A Study on Assessment of material handling activities in manufacturing factory for occupational health improvement: Case Study in Green Food Industries

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By

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ABSTRACT

Occupational health problems happened on work such as material handling activities and the most common injuries that a worker usually have is low-back pain, disability and Musculoskeletal Disorders (MSDs). More employees are injured in industry while moving materials than performing any other single function. These injuries have been estimated to account for 20 percent to 25 percent of all occupational injuries, as stated by Reese (2000). The first objective of this study is to determine the workers’ responses on experiencing discomfort and pain during work through questionnaire. The second objective is to analyze the workers’ posture and lifting limits on material handling activities through NIOSH and RULA tool. The third objective is to propose solutions and improvement using engineering control for workers’ posture and lifting limits on material handling activities after revising the effectiveness of the proposed solutions. Ten workers are selected to participate in the questionnaire survey where five workers from the production station and another five from packaging station. Six case studies on the workers’ material handling activities are selected for risk assessments using analytical tools such as RULA tool to analyze the workers’ posture and NIOSH tool to analyze the lifting limits for that job. Two phases are conducted in each case studies where the first phase consist of current material handling method used and the second phase consist the improved material handling method. From the questionnaire, the results shows that most of the workers have the possibility of being affected with occupational health injuries where most of them are in production station. The results from the case studies Phase 1 also shows that workers are highly risk of injuries and the Phase 2 results show that it reduces the risk of workers having injuries.
ABSTRAK

Masalah kesihatan pekerjaan berlaku pada kerja seperti aktiviti pemindahan barang dan penyakit selalu dikenak oleh pekerja ialah sakit belakang, cacat dan Musculoskeletal Disorders (MSDs). Kebanyakan pekerja industri cedera kerana memindah barang dan kecederaan ini dianggar merangkumi 20 peratus hingga 25 peratus daripada masalah kesihatan pekerjaan sperti dikata oleh Reese (2000). Objektif pertama untuk projek ini ialah menentukan gerak balas para pekerja yang mengalami ketidak selesaan dan kesakitan semasa berkerja melalui Persoalanan. Objektif kedua ialah mengkaji postur pekerja dan had mengangkat melalui RULA dan NIOSH. Objektif ketiga ialah mencadang solusi dan pembaikian dengan menggunakan kawalan kejuruteraan untuk postur pekerja dan had pegangkatan bagi aktiviti pemindahan barang selepas menganalisiskan kecekapan solusi cadangan. Sepuluh pekerja telah mengambil persoalan penilaian dimana lima pekerja dari produksi stesyen dan lima lagi di bungkusan stesyen. Enam case studies diambil untuk menganalisis postur dan had angak untuk pekerja kilang tersebut dengan menggunakan RULA dan NIOSH. Setiap case study mengandunggi dua fasa dimana fasa pertama ialah cara pemindahan barang oleh pekerja dan fasa dua ialah pengubahahan dibuat untuk membetulkan cara pekerja membuat kerja. Dari ujian persolahan, didapati bahawa kebanyakan pekerja mengalami masalah kesihatan pekerjaan dan kebanyakan mereka dari produksi stesyen. Selain itu, analisis fasa satu menunjukkan bahawa para pekerja mempunyai risiko tinggi untuk mendapat masalah kesihatan pekerjaan dan fasa dua menunjukkan cadangan pembaikian itu telah menurunkan risiko pekerja mengalami kecederaan dan masalah kesihatan pekerjaan.
DEDICATION

For my beloved parent, aunts, siblings’ and cousins.
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<tr>
<td>LBD</td>
<td>Low-Back Disorder</td>
</tr>
<tr>
<td>RULA</td>
<td>Rapid Upper Limb Assessment</td>
</tr>
<tr>
<td>OWAS</td>
<td>Ovako Working Posture Analysis System</td>
</tr>
<tr>
<td>MSDs</td>
<td>Musculoskeletal Disorders</td>
</tr>
<tr>
<td>MMH</td>
<td>Manual Materials Handling</td>
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<tr>
<td>IEA</td>
<td>International Ergonomic Association</td>
</tr>
<tr>
<td>UTeM</td>
<td>Universiti Teknikal Malaysia Melaka</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>BLS</td>
<td>Bureau of Labor Statistics</td>
</tr>
<tr>
<td>RSI</td>
<td>Repetitive Strain Injuries</td>
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<tr>
<td>CTD</td>
<td>Cumulative Trauma Disorders</td>
</tr>
<tr>
<td>OS</td>
<td>Overuse Strain</td>
</tr>
<tr>
<td>OOS</td>
<td>Occupational Overuse Syndrome</td>
</tr>
<tr>
<td>RMD</td>
<td>Repetitive Motion Disorders</td>
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<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
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<td>L</td>
<td>Load Weight</td>
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<td>H</td>
<td>Horizontal Location</td>
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<td>V</td>
<td>Vertical Location</td>
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<td>A</td>
<td>Angle of Asymmetry</td>
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<tr>
<td>F</td>
<td>Frequency of Lifting</td>
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<tr>
<td>Abbreviation</td>
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<td>C</td>
<td>Coupling</td>
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<td>D</td>
<td>Vertical Travel Distance</td>
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<td>Coupling Multiplier</td>
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<td>RWL</td>
<td>Recommended weight limit</td>
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CHAPTER 1
INTRODUCTION

This chapter explains the background of the study which consist the study background, problem statements, objectives, scope and limitation of project, and report structure.

1.1 Background of Study

The study is about occupational health improvement of material handling activities in Green Food Industries factory. The study is conduct to identify the possibility of the factory workers having occupational health problems through questionnaire and analyze of workers’ postures and lifting limits on material handling activities. Improvement and modification postures and lifting limits are proposed using engineering control and evaluated for its effectiveness to reduce the risk of having occupational health problems by workers.

1.1.1 Factory Background Information

Green Food Industries was established on August, 2007 and situated in Malacca. The factory produces product which related to ‘mee-suah’ or vermicelli. Besides that, the factory has around 10 workers where some are permanent and part-time workers and consist of 5 machines. The factory consists of two station which is production and packaging station. Most of the material handling activities performed by the workers is by manually such as lifting bag of flour and transferring the dough to another machine.
1.2 Problem Statements

Below shows some of the problem statements that had been found which related to this study:

(a) More employees are injured in industry while moving materials than performing any other single function. These injuries have been estimated to account for 20 percent to 25 percent of all occupational injuries, as stated by Reese (2000).

(b) We have found that many of the lifting tasks contain trunk motions that are associated with high LBD risk as revealed by Lavender, Oleske, Andersson, and Kwasny (2006).

(c) In industrialized countries, upper limb work-related musculoskeletal disorders (UL-WMSDs) are the most common form of occupational diseases as stated by Colombini and Occhipinti (2006).

(d) A low fixed workstation height resulted in taller operators adopting a stooped posture, likely to contribute to shoulder, neck and back complaints as stated by Trevelyan and Haslam (2000).

(e) Musculoskeletal symptoms were also associated with individual factors including age, sex, marital status and job tenure as revealed by Choobineh, Hosseini, Lahmi, Jazani, and Shahnaz, (2007).
1.3 Objectives

The objectives of study are:

(a) To determine the workers’ responses on experiencing discomfort and pain during work through questionnaire.

(b) To analyze the workers’ posture and lifting limits on material handling activities through NIOSH and RULA tool.

(c) To propose solutions and improvement using engineering control for workers’ posture and lifting limits on material handling activities after revising the effectiveness of the proposed solutions.

1.4 Scope and Limitation of Project

The project is mainly focus on the manual material handling activities of the workers’ posture in the manufacturing factory. Introduction of the selected manufacturing factory, relationships between material handling activities and occupational health, evolution of ergonomic, various tools that can be use, proper posture, MSDs and the tools used are stated briefly. The tools use to evaluate the material handling activities are by using NIOSH and RULA tools.

However, this project only revise, recommend solutions and improvement for the bad manual material handling method, this solutions and recommendation of the new material handling method is up to the factory to implement or not. No attempt was made to measure the effects of the improved material handling method on workers’ performance.
1.5 Potential Benefits of Study

The potential benefits from this study can be given to the following parties:

(a) Factory employer
This study may help the factory employer to improve the working environment for the workers which also decrease the possibility of workers absent due to occupational health problems and improve its productivity.

(b) Factory workers
This study may help workers become aware the risk of having occupational health problems. Besides that, workers’ discomfort will be reduce if the propose work design are implemented.

(c) Author
The study helps the author gain knowledge on ergonomic which based on real situation. The author also had learned to use the analytical tools such as NIOSH and RULA tools to implement in real life. Through the study, author can improve his knowledge on ergonomic and knowledge on improve and redesign the work. From the knowledge gained, it is very useful for the author be able to use it on working after graduated.

1.6 Structure of the Report

This thesis consist of introduction, theory, activities performed, recommendation and modification of material handling method, and reanalyze the results after doing improvements. The thesis consists of seven chapters and each chapter is described as below: