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Significance of IT on Geography of Mines in Gol-e-gohar mine. Iran

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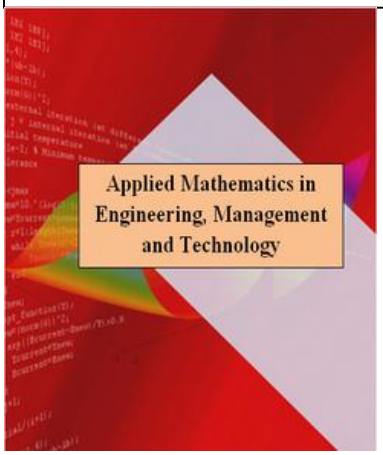

Abstract

Mining activities have had serious impact on the environment and ecology which contaminated the air, water, land, forest, biodiversity, and climate and threatened the miners' health and safety in open-pit mines of Kerman province in Iran. Recently, the mine managers have tried to balance between mining operations and environmental requirements and improve personnel's health and safety through applying modern technologies such as information technology (IT) in open-pit mines. The article tries to highlight the impact of IT on improving the health, safety and environment (HSE) with respect to the opinions of managers and technical staff, who are seriously involved in the allied issue, in Great Mines and Non-Great Mines in the region. The results reveal that IT adoption could enhance the level of HSE in open-pit mines of Kerman province.

Keywords: Information technology, health, safety, environment (HSE), Geography of Mine

1.Introduction

The Geography of Mines and mining activity is recognized as the most destructive factor of environment throughout the world. In addition, open-pit mines have more destructive impact on the environment in comparison to underground mines. During the past few years, mining operations, such as drilling, blasting, loading, transporting and processing, have caused the emission of various pollutants to environment and produced noise and vibrations in the mines. These have considerable impact on water, land, air, forest, and biodiversity and create various accidents, damages and diseases for miners and the people who are living in the settlements around the open-pit mines. Therefore, the level of health, safety and environment (HSE) has been considerably decreased.

Today, the information is a significant and inseparable element of mining management in the world so, the managers need proper and timely information for proper and timely decision- making. Information technology (IT) could have a considerable effect on mining performance in viewpoints of productivity, cost, time, health, safety, environment, etc in the modern world (Dessureault, 2006).

Mining is one of the most important economic sectors in Iran which could remarkably create welfare, convenience and employment for the people living in the region specially the settlements around the mines (PMOK, 1994). In Iran, there are 3200 mines of which 5 mines are known as "Great Mines". Out of 5 "Great Mines", 2 mines are located in Kerman province including Gol-e-gohar iron mine and Sarcheshmeh copper mine. There are 86 surface mines in Kerman province of which 12 mines are exploiting by open-pit technique (PMOK, 2006).

The study presents some important results of a field study conducted in 9 open-pit mines to formulate a project about IT application and impact in the mines of Kerman province. This article is a part of the above project

which mainly concerned to find out the impact of IT on improving the HSE in management of open-pit mines in Kerman province in Iran.

2.The location of study area

Iran lies in southwest of Asia in between 250 to 400 degrees north latitude and 450 to 630 degrees east longitude. The total area of Iran is 1,629,807 square kilometers and it consists of 30 provinces. The population of Iran was around 70 million in 2007. The climate conditions of Iran are mostly like arid or semi-arid, and subtropical along Caspian coastal region (MMI, 2003).
Kerman province is located in the southeast of Iran and situated in the 300 degrees north latitude and 570 degrees east longitude. The total area of Kerman is 181,714 square kilometers. In this province, the climate is like desert and semi- desert conditions. The region has strong potentials in mining, agriculture, industry, and tourism. Existence of huge mineral deposits, lying in the vicinity of main roads and free commercial centers, a variety in climatic conditions, and available electrical power, fuel and human resources, are the most important advantages which needs setting up a comprehensive program for overall development of the region (Mousavi, 2001).

3.Methodology

The data for the present study has been collected from a primary survey in the year 2008. The field study method is selected based on collecting the essential data through distribution of questionnaires to meet the allied objective. The various specialty questions are designed to understand whether IT could enhance the HSE in management of open-pit mines in Kerman province. These questions are designed to cover the various aspects of HSE. Among 12 open-pit mines, 9 mines are selected including Sarcheshmeh, Gol-e-gohar, Meidook, Jalalabad, Kahnooj, Cheshmeh Sefid, Shahzaheh Abbas, Fariab, and Goharhadid. 360 managers and technical staff are selected and employed questionnaires in collection of data because of their prominent positions in mine IT application and their ability to think broadly and creatively about current issue. Out of 360 respondents, 180 are in Great Mines and 180 are in Non-Great Mines in order to maintain equal weight in collection of data. The data could be analyzed by using the statistical software's like SPSS.

4.Statistical analysis of data

The data provided by the questionnaires is analyzed through SPSS software. Table1 reveals the opinions of respondents about impact of IT on HSE in Great Mines, Non-Great Mines, and Total Mines in Kerman province. The various viewpoints of respondents will be discussed as follows:
Impact of IT on HSE in Great Mines: According to this table, most respondents (%31.7) believe that IT has a moderate impact on improving HSE. In addition, 76.7 percent of them express that IT has a moderate or more impact on HSE in Great Mines.
Impact of IT on HSE in Non-Great Mines: As per the table, the majority of respondents (%32.2) express that IT has a moderate impact on enhancing the HSE in open-pit mines. In addition, 68.9 percent of them describe that IT has a moderate or more influence on HSE in Non-Great Mines in Kerman province.
Impact of IT on HSE in Total Mines: As per table 1, just 9.2 percent of the respondents believe that IT has a very low impact on HSE whereas 18 percent of them present that IT has a low influence on it. The majority of participants (%32) state that impact of IT on HSE is moderate. In addition, 22.5 percent of managers and technical staff describe that IT would highly influence on HSE whereas 18.3 percent of them present that IT has a very high impact on HSE. As per table 1, nearly 72.8 percent of managers and technical staff state that IT has a moderate or more influence in improving the HSE in management of open-pit mines in Kerman province in Iran.

Table (1): the opinions of respondents about impact of IT on HSE

Mines type / Opinions Type	Great Mines		Non-Great Mines		Total Mines	
	number of respondents	percent	Number of respondents	percent	Number of respondents	percent
Very low impact	11	6.1	22	12.2	33	9.2
Low impact	31	17.2	34	18.9	65	18.0
Moderate impact	57	31.7	58	32.2	115	32.0
High impact	40	22.2	41	22.8	81	22.5
Very high impact	41	22.8	25	13.9	66	18.3
Total	180	100.0	180	100.0	360	100.0

Fig 1 shows a comparison among different mines about the opinions of personnel for impact of IT on enhancing the HSE in open-pit mines in the region.

Source: primary survey-2008

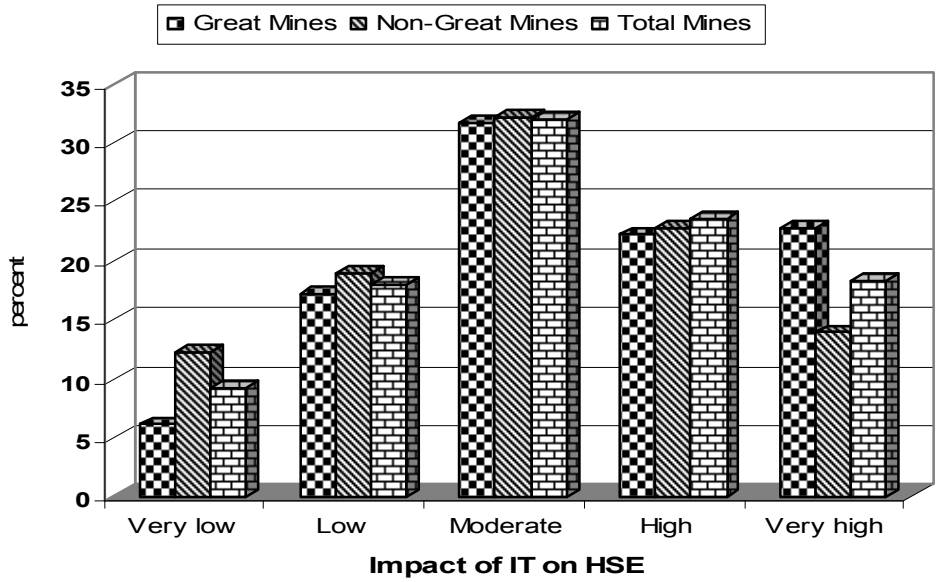

Fig (1): a comparison among personnel opinions in open-pit mines
Source: primary survey-2008

5.Impact of IT on HSE in open-pit mines

The sign test should be used herein to find out whether IT could improve the HSE in viewpoints of personnel in the mines (see table 2). The arbitrary scores for very low, low, moderate, high, and very high impact could be considered as 0, 1, 2, 3, and 4, respectively (the mean value is 2). Assuming that m is the median of personnel's viewpoints about impact of IT on promoting the HSE in open-pit mines of Kerman province, the null and alternative hypotheses of sign test could be considered as follows:

H0: m<= 2 (null hypothesis)
H1: m>2 (alternative hypothesis)

Table (2): statistics related to sign test

Median of opinions	Numbers less than 2	Numbers equal to 2	Numbers more than 2	P-value
2	98	115	147	0.039

Source: primary survey-2007

Considering the fact that p-value is less than the level of significance (i.e. 0.05), H0 is rejected so, it is not true. This means that the median of personnel's opinions, about impact of IT on improving the HSE, is more than mean value (i.e. 2).Therefore, it is possible to describe that in viewpoints of managers and technical staff, application of IT has improved the HSE in open-pit mines of Kerman province in Iran.

6.Conclusions

The article tried to identify the impact of IT on enhancing the HSE in the allied mines of Kerman district in viewpoints of managers and technical staff. According to opinions of personnel, IT application could promote the HSE conditions in open-pit mines of Kerman province. The majority of respondents in both Great and Non-Great Mines believe that IT has a moderate influence on HSE in open-pit mines. According to statistical calculations, just 9.2 percent of the respondents believe that IT has a very low impact on HSE whereas a considerable part of them (%32) state that influence of IT on HSE is moderate. Finally, nearly 72.8 percent of total personnel express that IT has a moderate or more impact on improving the HSE in the region. Particular statistical test also proved that IT could enhance the various aspects of HSE in management of open-pit mines in Kerman province in Iran.

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