

**IMPLEMENTATION OF NOISE MANAGEMENT IN CONSTRUCTION
SITE**

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ABSTRACT

Recently, safety and health in construction industry are widely being discussed between academics and professionals. It is true that the construction industry is one of the riskiest sectors which contribute to a quite a number of accidents. Noise exposure is one of the hazards in construction site that could lead to accidents and also negative impacts to human health. There are several regulations and guidelines to prevent the massive exposure to construction workers. However, most of the construction workers are lack of awareness about the impacts of the noise emission to their health. The aim of this research is to investigate the current implementation of noise management for a construction site and the perception of the construction workers in the Malaysian construction industry about the hazard of noise. EMP and EMR report was used to investigate the implementation of noise control management in the construction site. Dosimeter was used to measure the noise exposure level for the 1 hour work duration and perception on noise exposure regulations by workers was surveyed by interview. The data on noise exposure was compared with the limits specified by the 3 regulations. The results showed that management team has taken minimum administrative and engineering control related to noise management in construction site. It also found that workers who handles heavy machineries was exposed to high noise level due to noises emit by the machine itself. Unfortunately the construction workers still lack of awareness about the hazards of noise because they do not apply proper PPE during handling the works even though they knew noise is a general problem.

ABSTRAK

Kebelakangan ini, keselamatan dan kesihatan dalam industri pembinaan secara meluas dibincangkan antara ahli akademik dan profesional. Adalah diakui bahawa industri pembinaan adalah salah satu daripada sektor yang berisiko menyumbang kepada beberapa kemalangan. Pendedahan bunyi bising adalah salah satu daripada bahaya di tapak pembinaan yang boleh membawa kepada kemalangan dan juga kesan negatif kepada kesihatan manusia. Terdapat beberapa peraturan dan garis panduan untuk mengelakkan pendedahan yang besar kepada pekerja-pekerja pembinaan. Walau bagaimanapun, kebanyakan pekerja-pekerja binaan kurang kesedaran tentang kesan pelepasan bunyi terhadap kesihatan mereka. Tujuan kajian ini adalah untuk menyiasat pelaksanaan semasa pengurusan bunyi di tapak pembinaan dan persepsi pekerja-pekerja binaan dalam industri pembinaan Malaysia tentang bahaya bunyi bising. Laporan EMP dan EMR telah digunakan untuk menyiasat pelaksanaan pengurusan kawalan bunyi bising di tapak pembinaan. *Dosimeter* telah digunakan untuk mengukur tahap pendedahan bunyi untuk 1 jam tempoh bekerja dan persepsi terhadap peraturan pendedahan bunyi bising oleh pekerja-pekerja telah dikaji oleh temuduga. Data mengenai pendedahan bunyi bising telah dibandingkan dengan had yang ditetapkan oleh 3 peraturan. Hasil kajian ini menunjukkan bahawa pihak pengurusan telah mengambil minimum kawalan pentadbiran dan kejuruteraan yang berkaitan dengan pengurusan bunyi bising di tapak pembinaan. Kajian ini juga mendapati bahawa para pekerja yang mengendalikan jentera berat terdedah kepada tahap bunyi bising yang tinggi kesan daripada bunyi bising yang dikeluarkan oleh mesin itu sendiri. Malangnya pekerja-pekerja binaan masih kekurangan kesedaran mengenai bahaya bunyi bising kerana mereka tidak menggunakan *PPE* yang betul dalam mengendalikan kerja-kerja walaupun mereka tahu bunyi adalah masalah umum.

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LIST OF SYMBOLS

L_{Aeq}	=	Equivalent continuous sound level
L	=	Exposure level
T	=	Duration
$L_{EP,d}$	=	Daily personal noise exposure level
L_{Aeq,T_e}	=	Sound level equivalent for T_e duration
T_e	=	Duration of the person's working days
T_0	=	28,800 seconds (8 hours)

LIST OF ABBREVIATION

OSHA	=	Occupational Safety and Health
GDP	=	Gross Domestic Product
dB(A)	=	Decibel
DOE	=	Department of Environment
EMP	=	Environmental Management Plan
EMR	=	Environmental Monitoring Report
FMR	=	Factories and Machinery (Noise Exposure) Regulations
NIOSH	=	National Institute for Occupational Safety and Health
HSE	=	Health and Safety Executive
REL	=	Recommended exposure level
TWA	=	Time weighted average
PPE	=	Personal protection equipment

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Safety at work is currently one of the global concerns. Malaysia has taken ways to overcome the concern by coming out with their own act which is Occupational Safety and Health Act (OSHA) in 1994. This act is concerned about the safety, health and welfare of all workers in their workplaces. To be exact, OSHA gives a guideline of responsibilities in term of safety compliance to all key people such as employers, self employed person, occupiers, designers, manufacturer, suppliers and employees. It is this person's responsibilities to adopt safety culture in their workplace environment to ensure the safety and health.

OSHA stated further duties of employers are to provide a safe environment of the workplace. In details, employer should ensure the workplace is safe and will not bring harm when the employees perform their work. He also has to provide adequate personal protection equipment to the employees and make sure the workers used them. He should provide the information about safety and health to the employees and comply with the regulations. Compliance of safety regulations should come

together between employers and employees in order to maintain and improve safe working environment.

Construction sector contributes 3.5% of the Malaysian Gross Domestic Product (GDP) which requires a quite number of employees (MITI, 2012). Construction industry also contributes a higher number of accidents and could become the hazard work place if there is no adoption of safety culture (McDonald *et al.*, 2008). These accidents happen probably because of lack of concern about safety in the workplaces. Therefore, safety culture in construction site should be adopted by the employers and employees should support by comply with the regulations. To ensure a positive and improving safety culture among the organizations, management team has to take the massive decision to put on safety first instead of profit or cost in their planning systems.

One of the important occupational health hazards in the construction industry is noise exposure (Legris and Poulin, 1998). Noise at the construction site is the physical and continuous contaminant to human health. It could cause negative effects such as loss of hearing if a person overexpose to the contaminant and result in a hazard. A study about noise exposure in 2008 concludes that any working environment in the construction industry produces high level of noise emission (Marcos *et al.*, 2008). Therefore, safety and health steps on noise emission in construction site have to be considered and to comply by the employers and employees.

Another study that has been conducted in Malaysia shows that noise is one of the common hazards at construction site that related to the risk of ill health that can only be notified after a long and continuous period of exposure time. Out of 140 sites involved in this study, 134 of them have problem related to noise. Through the observation at the site, most of the workers had a lack of awareness on using the personal protection equipment during performing their work. In addition, employers fail to provide adequate equipment according to the number of workers. This

situation has to take into consideration to improve the safety and health of the workers (Hamid *et al.*, 2003).

Instead of OSHA, Ministry of Natural Resources and Environment has published 3 sets of guideline regarding the noise emission around human activities. To be more specific, this guideline is to be used for planning purposes and noise limits control by the local authorities and the people involved in such human activities that could contribute to high noise emission. Construction industry also included as a part of human activities that liable by the guidelines. Therefore, employers should concern about this guideline and comply with it to protect noise hazard among the workers and potential people that could expose to the hazard.

1.2 Problem statements

Study on a noise emission level in construction site has continuously been conducted almost 10 years back. Most of the study shows that noise emission level is high which are mostly coming from construction equipments and machineries. The range of the level measured previously is between 80 dBA to 120 dBA (Haron *et al.*, 2012; Koushki *et al.*, 2004; Fernandez *et al.*, 2008; Neitzel *et al.*, 1999; Legris and Poulin, 1998). Heavy equipments produce the highest level of noise emission therefore the exposure will risk the construction workers that working with and around the equipments (Neitzel *et al.*, 1999).

Continuous exposure of noise to the construction workers could become hazardous to their health. Previous study stated that construction workers that being over exposed to the noise will possibly suffer from hearing impairment, hypertension and elevated blood pressure level (Koushki *et al.*, 2004). In the United States, hundreds of millions of dollars being spent for noise-induced hearing loss (NIHL)

disease claims and 16-50% of them are from construction workers (Neitzel et al, 1999). These studies show that noise exposure could harm the worker's health if none or less prevention taken by the construction workers to avoid the hazard.

Guidelines from DOE clearly stated the limit of the permissible sound level according to the purpose of the development. The minimum level is from 50 dBA and the maximum level is 90 dBA. The guidelines also concern about the permissible sound level from machineries which being widely operated in construction sites. The minimum level is from 60 dBA and the maximum level is 118 dBA and the level is depending on the net installed power of the machineries. Regulation in European Union informs that workplaces which exceed the limit of 80 dB should provide the workers proper information and training about noise exposure assessment and the risk to hearing. The workers also have to undergo initial and further medical checkup frequently and provided personal hearing devices for their protection (Fernandez *et al*, 2009).

In the construction industry, most of the workers are not completed with high education. A study shows that level of education is essential in evaluating the awareness of the negative effect of noise exposure (Koushki, 2004). Therefore, employers should convey adequate information and provide enough training to their workers to improve the knowledge at the same time complying with the regulations and act. The problem is the information and training for safety in construction site to the workers in Malaysia is not being held adequately. It will lead to lack of knowledge and awareness about safety specifically in noise exposure and the level of complying with the regulation is low. This research is conducted to investigate the current implementation of noise management for a construction site and the perception of the construction workers about the hazard of noise.

1.3 Aim and objectives

The aim of this study is to investigate the current implementation of noise management for a construction site and the perception of the construction workers in the Malaysian construction industry about the hazard of noise.

The objectives of this study are as follows:

1. To investigate the current implementation of noise management in the construction site;
2. To obtain the noise exposure level experienced by the construction workers;
3. To investigate the perception of construction workers about noise hazard in a construction site.

1.4 Scope of study

The research was only focused on one building construction project around Johor, Malaysia and the measurement was taken at the super structure stage. The construction workers for measurement of noise exposure level were selected based on their task and more focus on heavy machine operators. The construction project also was identified for undergone Environmental Management Plan (EMP) before the construction project was started and Environmental Monitoring Report (EMR) every month and this report was used for determination of safety measures taken by the management team of the construction project. Only construction workers that work on site was measured and interviewed. Construction workers include site supervisor, operators, skilled labors and general workers. For compliance of noise exposure regulation, three regulations were used which are FMR, NIOSH and HSE.

1.5 Significant of the study

This study can be the reference for the employer to identify the noise exposure level for their workers while they doing their work. The noise exposure level experienced by the workers then was compared to the regulations such as NIOSH, FMR and HSE whether the level is below or beyond the permissible limit specified by the regulations. This study also can help the employee to provide the appropriate prevention method if the level of exposure is beyond the permissible limit such as providing personal protective equipment.

As the awareness part, this study can be referred to the public and private organizations towards the compliance of the regulation in construction sites by the employee and workers. The workers may not have enough information about the negative impacts of noise to them and this is the employee's responsibility to convey such information by giving them enough training and safety measures in construction sites.

1.6 Limitation of study

This study only covers the compliance of regulation in terms of the permissible exposure limit provided by the regulation. The management team for the construction project cannot provide the Environmental Impact Assessment for the purpose of comparison between prediction model before construction project was started and during the construction stage. The period of measurement on-site was limited to one day only due to inadequate person to entertain in the construction site while performing the measurement as they have to control the safety of the entire person in the construction site.

This study also should measured the construction worker from several construction stage but due to limitation of time only one construction stage was covered for the measurement on-site. Plus, the device used for the noise exposure measurement was limited and the usage must be managed properly. In terms of awareness of noise exposure, only the construction workers were interviewed and the perception about noise from consultant, design team and developer was not taken.

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