

**ERGONOMICS DESIGN FOR SUPERMARKET CHECKOUT STATION**

**MUHAMMAD NAJMUDDIN BIN FAKHRUR ROZI**

**A report submitted  
in fulfillment of the requirements for the degree of  
Bachelor of Mechanical Engineering (Hons)**

**Faculty of Mechanical Engineering**

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## DECLARATION

I declare that this project report entitled “Ergonomics Design for Supermarket Checkout Station” is the result of my own work except as cited in the references

Signature :.....

Name :.....

Date :.....

## **APPROVAL**

I hereby declare that I have read this project report and in my opinion this report is sufficient in terms of scope and quality for the award of the degree of Bachelor of Mechanical Engineering (Hons).

Signature :.....

Supervisor`s Name :.....

Date:.....

## **DEDICATION**

I want to dedicate this report to my lovely parents and family,  
lecturers, supervisor and friends.

## **ABSTRACT**

Ergonomics is a study of human scientific discipline and their relationship to their occupational environment. Every working individual will expose to ergonomics risk due to the nature of the work itself. This study was conducted to make comparison from existing design and finalize design in term of ergonomics design and to analyze the ergonomics using RULA analysis. The methods used in this study is observation, questionnaire, quality function development (QFD), product design specification (PDS), morphological chart and weight decision matrix. From the morphological chart, four concept design have been proposed and one of them has been selected to be the final design by using weight decision matrix. The outcome of this study is the ergonomics analysis has been conduct by using CATIA software. The final design and existing design has been compare in order to see the different ergonomics results. The results have been obtained through the RULA analysis. Other than that, the ergonomics analysis has been divided into two position which are seating position and standing position. Each position has been analyzed into several posture there are standing and seating posture, placing item into the packaging machine or bagging area and pointing towards the LCD monitor or keyboard. From the analysis, the final design shows more ergonomics compared to the existing design in term of seating and standing position. By having ergonomics analysis, the ergonomics design can help the cashier can be in a comfortable when doing job, less chance risk of injury happened and make the checkout process more effective.

## ABSTRAK

*Ergonomik merupakan suatu disiplin saintifik yang mengkaji hubungan diantara manusia dengan persekitaraan pekerjaan mereka. Setiap individu yang bekerja akan terdedah kepada risiko ergonomik kerana keadaan persekitaraan pekerjaan sendiri. Kajian ini dijalankan untuk membuat perbandingan dari segi reka bentuk yang sedia ada dan dengan reka bentuk yang muktamad dari segi reka bentuk ergonomik dan menganalisa ergonomik menggunakan analisa kaedah RULA. Kaedah yang digunakan dalam kajian ini adalah pemerhatian, soal selidik, pembangunan fungsi kualiti, spesifikasi reka bentuk produk, carta morfologi dan kaedah pemberat matrik. Dari carta morfologi, empat konsep reka bentuk telah dicadangkan dan salah satu reka bentuk tersebut telah dipilih untuk menjadi reka bentuk akhir dengan cara menggunakan kaedah pemberat matrik. Hasil kajian analisis ergonomik dilakukan menggunakan perisian CATIA. Reka bentuk akhir dan reka bentuk yang sedia ada telah dibandingkan bagi untuk melihat perbezaan ergonomik. Hasil kajian tersebut diperoleh melalui analisis kaedah RULA. Selain itu, analisis ergonomik telah dibahagiakan kepada dua kedudukan iaitu kedudukan semasa duduk dan kedudukan semasa berdiri. Setiap kedudukan di analisa kepada beberapa postur iaitu postur berdiri dan postur duduk, meletakkan barang ke dalam mesin pembungkus atau dikawasan pembungkusan serta semasa menunjukkan ke arah monitor LCD atau papan kekunci. Dari analisis juga, reka bentuk akhir menunjukkan lebih ergonomik berbanding dengan reka bentuk yang sedia ada dari segi keadaan semasa duduk dan keadaan semasa berdiri untuk kedudukan berdiri memberikan keputusan analisa 2 daripada 8. Sementara untuk kedudukan duduk memberikan keputusan akhir yang sama iaitu 2 daripada 8. Dengan menganalisis ergonomik, reka bentuk yang ergonomik dapat membantu juruwang berada dalam keadaan selesa ketika melakukan tugas, kurangnya peluang kemalangan yang berlaku serta proses daftar keluar barang akan menjadi lebih berkesan.*

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

This study is about ergonomics and musculoskeletal disorders. The study is carry out in order to identify which musculoskeletal disorder have risk most to the cashier and to analysis whether the checkout station that cahier use is ergonomic and also help to the cashier work more effectively. Checkout station is a counter that place in a store where customers go to pay the stuff want to buy and there is several task of cashier while working at checkout station.

In order to understand the ergonomics and musculoskeletal disorders, the definition of the terms must be understood. According to form the author from the journal that has been published, ergonomics the combination of Greek words which are ‘ergon’ (work) and ‘nomoi’ (natural law) which mean the sciences of works and a person’s relationships to the work (Kolgiri, Hiremath, & Bansode, 2016). Other than that, the science of fitting the work to user instead of forcing the user to fit the work is also one of the ergonomics definition (Adams, 2017). As for musculoskeletal disorders defined injuries and disorders that affect the human body`s movement or musculoskeletal system (Middlesworth, 2015.).

The importance of this study is to help identify which musculoskeletal disorder have effect much to the cahiers. Once the factor is identified, the prevention step can be developed and implemented in order to reduce the risk. Other than that, the

important of this project is to design an ergonomics checkout station that can help the cashier work more effectively. The benefits gain from this study are raising the ergonomics awareness among the cashier, help the cashier decreasing the discomfort and pain and improve the work quality life of the cashier.

## **1.2 Objective**

The objective of this study:

- i. To design an ergonomic checkout station for the cashier at supermarket in Malacca.
- ii. To analyse the ergonomics of the checkout station whether it is comfortable to use by the cashier using RULA analysis in CATIA V5 software.

## **1.3 Problem Statement**

Typically design checkout station in Malacca is to accommodate standing cashiers. Every design of checkout station give an impact on a cashier whether directly or indirectly is depend on customer behavior (Kihlstedt & Hägg, 2011). On the other hand, there are several risk factors that can happened to the cashier such as awkward and static posture, this happen because some design does not follow the guideline give. These two are the biggest factor contributed to disorders and cashier have been appointed as one of the top ten occupations in developing musculoskeletal disorders (Zuhaidi & Rahman, 2017).

## **1.4 Scope**

The scope of this study is only involved the supermarket checkout station. They are four company to be analyze the design of the checkout station. In this study, is to identify whether the current checkout station is ergonomics or not and to identify the strength and flaw every supermarket checkout station design.

For this study, the new ergonomics design of a checkout station for supermarket cashier is purpose and the design will be develop using CATIA V5 software. The design structure of the checkout station will be analyzing to ensure the ergonomics using RULA analysis. The implementation is depending on every supermarket manager whether they want to use it for their supermarket or not.

## **1.5 Organization of report**

The first part of this chapter is background: ergonomics and musculoskeletal disorder are outlined in order to better define specific aspects of identify which musculoskeletal disorder have risk most to the cashier addressed in this study. The second part of this chapter provide an overview of objective and problem statement. The final section describes main elements of a fresh technique of performance analysis. Chapter 2 until chapter 3 explain the literature review of ergonomics and methodology steps to achieve the objective. Chapter 4 describe the analysis of ergonomics for existing design and final design. Chapter 5 discusses the conclusion of this study and recommendation in order to improve the analysis of this study.