Original Article

Impact of Occupational Safety and Health on Performance Improvement in Water Service Projects

Mohamad Mahathir Mohamed Younos,[a,*] Mohamad Syazli Fathi[a]

[a] *Razak Faculty of Technology and Informatics, Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, 54100, Kuala Lumpur, Malaysia.*

Corresponding author: mohamad.mahathir@gmail.com

Article history

Received 18/2/2022
Accepted (Panel 1) 17/10/2022
Accepted (Panel 2) 10/5/2023

ABSTRACT: *Occupational Safety and Health (OSH) has long been a crucial element in all industries, and especially in water services projects. Water services projects are high-risk industries dealing with complex engineering construction, chemical use, water supply, and people. The increasing number of accidents and fatalities, including those derived from risk-injury and work-related diseases, requires organisations to improve performance from an OSH perspective. This study reviews the impact of OSH on the improvement of the performance of water services projects in Klang Valley through comprehensive questionnaires and descriptive statistics. The findings show how far the water services projects, or the water industry, complies with the OSH requirements and how they persevere to be fully committed to the performance improvement requirements stipulated in the Occupational Safety and Health Act, 1994. This study concludes by examining how OSH can further improve work performance, particularly in water services projects, and the impact on future work and technologies.*

Keywords: *Enactment, Health & Safety, Occupational Safety, Projects, Water Services*

1.0 INTRODUCTION

Water services play a significant role in any country's economic development by establishing the necessary infrastructure for socioeconomic development, while being a major contributor to overall economic growth (Drewer, 1980). However, it is one of the most hazardous industries (Chua and Goh, 2004) owing to the number of accidents and fatalities. According to the Social Security Organisation Malaysia (PERKESO), there was a slight increase in the number of industrial accidents reported in Malaysia between 2012 and 2016, from 35,296 to 35,304 cases. Therefore, there is a need to consider new methods to improve

its image. One key to success in business is cost minimisation. Providing a safe and healthy workplace is one of the most effective strategies for reducing the cost of conducting a utility business. Accident frequency and property loss have a significant impact on utility companies. They cause delays in operations, and directly and indirectly incur costs. Therefore, utility companies must provide safe working environments for their employees and subcontractors.

On 25th February 1994, the Occupational Safety and Health Act 1994 (OSHA 1994) was enacted, protecting safety and health for work activities in all economic sectors, especially the utility sector. Rules and regulations regarding work at high elevations are provided by OSHA. The Department of Occupational Safety and Health (DOSH) and other government agencies have regulations that lay down the legal requirements to ensure the safety and health of the workers at the place of work, and the public as well.

This guideline applies to all places of work in building operations and engineering construction activities in Malaysia, covered by the OSHA 1994 (Act 514), the Factories and Machinery Act 1967 (FMA 1967) (Act 139), and all regulations made thereunder. It is designed to serve as a handy reference and can be read together with the abovementioned legislation and other industry codes of practice. Every employer involved in the construction industry is required to comply with all safety and health regulations at the workplace, as stipulated by OSHA 1994 and FMA 1967.

Nevertheless, Hinze (1997) asserted that overseeing security includes four levels: the organisation arrangement, venture administration, site administration, and individual levels. Disappointment at each level was the purpose of a mishap. Disappointment at the main level builds the likelihood of disappointment at the second level, and so on. Uncalled for Occupational Safety and Health (OSH) administration prompts poor security records. It is extremely difficult to accomplish the target of 'zero mishaps' because of the harsh and intense nature of the business. In general, OSHMS, for the most part, depends on the consistent observation of markers of the execution of pertinent procedures and nonstop changes in these procedures. In industrialised countries, mishaps cause a larger number of deaths than infections and any single ailment, aside from those caused by coronary illness (Biggs et al., 2005). Security is a noteworthy concern in any industry. In the utility business, the requirement for such a concern may be more noteworthy than in most other enterprises. This is because of the large number of modern wounds brought about by utility specialists.

2.0 METHOD

Questionnaires were issued to 110 carefully selected personnel within the company's 11 water services projects in Klang Valley to collect information and data. The 110 respondents were all key persons directly involved in the projects. Quantitative data from survey questionnaires were used in this study.

To calculate the sample size, a Z-score of 1.96 with a confidence level of 95% was selected. The confidence interval was 0.05 and the standard deviation was 0.9225. A small standard deviation indicated that the data were clustered near the mean.

Confidence Level	Z-Score
80%	1.28
85%	1.44
90%	1.65
95%	1.96
99%	2.58

$$\text{Sample Size} = \frac{(\text{Z-score})^2 \times \text{Std Dev} \times (1 - \text{Std Dev})}{(\text{confidence interval})^2}$$

$$= \frac{(1.96)^2 \times 0.9225 \times (1-0.9225)}{(0.05)^2}$$

$$= \frac{3.8416 \times 0.9225 \times (0.0775)}{0.0025}$$

$$= 0.2747 / 0.0025$$

$$= 109.88 \text{ (rounded up to 110 persons)}$$

The validity of the questions in this survey was determined by pre-testing, which is crucial to determine any problems with the survey form before sending it to the actual respondents. Unnecessary questions, technical glitches, and potential sources of bias can be eliminated early in the pre-test, so that they do not affect the final data.

In the pre-test, 10 people from the target group were asked to attempt the questions. The testers completed the survey individually just as they would in the actual project, but in the presence of an observer. They were required to complete the survey while thinking out loud, and the observer monitored whatever crossed their minds. For instance, they needed to express if they could not understand the questions, if the questions were too lengthy, inappropriate, or unnecessary, if they got lost in searching for the next section, if the option they wanted was not available, or if the question made them feel uncomfortable. They were allowed to scribble on the questionnaire, highlight or underline unclear sentences, circle irrelevant questions, and add suggestions and comments.

In addition, the testers were observed on how they completed the survey. It was crucial to see if they hesitated or made the same mistake on a particular question, because this could indicate that the survey questions and layout were not clear enough and needed to be improved.

As a result of the pre-test, several questions in the questionnaire were modified, the questions were made more comprehensive, and the number of questions was reduced to cater to the level of understanding and accuracy of responses. Nevertheless, as can be seen in Section C – OSH Management Framework, question number 3 in the actual survey, the answers to this question were all significantly shorter than the other open-ended questions. This indicated that the respondents did not understand the need for the question or were unclear about what they were supposed to answer. However, because the question is crucial, the question stays and all responses were carefully interpreted.

2.1 Survey

The responses were multiple-choice and participants had three options to choose from in the form of a Likert scale. Among the questions asked in the questionnaire were the qualifications of the respondents, the number of years of work experience of the respondents, the type of water services project they were involved in, the occupation of the respondents, and whether they were consultants, safety and health officers (SHO), project managers, site managers, skill operatives, or clients; regarding the problems they faced in the projects they were involved in, the following questions were asked: whether there was a limitation in the Health Safety and Environment (HSE) laws and regulations, whether was corruption, whether there was poor HSE culture, and whether there was a high level of insecurity. In addition, the factors that affected the implementation of HSE were also assessed: whether there was a cost overrun involved, whether there were frequent changes in the design of the project as a whole, a question regarding poor labour productivity, and whether there was any entity or operator involved.

Next, the processing and extraction of these data were analysed according to the collection and recording of the data from the questionnaires using SPSS Version 17.0, including quantitative analysis, mean, and relative importance index method (RII). In the final step, the results obtained and recommendations on how OSH can improve work performance, particularly in water services projects, and the impact on future work and technologies, were published.

In addition to these questionnaires, data from organisational sources were obtained. These included the company's HSE objectives and targets, HSE yearly key performance index, HSE annual report, HSE monthly report, HSE daily report, HIRARC checklist, HSE legal compliance checklist, HSE communication report, accident report, HSE monitoring, and risk governance report. Other outsourced data were obtained from the DOSH Malaysia and Social Security Organisation (SOCSO).

Table 1 shows the number of respondents who participated in the data collection and their respective projects. Table 2 presents the occupations of the respondents. Table 3 shows the qualifications of the respondents, and Table 4 shows the number of years of work experience of the respondents.

Table 1 Number of Respondents

No.	Water Service Projects	Number of Respondents
1	Pipe Replacement Project (1200 mm–200 mm)	10
2	Rehabilitation Elevated Pump House Project	10
3	New Development Project	10
4	Flowmeter Measurement Project	10
5	Meter Replacement Project	10
6	Valve Replacement Project	10
7	Burst Pipe Project	10
8	Leak Pipe Project	10
9	Tank Cleaning and Storage Tank Project (Confined Space)	10
10	Slope Repair Work Project	10
11	Concrete Work Project	10
	TOTAL	**110**

Table 2 Occupation of Respondents

No.	Occupation	Number of Respondents (%)
1	Consultant	15 (13.64%)
2	Safety and Health Officer (SHO)	8 (7.27%)
3	Project Manager	33 (30%)
4	Site Manager	21 (19.09%)
5	Skill Operatives	11 (10%)
6	Clients	22 (20%)
	TOTAL	**110 (100%)**

Table 3: Qualification of Respondents

No.	Qualification	Number of Respondents (%)
1	*Sijil Pelajaran Malaysia* (SPM)	0 (0%)
2	Diploma	5 (4.55%)
3	Bachelor's degree	82 (74.55%)
4	Master's degree	16 (14.55%)
5	PhD	7 (6.36%)
	TOTAL	**110 (100%)**

Table 4: Work Experience of Respondents

No.	Number of Years of Work Experience	Total Respondents (%)
1	Less than five years	11 (10%)
2	Between five to 10 years	14 (12.73%)
3	Between 10 to 15 years	67 (60.91%)
4	More than 15 years	18 (16.36%)
	TOTAL	**110 (100%)**

3.0 RESULTS AND ANALYSIS

Regarding sociodemographic characteristics, there were 110 carefully selected respondents throughout the water services company directly involved in the water services projects participating in this study. Among these, 15 of them were consultants, eight were safety and health officers, 33 were project managers, 21 were site managers, 11 were skill operatives, and 22 were clients.

With respect to qualification, Table 3 shows that none of the respondents had only studied until *Sijil Pelajaran Malaysia* (SPM), with at least a small number of five respondents studying up to diploma level. Undoubtedly, most had a bachelor's degree (n = 82). Another 16 respondents had master's degrees, and the remaining seven had PhDs. This shows that most respondents working on the projects had the required qualifications to understand and perform the task well. Respondents with higher qualification levels either worked on projects long enough to obtain the required experience to pursue their studies or decided to do so to climb the career ladder and fulfil their ambition and achieve satisfaction.

Table 4 presents the respondents' work experiences. Eleven of the respondents, 11% said that they had less than five years of work experience in water services projects, and 12.73% admitted to having between five and 10 years of work experience. This was followed by respondents with between 10–15 years of work experience (60.91 %), which was the largest portion in the category. However, 16.36% of them had more than 15 years of work experience. This tallied with the occupation of respondents, which showed that most of them worked as safety and health officers and site managers in the projects and were mostly in the third category with between 10–15 years of work experience.

In another section of the questionnaire, we asked questions about the impact of OSH on the improvement of water services projects' performance in Klang Valley. The response scores averaged between 3 to 5; the problem of 'poor HSE culture' had the highest mean at 4.48. This shows that poor HSE culture results in low OSH compliance in a project. This is a very terrible impression, as in any project and especially in water services, there must always be a high HSE culture among workers for the working environment to be safe. The next highest mean in the list was the lack of skilled staff at 4.28, followed by the severity of penalties, with a mean of 4.23. A penalty of RM 50,000 and two years of imprisonment imposed by the government does not help ensure high OSH compliance in a project if there is no awareness from the workers in the first place. Finally, inadequate facilities and equipment on the side and inadequate coordination and integration with means of 3.80 and 3.67, respectively, gives the impression that the facilities, equipment, coordination, and integration do exist in a water services projects, but are most probably not up to standard at times, thus leading to low OSH compliance.

Table 5 shows the problems affecting the implementation of HSE legislation in water services projects.

Table 5 Problems Affecting the Implementation of HSE Legislation

No.	Problems	Mean	Rank
1	Poor HSE Culture Among Stakeholders	4.48	1
2	Lack of Skilled Staff	4.28	2
3	Severity of Penalties to Offenders	4.23	3
4	Inadequate Funding Facilities and Equipment	3.80	4
5	Inadequate Coordination and Integration	3.67	5
6	Corruption and Bribery	3.62	6
7	High Level of Insecurity	3.62	7
8	Political Influence	3.44	8
9	Limitations in the Present HSE Laws	3.44	9
10	Outdated HSE Laws	3.32	10
11	Inadequate Government Commitment	3.21	11
12	Weak Judiciary System and Structure	3.03	12

Using the Relative Importance Index (RII) method, the grades of the effect of the HSE legislation on the performance improvement that remained were graded by scores of five, where one represents the least crucial and five represents the most crucial. The RII was calculated following Cheung et al.

$$RII = (\sum W) / (A \times N), \quad (1)$$

where W is the weight assigned to each factor by the respondent, ranging from one to five; A is the highest weight = five; and N is the total number of respondents.

Table 6 Relative Importance Index of Each Factor Affecting Performance Improvement

No.	Factors	Consultants R11	Rank	Contractors RII	Rank	Clients RII	Rank
1	Cost overruns	0.773	1	0.822	3	0.863	1
2	Frequent changes in design	0.701	4	0.666	4	0.707	5
3	Poor labour productivity	0.60.1	5	0.888	1	0.800	2
4	Quality non-conformance	0.734	2=	0.745	5	0.734	3=
5	Time loss during project execution	0.734	2=	0.877	2	0.734	3=

The consultant and client graded cost overruns first, with a relative index of 0.773 and 0.863, respectively, revealing the impact of poor HSE culture among stakeholders in cost overruns on water services projects. The findings also indicated that accident frequencies and property losses have a significant impact, leading to overrun costs in water services projects. Different from its contractors' rank, labour productivity is very poor at 0.888 due to the ignorance of workers and management and non-adherence to HSE compliance, including client requirements.

4.0 DISCUSSION

4.1 HSE Policy

A health and safety policy is a written statement by an employer describing the company's commitment to protect the health and safety of employees and the public. Management endorses a commitment to employees regarding their health and safety. A health and safety programme contains the health and safety elements of organisational objectives, which makes it possible for the company to achieve its goal of protecting its workers in the workplace.

The Occupational Health and Safety Regulations specify the minimum requirements for a health and safety programme. Some of the requirements specified in these regulations may not apply to every workplace. However, each employer should conduct their own health and safety risk assessment in consultation with the occupational health and safety committee to determine the hazards present in the workplace. Once hazards have been identified, controls for exposure should be detailed in the health and safety programme.

There are several reasons why workplaces need health and safety policies or programmes, including demonstrating management's full commitment to their employees' health and safety. The reasons are enumerated as follows: first is to show employees that safety performance and business performance are compatible; second, to clearly state the company's safety beliefs, principles, objectives, strategies, and processes to build buy-in through all levels of the company; third, to clearly outline employer and employee accountability and responsibility for workplace health and safety; fourth, to comply with OSHA; and finally, to establish safe work practices and procedures to be followed to prevent workplace injuries and illnesses (Neis & Lippel, 2019).

4.2 HIRARC (Risk Assessment)

The HIRARC is a compound word comprising three consecutive activities. These activities include hazard identification, risk assessment, and risk control. Hazard identification refers to the ability to recognise objects that may cause injury or harm to a person (Purohit et. al., 2018).

Risk assessments are very crucial as they form an integral part of an occupational health and safety management plan. They help to create awareness of hazards and risks, identify who may be at risk (e.g., employees, cleaners, visitors, contractors, the public, etc.), determine whether a control programme is required for a particular hazard, determine if existing control measures are adequate or if more should be done, prevent injuries or illnesses, especially when done at the design or planning stage, prioritise hazards and control measures, and meet legal requirements where applicable.

4.3 Legal and Other Requirements

Under the OSHA 1994, Section 15, it is stated that there are general duties of employers and self-employed persons that need to be adhered to for the safety of their employees, and that these duties also extend to the employees (Ismail and Othman, 2021).

Act 514 of OSHA 1994 under the Laws of Malaysia, Section 15 has been quoted below.

15. General duties of employers and self-employed persons to their employees.

(1) It shall be the duty of every employer and every self-employed person to ensure, so far as is practicable, the safety, health and welfare at work of all his employees.

(2) Without prejudice to the generality of subsection (1), the matters to which the duty extends include in particular-

(a) the provision and maintenance of plant and systems of work that are, so far as is practicable, safe and without risks to health;

(b) the making of arrangements for ensuring, so far as is practicable, safety and absence of risks to health in connection with the use or operation, handling, storage and transport of plant and substances;

(c) the provision of such information, instruction training and supervision as is necessary to ensure, so far as is practicable, the safety and health at work of his employees;

(d) so far as is practicable, as regards any place of work under the control of the employer or self-employed person, the maintenance of it in a condition that is safe and without risks to health and the provision and maintenance of the means of access to and egress from it that are safe and without such risks;

(e) the provision and maintenance of a working environment for his employees that is, so far as is practicable, safe, without health risks, and adequate as regards facilities for their welfare at work.

(3) For the purposes of subsections (1) and (2)-

(a) "employee" includes an independent contractor engaged by an employer or a self-employed person and any employee of the independent contractor; and

(b) the duties of an employer or a self-employed person under subsections (1) and (2) extend to such an independent contractor and the independent contractor's employees in relation to matters over which the employer or self-employed person-

(i) has control; or

(ii) would have had control but for any agreement between the employer or self-employed person and the independent contractor to the contrary.

The amendment of the Construction Industry Development Board Act 520 (CIDB ACT 520) under the Safety of Buildings and Construction Works also states employer responsibility.

The amendment also makes it the contractor's duty to ensure the safety of the building and construction work, whether during or after the construction work. This amendment is applicable to all contractors, whether registered in the CIDB or not. Similarly, any person with the right and power to manage or control a construction site must ensure that the construction site and the means of entering and leaving the site are safe and not harmful to health.

The amendment provides that in the event of a breach of safety, the CIDB is empowered to immediately stop the construction work, conduct an inspection at the site at the contractor's cost, order the execution of specified construction works, and demolish the defective building or any defective parts of the building. Contractors who fail to adhere to the directives issued by the CIDB shall be guilty of an offense and, on conviction, be liable to a fine not exceeding RM500,000, with respect to a continuing failure to comply, an additional fine of not exceeding RM10,000 for every day or part of a day, which the offense continues after conviction.

Any contractor whose breach of duty results in death shall be guilty of an offense and, on conviction, be liable to a fine not exceeding RM500,000, or imprisonment for a term not exceeding two years, or both.

Apart from that, the CIDB Act 520 Amendment also imposes a higher penalty on contractors who undertake construction works without valid contractor accreditation–from RM10,000 to RM100,000–compared to the maximum penalty of RM10,000 before the amendment. Contractors who do not declare their construction projects can be fined up to RM50,000. Contractors who fail to pay the levy can be fined up to RM50,000 or four times the amount of the levy payable, whichever is higher.

4.4 Consultation and Communication

Consultation is a legal requirement under OSHA 1994. Effective and timely consultations with employees are crucial for maintaining and improving safe and healthy workplaces.

The workplace manager and/or management of OSH nominees must establish consultative arrangements with Health and Safety Representatives (HSR) and employees when making any decision or change in relation to OSH in the workplace. These include the identification and assessment of workplace hazards or risks, decisions made on measures taken to eliminate or control workplace risks, review of workplace risk assessments, decisions made about the adequacy of workplace facilities, changes to procedures for monitoring workplace risks, proposed changes to work premises, systems of work, plants, or

substances used at the workplace, decisions about changes in job roles, and decisions about consultation procedures and legislative requirements.

Where the information required to be disclosed is confidential (e.g., medical reports and personal records), the workplace manager and/or management OSH nominee should seek legal assistance before deciding to disclose the information. The department will consult and communicate with internal and external stakeholders on matters affecting state-wide health and safety, as determined by Part 4 of the OSHA 1994 and under the main objectives of the department's Health, Safety, and Welfare Policy.

The workplace manager and/or OSH management nominee must communicate the following information to employees: existing OSH practices and systems, changes to current OSH practices and systems, and workplace inspection outcomes (Liu et al., 2019). This includes communicating specific elements of the OSHMS, including the workplace risk profile (OSH Risk Register), the department's health, safety, and welfare policy, completed risk assessments and safe work procedures, safety data sheets for chemicals, and emergency processes, such as evacuation plans and incident controller details.

4.5 Contractor Management

Contractor management is a system of controls that ensures contracted service support for safe facility operations and the company's process safety and personal safety performance goals. This element addresses the selection, acquisition, use, and monitoring of such contracted services. Contractor management does not address the procurement of goods and supplies or offsite equipment fabrication functions covered by the asset integrity quality assurance function. Meanwhile, the most significant contractor safety challenges typically involve workers assigned closest to process hazards or those involved in high-risk occupations, such as construction work, and the safety needs of contractors provide simpler and more routine tasks. In this case, water services projects are not excluded.

Companies are increasingly leveraging internal resources by contracting a diverse range of services, including design and construction, maintenance, inspection and testing, and staff augmentation (Coreynen, Matthyssens, & Bockhaven, 2017). By doing so, a company can achieve goals such as: (1) accessing specialised expertise that is not required continuously or routinely, (2) supplementing limited company resources during periods of unusual demand, and (3) providing staff augmentation without the overhead costs of direct-hiring of employees. However, the use of contractors involves an outside organisation within the company's risk control activities. Contractors can place personnel unfamiliar with the facility's hazards and protective systems in locations where they can be affected by process hazards. Conversely, contractors may expose facility personnel to new hazards such as unique chemical hazards or X-ray sources because of their work activities. In addition, on-site activities may unintentionally defeat or bypass facility safety controls. Thus, companies must recognise and address the new challenges associated with the use of contractors.

5.0 CONCLUSION

This study demonstrates a significant relationship between the level of OSH compliance in water services projects and the impact of OSH on the performance improvement of water services projects. Poor HSE culture, lack of skilled staff, severity of penalties, inadequate facilities and equipment, and inadequate coordination and integration contribute to a low level of OSH compliance. Noncompliance with existing HSE legislation leads to accidents that cause cost overruns, which affect water services project performance.

It is crucial that water services projects take the initiative to examine the demographic criteria of persons before hiring them. This ensures that only qualified personnel are hired. In addition, a good-quality HSE policy, HIRARC (risk assessment),

legal and other requirements, consultation and communication, and contractor management are equally crucial in observing the impact of OSH on the improvement of water services projects' performance.

Finally, compliance with safety regulations will be even more challenging in the future with the advancement of technologies (Revolution 4.0) and outside influences. Therefore, water services projects need to get their fundamentals right, thus enabling them to continue to be pioneers in the OSH field.

REFERENCES

Biggs, H.C., Sheahan, V.L. dan Dingsdag, D.P. (2005). A Study of Construction Site Safety Culture and Implications for Safe and Responsive Workplaces. *The Australian Journal of Rehabilitation Counselling,* Vol. 11, No. 1, pp. 1-8.

CIDB. The Amendment CIDB Act 520. Retrived from http://www.cidb.gov.my/index.php/en/akta-520.

Chua, D.K.H., & Goh, Y.M. (2004). Incident Causation Model for Improving Feedback of Safety Knowledge. *Journal of Construction Engineering and Management,* Vol. 130, No. 4, pp. 542-551.

Coreynen, W., Matthyssens P., Bockhaven W.V. (2017) Boosting Servitization Through Digitization: Pathways and Dynamic Resource Configurations for Manufacturers. Industrial Marketing Management, Volume 60, pp. 42-53.

Drewer. S, 1980. Construction & Development: A New Perspective. *Habitat International*, Vol. 5, No. (3/4), pp. 395-428.

Hinze, J. W. (1997). Construction Safety. Columbus, Ohio: Prentice Hall, pp. 1-6.

Ismail, K.A.K., Othman, I. (2021). Causes of Construction Accidents and the Provisions of Safety Regulations in Construction Industry in Malaysia. ICCOEE 2021: ICCOEE2020, pp. 602–607.

Laws of Malaysia. Act 514 Occupational Safety and Health Act 1994. Section 15.

Liu, K.H., Tessler J., Murphy L.A, Chang C.C, Dennerlein J.T. (2019) The Gap Between Tools and Best Practice: An Analysis of Safety Prequalification Surveys in the Construction Industry. *NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy*, Vol. 28, No. 4, pp. 683-703.

Neis, B. and Lippel, K. (2019) Occupational Health and Safety and the Mobile Workforce: Insights from a Canadian Research Program. *NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy*, Vol. 29, No. 3, pp. 297-316.

PERKESO. Number of Industrial Accidents Reported 2012-2016. Retrived from https://www.perkeso.gov.my/index.php/en/laporan/number-of-accidents on 26 August 2018.

Purohit, D.P., Siddiqui, N.A., Nandan, A., Yadav, B.P. (2018). Hazard Identification and Risk Assessment in Construction Industry. *International Journal of Applied Engineering Research*, Vol. 13, No. 10, pp. 7639-7667.