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Original citation:

Shibani, A, Saidani, M & Alhajeri, M 2013, 'Health and safety influence on the construction project performance in United Arab Emirates' *International Journal of Public Administration*, vol 4, no. 2, 56A995A3923

<https://dx.doi.org/10.5897/JCECT2012.0225>

DOI 10.5897/JCECT2012.0225

ISSN 2141-2634

Publisher: Academic Journals

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Full Length Research Paper

Health and safety influence on the construction project performance in United Arab Emirates (UAE)

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Accepted 08 February, 2013

The traditional performance measurements of time cost and quality are no longer the only benchmarks for construction projects. In recent years there is an additional target of health and safety requirements challenging construction performance to plan more thoroughly. Wherever reliable records are available, construction is found to be one of the most dangerous safety criteria. Efforts have been made to address this problem but the results have been far from satisfactory as construction accidents continue to dominate. Despite the programs implemented by government authorities and measures introduced by companies themselves the number of construction accidents still remains alarmingly high. The principal aim of this research is to determine the importance of integrating and improving health and safety standards within construction project management in the United Arab Emirates (UAE), to investigate the extent health and safety influence- the construction project performance. Therefore, in the developing countries the construction industry continues to lag behind most other industries particularly as a consequence of inadequate organisational issues. From this perspective this research explores the approved methods adopted in the UK in order to improve the existing code of practice in the UAE thus introduce the foundations on which appropriate health and safety systems may be built. An overview of the published materials and the updated legislation were undertaken. To achieve the objectives of the study a questionnaire and interviews were carefully designed where 350 copies were distributed to construction industry companies in the UAE. Interview sessions have been also conducted to meet the first objective of the project which is to determine the health and safety currently applied on construction sites. The overall result of this research denotes that some safety managers were more concerned about cost than health and safety and in the UAE there is still a lack of preventive measures for reduction of occupational safety and illness on construction sites.

Key words: UAE, performance measurement, health and safety, construction industry.

INTRODUCTION

Health and safety is relevant to all branches of industry. It is particularly important for the construction industry which is among the most exposed sectors when it comes to occupational accidents. In spite of the high costs of work accidents, many construction companies adopt as their only health and safety management strategy the compliance with mandatory regulations. However only

being in compliance with these regulations might not be sufficient to guarantee excellence in health and safety performance as they cover only minimal preventive measures. Based on occurred accidents, the technical weaknesses of the designs were reduced by adding new requirements. But after that it became apparent that many accidents still occurred and that the root causes of these accidents were hardly the result of technical failures but much more the consequence of inadequate organisational issues. It was evident that these efforts are not sufficient truly to curb the occurrence of unsafe acts on construction sites. Many studies, for instance Hughes (2007), Hinze (2002) and Vredenburg (2002), have

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shown that health and safety improvements will only be achieved if workers change their behaviours; and incentive schemes are implemented to motivate them. Many civil construction companies have experienced difficulties in managing human resources mainly in the area of occupational safety and health management. These difficulties generally are revealed through research or interviews with company associates.

In developing countries, safety rules usually do not exist if any. The regulatory authority is usually very weak in implementing such rules effectively. The UAE is a developing country currently enjoying a strong growth in construction activities. According to the Arab World Competitiveness Report (2007), the UAE is the most competitive economy in the Arab world among the Middle East and particularly the Gulf States countries. Unfortunately its construction industry suffers from poor health and safety practices. The framework of the existing occupational and health conditions is fragmented and inadequately enforced making construction sites more hazardous. It may even be argued that relevant regulations are outdated and irrelevant in day-to-day construction operations especially with the event of the fact that the workforce may be drawn from many different countries, use many languages and have a variety of cultural backgrounds (Langford et al, 2000; Hughes, 2007). This can lead to health and safety problems. A new approach to the management of health and safety is therefore required.

LITERATURE REVIEW

Most construction projects cover a wide range of activities that could involve hazardous and risky operations. There are reasons to believe that the construction industry (CI) is more dangerous than other industries. CI is a very unique industry and unlike fixed workplace like factory. Construction site conditions are constantly changing and this always leads to the temptation to compromise on health and safety issues. In addition, the construction sector is characterised by a very fragmented structure in the production phase with a large number of independent companies. This type of organisation often makes management assignments in the building sector difficult and complex. It is not unusual that several sub-contractors are involved in a single construction project, often more than one at a time with varying influence on their own and other sub-contractors' working conditions.

A further characteristic of the CI that makes management of this sector more troublesome is the unfavourably high supervisor-worker ratio. This relationship is harder to develop if the ratio is too high, which is generally the case within the construction industry. Supervisors who have a more personal and positive relationship with workers have more favourable safety performance records (Fidderman, 2011).

Hughes (2007), Smallwood (2000) and Rowlinson and Lingard (1996) have attributed the prototype nature of construction projects, the transient nature of work low education levels of the workforce, and high levels of subcontracting as major contributing factors to poor safety records within the construction industry worldwide.

Construction industry accounts for high number of occupational injuries and fatalities every year. "Around 5500 people lose their lives each year through work-related accidents in the European Union. More than 75 000 are so severely disabled that they can no longer work. Moreover major surveys have found that people experience more physical problems at work than before dispelling the often fashionable belief that new technology has eradicated difficulties such as manual lifting of heavy objects. In the UK construction is a large industry which accounts for 8% of the gross domestic product of the United Kingdom. It employs one and a half million people and produces activity worth £65 billion each year. The UK construction industry has a world reputation for the quality of its work but it remains one of the most dangerous in Britain. The health and safety problem in the construction industry is its poor record when compared to the other parts of British industry. This performance deteriorated in 2000 and certain actions were taken by the HSE. A new Construction Division was launched in April 2002 and a new intervention strategy was developed. Clients and developers as well as construction sites are to be targeted in future. In 2001/02 the fatal injury rate per 100 000 workers was 42 while the industrial average was 088.

Fidderman (2011) gathered the statistics of fatal accidents in construction industries in selected countries worldwide from 1991 to 2000 which revealed the extent of the problems in construction industries worldwide. As regard to the UAE, the record is poor in terms of international standards. Accidents are often not made public. In 1999, 923 site accidents of Grade IV 1 and above were reported. Each accident involved two fatalities or 3 to 19 severe injuries or 01 to 03 million RMB Yuan in direct economic losses in which 1097 construction workers lost their lives (Qatar Statistical Yearbook of Construction (2000). The total construction workforce was 242860 in 1999 representing a rate of these Grade I-IV serious site accidents of 38 per 100000 workers. The fatality rate in these serious accidents is 45 per 100000 workers. This seriously underestimates the total fatality rate as single fatalities are not all reportable.

However, Construction Industry (CI) plays a vital role in boosting the economy of any country especially a developing country. It provides the infrastructure required for other sectors of the economy to flourish. Many studies such as Coble and Haupt (1999) have shown that construction industry reflects the level of economic development within the country. The construction sector everywhere faces problems and challenges. However in developing countries, these difficulties and challenges are present alongside a general level of socio-economic

stress and a lower productivity rate when compared to developed countries (Ofori, 2000). Construction within developing countries often fails to meet the needs of modern competitive businesses in the market place; and rarely provides the best value for clients and tax payers (Datta, 2000). Additionally this sector also demonstrates poor performance in respect of health and safety due to the absence of any stringent safety and construction laws. International labour organization (ILO) 1987 attributes the poor health and safety records in construction projects within developing countries to:

- (i) The high proportion of small firms and the high number of self-employed workers.
- (ii) The variety and comparatively short life of construction sites.
- (iii) The high turnover of workers.

The large proportion of seasonal and migrant workers and Kothari et al. (1995) found that in most developing countries for example like India there are no training programs for staff and workers, therefore no orientation for new staff or workers is conducted hazards are not pointed out and no safety meetings are held. Employees are expected to learn from their own mistakes and experience.

In adopting different approaches to health and safety in developed and developing countries two main differences can be identified. The first is the existence of legislation and its effective implementation, the second is hazard awareness.

Globalisation and effect of culture

The use of migrant workers in construction is a world-wide phenomenon and it is common practice in the UAE. Loughborough University carried out research visiting projects in Africa, Asia India, the Middle East and Eastern Europe to observe the health and safety measures employed and interview management staff. The visits together with a series of interviews and focus groups in the UK and mainland Europe were used to produce guidance manual (Bust and Gibb, 2006).

After the completion of that project cross-departmental social sciences and civil and building engineering discussions at the University identified areas for further investigation. First it was thought that the work in developing countries also raised questions about construction in the UK where there has been an increase in the numbers of migrant workers being employed. Secondly that this situation called for an assessment of the increasing variety of visual methods being used to communicate about health and safety on and about construction sites was necessary and ultimately the construction workers being employed around the globe.

Research on construction safety in Kuwait reported that

there was an extensive use of foreign labour. This different labour cultures and traditions reflect on human relations, different work habits and communication problems. The workers were emotionally vulnerable and preoccupied with their problems. All of these factors can affect the concentration and attention of the worker and may contribute to mistakes (Kartam and Bouz, 2000).

Culture has also emerged as an important factor in health and safety in construction particularly with the increasing internationalisation of procurement project. At the project and organisational level, there have been studies looking at such issues "Disputes and Construction Industry Cultures" and comparisons between organisational cultures of contractors and consultants (Rameezdeen and Gunarathna, 2003). This study demonstrates a growing awareness in the construction industry of the role of culture in project performance outcomes.

Legislative and legal framework governing health and safety in construction industry

Governments worldwide have maintained an ongoing commitment towards establishing a working environment free of injury and disease. This commitment is reflected by establishing performance based workplace health and safety legislation which sets generalized performance objectives and provides a system of clearly stated responsibilities to encourage greater self regulation for the construction industry. The regulations apply to all that are involved in construction work including contractors' subcontractors and suppliers. According to general safety and health provisions, it is the responsibility of the employer to initiate and maintain programs for safe working conditions for employees. It further states that any such programs shall provide for frequent and regular inspections of the job sites materials and equipment to be made by designated competent persons. The safety training and education regulations create a responsibility for the employer to avail himself of the safety and health training programs; and instruct each employee of any unsafe conditions and regulations applicable to employee's work environment to prevent any hazards.

In the UK, the Health and Safety at Work Act 1974 (HSW) is the basis of British health and safety law. It outlines the lawful requirements of the employers and the other people that may be included. A significant section of the act is the forming of the HSE Health and safety Executive and the HSC Health and Safety Commission (HSC). The purpose of the act was to assure safe and healthful working conditions for working men and women by authorizing enforcement of the standards developed under the act. The Health and Safety Commission conducted a review of health and safety regulation making more explicit, what employers are required to do to manage health and safety under the Health and Safety

at Work Act 1974.

In the UAE, health and safety are regulated respectively by the Ministry of Labour Law No 8 of 1980 Regulating Labour Relations as amended by Federal Laws No 24 of 1981 No15 of 1985 and No12 of 1986 Law. The Law is federal and is therefore applicable to all the emirates of the federation.

In the UAE health and safety in the construction industry is governed by the Ministry of Labour and Social Affairs by the Department of Labour Sector.

RESEARCH METHODOLOGY

The research methodology adopted consists of a questionnaire and interviews which were carefully designed, however questionnaires were distributed to 10 construction industry companies from both public and private sectors, but also from the companies operating in the oil sector.

Pilot interviews

The pilot interviews were also carefully designed (structured) with short and simple questions. A total of 7 interviews were conducted with senior people in 3 different construction companies (project managers, senior engineers, and senior site engineers). The interview form consisted of two main parts:

- (i) The first part includes information about company profile such as company name and business activity of the company and also respondent particulars such as field of specialisation and numbers of years of experience.
- (ii) The second or final part of the interview form dealt with the risk assessment of health and safety applied on construction sites by the company itself.

In its simplest form, a structured interview involves one person asking another person a list of predetermined questions about a carefully-selected topic. The person asking the questions is allowed to explain things the interviewee does not understand or finds confusing.

Like any other method of collecting data and information, conducting interviews has its own strengths, uses, weaknesses and limitations as shown in Table 1.

The pilot questionnaire and interviews helped with identifying problems with the questions before they were used. It also gave the author valuable experience in the relevant administrative procedures, contacting the respondents, explaining the purpose of the survey and timing each operation.

Structured interviews using repertory grid technique

Repertory grid technique

Based on the pilot questionnaire and pilot interviews, structured interviews were planned and executed with the ultimate aim of obtaining as much information as possible about health and safety on the construction sites and what are the barriers to adopting a health and safety strategy in the UAE construction companies. In order to make the study manageable, companies targeted by the interview were small to medium companies. The reason being, that larger companies were more likely to have health and safety policies and practices in place than small and medium companies. Also, only senior site engineers were interviewed. Interviews were

carried out, with 6 small size companies and 8 medium size companies. All companies interviewed were construction contractors.

The relatively novel technique of repertory grid is adopted in this study. It is relatively novel in the construction industry context, although the technique itself dates back from the 50s when a clinical psychologist by the name of Kelly developed the Personal Construct Theory (Kelly, 1955).

The use of Repertory Grids offered a number of great opportunities such as:

- (i) It allowed the selected construction managers to sufficiently respond to the questions asked at their own pace of time thereby increasing the reliability and accuracy of their responses.
- (ii) The information received from participants was standardised and consistent due to the design structure of the Repertory Grid.
- (iii) It was a very straightforward yet rigorous way of gathering qualitative information from experienced construction managers about how they view the management of health and safety operations.
- (iv) It is a fairly cheap and low cost data acquisition method with less interviewer bias and a high degree of anonymity with a wide access to geographically dispersed samples (as such is the case with UAE).

Interview framework

The procedure in which the interviews for the Repertory Grid data elicitation were performed is clearly shown in Figure 1.

The framework shown in Figure 1 was adopted from Okoroh and Torrance's (1999) work on subcontractor selection in facilities refurbishment projects. The initial step in eliciting the necessary Health and safety knowledge from the selected participants started with the researcher clearly stating the main objective of the research problem and the purpose of the Repertory Grid data elicitation exercise.

Before the interviews commenced the researcher assured the participating healthcare facilities managers that all completed Grid data would be kept in confidence.

In addition, participants' names were not included in any analysis. As there were no names used, a special coding system was used for further identification purposes. After the conformation of information confidentiality, the researcher proceeded with asking the participants to provide a list of the most critical risk factors they considered to have affected their rate of success when delivering construction projects. During the elicitation of constructs, a set of randomly selected pair of health and safety elements were displayed and the domain expert asked how they considered the risk exposure. The health and safety experts were also asked to show with reference to construct that they would use to describe the difference in management strategies. As a result of this process, the researcher was able to select the most popular critical constructs that carefully discriminated between the 'unimportant' and 'very important' risk constructs used by constructions managers to manage effectively their health and safety business processes in order to support the delivery of construction projects.

Preparing the grid

Generally, the grid is prepared with supplied or free-response elements and constructs arranged as shown in Table 2. During knowledge solicitation 8 key elements were used as pre-determined elements. These key elements of health and safety had earlier on been identified in literature review; the pilot and the major survey as being managed under an integrated health and safety approach in the surveyed contractor organisations. Therefore, in this research,

Table 1. Strengths and limitations of structured interviews.

This method has the following Strengths / Uses:	This method has the following Weaknesses /Limitations:
1. It enables the researcher to examine the level of understanding a respondent has about a particular topic - usually in slightly more depth than with a postal questionnaire.	1. Can be time consuming if sample group is very large (this is because the researcher or their representative needs to be present during the delivery of the structured interview).
2. It can be used as a powerful form of formative assessment. That is, it can be used to explore how a respondent feels about a particular topic before using a second method to gather a greater depth of information. Structured interviews can also be used to identify respondents whose views you may want to explore in more detail.	2. The quality and usefulness of the information is highly dependent upon the quality of the questions asked. The interviewer cannot add or subtract questions.
3. All respondents are asked the same questions in the same way. This makes it easy to repeat (“replicate”) the interview. In other words, this type of research method is easy to standardise.	3. A substantial amount of pre-planning is required.
4. Provides a reliable source of quantitative data.	4. The format of questionnaire design makes it difficult for the researcher to examine complex issues and opinions. Even where open-ended questions are used, the depth of answers the respondent can provide tend to be more-limited than with almost any other method.
5. The researcher is able to contact large numbers of people quickly, easily and efficiently.	5. There is limited scope for the respondent to answer questions in any detail or depth.
6. It is relatively quick and easy to create, code and interpret (especially if closed questions are used).	6. There is the possibility that the presence of the researcher may influence the way a respondent answers various questions, thereby biasing the responses. For example, an aggressive interviewer may intimidate a respondent into giving answers that don't really reflect the respondent's beliefs.
7. There is a formal relationship between the researcher and the respondent with the latter knowing exactly what is required from them in the interview.	7. A problem common to both postal questionnaires and structured interviews is the fact that by designing a “list of questions”, a researcher has effectively decided the things they consider to be important and unimportant.
8. The researcher does not have to worry about response rates, biased (self-selected) samples, incomplete questionnaires and the like.	

the researcher supplied elements for the Repertory Grids to all health and safety managers who were interviewed.

Analysis of the results

The results of the repertory grid study may be analysed both qualitatively and quantitatively. A qualitative analysis may be enough to develop a good understanding of the constructs that are important to the target audience.

In addition, and in order to identify which constructs are most relevant and most clearly distinguish the selected examples, the researcher may apply factor analysis to the participants' ratings of the examples. This may be achieved through a number of software that are freely available on the internet. The result is a dendrogram or tree diagram—similar to what you would get during a card sort exercise—that shows which examples are most closely associated with one another and also the selected examples' most differentiating characteristics.

Interview planning and structure

Basically, a repertory grid consists of (a) a series of *elements* that are representative of the content area under study, (b) a set of *personal constructs* that the subject uses to compare and *contrast* these elements, and (c) a *rating system* that evaluates the elements based on the bipolar arrangement of each construct. As a result, the parameters that are to be set in the design phase of a grid assessment are the selection of elements and constructs, the rating system to be used and the number of grids to be administered. These decisions will determine the type of information obtained. Therefore, the aims of the assessment must be closely considered.

Elements and constructs selection

Based on the preliminary questionnaire and interview, the elements and constructs were decided by the author.

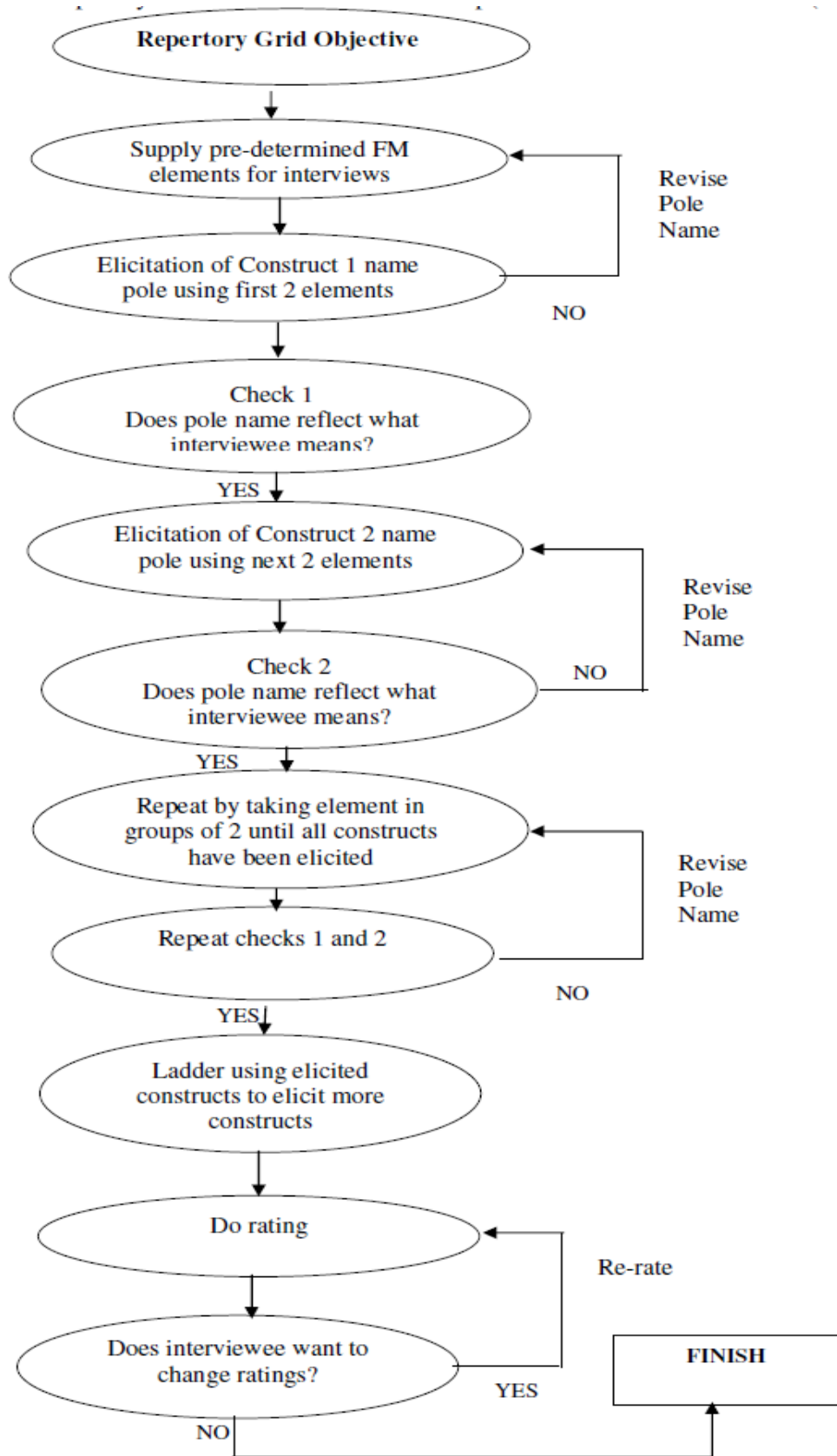


Figure 1. Repertory Grid elicitation framework adopted from Okoroh and Torrance (1999). Important questions which could have not been answered directly by the participants.

Table 2. Repertory grid from results of interviews.

Constructs	Elements								Contrasts
	1. H&S policy	2. Risk assessment	3. Risk management	4. Accident reporting	5. Accident recording	6. Follow-up (actions)	7. Cultural barriers to adherence to H&S procedures	8. Training of workers in H&S	
1. Existent	2.93	3.86	3.50	4.43	3.71	2.71	4.36	3.57	1.Non-existent
2. Updated	2.29	3.07	3.43	2.79	2.86	3.21	2.64	3.71	2.Out-dated
3.Made ware of	2.57	2.86	3.00	3.79	3.00	2.36	4.57	3.14	3.unaware of
4.Adhered to	3.14	3.64	3.57	4.29	4.14	2.71	NA	3.00	4. Ignored
5. Provided	2.43	2.57	2.79	3.71	3.57	3.07	NA	3.86	5.Not provided
6.Adequate	3.93	3.21	3.14	2.79	3.21	2.29	2.43	2.21	6.Inadequate

A rating level established from a Likert scale from the range 1 to 5 is considered to be appropriate in this research because more or fewer categories appear to be either too many or too few for user friendliness and accuracy of the results for evaluation (from strongly agree, rated 1, to strongly disagree, rated 5).

The 14 interviewees were asked the same questions and each of their answer is given a value between 1 and 5. For each individual construct, the participant rates an example on a scale of 1 to 5, where 1 represents one end of the pole (left side) and 5 represents the other (right side).

For example, if the participant identified a construct whose two poles are “updated” and “outdated,” the author asks the participant to rate each element on a scale from 1 to 5, where 1 is updated and 5 is outdated (the participant can give any rating between 1 and 5). The results obtained from all participants are then added together for each of the elements.

It is worth noting that the maximum score any element can get is 5. A score of equal or less than 2 indicate an inclination towards the ‘strongly agree/agree’ side, whereas a score of greater than 3 indicates an inclination towards the

‘disagree/strongly disagree’ side.

For example, on the question of whether a health and safety policy exists, a score of 41 was achieved (total of all responses from the 14 respondents). This is then divided by the number of respondents (14), which gives an average score of $41/14 = 2.93$.

An examination of the grid reveals that most results (percentages) lean towards the ‘strongly disagree’ side. For example:

- (i) 71% (3.57/5) of workers said that there is no training of workers and 74% (3.71/5) believe that such training, when existent, is outdated.
- (ii) 87% strongly agree that there exist cultural barriers to adherence to H&S procedures, although 91% said they were not made aware of such barriers, which suggests that the issue was not discussed.
- (iii) 86% of respondents admitted that they did not adhere to accident reporting procedures, and a similar percentage (83%) admitted not recording accidents. Interestingly, 71% of respondents said that they were not provided with means of recording accidents which explains why only 54% carry out any follow up action following an accident.

As may be seen, the repertory grid method is very powerful as it gives a lot of valuable information, all presented in a concise and clear manner showing all the possible links between the different elements.

The results were analysed using software called WebGrid. WebGrid is web implementation of Kelly's repertory grid technique for building conceptual models based on his Personal Construct Psychology (PCP) (Kelly, 1955).

The software is user friendly and quite easy to use. The author self-learned it in a very short time. The user is guided to enter the data in a very systematic and logical manner. The software then does the rest to produce output in the form of grids and maps.

The author will not attempt to explain how the software actually works because this readily available on the software's web site together with a help manual that details all the necessary steps in inputting data and interpreting output.

First, the software produces the actual Grid Data that was generated by the user through the input data (Figure 2).

It is worth noting that the software allows the use of nearest whole numbers only (integers), which explains why the numbers in Table 2 above

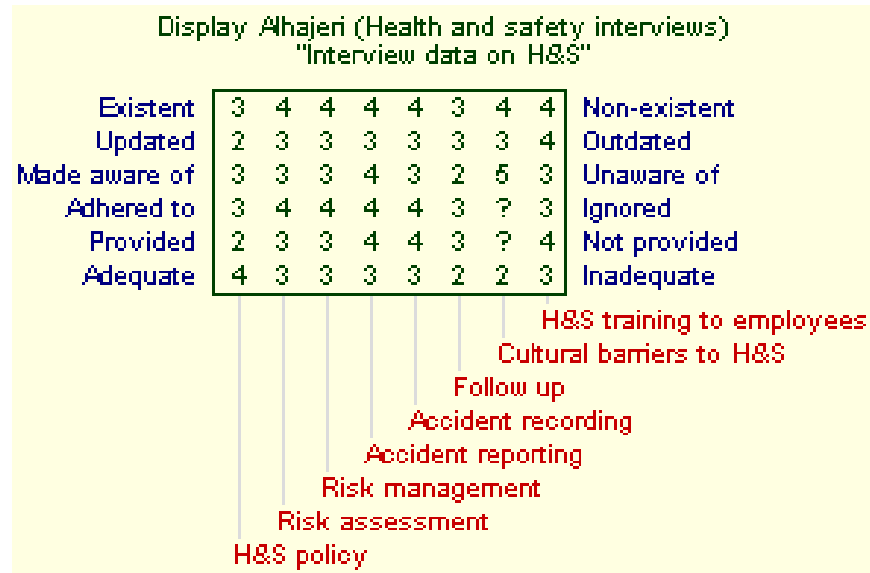


Figure 2. Grid data generated by the author.

have been rounded-off to the nearest integer between 1 and 5.

The use of the FOCUS analysis option is to sort the grid so that similar elements and similar constructs are clustered together (hence this called CLUSTER ANALYSIS). WebGrid graph show the data and returns it as a GIF as shown in Figure 2 for the current example.

The FOCUS (or CLUSTER) sorting analysis permits to see not only the actual data but also the interaction between the different features of the analysis, to see which ones are similar and which ones different. Typically, two-way clustering (co-clustering or bi-clustering) is carried out, that is, both elements and constructs are clustered and the sorted according to proximity. Then a dendrogram can be drawn on top (elements) and to the right (constructs) of the repertory grid.

The WebGrid cluster analysis algorithm is based on the FOCUS algorithm (Shaw, 1980). It uses distance measures to reorder the grid, placing similarly rated constructs/elements next to each other. This is kind of two-way hierarchical cluster analysis for both elements and constructs. The grid is rearranged to place similarly rated constructs/elements next to each other and a dendrogram is shown for each axis.

From Figure 3 it may be seen, for example, that the element "H&S policy" is closely related (80%) to the element "Follow up". Similarly, it may be said that construct "adhered to" is closely related (85%) to construct "existent". There is a 90% correlation between updated and inadequate. Also, it may be seen that "risk assessment" and "risk management" are virtually identical (100% correlation) in the current study.

Therefore, the cluster analysis is a very useful tool in detecting close associations and relations between the

different elements, constructs and contrasts.

DATA COLLECTION AND RESULT

The questionnaire was designed and distributed to investigate health and safety in oil and construction sites in the UAE. 350 copies were distributed to contractors in the construction and Oil sector in the UAE.

It is estimated that small and medium construction companies make up about 50 and 30% of construction and oil companies in the UAE respectively while large and oil companies constitute the remaining 20% equally. The number of questionnaires distributed to the companies was based on the percentages given above and hence 50 questionnaires were sent to companies which operate in the oil sector. On the other hand, 50 questionnaires were sent to large construction companies, 100 questionnaires were sent to medium construction companies and the remaining 150 questionnaires were sent to small construction companies. From the 350 questionnaires, only 130 questionnaires were filled out and returned.

Sample of questionnaire output

The questionnaire consists of seven parts in total. The responses to each question are analysed as a whole so that an overall view of the situation in the UAE is presented. Also, in-depth analysis by company type is conducted to determine the extent of those problems in each category. The purpose of each question is stated while carrying out the analysis and the result is demonstrated using appropriate charts. In some parts, a

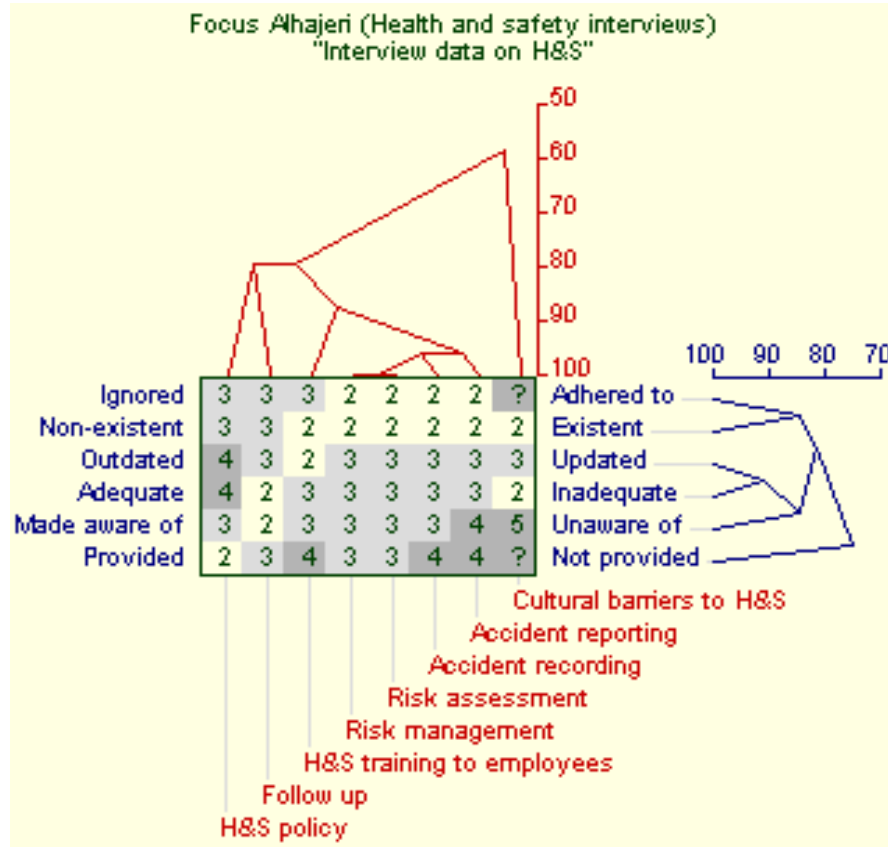


Figure 3. Clusters produced by FOCUS sorting analysis.

number of questions are grouped together as some questions are relevant to each other, making the analysis of responses to those questions more sensible. In this paper only a sample of questions asked and response received is given.

Summary of findings

With respect to the health and safety policy in the UAE construction companies, the questionnaire shows 69% of construction companies in the UAE have a serious lack of understanding of H&S policy importance. It specifically shows that this problem is serious in all small and 75% of medium construction companies as they have no awareness of such policy. Although the questionnaire highlights that 25% of medium construction companies possess an H&S policy, it is apparent from their explanation they are not fully aware of what kind of information the policy should contain.

To be able to produce a comprehensive health and safety policy, it is usually required to have extensive health and safety training. The questionnaire reveals a problem in this respect in the UAE as all medium construction companies tend not to have a specialised

health and safety officer and hence produce poor health and safety policies. Similarly, the questionnaire demonstrates that the H&S policy in 74% of large construction companies was signed by the executive managers of the companies who had basic training in health and safety. This could be problematic for companies of this size since their health and safety policy must be comprehensive and this is not usually achieved with basic health and safety training.

The frequency of updating the health and safety policy in these companies fluctuates widely as the analysis displays that only 30% of oil companies along with 7% of large construction companies update their H&S policy every 6 months which displays their appreciation of such action as to include any new arising health and safety issues in their policies and mitigate them effectively. In contrast, the analysis depicts a problematic situation in the remaining companies as 35 and 20% of oil companies and large construction companies respectively update their policy every one year only which is considered, to some extent, insufficient, as companies of this size are expected to have constant changing working conditions often which render their policy out of date.

With regard to the consultation of employees on health

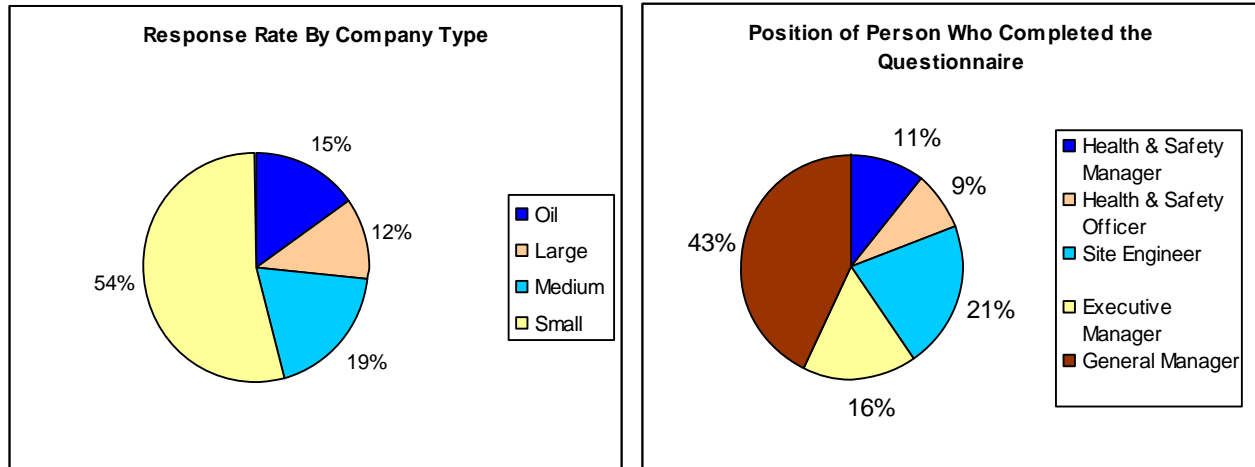


Figure 4. Company business type.

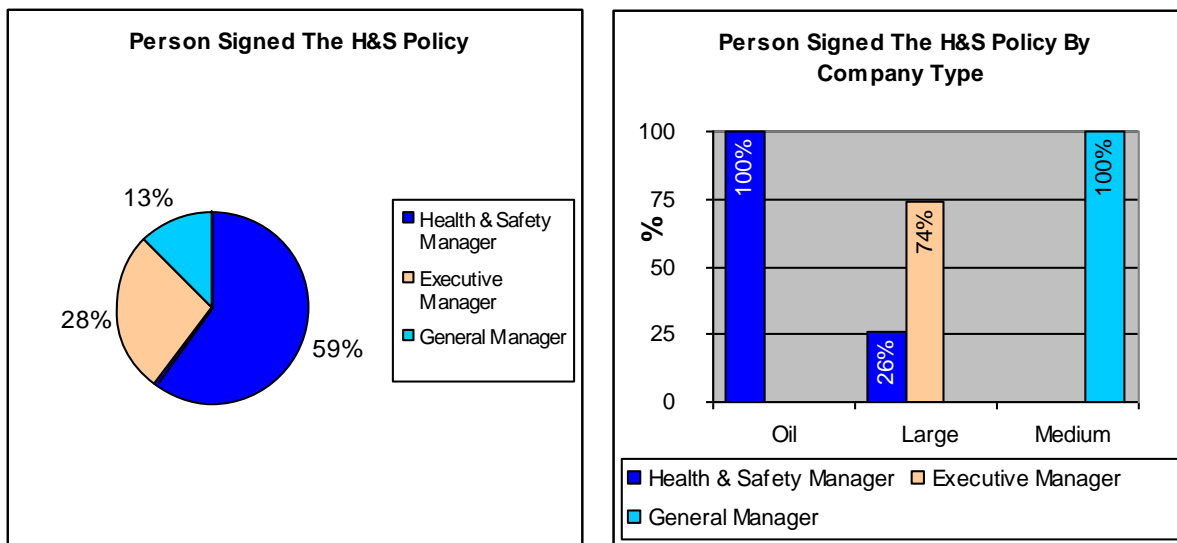


Figure 5. Position of person answering.

and safety matters by the companies, the analysis of data reveals the situation in the UAE is quite difficult as 70% of companies report they consult their employees, yet their explanation of the consultation is vague. For example, in response to the question, a company stated the following “we are conducting health safety programs and safety health campaigns”. This suggests that most of these companies either do not consult their employees in reality, and hence are embarrassed to admit it, or their consultation is poor and do not address any critical health and safety issues. The analysis of the questionnaire reveals at first look that all oil, large and 84% of medium construction companies have a healthy attitude toward the formal health and safety induction training to new employees. However, this perspective fades once the analysis of their response to the frequency of their health

and safety induction training is consulted as it reveals that 19 and 20% of medium and large construction companies respectively undertake the training induction every 6 months. Additionally, the frequency analysis demonstrates that 81 and 67% of medium and large construction companies respectively undertake the training once a year only with the remaining 13% of large construction companies undertaking the training every 3 months. Concerning health and safety induction and training, the questionnaire reveals the general poor attitude of the UAE construction companies toward the continuous health and safety training of their employees as only 18% of respondents confirmed having such training. This percentage consisted of 86% of oil companies and 14% of large construction companies. Figures 4 and 5 clearly show the lack of awareness of

small, medium and large construction companies in the UAE with regard to the importance of health and safety training.

DISCUSSION

There is still lack of preventive measures for reduction of occupational safety and illness on construction sites. Unfortunately the enforcement of health and safety regulations in the UAE is not widespread. Some may even argue that the framework of existing occupational and health conditions is fragmented and inadequately enforced. Therefore it is believed the integration of safety and health measures into a total management system within the construction sector in the UAE could contribute significantly to the cost efficiency quality assurance and environmental protection of the company and its employees. The law therefore should be inspected and maintained annually with the knowledge of specialists.

It was not surprising to find that the majority of firms do not allow for health and safety cost in their tenders particularly the small firms. This seems to suggest that these firms will find it difficult to implement the most effective health and safety during the construction phase of their projects. Therefore company size had a significant influence on a company's health and safety performance. This result was consistent with research by Hinze (1988) and Wilson (2009). The study shows that there were important differences between the larger and smaller contractors. This is not a surprising finding because smaller companies lack the resources to perform at a high level of health and safety performance. In general smaller companies have poorer standards. According to Monk (1994) many occupational accidents and injuries are due to breakdowns in the existing health and safety management systems. The result was found to be consistent with this research. When contractors scored highly in the management responsibility and health and safety system elements, their total health and safety standards tended to be higher. These two elements have the highest overall average scores and it is likely that many of the respondents recognised their importance. It was found that regular involvement by the company management improved the safety standards. This research confirmed that all the top contractors have regular health and safety reviews. Nishgaki (1994) showed that safety committees encourage the interaction between the parties on-site which helps promote accident prevention and safe work habits.

Conclusion

In the UAE there is still a lack of preventive measures for reduction of occupational safety and illness on construction sites. There is no reason why health and

safety performance in the UAE should not benefit from the same approach and achieve at least as much improvement. There is a very strong commitment from the government to improve health and safety standards but the law on its own would not be enough. There is a need to build a capacity for enforcement and the industry needs to improve things. Some sectors like oil and gas have standards that are comparable with the rest of the world. The benefit of implementing the safety and health program can increase the productivity in construction site by reducing accident. The principles of good and effective management provide a sound basis for the improvement of health and safety performance. Each accident should be investigated to the extent necessary to understand its causes and potential consequences and to determine how future accidents can be avoided. All the root causes will be identified and their relationship leading to the dangerous event will be revealed and the resulting consequences will be established. Then the complete scenario of events leading to an accident will be modelled.

Main findings summarised

The main findings from the research investigation may be summarised as follows:

- (i) 69% of construction companies in the UAE have a serious lack of understanding of H&S policy importance.
- (ii) In the UAE as all medium construction companies tend not to have a specialised health and safety officer and hence produce poor health and safety policies. Similarly, the questionnaire demonstrates that the H&S policy in 74% of large construction companies was signed by the executive managers of the companies who had basic training in health and safety.
- (iii) In all oil companies and 27% of large construction companies, health and safety policies were signed by health and safety managers with extensive experience and training in health and safety which reflects their awareness of its importance and commitment to the safety of their employees.
- (iv) All small construction companies together with 80 % of medium construction companies do not have a written health and safety policy. This result was concurred with findings from the interviews.
- (v) The frequency of updating the health and safety policy construction companies in the UAE fluctuates widely as the analysis displays that only 30% of oil companies along with 7% of large construction companies update their H&S policy every 6 months.
- (vi) In contrast, the analysis depicts a problematic situation in the remaining companies as 35 and 20% of oil companies and large construction companies respectively update their policy every one year only which is considered insufficient.
- (vii) The situation becomes worse with the remaining 35,

37 and 28% of oil, large and medium construction companies respectively as they update their policies only once every 2 years.

(viii) The remaining 72% of medium construction companies update their policies only upon significant change of working conditions which means, taking their work size into account, may not update their policy for up to 3 years as they do not usually see any major change in their work nature.

(ix) With regard to the consultation of employees on health and safety matters by the companies, the analysis of data revealed by the situation in the UAE is quite difficult as 70% of companies report and consults their employees, yet their explanation of the consultation is vague.

(x) The analysis of the questionnaire reveals at first look that all oil, large and 84% of medium construction companies have a healthy attitude toward the formal health and safety induction training to new employees.

(xi) However, this perspective fades once the analysis of their response to the frequency of their health and safety induction training is consulted as it reveals that 19 and 20% of medium and large construction companies respectively undertake the training induction every 6 months. Additionally, the frequency analysis demonstrates that 81 and 67% of medium and large construction companies respectively undertake the training once a year only with the remaining 13% of large construction companies undertaking the training every 3 months.

(xii) On the contrary the results from oil companies shows their commitment to the health and safety of their new employees as 70% of them undertake health and safety induction training every 2 weeks and 30% undertake the training on a monthly basis. Also, these companies explain that all new employees must attend this training before commencement of work and hence new employees would be made fully aware of the risks associated with their jobs.

(xiii) Concerning the health and safety induction training, the questionnaire reveals the general poor attitude of the UAE construction companies toward the continuous health and safety training of their employees as only 18% of respondents confirmed having such training.

(xiv) In contrast, 70% of the oil companies provide formal health and safety training to their employees every 6 months while the remaining 30% along with all large construction companies, which have health and safety training, do so every one year.

(xv) In terms of awareness of training schemes importance, the questionnaire reveals a serious problem across the oil and construction industries as all small, medium and large construction companies as well as 80% of oil companies do not belong to any training schemes.

(xvi) In terms of undertaking risk assessments, the questionnaire highlights there is, to some degree, an appreciation of risks assessments across the UAE

construction companies as all oil companies as well as large construction companies and around 44% of medium construction and companies have procedures for undertaking risk assessments.

(xvii) With regard to the health and safety inspection of sites, the questionnaire indicates that apart from oil companies and 33% of large construction companies, no other construction companies in the UAE take this matter seriously.

(xviii) In terms of accidents recording, the questionnaire as well as the interviews revealed that construction companies in the UAE generally need to improve their practice in this area with exception of oil companies and a small percentage of large construction companies.

(xix) With reference to enforcement agencies which deal with H&S issues in the UAE, the questionnaire reveals an untouched problem in this industry as all participating companies stated that they or any subcontractors working directly under their control had not been issued with any kind of improvement notice, prohibition notice or been prosecuted for neither health & safety nor environmental issues.

(xx) 71% of senior site engineers interviewed said that there is no training of workers and 74% believe that such training, when existent, is outdated.

(xxi) 87% strongly of those interviewed agree that there exist cultural barriers to adherence to H&S procedures, although 91% said they were not made aware of such barriers, which suggests that the issue was not discussed.

(xxii) 86% of those interviewed admitted that they did not adhere to accident reporting procedures, and a similar percentage (83%) admitted not recording accidents. Interestingly, 71% of respondents said that they were not provided with means of recording accidents which explains why only 54% carry out any follow up action following an accident.

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