0	0	0	0	0	Sig	
159	159	159	159	159	159	159	159	N	

Table 3: Pearson Correlation between commitment and leadership and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/827**	0/673**	0/473**	0/517**	0/642**	0/769**	0/677**	1	Pearson Correlation	commitment and leadership
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 4: Pearson Correlation between policy and strategic objectives and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/757**	0/638**	0/503**	0/430**	0/515**	0/697**	1	0/677**	Pearson Correlation	policy and strategic objectives
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 5: Pearson Correlation between Organization, resources and documentation and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/928**	0/783**	0/641**	0/731**	0/781**	1	0/697**	0/769**	Pearson Correlation	Organization, resources and documentation
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 6: Pearson Correlation between sources and risk management and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/855**	0/698**	0/539**	0/738**	1	0/781**	0/515**	0/642**	Pearson Correlation	sources and risk management
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 7: Pearson Correlation between planning and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/809**	0/656**	0/610**	1	0/738**	0/731**	0/430**	0/517**	Pearson Correlation	planning
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 8: Pearson Correlation between implementation and monitoring and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/756**	0/706**	1	0/610**	0/539**	0/641**	0/503**	0/473**	Pearson Correlation	implementation and monitoring
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 9: Pearson Correlation between evaluation and review and other Elements of HSE-Ms

HSE	evaluation and review	implementation and monitoring	planning	sources and risk management	Organization, resources and documentation	policy and strategic objectives	Commitment and leadership		
0/881**	1	0/706**	0/656**	0/698**	0/783**	0/638**	0/673**	Pearson Correlation	evaluation and review
0	0	0	0	0	0	0	0	Sig	
159	160	160	160	159	160	160	160	n	

Table 10: SWOT Matrix for HSE

Weaknesses	Strengths	HSE strategies
Paper and recorded in order to attract domestic and foreign academic circles about the importance of research and innovation management	National Conference on HSE	Opportunity
Creating change management committee on foreign models	Held annually in the Internal Audit	
-----	HSE personnel deployed for specialized training by foreign companies	
Create a program for managing corporate meetings attended by all staff	Perform maneuvers during a period of disaster preparedness	Threat
Using local knowledge and national companies to supply goods and parts required	Periodic meetings with government and military environment for interaction and exchange of information	
-----	Legal capacity to deal with complaints from stakeholders	

### Suggestions

Regarding the fact that stuff with the education level of bachelor or higher are young and also the newest technology in designing discovery, exploitation and production in Arvandan Gas and Oil Company we suggest that:

1. Start a research center in different fields including HSE
2. Throw monthly meetings with stuff and managers
3. Set strategies to instruct the stuff who are replaced or promoted
4. Teach and announce HSE instructions to mayors through in-place instruction and in media in the cities

in the vicinity of installations to ensure that nobody violates the limits of those installations

5. Centralizing the stuff or
6. Increase the quality of accommodations for the stuff's families
7. Senior managers should pay attention to HSE
8. Allocate financial resources for HSE
9. Support commands and critiques system for HSE
10. Develop goals related to HSE and update them
11. Clarify the tasks in emergencies
12. Management must pay attention to safety health and environment matters
13. Initial education for the stuff
14. Developing and executing safety instructions

15. A suitable hiring and choosing process must be chosen for the staff
16. Recognize and assess the risk
17. Effective monitoring for HSE performances for contractors
18. Analyze and find the causes of the accidents
19. Control and lower the risks
20. Apply HSE to purchase, installation and development phase
21. A good change management
22. Do maneuvers and analyses of them
23. Auditing and assessing HSE
24. Showing interest in improvement without accidents by the management
25. Use qualified staff in HSE system
26. Measure and check contaminators
27. Record and pursue adjustments
28. Prevention through HSE in actions

Regarding the results, there is a significant correlation between HSEMS and HSE culture. Also there is an interactional correlation between ORD and revision and review which shows the importance of resource allocation and organization HSE and reviewing the system in order to improve the Resourcesystem continuously.

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