# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## IMPROVING STOCK RECORD ACCURACY USING MOBILE APPLICATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Manufacturing Engineering Technology (Process and Technology) with Honours.

by

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# DECLARATION

I hereby, declared this report entitled "Improving Stock Record Accuracy using Mobile Application" is the results of my own research except as cited in references.

Signature : …….

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# APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor's Degree in Manufacturing Engineering Technology (Process and Technology) with Honours. The member of the supervisory is as follow:

……

(DR ROHANA BINTI ABDULLAH)

# ABSTRAK

Sejak kebelakangan ini, kawalan inventori sangat penting kepada sesebuah organisasi kerana semua stok mesti diurus, dikawal dan dikesan pada bila-bila masa dan di mana-mana sahaja. Kini, kawalan inventori lebih penting lagi untuk kejayaan dan kesinambungan. Projek ini membincangkan tentang kajian prosedur kawalan inventori semasa di makmal JTKP dan untuk mereka bentuk aplikasi telefon mudah alih mengikut proses pemetaan dan kemudian menguji keupayaan aplikasi telefon mudah alih ini yang dikenali sebagai e-Inventori untuk menguruskan inventori. Aplikasi yang digunakan ialah sistem Android. Data inventori akan disimpan dalam pangkalan data awan yang dikenali sebagai *Firebase Real-time Database* yang bermaksud pangkalan data boleh diakses pada bila-bila masa dan di mana-mana sahaja melalui pengaksesan internet. E-Inventori mengandungi tiga kategori iaitu "Pengurus", "Admin" dan "Pengguna". E-Inventori menggunakan ciri pengesahan untuk mengenal pasti pengguna dengan menggunakan e-mel dan kata laluan melalui *Firebase Authentication*. Ujian keupayaan sistem telah dijalankan untuk menguji e-Inventori. Keputusan ujian dan ulasan pengguna dibincangkan dalam kajian ini. Beberapa pengguna telah dipilih untuk menguji aplikasi ini. Kesimpulannya, kajian ini telah dilakukan dan matlamat projek ini telah dicapai. Aplikasi ini diterima oleh pengguna termasuk pengurus stor dan penjaga stor. Akhir sekali, kawalan inventori dengan menggunakan aplikasi telefon mudah alih telah dibuktikan lebih cekap berbanding dengan sistem kawalan inventori semasa.

# ABSTRACT

Recently, inventory control is very important to an organization because all the stock must be managed, controlled and tracked at anytime and anywhere. Nowadays, inventory control is even more crucial to success and sustainability. This project discuss about to study current inventory control procedure in JTKP lab and to design mobile application according to process mapping then to test the capability of the mobile application called E-Inventory to manage the inventory. The mobile application is used Android system. The features of E-Inventory which are manage, count, record stock transaction and track the stock in warehouse. The inventory data will be stored at a cloud database called Firebase Real-time Database which means the database can accessed at anytime and anywhere with internet access. E-Inventory contains three types of categories which are "Manager", "Admin" and "User". The E-Inventory has authentication's feature to identify the user by using E-mail and password through the Firebase Authentication. The system capability testing has been carried to test the E-Inventory. The testing results and user comments are discussed in this study. The end users have been selected to test the mobile application. As to conclude, this study has been done and the objective of this project has been achieved. The mobile application is accepted by the end users which the store executive and store keeper. In the end, the inventory control by using mobile application has been proved to provide more efficient compare to current inventory control system.

# DEDICATION

I would like to dedicate this project to:

My beloved parents,

All my lecturers,

My friends,

Who always encourage me to finish this project.

# ACKNOWLEDGEMENT

I would like to express my sincere thanks to my project supervisor, Dr Rohana Binti Abdullah giving me a golden opportunity to do this Final Year Project title. I feel very excited with the challenging part of the project. Moreover, I feel so lucky Dr Rohana Binti Abdullah accepted what I have proposed and take charge as my supervisor to guide me throughout this project by providing advises for the problems that I had encountered. She always pointed me to right direction and suggested some solutions when I was feeling lost when doing the project.

In addition, I would like to thank my lovely family and friends. They gave me a lot of innovative ideas and comment which help to improve my Final Year Project. Throughout this project, I have gain a lot of knowledge about inventory control, how to develop mobile application that will give me benefits for my future life.

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| | |
|---|---|
| IRI | Inventory Record Inaccuracy |
| FTK | Faculty Teknologi Kejuruteraan |
| JTKP | Jabatan Teknologi Kejuruteraan Pembuatan |
| UTeM | Universiti Teknikal Malaysia Melaka |
| Lab | Laboratory |
| WIP | Work in Progress |
| MRO | Maintenance, Repair and Operating |
| JIT | Just In Time |
| JIC | Just In Case |
| App | Application |
| Ram | Random Access Memory |
| CPU | Central Processing Unit |
| OS | Open Source |
| SDK | Software Development Kit |
| API | Application Programming Interface |
| UI | User Interface |
| MB | Megabyte |
| JSON | JavaScript Object Notation |
| SQL | Structured Query Language |

# APPENDICES

# CHAPTER 1

# INTRODUCTION

## 1.1 PROJECT BACKGROUND

Inventory control is very important to an organization because all the stock must be managed, controlled and tracked at anytime and anywhere. Nowadays, inventory control is even more crucial to success and sustainability. Inaccurate inventory control can lead to lost business profits. For example an employee telling a customer an item is out of stock however he discovers it is in stock later, it may make the company loss a lot of business. According to Chuang and Oliva (2015), they estimated IRI (Inventory record inaccuracy) reduces a company's total profits, they found that a retail store had IRI 29% of the items it make the company's loss by 10% profits. Manually to manage the stock may also cause inaccuracy data happening and difficult to check the quantity of the stock in a short time. According to Wang et.al (2016), there are many factors to cause the inventory record inaccuracy; the three main sources are stock missing, misplacement of stock and stock transaction errors.

Nowadays, inventory control must require a computerized system for a better record all the stock documents and avoid any aging documents deteriorate occur. Manually tracking and counting inventory is nearly impossible by today's industry standard. There are many types of inventory computer software in market however relying on inventory control and tracking methods solely on a desktop computer is no longer feasible.

According to Smith (2012), there are 88% of United State adults own a mobile phone and there is 55% of mobile phone owners use their phone to go online or Email rather than use laptop or desktop computer.

With stocks flying in and out at warehouse, tracking all the moving quantities can be overwhelming. According to Wang et.al (2014), Smartphone is a miniaturized desktop computer that having an operating system to support potentially thousands of mobile computing software called Mobile application. So that mobile application is one of the ways to manage the inventory. Mobile applications can immediate access inventory information accurately and timely in the palm of your hand. According to Gelogo and Kim (2014), time is money so that a faster decision making is one of the benefit that results from employees having access to real time accurately data whenever it is needed. By using mobile application not only increase the productivity of the staff however also increases the stock record accuracy at all the time.

## 1.2 PROBLEM STATEMENT

In Universiti Teknikal Malaysia Melaka, Faculty Engineering Technology (FTK) is a faculty which is aims to educate and train highly skilled manpower to contribute to the advanced industrial countries. FTK has divided the academic system into two categories which are 60% practical assessment and 40% final exam. Therefore, the material stock becomes a very important thing in the laboratory activity. JTKP (Jabatan Teknologi Kejuruteraan Pembuatan) having laboratory and consists of consumable goods. The consumable goods should be controlled in order to ensure that the learning process is running smoothly at all the time and reducing the costs of material in laboratory. Multiple laboratory location suffer when staff have to keep calling each other to find and count quantities of consumable goods or to confirm it is actually at the store. Accurate control the consumable goods will eliminate the issues with consumable goods' stores location. It is identify currently the inventory control for consumable goods in JTKP labs done manually which means that JTKP was used the yellow form paper sheet

to record the stock transaction and used spreadsheet with various columns for stock name, item number, quantity and so on by sing Microsoft Excel to record all the stock data unfortunately the result seem that was not very efficient to the inventory. The consumable goods information difficult to share and stock quantities and details are not transparent to others. JTKP also they need a lot of time to get the real time accurate data in warehouse because they are manually counting the quantities of consumable goods.

## 1.3 OBJECTIVE

The stock accuracy is very important in JTKP laboratories this is because the consumable goods should be controlled in order to ensure that the learning process is running smoothly at all the time in laboratories. The objective of this project is to improve the stock record accuracy using mobile application. This objective can be achieved into following specific goals:

1. To study current inventory control process in JTKP lab.
2. To design a mobile application for inventory control process in JTKP lab.
3. To test the capabilities of mobile application in JTKP lab.

## 1.4 SCOPE

This project is carried out to design a mobile application for the consumable goods for raw material only in the Jabatan Teknologi Kejuruteraan Pembuatan (JTKP) in Universiti Teknikal Malaysia Melaka (UTeM). This is for the creation of an inventory control application with mobile phones. The mobile application of this project called E-

Inventory. This will be a mobile application for Android system. The Android Studio will be used to develop the mobile application. This mobile application requires internet access to operate. This is because the inventory data will be stored in a cloud database called Firebase real-time database. So the inventory data can be accessed at anytime and anywhere with internet access. The E-Inventory can be signed in with multiple users at the same time. All the users will be access the same cloud-database. This project does not consist of any cost analysis. The mobile application will need to know the identity of a user before starting the mobile application this is because the cloud database is confidential so that the mobile application need user authentication. The authentication will use the user's email and password. The mobile application will consist of three categories which are "Manager", "Admin" and "Student". The System Development Life Cycle (SDLC) is chosen as methodology of mobile application design. SDLC will consist of project planning, system analysis, design, testing and implementation. However, this project will follow the SDLC until the testing phase only.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Inventory

Inventory can be said that is the material or supplies that keep it in the warehouse for future use or sales. Inventory also can be goods or stocks that there are waiting to be processed or converted into the finished goods to the customers. Inventory can be defined as a stock or store of goods.

Inventory can be said that to provide immediate product supply due to increasing over time, inventory also can be said that as a mechanism to affect the product demand, (Aydinliyim et.al, 2017). The meaning of inventory is a physical stock kept in the warehouse to achieve expected demand, (Vrat 2014). Another word to say inventory is an available resource however idle having economic value to a company or organization.

### 2.1.1 Type of Inventory

Inventory can provide the capability to fulfil the customer's requirement, maintenance, to carry out the production smoothly and etc. According to previous work, there are many types of inventories (Vrat ,2014) ; Nemtajela and Mbohwa , 2017):

1. Work in progress (WIP) or Pipeline inventory – partially complete product.
2. Raw material and purchased part.
3. Finished goods inventories- a product that ready for current customer sales.
4. Maintenance, repair and operating (MRO)-spare part and etc
5. Bought-out-parts (BOP) inventory - the parts which go to assembly production directly.
6. Buffer inventory- it can be as safety stock, it can replenish the demand and supply uncertainties.
7. Anticipation inventory- stock for future demand and unanticipated supply interruption.
8. Cycle inventory – the process is unable to supply according the demand and accumulate the inventory product available when processing other types of product.

### 2.1.2 The Importance of Inventory

Inventory is considered as a waste in the Just-in-Time (JIT) in manufacturing however the inventory plays a very important role in an industry's company. If an industry does not have inventory, it may cause the materials shortages, production delays and project cannot run smoothly at all the time, (Vrat 2014). There are some of the important reasons for obtaining and holding inventory is:

Table 2.1 Importance of Holding Inventory

| No | Reason | Description |
|---|---|---|
| 1 | Time lag between ordering and getting the stocks at the point of consumption | Replenishment lead time means that there is a time lag between placing order the stock and shipping time. |
| 2 | Demand variability | Company are unable to estimate the actual demand. Due to the uncertainties in |