

EMPIRICAL INVESTIGATION OF MANAGERS' PREFERENCES FOR CONSTRUCTION SAFETY PRACTICES IN PAKISTAN

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ABSTRACT: Classic construction safety management functions – such as recruitment, training, supervision, etc. – are determined by different conceptions of the role and nature of management effectiveness, and these conceptions are underpinned by related cultural values. This paper attempts to shed some light on in what way, and to what extent, does the national cultural value orientations influence individual preferences for safety management policies and practices. It presents the empirical results of a questionnaire survey administered in Pakistan targeting construction managers with safety management responsibilities. Based on the survey findings, the paper argues that there is a causal link between cultural values' orientations and preferences for, and perceptions of, safety management policies and practices.

Key words: Safety Management Practices, National Culture, Construction, Pakistan.

1. INTRODUCTION

During the past decade, there has been increased interest in trying to understand how management practices and organizational factors impact workplace safety. Research has focused on managers as role models for instilling safety awareness and supporting safe behaviour [1]. Advocating the importance of safety management systems and practices, Hofmann et al. [2] described individual attitudes and behaviours in the safety climate concept as micro-elements of an organisation. These micro-elements are themselves determined by the macro-elements of the organization, like safety management practices. Kirwan [3] relates safety management practices to the actual practices, roles and functions associated with remaining safe. It is therefore more than a “*paper system*” of policies and procedures [4]. Duff et al. [5] and Robertson et al. [6] carried out a two – phased study on the effectiveness of different management strategies. Specifically, they looked at the effects of three techniques: 1) feedback, 2) goal setting, and 3) training, on safety performance. They found that the techniques used had produced marked improvements in site safety in general, with participative goal-setting being the more effective technique of the three. However, a continuous and consistent management commitment along the life-cycle of the site was recommended in both studies to achieve maximum benefit.

Tam and Fung [7] studied the effectiveness of safety management strategies of different 45 construction firms in Hong Kong. Their study identified seven (7) management strategies to reduce accidents rates on sites. The strategies were; level of management responsibility, orientation programmes, safety personal on site, safety awards and incentive schemes, post-accident investigation and feedback,

safety training and its intensity, presence of safety committees. Mohamed [8] reports that the construction industry in general seems to suffer from an inability to manage workplace safety and health to an extent where a proactive zero accident culture prevails.

Lingard and Rowlinson [9] used a similar research design to that of Duff et al. [5] in the Hong Kong construction industry and reported highly significant improvements due to the site housekeeping as their management strategy. They concluded that in “*behaviour-based safety management programs... safe behaviour can only be achieved where a basic safety infrastructure is already in place*” (p.225).

Cultural differences have significant impact upon safety culture and help in understanding the different approaches to accidents and safety management [10]. There is no single, accepted definition of culture. There is, however, a commonly-used set of characteristics that helps to identify culture: 1) culture includes systems of values; 2) culture is learned, not innate; 3) culture distinguishes one group from another; and 4) culture influences beliefs, attitudes, perceptions and behaviour in a somewhat uniform and predictable way [11]. This study is a part of an ongoing PhD research study, entitled “*Influence of national culture on construction safety climate in Pakistan*” being carried out by the first author. This study attempts to explore the possible influence of national culture on perceptions, attitudes and behaviour of construction workers and managers with regards to safety management practices. The part of this study which is reported herein was conducted to explore: a) local construction safety management practices, b) national culture value orientations in managers, and c) whether managers' national cultural dimensions influence their safety management policies and practices.

2. RESEARCH METHODOLOGY

The research methodology adopted was a cross-sectional one, based on a representative sample of eleven construction companies from eight large construction sites in Pakistan.

A three-part interview-based questionnaire survey was developed and administered by the first author, targeting local construction managers, who are considered to have safety management responsibilities and are aware of local practices. The sample included project managers, project engineers, site engineers, and site supervisors. The first part of the questionnaire, labelled as MS1, contained a detailed format of questionnaire addressing the key issues of the management safety systems. It included open- as well as close-ended questions.

The open-ended questions were provided with a view to get as much as possible information regarding site safety conditions and plans. This type of questionnaire also had several quantitative measures (Keys) built into it. These quantitative measures (Keys) were provided with an intention to translate the qualitative impressions gathered after each interview into some measurable rating scales. The second part of the questionnaire labelled as MS2 was the summary of MS1 and was developed in order to confirm whether the respondent is being biased or not. In other words this second questionnaire acted as a counter check tool for the results of the first questionnaire. MS2 contained 14 statements of close-ended type, addressing key safety issues of management systems. For each statement, managers were required to express the level of their agreement on a five point Likert-type scale where 1 = *strong disagreement*, and 5 = *strong agreement*. The third and final part of the survey explored the national cultural trends of managers and was labelled MS3. For this study the culture of Pakistan would be seen only from the well-known framework of Hofstede [12] which identified the following four (4) work-related cultural dimensions: 1) High/low power distance (PD), 2) Individualism (IND) and Collectivism (COL), 3) High/low uncertainty avoidance (UA), and 4) Masculinity (MAS) and Femininity (FM). MS3 contained 25 statements. For each statement, managers were required to express the level of their agreement on a five point Likert-type scale where 1 = *strong agreement*, and 5 = *strong disagreement*.

3. DATA COLLECTION AND ANALYSIS

Management staff of 11 construction companies from 8 construction projects was interviewed. Sample size included 100 managers for the MS1 & MS2 questionnaires and 130 managers for the MS3 questionnaire. Head offices of these companies were contacted to request the participation of project directors/managers in the survey, and to ask for permissions for interviewing managerial staff on site as well.

3.1 Managers' Safety Practices

MS1 explored the following areas of safety management practices:

- Existence of site safety plans;
- Level of competency and training;

- Safety monitoring and accident reporting systems;
- Communication systems within the workplace;
- Assumptions about the responsibility for safety; and
- Cooperation between main contractor and sub-contractors.

Survey results revealed a very low level of available safety plans that allows managers to monitor and audit safety performance. The majority of survey respondents were of the opinion that their organisations do not have printed and published safety documents at the organisation level. However, they indicated the existence of site safety plans at the site level, which - according to them - may not meet international safety and health standards, but are being effectively implemented on sites.

Managers seem to have little interest in using safety competence as a criterion for selecting and recruiting construction workers. However, managers of two out of the eight sites claimed having a recruiting policy for workers, managers and subcontractors that refers to safety competence. These two sites are being operated by a company that pays attention to safety competence when recruiting operators for special tasks such as crane operators. This particular company was found to organise mandatory safety induction and periodical 1-day programmes for its workers. In contrast, managers representing the rest of the companies reported the lack of such programmes.

The majority of the managers reported having some level of monitoring systems for safety on site, which usually include hazard reporting, incident and accident reporting. At two different sites – operated by the same company – a flow chart depicting clearly the process of safety monitoring and accident reporting was sighted. During discussion, it was made clear to the first author that managers believe workers feel reluctant to report hazards or accidents on their own will, till they are reminded again and again to do so.

As for communicating safety requirements and performance, management appears to be relying on adopting an informal approach to communication. Only two sites had informal safety meetings on a regular basis, and also had incorporated safety awareness poster campaigns. Other sites relied heavily on individual briefings to communicate safety messages, as this one-to-one approach is considered to be more reliable and effective.

Generally, the working relationship between the main contractor and subcontractors seems to be effective in handling safety issues. It was strongly believed, that the main contractor is always responsible for the safety issues on site, whether it is legally bound or not through contract.

3.2 Factor Analysis

As mentioned earlier, the sample size of the MS2 questionnaire was 100, thus the ratio of 7.1 to 1 variable was found to be within permissible limits for undertaking factor analysis [13]. The data gathered from MS2 was factor analysed by using principle component analysis with Varimax rotation. First, data suitability was assessed by the measure of sampling adequacy (MAS) test and Kaiser-Meyer-Olkin (KMO) test. Two variables were found short of the limits of data suitability, therefore were deemed fit to

eliminate them from further analyses. The 12 variables were put into for factor analysis. The process revealed the existence of a two-factor solution accounting for 82% of the total variance.

Seven items loaded on the first factor accounting for 63% of the total variance, and was labelled "*Strategic*". This factor contained seven items addressing safety management strategic issues. These items include; existence of effective safety plans for site; existing recruitment policy for workers; managers and sub-contractors with particular reference to their safety experience; training programmes for workers, managers and supervisors; and expected level of cooperation between main contractor and sub-contractors on safety issues. The majority of the items enjoyed relatively large factor loadings (>0.77). The mean and standard deviation scores showed that the majority of the managers were of the opinion that their organisation does not have proper and highly effective site safety plans [mean score = 1.49]; there is policy for neither having a safety competence criteria for the recruitment of staff (which includes, workforce, managers, site supervisors) nor for hiring of sub-contractors [mean score = 1.35]; no proper or specific safety training conducted for workforce [mean score = 2.01], managers and supervisors [mean score = 2.0]. Managers mentioned that the cooperation between main contractor and sub-contractors to handle safety at site is satisfactory [mean score = 4.29].

The second factor "*Operational*" contained five items addressing the operational aspects of site work. Such items included; monitoring safety policy and keeping safety records; having efficient hazard, incident and near misses reporting system; effectiveness of communication styles on promoting safety issues in the workplace. Managers' replies showed a mixed response on these issues. Many of the management staff confirmed the existence of proper safety monitoring policy [mean score = 4.68], and effective hazard reporting system on the sites [mean score = 4.15]. Presence of effective communication systems on safety issues was also strongly acknowledged [mean score = 4.88].

3.3 National Culture

In order to explore the national cultural trends, a factor analysis test was conducted. The sample for the MS3 questionnaire was increased to 130 in order to reach the adequacy of sample size for factor analysis procedure. Hair et al. [13] mentions, that as a general rule, the minimum sample size should be at least five times as many observations as there are variables to be analysed. A total of 24 variables were put for data suitability tests so as to proceed further for factor analysis. Test showed that five variables of the culture questionnaire could not meet the minimum value of 0.5. Therefore, each of the five variables was removed one by one and each time the test was repeated to check MAS.

Finally, 20 variables were put into actual factor analysis test, again using principal component method. The results revealed the presence of three factors accounting for 81 % of the total variance. The 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 have got the loadings equal to or more than 0.5 [13]. The factors formation pattern was almost the same like that obtained for workers cultural trends in Pakistan [14]. The items representing power distance and femininity loaded on the same factor, thus overlapping two cultural dimensions onto one. The first factor catered for nine items and accounted for 37% of the total variance. The second and third factors catered for six and five items respectively and accounted for 24% and 20% of the total variance, respectively.

Each factor solution was labelled in accordance with the set of individual items loaded onto it. The first factor was labelled "*Power Distance and Femininity*". The items loaded on this factor were basically addressing the issues of perception of power distance and femininity. Out of the nine items; five were posed to measure managers perception of power distance and rest of the four items addressed femininity. The mean values for the five power distance statements showed that managers have strong perception for power distance (4.12 – 4.65). Two of these statements were used to describe the active participation (if any) of workers in developing site safety plans and making decisions regarding site safety issues.

The second factor was labelled "*Uncertainty Avoidance*". The six items or statements for this factor were of two different styles. Two statements were presented in such a way that agreement with them would represent high uncertainty avoidance (mean values ranging from 1.52 to 1.54) and the rest of four items were presented in a way that disagreement with those items would represent high uncertainty avoidance (mean values ranging from 4.42 to 4.56). Managers' responses for all these statements (whether in agreement or not) revealed a high degree of uncertainty avoidance attitude.

The third factor had five items and was labelled "*Collectivism*", because all the items it catered for, were posed to measure the perception of collectivism among the managers. The relatively low mean score values (1.20 to 1.59) for the responses showed that managers also possess strong perception to work collectively rather than individually.

3.4 Relationship between Managers Safety Practices and National Cultural Values

To identify whether national cultural values influence managers preferences for safety management practices, a Pearson correlation test was carried out in order to explore the linear relationship between safety factors (identified in section 3.2) and the national culture factors (identified in section 3.3) [refer to table1 for the Pearson correlation values along with the significance values]. The Pearson correlation results revealed some strong linear correlations between the two sets of factors. Presence of such pattern of relationship depicts that there is strong effect of femininity and power distance on the strategic and operational issues of safety. Therefore, one can conclude that Managers' decisions regarding safety plans, safety monitoring, hazard reporting, cooperation between main contractor and subcontractor are being strongly affected by the femininity and power distance

cultural dimension.

The second cultural dimension of “*Uncertainty avoidance*” showed the negative relationship with the first factor of safety management systems “*Strategic*” and surprisingly a positive relationship with second safety systems factor “*Operational*”. As the descriptive analysis showed that managers have stronger uncertainty avoidance nature, therefore this negative relationship could be explained as the higher uncertainty avoidance, the lower will be their risk-taking attitude in their strategic safety planning. The positive relationship between *Operational* and *Uncertainty Avoidance* factors shows, the higher the uncertainty avoidance the higher the intensity of site safety activities like, hazard reporting, accident reporting, and use of effective communication channels for safety.

The third cultural dimension of *Collectivism* showed a strong positive relationship with the second factor of safety management systems *Operational*. From the descriptive analysis of the cultural dimension “*Collectivism*”, it was obvious that managers tend to be more comfortable and confident while working in a collectivistic environment. Therefore, this positive relationship depicts that operational aspects of safety at site will be more effective and efficient, if managers work closely together. These operational aspects include monitoring safety performance, a combined effort for hazard reporting, and the use of effective communication channels for safety.

Table 1. Statistically significant correlations between managers safety practices and cultural factors

		PD & FEM	UA	COL
Strategic	Pearson	.639	-.720	.598
	Correlation			
	Sig. (2-tailed)	.018	.037	.061
Operational	Pearson	.632	.720	.818
	Correlation			
	Sig. (2-tailed)	.001	.023	.017

4. CONCLUSION

Management surveys indicated that the majority of the sites did not have site safety plans. Only two out of the eight visited sites had safety plans, these were mostly generic documents that could be applied to any construction site. Six out of the eight sites denied, having any recruiting policy on the basis of safety experience or competence for the workers, managers and sub-contractors. Almost all sites showed affirmative attitude on existence of safety monitoring systems at least to some level. Managers were found to be happy in using the informal approach like individual briefings to communicate safety issues. Some evidences were found to show that the main contractor had effective safety co-operation with his organisation and sub-contractor

staff as well.

Cultural analysis revealed the presence of three cultural dimensions. Managers recommended “*power distance*” as a useful tool for effective administration. Managers tended to be more collectivistic and supportive, less masculine and more uncertainty avoiders while they make their safety decisions either in head office or on sites. These cultural findings in managers regarding power distance and collectivism are in line with Khilji [15] and Islam [16] findings. Khilji [15] findings state that the typical organizational structure in Pakistan is bureaucratic, centralized and not generally responsive to needs of employees. Also she pointed out that several local managers have resisted the development of participatory culture, in order to retain power and non-questioning culture. The Pearson correlation analysis of interrelationships between managers’ cultural trends and their safety management preferences revealed some strong relationship patterns.

This analysis shows that managers’ safety management preferences are being influenced by their cultural trends. Their safety related decisions, whether being developed in head office or on site are definitely influenced by their high collectivistic, feministic, power distance and uncertainty avoidance attitude.

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