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Evaluation of Accident Proneness among Iranian Manufacturing Industries: Results and Perspectives

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ABSTRACT

Accident related health problems have been suggested to cluster within persons. This phenomenon became known as accident proneness and has been a subject of many discussions. The aim of study is assess the relationships of certain occupational and individual characteristics with frequency of occupational injuries. The study's sample consisted of 495 employees working in Mabna Group in Iran in 2012. A standardized accident proneness questionnaire was completed by the researcher in the presence of the subject. The data were analyzed using logistic regression, analysis of variance (ANOVA) and correlation. There was a significant correlation between the work experience and accident experience with the score of accident proneness (P-Value < 0.012). There was also a significant correspondence between type of job and level of education with the score in assessment of accident proneness (P-Value < 0.032). This study identified a number of work and individual factors that predicted occupational injury frequency and may be useful in designing preventative measures. The results of the study emphasize the need to screen the accident-prone individuals in the course of inspections and recruitment, assign them to less critical tasks, design and implement regular training and retraining sessions.

Keywords **-** Accident proneness; Accident; workplace; IRAN

I. INTRODUCTION

Occupational accidents result in severe socio-economical consequences [1, 2] Accidents and their resulting losses are one of the critical public health problems. In terms of industrial level, the occupational safety concern is obvious. A work related accident will temporarily disrupt the equilibrium in the working environment in which it occurs. Economic costs are not only borne by those injured but also by the companies concerned and the government and can be in the form of both direct as well as indirect costs. Some studies estimate these indirect costs for organizations at several times the direct costs (Andreoni, 1986).

Preventing occupational accidents would seem to be an effective means of decreasing costs related to unhealthy working conditions [4].

It is known that occupational injuries are mainly caused by work conditions [5, 6] but some individual characteristics also Features the risk of incidents [7]. Some People have more than one accident during a short period. It is thus important to identify risk factors which might be useful in accident management [8].

The concept of accident proneness is used to demonstrate that some people have more accident chance than others [9, 10]. Greenwood and Woods studied Employees at a British munitions industry and found that incidents were unevenly distributed among workers, with a relatively low proportion of employees accounting for most of the accidents. They suggested that the description for this clustering of incidents in certain persons was to be found in their personality make up [11]. Farmer and Chambers (1929) proposed the term accident proneness for this phenomenon. They defined accident proneness as a "personal idiosyncrasy predisposing individual to a higher accident rate" [12]. More recent evidence is now emerging that accident proneness is indeed a personality character [13].

Further evidence to suggest that incident proneness is a personality character originates from research among children and youngsters. These studies do indicate the existence of something relevant to injury liability. For example, there are children living in unsafe conditions who never experience an incident while others living in safe environments suffer repeatedly from accidents [14].

As a starting point of this paper, we regard accident proneness as the tendency of an individual to experience more accidents than otherwise identical individuals (in terms of basic personal characteristics like age, gender and place of residence), due to stable personality characteristics. We did not include exposure to risk as part of the definition itself, because the extent to which individuals expose themselves to risk may be largely

determined by personality characteristics. This study assessed the role of a number of individual and occupational factors in the frequency of occupational injuries in a manufacturing industry in IRAN.

II. METHODS

Statistical sample

This study carried out in a manufacturing industry in Iran y during the years 2011 and 2012. A pilot study was carried out prior to the study to determine the required sample size. Considering the mean, minimum, maximum and standard deviation of the accident proneness scores as well as the maximum error allowed, which is 4, the actual sample size of 495 was obtained.

Questionnaire

Accident proneness culture questionnaire was initially developed based on the review of the relevant literature. Trained subjects conducted face – to face interviews using a questionnaire was prepared with reliability Alpha- Cronbach=78% and validity checked by Iranian HSE experts. This questionnaire has 65 questions that is completed in five-scale responding alternative, "never", "rarely", "sometimes", "often", "most times". Furthermore, in order to determine the demographic information of the employees such as age, occupation, workplace, duration of employment and etc was completed by all samples. The method of samples selection was completely random and the methodology used to complete the questionnaires consisted of a semi-supervised implementation.

Procedure

The employees of the industrial units were interviewed to complete the questionnaire. The first page of the questionnaire emphasized that replies were anonymous, that respondent participation was voluntary, and that the questions should be answered honestly. All of samples answered the questionnaire, however, the response rate varied from 71% to 96%, with an average of 85%.

The data was then analyzed using SPSS and statistic tests namely, analysis of variance (ANOVA), correlation and logistic regression.

III. RESULTS

The mean age of the people under study was 30.7 years with a standard deviation of 6.5. The mean work experience was 25 years with a standard deviation of 7.2. 48% had high-school education, 34% were college-educated and the rest had not finished high-school. 73% of samples were married. 24% had experienced an accident or more at their work.

The mean score in assessment of accident proneness was 60 with a standard deviation of 10. The minimum and maximum achieved scores were 27 and 82, respectively. The mean score of accident proneness in 15.5 % of the employees was less than 50%, 33.5% was between 50 to 60, 35.1% was between 60 to 70 and 15.9% of the rest was more than 70. In other words, in the company under study, 35.1% of those who are working in critical occupations are accident-prone, and approximately 16% are very accident-prone.

Multivariate Logistic Regression test also distinguished the significant correspondence between the rate of work experience and pro-accident experience with the score of accident proneness. (P-Value < 0.05). The correlation between the score of accident proneness and the number of pro-accident experience and work experience was reverse.

The correlation coefficients between the score of accident proneness with the number of pro-accident and work experience were 0.78 and 0.67, respectively.

In order to determine the effect of variables such as level of education, marital status, occupation and workplace on the score of accident proneness was used from variance of analysis test. There was a significant correspondence between the kind of job and level of education with score of accident proneness (P-Value < 0.05). The occupational groups consist of construction workers putting up scaffolding and drivers had the highest score in assessment of accident proneness.

IV. DISCUSSION

In this company 51.1% of the employees who were involved critical occupations, for instance, construction workers putting up scaffolding, operators of crane, pressure welder and the roof plumber had the score in assessment of accident proneness over 60. In other words, 51.1% of the individuals were accident-prone and very accident-prone. This afore-mentioned group is more likely to be involved in accidents and have the high rate of unsafe behavior ratio. In regard to the nature of their work, the employment of this group of the individuals in critical occupations will be very much dangerous [15, 16]. In the company under study, there were six instances of death, 5 of which included the afore-mentioned critical occupations.

The existed direct relation between high accident proneness and occupational accident experience has been approved in many other studies [17]. In this study the relation between age and work experience was direct. In other words, with the higher age of samples, the work experience would increase too. With increasing work experience, the fewer rate of accident proneness was also attained [8]. The reasons of these achieved results can be related to more acquaintance with the existed hazards in work environment and the higher the level of training attained by individuals who have more work experience.

In this study the highest score of accident proneness was related to the occupational groups which are more dangerous, for instance the groups of construction workers putting up scaffolding and drivers. In these jobs, taking an error can be very catastrophic [18, 19]. This finding indicates the more necessity of implementing controlling measures.
Decreasing accident proneness with higher level of education shows that receiving more training can help in controlling the score of accident proneness. In the other studies the reverse correspondence between the rates of accidents with the level of education has been also approved. In addition, researchers have showed that with increasing employees training, the rate of occupational injuries would be reduced [20, 21].

V. CONCLUSION

The results of the study emphasize the need to screen the accident-prone individuals in the course of inspections and recruitment, assign them to less critical tasks, design and implement regular training and retraining sessions.

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