

Perception Of Safety Of Workers In Various Occupations At The Construction Site

Muhammad Dawood Idrees, Arsalan Ansari, Abdul Sami

Abstract: There are several dangerous industries and construction industry is considered as one of the most dangerous industry among all industries, because worker safety is always a big issue at working sites. There are several reasons of accidents at construction sites, but psychological factors are one of the factors that affect workers' perception of safety. The concept of safety varies by region and depends on the demographics of the worker, such as gender, age, education, and job level. The purpose of this study is to evaluate the impact of psychological factors on workers' at various job levels. A comprehensive literature review was conducted to find the symptomatic relationship between psychological factors and safety perceptions, and a hypothetical structural model was developed according to the literature review. Research questionnaire was developed to obtain data from construction sites. Structural Equation Modeling (SEM) techniques have been adopted to study the influence of psychological factors on workers' perceptions of safety of workers at different levels of work. The results of this analysis shows that organizational relationship and job security are more influencing factors in labor, therefore workload, mental stress, and job satisfaction are more influential factors in managerial staff.

Index Terms: Safety, Accidents, Safety awareness, Workers perception of safety, Occupation of workers

1 INTRODUCTION

The rate of accidents in construction sites are increasing rapidly. According to International Occupational Safety statistics, the rate of accidents in construction industry is the highest as compared to other industries. Yearly, 30-40% of total injuries are reported on construction sites [1]. The US Bureau of Statistics revealed that in 2012, the number of workers who got serious injuries and disabilities were 183,000 and 775 workers were expired in construction sites [2]. These accidents are happening due to lack of safety measures and workers behavior towards safety. Mostly the nature of work is complex in construction industries which affects the nature of work, management of safety and workers attitude. In 2014, 899 accidents occurred in construction industry out of 4386 total injuries which also indicates that one out of five workers become victim of death indicating highest rate of fatalities [3]. Construction companies are constantly searching for novel strategies to promote the safety and to control the highest proportion of major and minor accidents [4]. With the economic growth, Pakistan's construction industry is increasing rapidly. With cheap labor force available, manual work is preferred over using machinery thus increasing the risk of accidents among the workers due to poor attitude towards safety measures. Many others factors contributing towards accidents includes working environment, workload, job security, job satisfaction of worker, mental stress, organizational relationship and job clarity. The perception of safety has a wide relationship with different psychological factors including personal care, safety training, behavior of supervisor as well as behavior towards coworkers [5].

Now a day's safety of workers is one of the significant issue across the world but it varies demographically, regulatory and culturally from region to region. Developing countries like Pakistan is far away for the implementation of safety management [6]. The safety perception is highly effected by certain factors such as employment level, gender, marital status, workers experience, age of worker and education [7]. It also observed that the employment level of workers and risk of a major and minor accidents are highly related. Past researches have been conducted to examine the effect of psychological factors but this is first research which conducted the effect of different psychological factors in different job level of workers (Managerial and Labor staff) at different construction sites.

2 RESEARCH APPROACH

For this research study, data was collected from different employees based on psychological measurement scales. In this scale those psychological factors were considered that may have a direct effect on the safety of workers. A Likert-type scale was used to record the behavior of each worker. These scales were used from past research studies. These questions were widely used in past research studies due to their better reliability.

Structural equation modeling (SEM) is used in this study. SEM helped to find the relation between different latent variables. To develop the hypothetical model, the observations and researcher judgment are very necessary along with SEM. To study the comparison between two job level groups, the authors assumed that the questionnaire and the hypothetical model should be same for both, Figure 1 shows the hypothetical model. Five psychological factors were included in the formation of baseline hypothetical structural model which are mental stress, work load, job security, job satisfaction and organizational relationship. These Psychological factors were analyzed which shows direct impact on the personal safety at construction industry. Based upon past studies it was found that organizational relationship, mental stress, workload, and job security and job satisfaction have a significant direct effect on the safety of workers. The base hypothetical model consists of six latent variables. All hypotheses used in this study are explained here:

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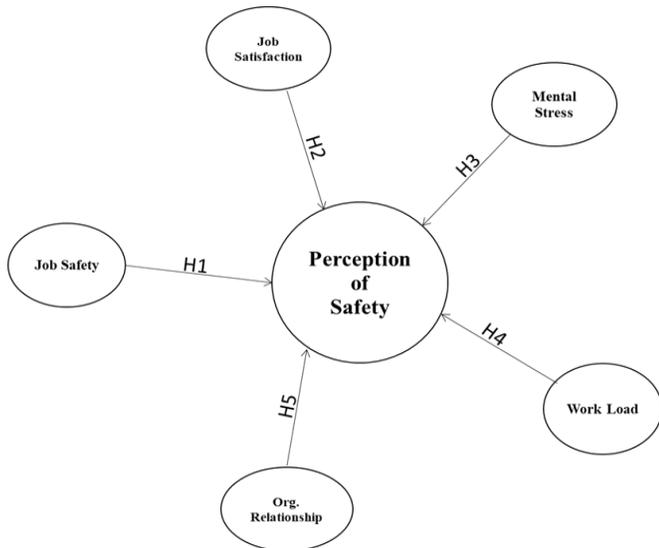


Figure 1. Baseline Hypothetical model

2 METHODOLOGY

3.1 Data Collection

Survey was conducted at different work sites, it was categorized into two different groups according to employment level. Sample 1 for group 1 was gathered from managerial staff and sample 2 for group 2 was obtained from non-managerial staff to collect the data. A questionnaire having two parts was adopted to collect the data. In the first part of survey analytical information related questionnaire were asked, the second part consisted of 36 statements based on psychological factors. A five point likert type scale was used to record the response of each worker. The total of 265 questionnaire were distributed among the workers of various construction sites including different trade of workers shown in Table 1.

Item	Category	Frequency	
Employment level	Managerial staff	Supervisor (71)	135
		Site Engineer (43)	
		Project Manager (16)	
	Labor	130	

3.2 Data Analysis

For this research study, AMOS version 22 was used to analyse the data. The methodology was adopted in two steps. The first step was to develop a structural model which was based on past studies, logical expressions and researcher perception. In second step six latent variables were used to develop a structural model for the statistical analysis. In the initial step of SEM, the confirmatory factor analysis (CFA) was conducted which shown the relevance rate of 95% confidence interval between the latent variables and their indicators. CFA is a method to develop a strong and stable measurement model. To make the model more stronger we performed the process of model refinement by Goodness of Fit (GoF) Indices and achieved the recommended value as shown in Table 2. A GoF model based on different types of measurement fit indices [37] was used to measure the normed Chi-square (X²/DF), goodness of fit index (GFI), comparative fix index (CFI), and root mean square error of approximation (RMSEA). The maximum likelihood method was used as the estimate procedure [38], with a 95% confidence interval. The recommended value of normed Chi-square (X²/DF) is 1.0 to 2.0 [38]. The value of CFI from 0.0-1.0 are recommended, and a value closer to 1.0 indicates a good fit. The recommended value for RMSEA is less than 0.08 [37].

Fit Indexing	Labor (Group-1)	Managerial (Group 2)
X ² /dt	1.973	1.818
CFI	0.866	0.864
GFI	0.799	0.759
TLI	0.844	0.845
PNFI	0.663	0.656
PGFI	0.604	0.620
RMSEA	0.078	0.079

2.1 Workload

Accidents majorly occurred on construction sites due to lack of job satisfaction. It affects the workers performance and behavior in the working environment. Workload is one of the major factors which effect the perception of safety of worker. Workload is highly affiliated with the quantity of work, job nature and time period.

2.2 Organizational Relationship

Organizational behavior and commitments are the major factors which highly effects the workers safety. An organizational relationship is the workers feelings and psychological attachment towards the organization. The relationship between organization and workers is effected by management attitude, management support and coworkers relationship which directly or indirectly effects the perception of safety of workers [8].

2.3 Mental Stress

Mental stress includes bad attitude, lack of concentration, sleep disorders and negative behavior with co-workers family and friends. Here mental stress means mental health which shows physical health of workers and organization [9].

2.4 Job Security

It is the risk of losing someone's present job and it affects the safety of worker [10]. The job security of worker is directly proportional to the safety and job satisfaction due to which they follow the rules and regulations. Job security has negative impacts on workers attitude and behavior [11]. The perception of personal safety disturbs psychologically due to job dissatisfaction.

2.5 Job Satisfaction

Job satisfaction is negatively affected by organizational relationship, mental health, working environment, etc. which results in increased errors, lowers the performance of worker, decreased productivity with increasing in accident rates.

Table 3. Validity and reliability results

Constructs	Reliability (α)		AVE		C.R	
	Lab.	Mgr.	Lab.	Mgr.	Lab.	Mgr.
Organizational Relationship	0.82	0.79	0.57	0.52	0.75	0.82
Mental Stress	0.73	0.88	0.56	0.48	0.82	0.79
Work load	0.76	0.75	0.52	0.53	0.81	0.73
Perception of Safety	0.81	0.79	0.52	0.55	0.81	0.88
Job Security	0.78	0.81	0.43	0.47	0.69	0.86
Job Satisfaction	0.85	0.83	0.49	0.53	0.87	0.81

4 RESULTS AND DISCUSSION

As an initial step, reliability test was conducted to evaluate the reliability of the purposed model. The recommended value for Cronbach reliability test index must be 0.7 [12]. According to the Cronbach's reliability test all the values were above 0.7 which shows that the purposed model was reliable enough for further analysis. The consistency of data and quality of measurement were also be analyzed by finding Average Variance Extracted (AVE) and Cronbach's Reliability (CR). The values of both AVE and CR for managerial and labor staff are shown in the Table 3. Both the models were separately analyzed as shown in Figure 2, to check the predicted direction and relationship between the under observed variables. The job security is the second factor which effect the perception of safety of labor more and it also effects the perception of safety of managerial staff as well. This relationship shows that managerial staff feels more secure about there job then labors because managerial staff can switch their job easily then labor. Mental stress and work load equally effects the perception of safety of labor but it is quite less than that of managerial staff. The factor that highly effects the perception of safety of managerial staff is mental stress because of excessive work load as they had to deal with the number of problems and working within the industry. Job satisfaction also directly effects the perception of safety which is quite a bit greater in managerial staff while among labor staff it is almost negligible. Job satisfaction is mainly because of the fulfilment of basic needs which are somehow accomplished for managerial staff and almost none for the labors.

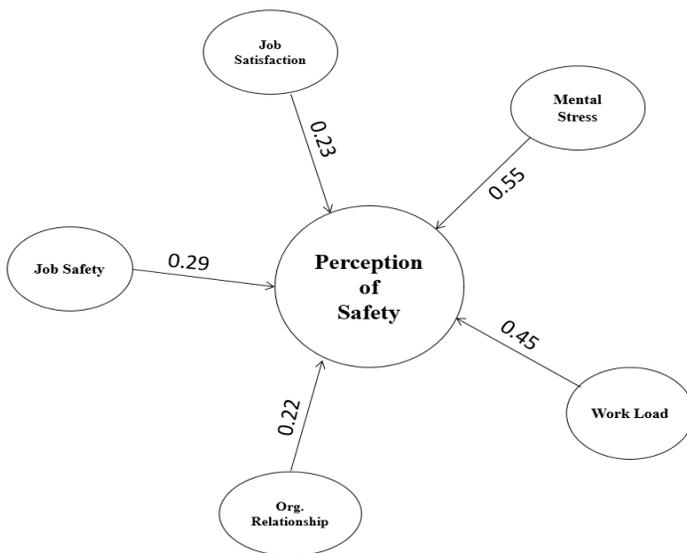


Figure 2.a. Managerial Staff

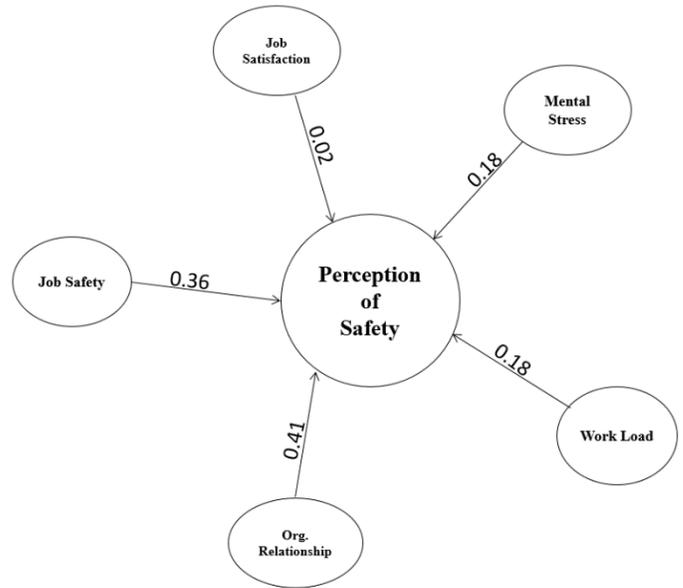


Figure 2. Comparative results oof Model-1, and Model-2

After considering the psychological factors, this study analyses the perception of safety among managerial staff and labor. All the hypothesis regarding job satisfaction, organizational behavior, mental stress, work load and job security confirms the previous studies showing the direct effect on the perception of safety. Different psychological factors according to construction industry in Pakistan with the varying environmental and cultural differences were analyzed in this study which suggest that work load and mental stress are the two most important factors effecting the perception of safety of managerial staff but in the labor organizational behavior and job security are the two dominant factors that directly effect the perception of safety. Overcoming the workload and mental stress among managerial staff can reduce the number of injuries and can also induce the better product with maximum safety and minimum accidents. A better organizational relationship and assurance of job security will decrease the number of major and minor accidents which will increase the quality of product in a better workplace.

5 CONCLUSION

This study was an attempt to examine psychological factors affecting perception of safety among managerial and non managerial (labor) staff / workers at construction sites in Pakistan. This research was supported by theory and past experimental studies. The findings of this research support the hypothetical structural model and reveal that psychological factors have statistically significant direct and indirect relationships with the perception of safety of workers at construction sites in Pakistan.

REFERENCES

- 1) Idrees, M.D., M. Hafeez, and J.-Y. Kim, Workers' age and the impact of psychological factors on the perception of safety at construction sites. Sustainability, 2017. 9(5): p. 745.
- 2) Fleming, M. and R. Lardner, Strategies to promote safe behaviour as part of a health and safety management system. 2002: HSE Books.

- 3) Bunting, J., et al., A national safety stand-down to reduce construction worker falls. *Journal of safety research*, 2017. 60: p. 103-111.
- 4) Demirkesen, S. and D. Arditi, Construction safety personnel's perceptions of safety training practices. *International Journal of Project Management*, 2015. 33(5): p. 1160-1169.
- 5) Sawacha, E., S. Naoum, and D. Fong, Factors affecting safety performance on construction sites. *International journal of project management*, 1999. 17(5): p. 309-315.
- 6) Koehn, E.E., R.K. Kothari, and C.-S. Pan, Safety in developing countries: professional and bureaucratic problems. *Journal of Construction Engineering and Management*, 1995. 121(3): p. 261-265.
- 7) Hinze, J., *Construction safety*. 1997: Prentice Hall.
- 8) Masia, U. and J. Pienaar, Unravelling safety compliance in the mining industry: examining the role of work stress, job insecurity, satisfaction and commitment as antecedents. *SA Journal of Industrial Psychology*, 2011. 37(1): p. 01-10.
- 9) Ahsan, N., et al., A study of job stress on job satisfaction among university staff in Malaysia: Empirical study. *European journal of social sciences*, 2009. 8(1): p. 121-131.
- 10) Artz, B. and I. Kaya, The impact of job security on job satisfaction in economic contractions versus expansions. *Applied Economics*, 2014. 46(24): p. 2873-2890.
- 11) Hellgren, J., M. Sverke, and K. Isaksson, A two-dimensional approach to job insecurity: Consequences for employee attitudes and well-being. *European Journal of Work and Organizational Psychology*, 1999. 8(2): p. 179-195.
- 12) Pallant, J., *SPSS survival manual*. 2013: McGraw-Hill Education (UK).