

Predicting Safe Work Behaviour: The Case of Pakistan

Tauha H. Ali

Doctoral Candidate, School of Engineering, Griffith University, Gold Coast, Australia

Sherif Mohamed

Associate Professor, School of Engineering, Griffith University, Gold Coast, Australia

Abstract

It is widely accepted that a proper attitude toward safety predicts safe work behaviour. Also, there is strong evidence that the national culture affects one's perception, attitude and behaviour. This paper statistically attempts to explore in what way, and to what extent does the national culture value orientations influence construction workers' attitudes and behaviours. The paper presents the results of a questionnaire survey, administered in Pakistan to determine whether construction workers' intentional behaviour could be explained by their attitudes and perceptions. The paper then proceeds with investigating the influence the national culture has on identified attitudes and behaviours.

Key words

Safe behaviour, attitude, perception, national culture

1. Introduction

Pakistan is a developing country that is currently enjoying a relatively strong growth in construction activities. The national construction industry greatly contributes towards the GDP and employs about 9.0% of the total labour force (Labour Force Survey Report-Government of Pakistan, 2001). Regrettably, existing national safety regulations do not apply directly to the construction industry. As such, construction workers are not provided with the protection that is available to industrial workers. The absence or deficiency of such a set of safety regulations adversely affects the enforcement of safety on the job site, thereby resulting in more vulnerable conditions to occupational health and safety for workers.

Cultural differences have a significant impact upon industrial safety culture and help in understanding different approaches to accidents and safety management (Pickett et al. 2002). There is no single, accepted definition of culture. However culture, distinguishes one group from another; and influences beliefs, attitudes, perceptions and behavior in a somewhat uniform and predictable way (Bird, 2000). This study was conducted to investigate: a) the perceptions and attitudes of local workers regarding safety issues, b) their safe or unsafe work behaviour in handling a risky situation, c) whether workers' intentional behaviour could be explained by their attitudes and perceptions, and d) whether cultural dimensions influence workers' attitudes, perceptions, and behaviour.

2. Research Design

The research design adopted was a cross-sectional one, based on a representative sample of eight large construction sites in Pakistan. A three-part interview-based questionnaire survey was developed targeting

'front line' workers who are considered to be the main agents to report on safety in the workplace. The first part comprised 25 statements (variables) dealing with attitudes and perceptions regarding; management commitment and communication towards safety, safety training, inspections, workers own risk perception, relationships among the workers, and work pressure.

The second part dealt with workers' behaviour in connection with performing tasks: (1) on scaffolds, (2) using ladders and (3) on roofs. For each task, workers were asked to consider the risk levels for three given working situations and their intentional (i.e. preferred) behaviour whenever each situation is encountered. They were also asked about their personal account of the frequency of each situation (i.e. how frequently do they face this particular situation on the present site?). The third and final part of the survey explored the influence of national culture of workers on their attitudes, perceptions, and behaviour. For this study the delimitation was that the culture of Pakistan would be seen only from the framework of Hofstede (1994), which identified the following four work-related cultural dimensions: 1) High / low power distance (PD), 2) Individualism (IND) and Collectivism (COL), 3) High / low un-certainty avoidance (UA), and 4) Masculinity (MAS) and Femininity (FM).

3. Data Collection and Analysis

A total of 140 workers representing six common construction trades (i.e. scaffolding, masonry, steel fixing, carpentry, painting and electrical works) were surveyed. At the beginning of each site survey, site administration (management staff) were contacted and permission was requested to introduce the survey administrator to workers, in order to facilitate the process of data collection.

3.1 Workers' Attitude and Perception

Data gathered using the first part of the survey were factor-analyzed. First, data suitability was assessed by the measure of sampling adequacy (MAS) test and Kaiser-Meyer-Olkin (KMO) test. On the basis of these two tests, the variable list was reduced to 20 variables. A principal component analysis followed by Varimax rotation revealed three distinct factors accounting for 74 percent of the total variance. Factors were then examined to identify the number of items that loaded on each factor. Reliability scores, for individual factors ranged from 0.70 to 0.78 indicating adequate internal consistency (Kaplan and Saccuzzo, 1993). The first factor, *awareness and beliefs*, accounts for 34% of the total variance and comprises 11 items. All of which indicate the degree of awareness or belief, workers have of both their own and management safety responsibilities. Workers seem to share a common belief that working safely is a top priority for all involved. They also recognize management as a safety associate; this is reflected by a reasonable degree of agreement with items addressing management safety responsibilities.

The second factor, *physical work environment*, contains five items and accounts for 25% of the total variance. Collectively, this group of items demonstrates workers' perception of the risk they are generally exposed to in their workplace environment, and how such an environment contributes positively or otherwise to their personal safety. Overwhelmingly, responding workers seem to perceive construction sites as dangerous places, and their jobs to be associated with high risks. Respondents appear to be relatively satisfied with the availability, but not condition of equipment needed to carry out the job safely.

The third and last factor, *supportive environment*, has four items and accounts for 16% of the variance. These four items indicate the intensity of support given by peers (through shared responsibility and

involvement) and management (through training) to perform the job safely. Closer examination reveals, however, that training is scarce, and only few workers have had limited experience with formal safety training, and thus respondents were inclined to disagree with statements referring to on-site hazard-identification skills gained through training. In sum, it was very encouraging indeed to get such a positive attitude towards safety among the sample. Contrary to the notion that construction workers in many developing countries are in favour of a fearless attitude respondents, on average, tended towards a good degree of risk awareness and self-rated competence, and a relatively high degree of safety awareness.

3.2 Behavioural Analysis

This section deals with workers' perception of risk and intentional behaviour associated with working at heights. Most of the respondents had a good deal of experience working in the industry, with half of the sample reported having worked for more than 15 years. It is worth noting, however, that 80% of the respondents had not received any sort of formal safety training at all.

As mentioned earlier, workers were asked to consider the risk levels for nine given working situations and their intentional (i.e. preferred) behaviour whenever each situation is encountered. With the exception of two situations, all the remaining presented situations perceived as of being either medium or high risk. Workers perceived working on: 1) scaffolds which are not totally boarded, 2) ladders which are not tied or secured well, and 3) fragile roofs as being the most risky of the nine situations presented.

In the situation of working on roofs without edge protection, 65% of workers perceived it as of low risk and 94% of them opted to continue working. Working on roofs in strong windy conditions was also perceived as a low-risk situation and hence workers were more likely to continue working. For situations clearly perceived as of medium-to-high risk, the majority of workers seem to prefer to stop working.

The majority of workers do not have a misperception of risks associated with these situations. However, there is a minority of workers that do misperceive them and so could be exposing themselves and other co-workers to risks due to their misperception. This is in line with the findings of McDonald and Hrymak (2001) where typically 3-5% of workers on site were found to have a low perception of risk to situations seen by others as of medium-to-high risk. It is worth mentioning that this minority of workers, in our sample, appears to be inexperienced workers with 1-5 year's construction working experience.

3.3 National Culture

A total of 23 variables were factor analysed to determine the underlying dimensions of national culture. The results revealed the presence of three factors accounting for 80 % of the total variance. Factors were then examined to identify the number of items that loaded on each factor by keeping in mind the rule for selecting only those items which has got the loadings equal to or more than 0.5 (Hair et al.1998). This has led to the elimination of one variable.

Each factor solution was labelled in accordance with the set of individual items loaded onto it. The first factor was named as *collectivism & femininity*. This factor accounts for 48% of the total variance and contained thirteen items describing the individualism, collectivism, masculinity and femineity themes. The results showed that workers believe in carrying out all operations more collectively rather than individually.

The second factor *uncertainty avoidance* accounted for 18% of the total variance contained six items all addressing that particular theme. Workers' responses showed that they all had clear perception regarding safe and unsafe conditions and most of them are prone towards high uncertainty avoidance. Results of this

factor do confirm the results of workers behavioural survey analysis, in which most of the respondents opted for not to continue working in risky situations.

The third factor gathered 14 % of the total variance and contained four items poised to measure the *power distance* between workers and managers. The majority of workers do not see much power distance between themselves and the management whenever there are issues either of communication of safety issues, consultation with workers on site safety plans or taking any action if workers perceive the situation as risky.

3.4 Prediction of Intentional Behaviour through Attitudes and Perceptions

A binary logistic regression analysis test was conducted to assess the independent effect of each of the already identified three attitudes & perceptions factors on the nine behavioural situations.

All three factors predicted large number of behavioural situations. *Awareness and Beliefs* emerged as most influential predictor. It predicted seven behavioural situations out of nine and showed statistically significant correlations (using the standard alpha level of 0.05) as well. The predicted seven situations are as follows:

- Working with scaffolds, which are not totally boarded
- Working with scaffolds with guard rails missing
- Accessing scaffolds by climbing up and down
- Working with ladders that are not tied
- Working with ladders that are too short for the task being performed
- Using a broken or defective ladder
- Working on a fragile roof without crawling boards

The above situations, as mentioned above, were perceived to be as of either medium or high risk, and the majority of respondents indicated their preference to stop working when facing such situations. The significant correlations indicate that this factor is a strong predictor of the workers' preferred behaviour. In all seven situations, negative values for the B coefficient were obtained (see table 1) indicating that the higher the level of workers' awareness towards safety, the less likely they will continue working. Similarly, the second factor, *Physical Work Environment*, showed significant correlations with six of the above seven situations reflecting a reasonable degree of predictive ability. The third factor, *Supportive Environment*, showed significant correlations with the remaining two situations:

- Working on roof without edge protection
- Working on roof in strong windy conditions

As mentioned earlier, these two situations appear to be encountered on a frequent basis on sites, and were perceived by many workers as low risky situations, thus workers are more inclined to not stop working. The positive B values indicate that the higher the level of support given by peers (i.e. co-workers), the higher the chance that workers will continue working. Comments that were verbally made and freely added to the questionnaire provided insight into the thinking of the respondents. For example, peer support might give rise to unsafe work behaviour.

Table1: Binary Logistic Results

		B	S.E	Wald	df	Sig	Exp(B)
Awareness and Beliefs (FAC-1)	Scaffolding Situation-1	-.473	.215	4.845	1	.028	.623
	Scaffolding Situation-2	-.418	.199	4.416	1	.035	.658
	Scaffolding Situation-3	-.395	.199	3.939	1	.047	.673
	Ladder Situation -1	-.695	.324	4.601	1	.032	.499
	Ladder Situation -2	-.382	.188	4.128	1	.042	.682
	Ladder Situation -3	-.370	.178	4.340	1	.037	.691
	Roof Situation -1	-1.915	.919	4.337		.037	.147
	Roof Situation -2	.239	.357	.449	1	.503	1.270
	Roof Situation -3	.199	.227	.771	1	.380	1.221

3.5 Relationship Between Workers' Attitudes, Perceptions and National Culture

A Pearson correlation test revealed some strong linear correlations between national culture dimensions and workers attitude and perception factors. The results of descriptive analysis of the workers cultural questionnaire relating to measuring collectivism and femininity has revealed that workers attitude is prone more towards collectivism rather than individualism and also towards femininity rather than masculinity. National culture dimension of COL & FAM showed strong positive correlations with two factors of workers attitude and perception; *"Awareness and beliefs"* and *"Physical work environment"*. The positive relationship with both of these factors indicates that the more collectivism and femininity will exist in workers attitude, the more they will be aware of safety issues and more stronger beliefs they will be having. Therefore presence of such strong positive correlation does make sense on the basis of its descriptive analysis, because workers tend to be more supportive in sharing and conveying safety concerns so as to help each other and also because they do not tend to take chances for any risky situation therefore they always want to be safe as much as possible. The second cultural dimension of uncertainty avoidance (UA) showed strong correlation with *"Awareness & beliefs"* and with *"Physical environment"* and relatively less strong correlation with the third attitudinal factor *"Supportive environment"*. The PD dimension showed negative correlation with attitudinal factor of *"Awareness and beliefs"*, and positive correlation with *"Supportive environment"*. The negative correlation between power distance and awareness & beliefs can be interpreted as the greater power distance between workers and management, the less will be the awareness and beliefs regarding safety issues.

3.6 Prediction of Intentional Behaviour through National Culture

In order to predict workers behaviour through their national culture or to explore the influence of workers national culture on their safe/unsafe behaviour, Binary logistic regression was used again. This time only two cultural dimensions *"Collectivism and Femininity"* and *"Uncertainty Avoidance"* predicted nine different behavioural situations. The third and last cultural dimension *"Power Distance"* did not predict any of the behaviour. The first national cultural dimension predicted the same situations predicted by workers attitudinal factor of *"Awareness and beliefs"* (refer to table 2 depicting an example of binary logistic regression results). The predicted situations were:

- Working with scaffolds, which are not totally boarded
- Working with scaffolds with guard rails missing
- Accessing scaffolds by climbing up and down
- Working with ladders that are not tied

- Working with ladders that are too short for the task being performed
- Using a broken or defective ladder
- Working on a fragile roof without crawling boards

These situations were perceived to be as of either medium or high risk. Most of the workers opted for stop working as their intentional behaviour on these situations. The significant correlation and the Wald values indicate that this factor is a strong predictor of these behaviours. In all seven situations negative values for the Beta coefficient indicate that the higher the collectivism and femininity the less likely workers will continue working. Similarly the second factor, Un-certainty avoidance, predicted six of the above seven situations. Again the negative Beta coefficient values depict that the higher the un-certainty avoidance among the workers, the lower is the chance that they will continue working.

Table2: Binary Logistic Results

		B	S.E	Wald	df	Sig	Exp(B)
Collectivism & Femininity (FAC1)	Scaffolding Situation-1	-.418	.199	4.416	1	.035	.658
	Scaffolding Situation-2	-.400	.202	3.928	1	.047	.670
	Scaffolding Situation-3	-.400	.202	3.928	1	.047	.670
	Ladder Situation -1	-.382	.185	4.263	1	.029	.682
	Ladder Situation -2	-.263	.123	4.534	1	.033	.249
	Ladder Situation -3	-.521	.255	4.172	1	.041	.604
	Roof Situation -1	-.431	.199	4.699	1	.030	.650
	Roof Situation -2	.089	.399	.050	1	.823	1.093
	Roof Situation -3	.573	.376	2.318	1	.128	1.774

4. Concluding Remarks

There is a growing general recognition that construction workers' attitudes towards safety are influenced by their perceptions of risk, management, safety rules and procedures. An examination of the literature suggests that a positive correlation exists between such perceptions and workers' safe behaviour and also cultural dimensions may influence their attitudes and behaviour. With 140 responses across a range of construction trades and sites in Pakistan, the study could be argued to be generally representative. Data gathered via face-to-face interviews were factor-analysed to examine interrelationships among 25 safety climate statements and 24 cultural statements. The results show that the large majority of respondents are well aware of the risk associated with their job, do not find working with a certain amount of risk as being exciting, believe in having shared responsibility and in maintaining good working relationships to prevent accidents, are confident about their ability to identify hazards, and do generally trust management.

Respondents, on average, tend towards a good degree of risk awareness and self-rated competence, and relatively high degree of safety awareness. The work experience an individual has seems to influence their perception of risk. However, a minority of workers do misperceive risks attached to a number of situations and thus could be exposing themselves and other co-workers to risks due to their misperception. Overall, workers' intentional behaviour seems to be best explained by workers' attitude towards their own and management safety responsibilities as well as their perception of the risk they are generally exposed to in their workplace environment.

The cultural analysis showed that workers are more collective, feminist, believe in less power distance and opt for higher un-certainty avoidance in their attitudes. The analysis of interrelationship between workers behaviour and national culture revealed that, the workers working more in collective, feminist, and higher uncertainty avoidance environment, the more they going to exhibit safer behaviour.

5. References

- Bird, A. (2000). "The impact of national culture on collaboration". *Proceedings of Symposium for collaborating across professional boundaries: from education to practice*. Chicago.
- Cheyne, A., Cox, S., Oliver, A. and Tomas, J.M. (1998). *Modelling safety climate in the prediction of levels of safety activity*. *Work and Stress*, 12, 255-271.
- Hair, J. Anderson, R. and Black, W. (1998). *Multivariate Data Analysis*, 5th edition, Prentice-Hall International, INC. New Jersey.
- Hofstede, G., (1994). *Culture and Organisations: Software of the Mind*. McGraw-Hill, International, London.
- Kaplan, R. and Saccuzzo, D.P. (1993). *Psychological Testing: Principles, Applications & Issues*, and Brooks & Cole Publications. California.
- McDonald, N. and Hrymak, V. (2001). *Safety Behaviour in the Construction Industry*. Report to the Health and Safety Authority (Dublin) and the Health & Safety Executive (Northern Ireland).
- Peckitt, S.J., Gelndon, A.I., and Booth, R.T. (2002). "A comparative study of safety culture in the construction industry of Britain and the Caribbean". *Proceedings of International Symposium of the CIB W92*, Trinidad & Tobago, pp.195-214.