UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

IMPROVING EFFICIENCY OF INVENTORY SYSTEM: A CASE STUDY

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Manufacturing Management) (Hons.)

by

MUFIDAH DALILA BINTI MAROF
B050910059
900803-10-5660

FACULTY OF MANUFACTURING ENGINEERING
2013

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **IMPROVING EFFICIENCY OF INVENTORY SYSTEM: A CASE STUDY**

SESI PENGAJIAN: **2012/13 Semester 2**

Saya **MUFIDAH DALILA BINTI MAROF**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **Sila tandakan (✓)

☐ SULIT (Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

☐ TERHAD (Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

☐ TIDAK TERHAD

Disahkan oleh:

Alamat Tetap:

NO. 54, JALAN JATI,

DESA SUBANG PERANTAU

40150, SHAH ALAM, SELANGOR

Tarikh: 20/6/2013

Cop Rasmi:

DR. ZU... EBRAHIM
Senior Lecturer
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya
76100 Durian Tunggal, Melaka

Tarikh: 20/6/13.

** Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report entitled "Improving efficiency of inventory system: A case study" is the results of my own research except as cited in references.

Signature	:	....
Author's Name	:	MUFIDAH DALILA BINTI MAROF
Date	:	..............20/6/2013..............................

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Manufacturing Management) (Hons.). The member of the supervisory is as follow:

.... 20/6/13.

DR. ZUHRIAH BINTI EBRAHIM
Senior Lecturer
Faculty of Manufacturing Engineering
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya
76100 Durian Tunggal, Melaka

ABSTRAK

Inventori adalah simpanan atau barangan yang digunakan dalam syarikat. Inventori adalah salah satu elemen penting yang harus dikawal, bagi memenuhi kepuasan pelanggan. Bagi mengurangkan masalah kehabisan barangan dalam inventori, syarikat haruslah memantau tahap inventori dengan lebih kerap. Tujuan kajian ini dijalankan adalah untuk meningkatkan kecekapan sistem inventori penggunaan daging ayam di Syarikat X. Terdapat tiga objektif untuk mencapai meningkatkan kecekapan dalam sistem inventori di Syarikat X iaitu: (i) untuk mengkaji kebarangkalian punca kekurangan penggunaan daging ayam (ii) untuk meningkatkan kecekapan sistem rekod inventori, (iii) untuk meningkatkan keberkesanan sistem inventori. Dari pemerhatian yang telah dijalankan, terdapat beberapa jenis kekurangan yang telah dikenalpasti yang terdiri daripada inventori tidak direkodkan, kesilapan manusia, produk hilang dan kerosakan produk. Dalam hal ini, SOP untuk sistem inventori rekod telah dihasilkan dan dilaksanakan dimana bilangan kekurangan daging ayam telah dikurangkan kira-kira 4% kepada 0%. Tambahan pula, pelaksanaan SOP label merah telah meningkatkan kecekapan sistem inventori kepada 100%. Kesimpulannya, prosedur kerja yang sistematik seperti SOP dan kaedah merekod dalam sistem inventori boleh meningkatkan kecekapan sistem inventori.

ABSTRACT

An inventory is a stock or store of goods are used in a company. The inventories are one of the important elements that must be control, in order to fulfil customer satisfaction. To reduce the number of shortage in inventory, the company need to monitor the level of inventory more frequent. The aim of the study is to improve the effectiveness of inventory system of chicken meat consumption at Company X. There are three objectives that need to achieve for improve the effectiveness in inventory system at Company X which is: (i) to study the possible causes to the shortage of inventories system at Company X, (ii) to improve the inventory recording system, (iii) to improve the efficiency in the inventory system. In this study, there are four possible causes of shortages that have been identified as no inventory record, human error, product missing, and product damage. In this regard, the standard operating procedure for inventory recording system was developed and implemented which the number of chicken meat shortage had been reduced approximately from 4% to 0%. Furthermore, the implementation of red label SOP has increased the efficiency of inventory system to 100%. In conclusion, a systematic working procedures such as SOP and recording method in inventory system has improved the efficiency of the inventory system at Company X.

DEDICATION

To my parents thank you for their endless love, support and encouragement

ACKNOWLEDGEMENT

First and foremost, I praise to Allah (SWT) for letting me complete my Projek Sarjana Muda. I also would like to extend my thankfulness to the most precious persons in my life, my father and mother for all their moral support, financial support and also to my friends for never ending reminding me to always be honest and trustworthy. I am forever indebted to Dr. Zuhriah Ebrahim for her unwavering support as my supervisor for all the reprimand and guidance as it is very helpful for me in completing my Projek Sarjana Muda. Last but not least I would like to extend my appreciation to my industrial supervisor, Miss Sarasyahida Binti Adam for their advices and patiently entertain me to fulfill my desire in order to complete my Projek Sarjana Muda. I very much appreciate for their entire kindness helping and teaching me. I am very lucky to have such a helpful colleagues and I never felt left out in any situation. Had it not been for all your prayers and benedictions, were it not for your sincere love and help, I would never have completed this thesis.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND SYMBOLS

FIFO	-	First in First out
HQ	-	Headquarters
LIFO	-	Last in First out
No	-	Number
PSM	-	Projek Sarjana Muda
RM	-	Ringgit Malaysia
SOP	-	Standard operating procedure

Symbol

A	-	Actual balance
C	-	Calculated inventory

CHAPTER 1
INTRODUCTION

1.0 Preliminary

This chapter presents an overview of the study, including the background of study, background of company, problem statement, significance of study, aim and objectives and scopes.

1.1 Background of study

A systematic inventory contributes to customer satisfaction (William and Sum, 2010) and failure to recognize the importance of inventory will lead to losses for the company. An inventory is generally defined as a stock or store of goods that are used in a company. Ideally, a company needs to monitor the level of the inventory to avoid shortages in the future. It is important to be aware of the availability of stock in storage before the company plans the next order from its supplier. Shortages may occur in an inventory due to several factors such as inaccurate records, product defects, missing products, and human error. There is also the uncertainty factor, where the problem is difficult to anticipate and harder to avoid. Shortages may cause the company to lose customers and sales, eventually result in losses. Shortages may prompt the company to increase the stock level of a product even when the customer demand is low.

In the food and beverage industry, inaccuracy in inventory records is one of the common problems, which cause shortages. A company needs to reduce or eliminate this problem by closely monitoring and managing the level of inventory while reducing the number of wastes. Meanwhile, problems, which are related to human errors such as miscalculation and missing records, must be addressed to improve the accuracy of information. Inventory management helps to balance and guarantee the continuous supply of raw materials for production.

Thus, this study attempts to investigate the root causes of shortage occur at Company X. In addition, the efficiency of its current inventory system will be determined through this study.

1.2 Background of Company X

Company X is a wholly owned Bumiputera company, which was established on 24 September 2012. Strong dedicated professionals support the company with experiences in the food and beverages industry. The highly trained workforce provides professional service and produces a variety of dishes for the customers. This study focuses on the chicken meat consumption, which is controlled by the headquarters (HQ) beginning from the pre-order to the supplier. The HQ revises the pre-order submitted by individual restaurants based on the chicken meat consumption on the previous business day. The individual restaurant then receives the order and an employee records the data into the inventory recording system, based on the supplier invoice. When the delivery is received at the restaurant, the chicken meat is cleaned and marinated by restaurant employees, prior to packaging. The plastic packaging is prepared according to one serving per customer and stored in the cold storage, until there is demand from customers. The process flow for chicken meat production at the restaurant is summarized in Figure 1.2.

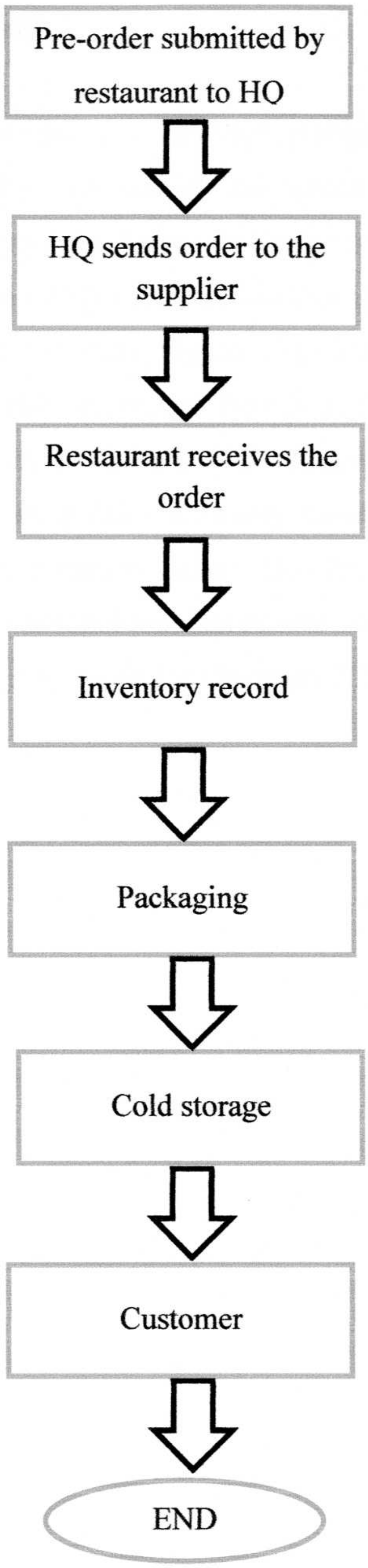

Figure 1.2: Process flow of Company X

1.3 Problem statement

Company X experiences a shortage problem where the actual material consumption does not tally with the physical inventory. Company X is a food and beverage company that practices the manual inventory system. The problem begins when the chicken meat consumption is left out during inventory counting, causing a shortage in supply for the customers. Figure 1.3 presents the imbalance chicken meat consumption in the monthly inventory. However, the imbalance has occurred at certain months, which corresponds with high chicken meat consumption. Table 1.3 shows the number of missing daily inventory records where Company X fails to record the amount of the inventory usage. This indicates the inventory recording system of Company X is not consistent that results inaccurate record of chicken meat consumption. Therefore, it is crucial for Company X to improve the efficiency of its inventory system.

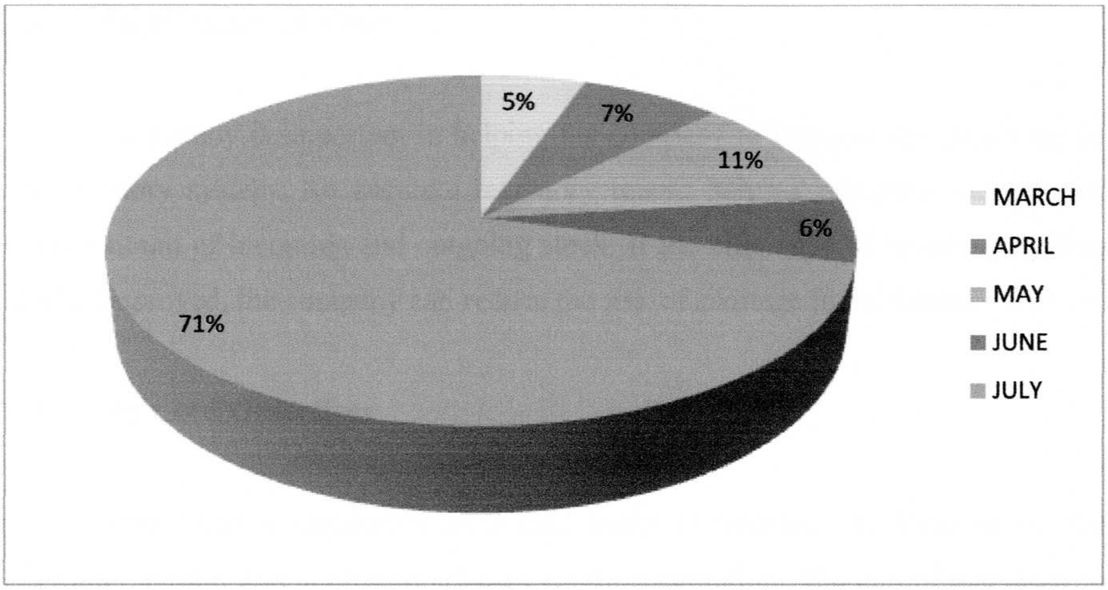

Figure 1.3: Imbalance of chicken meat consumption in 2012

Table 1.3: Monthly Inventory Record of Chicken Meat Consumption

Month	Start	End	Missing Inventory Record (Day)
March	13/03/2012	31/03/2012	12
April	01/04/2012	30/04/2012	8
May	01/05/2012	31/05/2012	1
June	01/06/2012	30/06/2012	3
July	01/07/2012	31/07/2012	3

1.4 Significance of study

This study is important in helping the company to improve the efficiency of its inventory system. An accurate inventory record helps a company to track the exact amount of incoming and outgoing stock. If the efficiency of inventory system can be improved, the company can reduce the risk of shortage in the future.

1.5 Aim and Objectives

This study is conducted as a case study at company X, focusing on the inventory system that applies to chicken meat consumption. The aim of this study is to improve the efficiency of inventory system and solve the problem that contributes to shortage. There are three objectives set to achieve this aim:

i) To study the possible causes to shortage in chicken meat consumption.
ii) To improve the inventory recording system.
iii) To improve the efficiency in the inventory system.

1.6 Scope

This study will be done through a case study at company X. The study will focus on the inventory system applies for chicken meat consumption.

1.7 Organization of study

The following chapters are organized as follows. Chapter two summarizes a review of literature related to inventory, including previous studies on the issues and problems in inventory counting system. Chapter three describes the data used in this study and explains the methodology. Chapter four discusses results from the analysis and chapter five summarizes the findings of this study.

CHAPTER 2

LITERATURE REVIEW

2.0 Preliminary

This chapter reviews previous literature on inventory, including definition, the inventory counting system and common issues regarding inaccuracy in recording stocks. The inventory counting system consists of two systems, namely the periodic system and the perpetual system. Meanwhile, inventory inaccuracy leads to problems such as shortages, unrecorded inventory, miscalculation, missing products and product defects. This chapter also discusses demand uncertainty as a factor to causing shortage in inventory. The literature review continues to explore issues on inventory management, inventory control and the effect of inventory inaccuracy on profit.

2.1 Definition of inventory

Richard et al. (2006) defined inventory as stock of any item or resource used in a company while Eliyahu and Jeff (2010) refers to inventory as all the money that the company has invested in purchasing things, which it intends to sell. In the manufacturing industry, William and Sum (2010) explain that inventory is divided into five categories, namely raw material, finished goods, replacement parts, transit goods, and partially completed goods.

The inventory counting system consists of two systems, which is periodic, and perpetual (William and Sum, 2010). The periodic system uses a physical count of items made at periodic intervals such daily, weekly, and monthly. An employee checks the shelves or stockroom to determine the quantity of item available. Alternatively, the perpetual system keeps track of continuous removal of items from inventory, and records the current level of inventory for each item. Information from both inventory counting systems helps the company to decide how much stock is needed for ordering purposes. Although a company may prefer the perpetual inventory system, periodic counting of inventories must also be physically performed for verification. This is to avoid possible errors, such as pilferage and spoilage, which can reduce the effective amount of inventory.

The basic purpose of an inventory in stock keeping services is to determine the right time to place an order for an item and the exact quantity needed. Silver et al. (1998) refer to inventory management as a key success factor for many companies and Matthew et al. (2006) believe that a company's success depends on how well it manages its inventory.

2.2 Common issues

Various issues relating to inventory have been discussed by researchers in the literature. Puvanasvaran (2012) states that excess inventory is regarded as a waste and will only add costs to the products supplied by the company. Meyer (1991) and Rajeev (2008) agree that inventory inaccuracy causes loss of productivity, a reduction in the level of customer commitment and costly physical recounting of inventory.

Therefore, a company needs to closely monitor its inventory to determine the exact number of items available before placing a new order. Some companies may not regard inventory as a serious issue as long as they enjoy business profits. However, uncontrolled level of inventory will contribute to losses and inaccurate inventory is a main issue in business when dealing with physical assets. Richard et. al. (2006) caution companies that poor inventory management may result in a loss of profit. Ifuwe and Agunwamba (2008) later found evidence to support that inefficient inventory management affects the profitability of the company.

According to Bulent (2006), companies must consider the uncontrollable factor relating to shortages where unavailable items can either be backordered or they face risk of losing sales. There are many factors that can cause a shortage in inventory. In the food and beverages industry, shortage becomes a problem when there is immediate demand from customers. Since an employee conducts manual inventory counting, human mistakes are difficult to avoid. Most common errors in inventory counting that lead to shortages include unrecorded inventory, miscalculation, missing products and product defects.

2.2.1 Unrecorded inventory

Small businesses commonly rely on a manual inventory recording system. An inventory is normally recorded when the material is received and added from the supplier, where the calculation involves adding receipt quantity with the on-hand balance. An accurate inventory record helps a company to track the exact amount of incoming and outgoing stock every day. In the past, auditing was done using manually written entries where the quantities or values of inventory were observed by the inventory taker. Joseph et. al. (1977) argue that this procedure is excessively time consuming and susceptible to errors. An inventory stock record is in error when the recording of stock is not equivalent the physical stock (Donald and Richard, 1972). When the inventory is not recorded properly, it leads to excessive usage and unsystematic inventory management affects the ability of a company to provide good services to the customers.

2.2.2 Miscalculation by suppliers

Shortage can also be caused by poor service from the suppliers. Normally, a company entrusts a supplier to deliver an item following a request. However, Delaunay et. al. (2007) found that mistakes are often made by the suppliers in the process of checking and counting the items during the delivery. Some items might be counted several times and some are forgotten hence resulting in miscalculation that results in shortage. Hallikas et al. (2002) divided risk factors of network of suppliers into four categories:

i. Low and inappropriate demand
ii. Poor performance in delivery
iii. Management cost and pricing
iv. Weakness of existing resources and flexibility of the company

When a supplier performs poorly in aspect of delivery time or quantity, it will be difficult to estimate the arrival time of the shipment or whether the quantity delivered would meet customer demand (Cynthia, 2006). The receiving company must take a longer time to recheck the quantity of goods received from the supplier to ensure fulfilment of prior order. Geoff (2006) explains that businesses generally hold these stocks for protection against general shortages or potential problems with suppliers. Extra copies of purchase orders are quick references to determine how much business is done with each supplier and the quality of service provided.

A good inventory system that records mistakes by the supplier is thus very important and can be very helpful in negotiating price, delivery and terms for the company. Once delivery mistakes are identified by the company, the supplier will normally deduct the delivery cost for the shortage. However, the company still faces problem to fulfil existing demand and risks losing its customers.

2.2.3 Miscalculation by employees

Miscalculation in manual stock-taking mostly occurs when the inventory forms are filled by two or more employees. Any shortage in stocks is harder to identify when a new employee is assigned to count the inventory each time, since the previous employee is more familiar with the inventory. Loss of focus and carelessness while checking the inventory will also result in inaccurate reporting, where an item may be counted repeatedly when the employee is distracted by outside disturbances (Delaunay et. al., 2007). Besides, some employees may not even realize the importance of inventory recording for the business, in order to make profit and avoid losses.