UNIVERSTI TEKNIKAL MALAYSIA MELAKA (UTeM)

ENVIRONMENTAL ERGONOMICS AT HIGHWAY TOLL BOOTH

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By

OOI ZHUEN HONG

Faculty of Manufacturing Engineering

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OOI ZHUEN HONG

UNIVERSTI TEKNIKAL MALAYSIA MELAKA (UTeM)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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76, LORONG NANGKA 3,
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ABSTRACT

The main purpose of carrying out this project is to investigate how the ergonomic system is used in the different area including the factory, the workshop or others. So from the project, it will increase students' knowledge on the environmental ergonomic or formerly known as human factors. The topic that has been chosen by this final year project for the discussion is the ergonomic system in the toll booth in the highway. The highway toll booth that has been chose is Juru highway toll booth, situated at Penang. In order to identify the problem occurred among the workers during carrying out their work, questionnaire will be conducted and the problems that may be faced by the worker are highlighted among the workers. Lastly, discussion will be made and some of the recommendations will be highlighted in the end of this report.

DEDICATION

For my beloved mother and father.

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CHAPTER 1

INTRODUCTION

1.1 Background

Ergonomics is the study of work in relation to the environment in which it is performed (the workplace) and those who perform it (workers). It is used to determine how the workplace can be designed or adapted to the worker in order to prevent a variety of health problems and to increase efficiency; in other words, to make the job fit the worker, instead of forcing the worker to conform to the job. One simple example is raising the height of a work table so that the worker does not have to bend down unnecessarily to reach his or her work. A specialist in ergonomics, called an ergonomist, studies the relation between the worker, the workplace and the job design.

There are many obvious benefits of applying ergonomics in the workplace. For the worker, the benefits are healthier and safer working conditions. For the employer, the most obvious benefit is increased productivity.

1.1.1 Applying ergonomics to the workplace :

- Reduces the potential for accidents and incidents;
- Reduces the potential for injury and ill health; and improves performance and quality.

1.1.2 Objectives

- To observe and identify the environmental ergonomics factors that may have led to the occurrence of the problems at highway toll booth.
- To find out the data and analyse them to verify the comments from the toll booth workers.
- To bring out some solutions or recommendations that will be able to minimize the problems.
- To expose students to the ergonomic factors that will be always applied in the working area.

1.1.3 Scopes

In this final year project the scope will be cover the below criterion. To collect the data by make a questionnaire and interview section among the toll workers. Besides that, do the observation through video recording or camera photo to verify the questionnaire results. In addition, apply ergonomics equipments to measure air quality, sound level, temperature and illumination at the toll booth. Finally, come out

with some recommendations to make the current toll booth more comfortable for the workers. This final year project stresses on the research on the manual operations that are carried out at the toll booth. These manual operations do not include operations that use Smart Tag system and Touch n Go system. For this final year project, the places will be researching is Juru Highway toll booth. In Juru highway, these are five toll booths on both sides of the highway. Three of the toll booths on each side are manually operated while the other two is automated.

Figure 1.1 shows the Juru Highway Toll

1.2 Definition

1.2.1 Ergonomics

Ergonomics or human factor is a multidisciplinary activity striving information on people's capacities and capabilities for use in designing job, products workplaces, and equipment. As concerns about productivity, employees job satisfaction, and health and safety in the workplace have increased, interest in ergonomic has also increased. Many schools with an industrial engineering or a psychology department now include a course in human factors, and industrial hygienists are expected to know some ergonomics principles for certification.

Medical professional are recognizing the value of ergonomic analyses of jobs to assist them in the rehabilitation of people returning to work after illness. In addition, with increasing industrialization of developing countries, there is more demand for design guidelines that recognize the capabilities of people in manufacturing systems.

The probable benefits of well-designed jobs, equipment, and workplaces are improved productivity, safety, health and increased satisfaction of employees. Removing unnecessary effort from jobs or reducing demands by improving the way in which information is transferred between people or between product and people (inspection) allows for greater productivity and, ultimately, higher profitability.

The term's ergonomics and human factors are often used synonymously. Both describe the interaction between the operator and the job demand, and both are

concerned with trying to reduce unnecessary stress in the workplace. Ergonomics, however, has traditionally focused on how works affect people. This focus includes studies of their physiological responses to physically demanding work; environment's stress such as heat, noise, and illumination; complex psychomotor assembly tasks; and visual-monitoring task. The emphasis has been on ways to reduce fatigue by designing task within people's work capacities. In contrast, human factors, as practiced in the United States, have traditionally been more interested in the man-machine interface, or human engineering. It has focused on people's behaviour as they interact with equipment, workplaces, and their environment, as well as on human size and strength capabilities relative to workplace and equipment design. The emphasis of human factor is often on design that reduces the potential for human error.

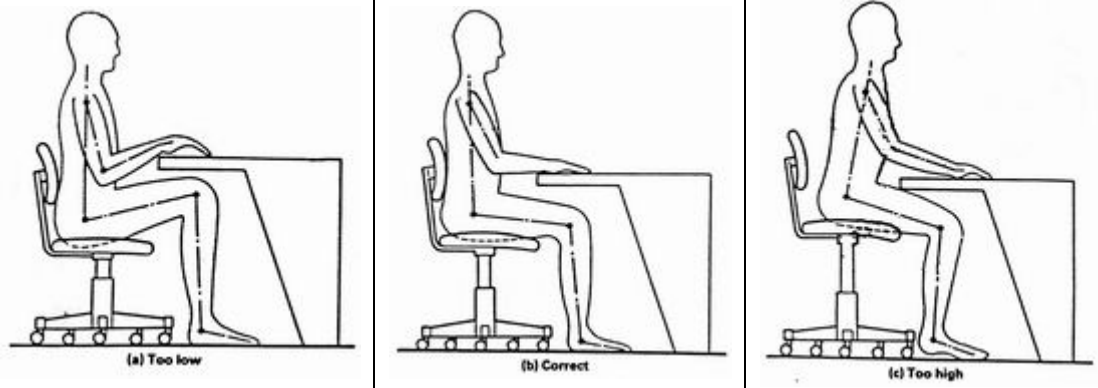
1.2.2 Work Posture

Work posture in the workplace is determined by the interaction of many factors, including workstation layout (heights of table and chair, reached of the worker to vehicles), equipment design (position of keyboard, location of visual displays), and work methods (sequence of work tasks, work technique). In addition, body-size characteristics of a worker interact with the entire workplace factor to determine specific posture used to perform a job.

To the greatest extent possible, jobs should be designed to accommodate a neutral posture. For a standing worker, this means that the trunk and neck should be nearly

vertical, with minimal twisting or bending (forward, backward, and sideways). Furthermore, both arms should hang comfortably down form the shoulders, roughly parallel to the trunk.

Awkward postures occur when there is mismatch between a worker's body size and the job requirements. If awkward postures are assumed repetitively or for long prolonged periods, increased rates of fatigue, discomfort, and injury may occur, resulting in reduced productivity and higher costs.



(a) Too Low | (b) Correct | (c) Too High

Figure 1.2 shows well and poorly adjusted seats

1.3 Problem Statement

1.3.1 The working area

It is often useful to divide up the area, which surrounds the working person into vertical height ranges. It is the easiest to describe these by referring to the levels of various parts of the person's body in a relaxed sitting and standing position, knee height, elbow height, shoulder height and etc.

1.3.2 The layout of the Highway Toll Booth

Problems arise because of the layout of the highway toll booth. Comfortable layouts will easy the works. So, this workshop has a layout that needs to be change in order to increase the quality of service.