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The Awareness Level of Behaviour Based Safety (BBS) In Construction Industry

Siti Nasyrah Ibrahim[1], Siti Nurani Hassan[2], Syed Abdul Hamid bin Syed Hassan[3], Mohammad Noorizzuddin Nooh[4], Norsyahidah Mohammad Yusof[5]

[1, 2] Consultation, Research and Development Department, National Institute of Safety and Health (NIOSH)
43650 Bandar Baru Bangi, Selangor, Malaysia
[3]Department of Occupational Safety and Health (DOSH), Block D3, Complex D,
Federal Government Administrative Centre, 62530 Putrajaya, Malaysia
[4]Faculty of Economics and Muamalat University Sains Islam Malaysia (USIM), Bandar Baru Nilai,
71800 Nilai, Negeri Sembilan.
[5]Institute of Labour Market Information and Analysis (ILMIA), Ministry of Human Resources,
63000 Cyberjaya, Selangor Malaysia

Abstract: **The rate of fatalities and serious injuries at construction site has risen ultimately for the last few years. One of the main factors of Occupational Safety and Health (OSH) incident is human errors. Behavioural Based Safety (BBS) is a systematic method that helps workers to identify and change their behaviours to prevent unwanted incidents at the workplace. This paper aims to identify the awareness level of Behavioural Based Safety (BBS) in construction sites. The methodology of this paper is through quantitative research on a total of 58 numbers of respondents among Safety and Health Officers (SHO) working in construction industry. The general finding of this paper shows the workers awareness in terms of behaviour is still in moderate level. Future research related to this field should be expanded to enhance the effectiveness of BBS system implementation in the construction industry.**

Keywords: **Behavioural Based Safety, Workers Behaviour, Construction, Incident rates, Occupational Safety and Health**.

1. INTRODUCTION

Occupational Safety and Health (OSH) have become a necessity in construction industry. Many laws and regulations are made to control the accident risks occurred at the construction site. Two main approaches have been applied to manage workers safety. One is system approach and the other one is behaviour-based approach. Occupational Safety and Health Management System (OSHMS) is the medium for the system approach. The application of OSHMS will help the organization to lead an effective safety and health practice as well as to maintain the status of compliance towards legal requirements. However, it is optional to have one.

Behavioural Based Safety (BBS) is a method to identify and change workers behaviours to prevent incidents in the workplace. BBS is the newest approach on creating a safe work culture. The essential of BBS is based on behaviourism and incorporates specific concepts from proper ergonomics to positive reinforcement. The BBS system focuses more on using the tools of behavioural psychology to decrease unsafe behaviour and human error that may lead to accidents. BBS takes serious interest in various high risk industries such as oil and gas, manufacturing as well as construction.

BBS is being practice in construction industry from developed countries such as the United Kingdom, Japan and Australia. Construction industry is one of the highest contributing industries towards the country's economy. However, such achievements have also contributed towards the safety issues where statistics showed that this industry has earned the reputation of being a highly hazardous industry due to its fatality rates [1]. Therefore, this paper tries to explore the effectiveness of BBS factors and level of awareness in construction industry.

2. LITERATURE REVIEW

Occupational Safety and Health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of the workers taking into account, the possible impact on the surrounding communities and the general environment [2]. The mass media also continues to report a variety of accidents and injuries in the workplace.

Table 1: SOCSO Annual Statistic 2013: Workplace Incidents by Industries

Industry/ Occupation	Fatality	Temporary Injuries	Permanent Disability
Manufacturing	58	1469	128
Mining & Quarry	5	30	-
Construction	69	83	12
Agriculture &Fisheries	33	488	14
Facilities	7	100	1
Transportation & Logistics	8	84	-
Wholesale & Retail	5	66	7
Hospitality & Tourism	-	19	-
Banking & Insurance	-	70	-
Public & government	-	67	-

(Source from SOCSO, 2013)

According to the Social Security Organization (SOCSO) statistics 2013, construction industry marks the highest fatality case [3]. Workplace accidents can be prevented if employers and employees more sensitive or has a good safety behaviour [4]. Effective implementation of OSH helps the development of good safety behaviour as the implementation of OSH regulations requires commitment from the employer to meet the security needs of the employees while the employees will need to have responsibility for their own security. OSH implementation is crucial to ensure compliance with the regulations. Studies have found that the security measures taken in the work place can lead to better safety performance [5].

The Occupational Safety and Health Management Systems (OSHMS) have been accepted as a way of continuing the approach to prevent or reduce accidents and injuries as well as increasing the OSH awareness in an organization. OHSAS 18001: 2007 is a requirement for the system management of occupational safety and health in order to facilitate an organization to control OSH risks and improve organizational performance. Safety and health management system based on OHSAS 18001 series is more similar to the OSHMS and built specifically to protect workers from health and safety aspects will also provide positive benefits to organizations [6].

Hazard is defined as anything that has the potential to harm people or damage any property. There is a strong belief the construction site is unsafe and very risky where accident occur may cause physical injuries or health illness in a long term basis. The term hazard in construction industry defined as working at height, scaffold, excavation, and formwork. In order to ensure a safe and conductive working condition, there are three basic steps that should be taken namely, identifying the hazard, assessing the risk and controlling the risk [7].

Behavioural Based Safety (BBS) is the application of psychological research on behaviour applied to safety in order to reduce accidents and injury in the workplace. BBS has derived from behavioural learning principles conceived by behaviourist during the late 19th century and developed into and approach through integrating organizational development with quality and safety management [8].

Attitude is the response to the ongoing evaluation of ideas, objects, activities, policies and value and can cause rapid changes in behaviour of a person. For example, in the construction industry, although the OSH management system has been established, unsafe work behaviour persists. This is because the nature of construction relies on profit. The workers

have to speed up their work to gain higher profit. Hence, the safe procedures are always violated. Studies in other countries show that 90 percent of workplace accidents are caused by employee errors and only 10 percent fall in unsafe work places and the use of improper equipments [9].

Employee error factors are due to lack of knowledge, lack of interest, negative attitude, and behaviour that is unsafe and inefficient. Pro-active action such as provision of remuneration, training, and investment in the environment is important to have successful implementation of OSH [10]. All OSH measures might fail if the employee does not have the right knowledge, attitude and behaviour towards the practice of OSH in the workplace [11].

3. METHODOLGY

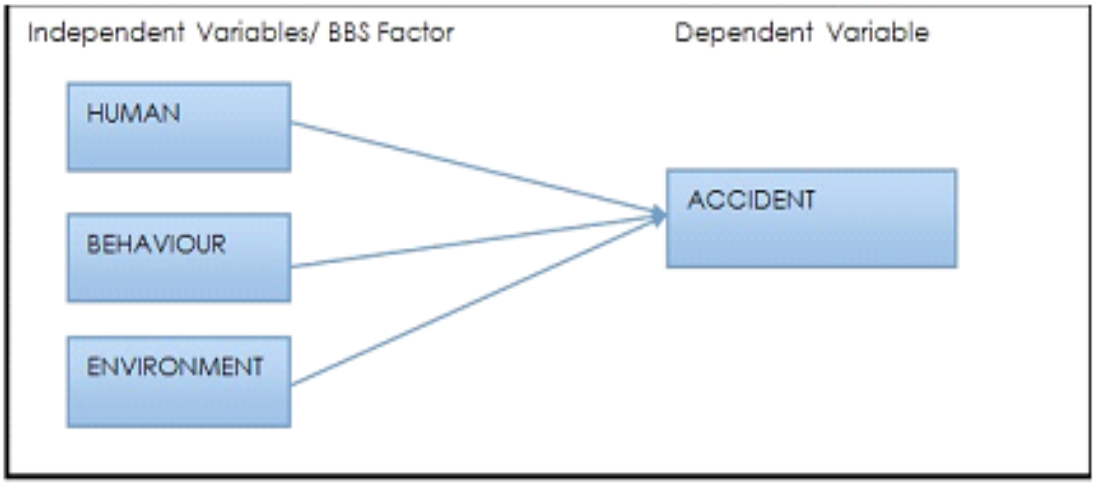

Fig. 1: Theoretical Framework adapted from previous researches

The BBS factors have been identified as human, behaviour and environment. Most of the researchers have agreed that BBS is the most effective method in eliminating occupational diseases at workplace. Figure 1 shows the theoretical of framework adapted from previous researches namely, Ten principles for achieving a Total Safety Culture [12] and Assessing safety culture [13].

A total number of 378 questionnaires were distributed to registered SHO working in the construction industry. However, only a total of 58 surveys were returned. The OSH awareness level in terms of knowledge, understanding and practice has been indicated and interpreted by descriptive analysis using Statistical Package for Social Science (SPSS). Cronbach's Alpha analysis was conducted to determine the reliability of the questionnaire for this study.

There are three types of analysis used in this study which are:

i. Demography profile:

An overview of respondent as well as company background and information in terms of regional, age, gender, working experience, education background, annual sales turnover and number of workers.

ii. Ranking analysis :

Determining the respondent feedback on BBS factors contributes to accident in the construction site.

iii. Descriptive (Frequency) analysis :

SPSS descriptive analysis was conducted to determine the mean value for each component of the behaviour factor. The mean score were then calculated. This method is used to support the ranking analysis result to determine the level of awareness among the construction workers focuses on the three parameters:

i. Knowledge

ii. Understanding

iii. Practice

A 3-level scale based on the mean score is used to interpret the level of awareness [14].

Table 2: 3- level scale of awareness

Mean range	Classification
1.00 – 2.33	Low
2.34 – 3.67	Moderate
3.68 – 5.00	High

4. RESULT

Table 3: The coefficient value for each variable

INDEPENDENT VARIABLES	CRONBACH'S ALPHA	BIL.ITEM
Human	0.978	33
Behaviour	0.981	24
Environment	0.965	18

Alpha coefficient ranges in value from 0 to 1 may be used to describe the reliability of factors and multi-point formatted questionnaires or scales (i.e., likert scale: 1 = poor, 5 = excellent). The higher the score, the more reliable the scale is. Based on the Cronbach's Alpha analysis, the reliability for each variable manipulation is high, ranging between 0.9 and approaches to 1.0. In conclusion, all of the statements provided in the questionnaire are easily understood by respondents. Previous study in Psychometric Theory has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature [15].

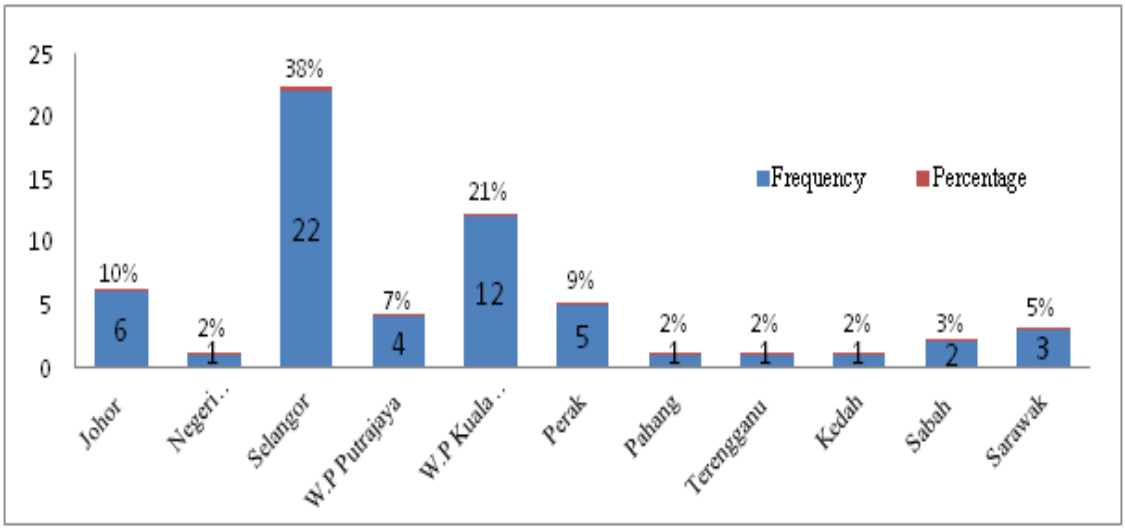

Fig. 2: Classification by States

Figure 2 shows that the majority of 38 % respondents are from Selangor, while Negeri Sembilan, Pahang, Terengganu and Kedah have the lowest number of respondent with 2%.

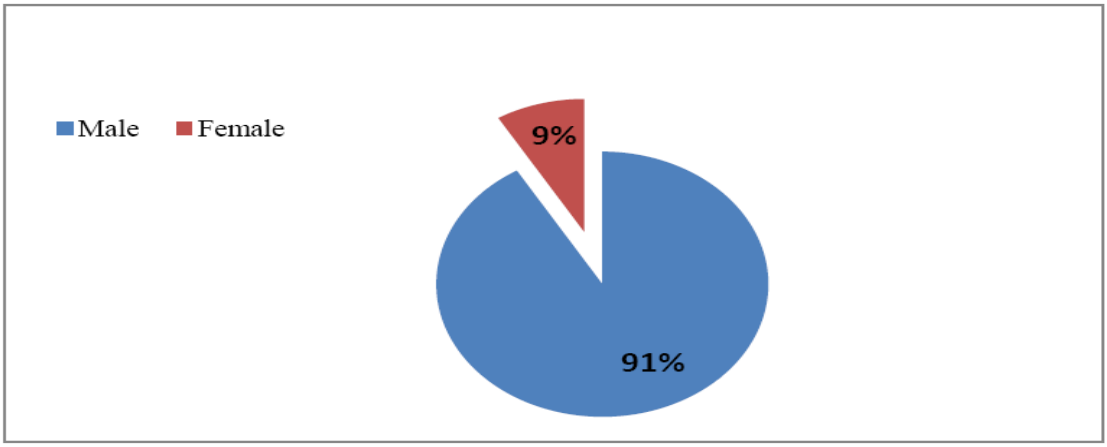

Fig. 3 : Classification of Gender

Figure 3 shows the majority of the respondents (91%) are male, followed by female with the percentage of 9%.

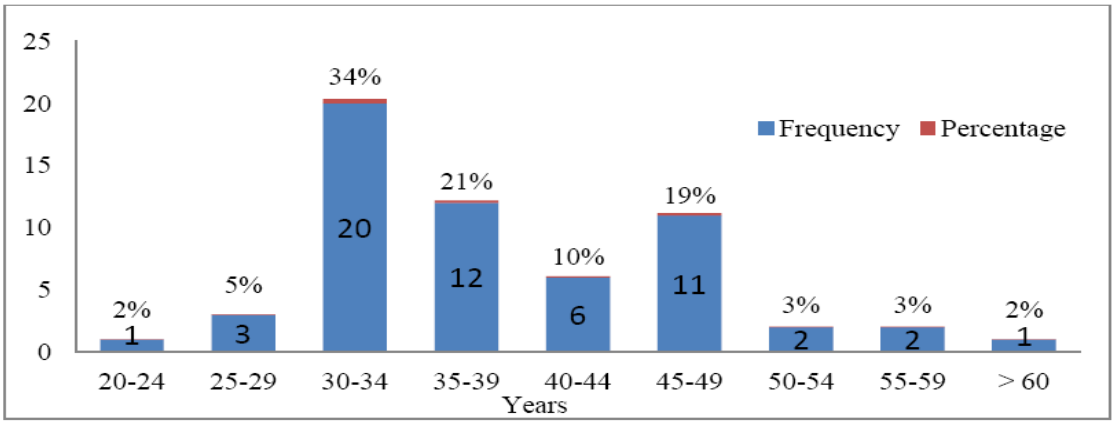

Fig. 4: Classification by Age

From Figure 4, most of respondents (34%) aged between 30-34 years, 19% aged between 45-49 and 35-39 years. Whereas workers between the ages of 50-54 and 55-59 years only 3%.

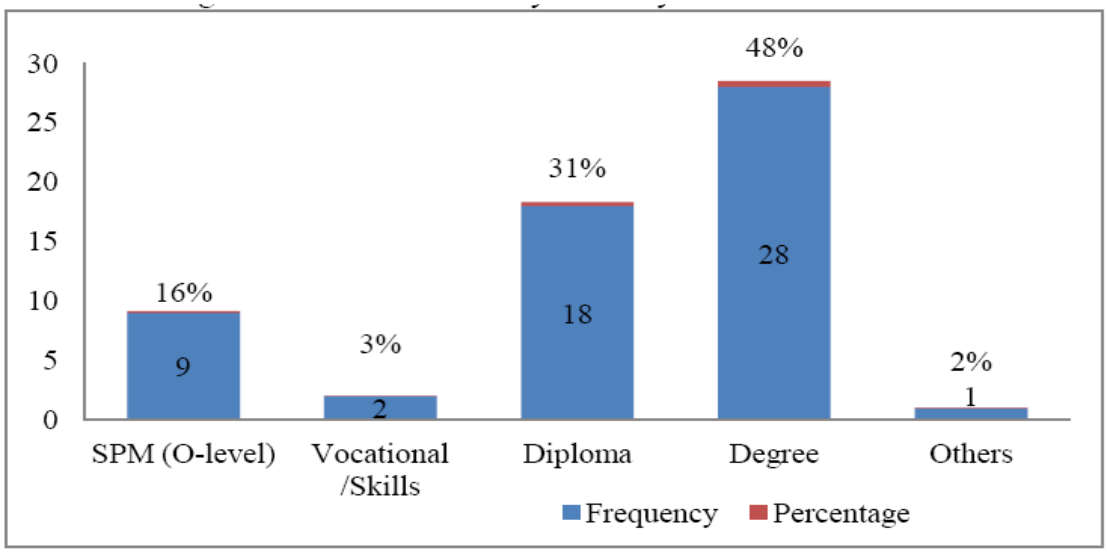

Fig. 5 : Classification of Education Level

From Figure 5, it was found that 48% of respondents have a degree and 31% with diploma. While only 3% of the respondents have skills certificate.

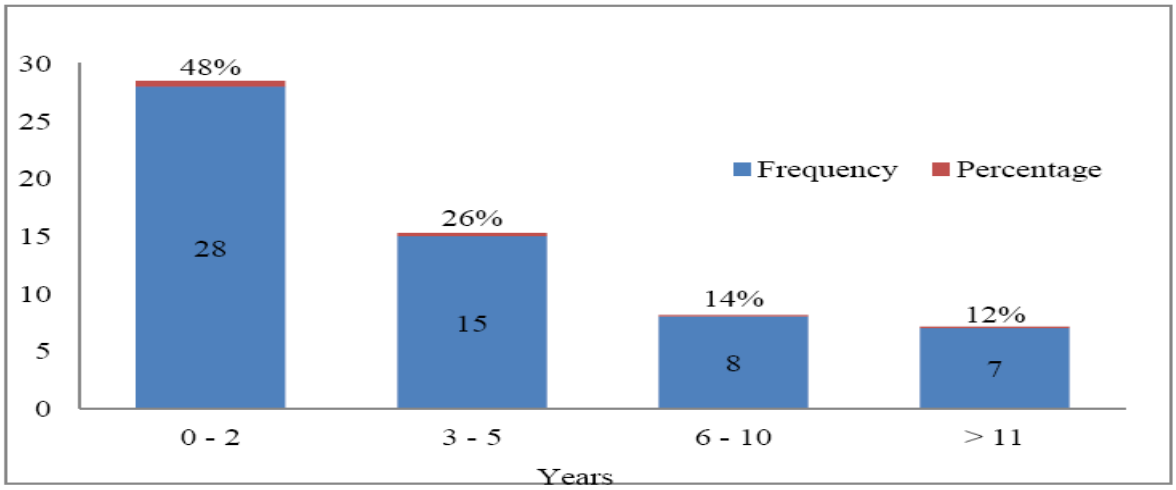

Fig. 6 : Classification of Working Experience

Figure 6 shows the majority of respondents have work in the construction industry for 0-2 years (48%), followed by 26% of the working experience of more than 3-5 years.

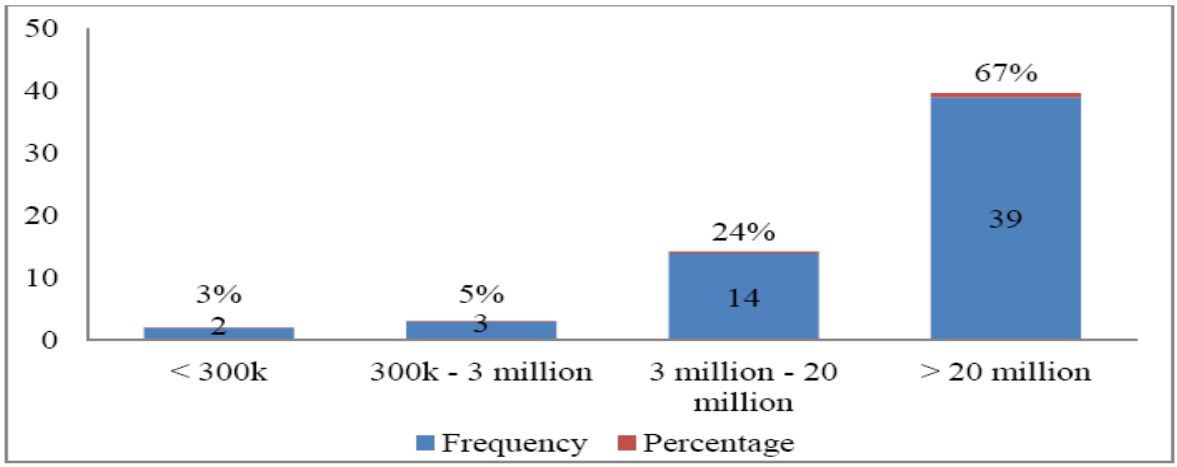

Fig. 7 : Classification of Annual Sales Turnover

From Figure 7, the annual sales turn over between 3 million – 20 million has recorded the highest number of 24%, while lowest percentage of 3% belongs to annual sales turnover less than 300 thousands. The majority of construction sites operating in Malaysia are in the category of 20 million and above. This indicates the need of compliance on section 29, OSHA 1994 on appointing a competent safety and health officer to be the OSH adviser [16].

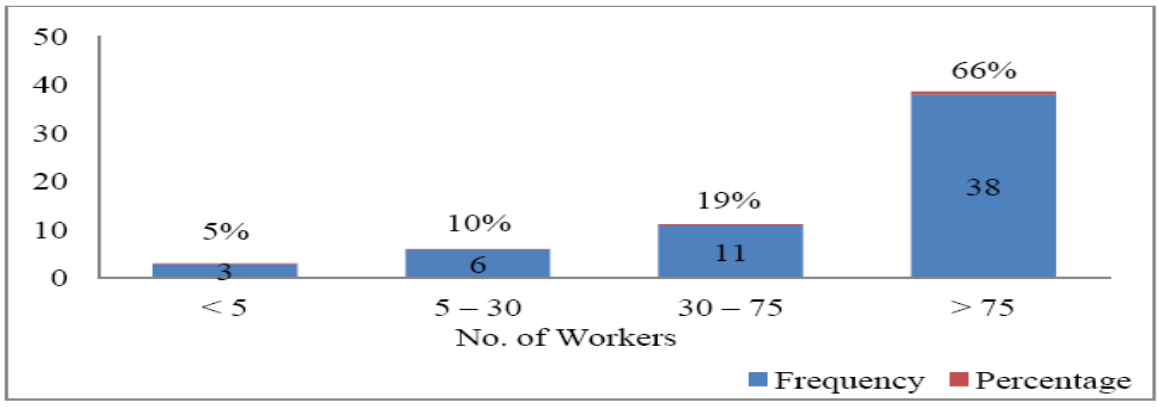

Fig. 8: Classification on Number of Workers

Figure 8 states most companies have more than 75 employees (66%), followed by number of employees between 30-75 and 5-30 at 19% and 10% respectively. Only 5% of the companies have less than 5 employees. Moreover, the majority of

the construction site has more than 75 employees. According to section 16, OSHA 1994 the employer must formulate Safety and Health policy if it has five employees and above. From Section 30, OSHA 1994 the organization of 40 employees and above shall establish a Safety and Health Committee. Therefore, most of the construction companies need to establish safety and health policy and form the Safety and Health Committee.

Table 4: Ranking Analysis Value on BBS Factors Contributing To Accidents

FACTOR	PERCENTAGE VALUE (%)
HUMAN	39
BEHAVIOUR	48
ENVIRONMENT	12

Based on Table 4, the majority of respondents agreed that behavioural factors are the main cause of accident (48%). This was followed by human and environmental factors, respectively 39% and 12%. From the ranking analysis, it was found that the behaviour factor plays an important component to ensure effectiveness of BBS.

Table 5 : Mean value and awareness level of Practice

No.	Components	Knowledge	Understanding	Practice	Awareness Level
1	Positive Reinforcement (e.g: Incentives, reward)	3.72	3.72	3.40	Moderate
2	Coaching approach	3.78	3.71	3.41	Moderate
3	Report any *unsafe act* (e.g: improper use of safety harness)	3.86	3.84	3.42	Moderate
4	Fatigue Prevention	3.89	3.86	3.49	Moderate
5	Report any *unsafe condition* (e.g: exposed *open edges)*	3.91	3.88	3.50	Moderate
6	Remind other workers on disobedient (e.g: Not wearing safety helmet)	3.91	3.86	3.55	Moderate
7	Effective Communication (e.g: *toolbox meeting*)	4.07	3.93	3.69	High
8	Regulatory compliance (cth: OSHA 1994, FMA 1967, BOWEC 1986)	4.07	3.93	3.64	Moderate

From Table 5, it was found the Knowledge and Understanding has higher mean scores than Practice. This shows that, even though the workers are educated and trained on OSH standards and requirement, their practice level still needs to be improved. Hence, the awareness level was determined by using a 3-level scale classification focusing only on the Practice level. The analysis result shows that there are a number of behaviour components still in moderate practice level. Improvements on the behaviour factor are necessary to create safety culture among workers at construction industry especially on effective communication, regulatory compliance, positive reinforcement and coaching approach. In addition, it can be said that most construction sites in Malaysia has been exposed by OSH awareness and the need to comply with the acts and laws relating to OSH theoretically. However, approaches on applying the practices and values of safety culture should be further enhanced.

Positive reinforcement is the key ingredient for addressing a range of issues in construction industry, such as communication gap, dangerous behaviour and disobedient workers. There are many ways to create positive approach including maintaining good relationship among workers. This is to close the gap between employers and workers through motivational approach. All instructions and compliance with OSH will be easier and organized with effective BBS approach.

5. CONCLUSION

The results of data analysis and control measures discussed in this study are expected to be a reference to renew and strengthen the OSH practice as well as upgrade the BBS system implementation at construction sites. Safe work culture should always be the priority when doing a job. Human behaviour plays a very important role in reducing and controlling risks, dangers and accidents in the workplace. It can be concluded, even though the workers had been given the ample OSH education and trainings, they are still lack in awareness level to implement good OSH practice at the construction site. Therefore, awareness level on having good OSH practice should be improved in terms of effective communication, regulatory compliance, positive reinforcement and coaching approach. Knowledge and understanding of OSH requirements alone are not enough to minimize unwanted incidents. This study is also expected to provide ideas for developing the effective measures to improve the level of humans by other studies such as human psychology, current issues in the construction industry and others.

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