CHAPTER I   INTRODUCTION

I.1. Background

Warehouse plays an important role in achieving the service level target with the lowest total cost possible. The unbalance between supply and demand causes companies to hold inventory or stock of goods in order to anticipate the spikes in customer demands. In storing process, inventory requires a space known as warehouse. A warehouse is designed to maintain the balance between delivery and demand for goods and is a part of logistic system that functions to temporarily hold raw material, work-in-process, finished goods and parts originating from their point-of-origin which will be delivered to their point-of-consumption and provides information on the condition of the retained goods for the company (Lambert, 1993).

Inventory is an idle resource in the form of raw material, work-in-process, finished goods and parts which waits for the next process. The presence of inventory indicates waste as it generates additional cost, hence the necessity to minimize inventory with a warranted customer order fulfillment (Bahagia, 2006).

PT. SMA is a company located in Sunter, Pegangsaan Dua, Cikarang, Cibitung and Cikampek engaged in automotive, motorcycle manufacturing business which aims to fulfill demands for motorcycles in Indonesia. PT. SMA has reached a total production capacity of 4,2 million unit of motorcycles yearly. This research is conducted in raw material 1 warehouse at PT. SMA Pegangsaan Dua, Kelapa Gading. PT. SMA Pegangsaan Dua currently produces 5 types of motorcycles: Revo, Blade, New MegaPro, C150R and VERZA. The production process flow of PT. SMA is illustrated in Figure 1.1.1 as follows:
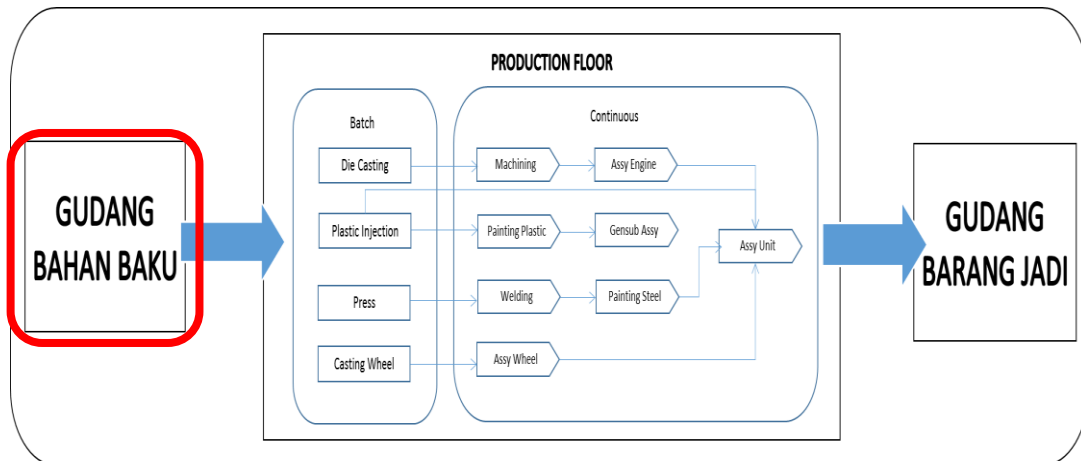
Figure I.1 Production Process Flow

PT. SMA Pegangsaan Dua has 4 warehouses, 3 of which are utilized as storage for the raw material of the main components and the other as storage for supporting components. This researched is directed to the raw material warehouse for the main components as a means to s the production process at PT. SMA. The comparison between the three raw material warehouses according to the quantity of components held is as follows.
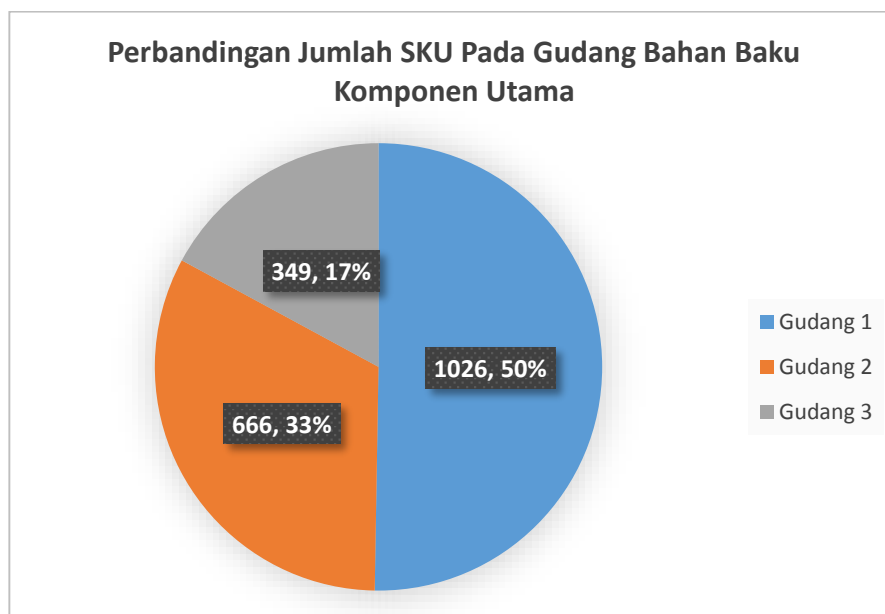

Figure I.2 Comparison of SKU Amount at Raw Material Warehouse

Raw material 1 warehouse is selected as the object of this research as it possesses the highest level of complexity since raw material 1 warehouse retains the most amount of SKU and has the fastest inflow and outflow of goods. Process flow of raw material warehouses at PT. SMA Pegangsaan Dua is shown in Figure I.1.3.
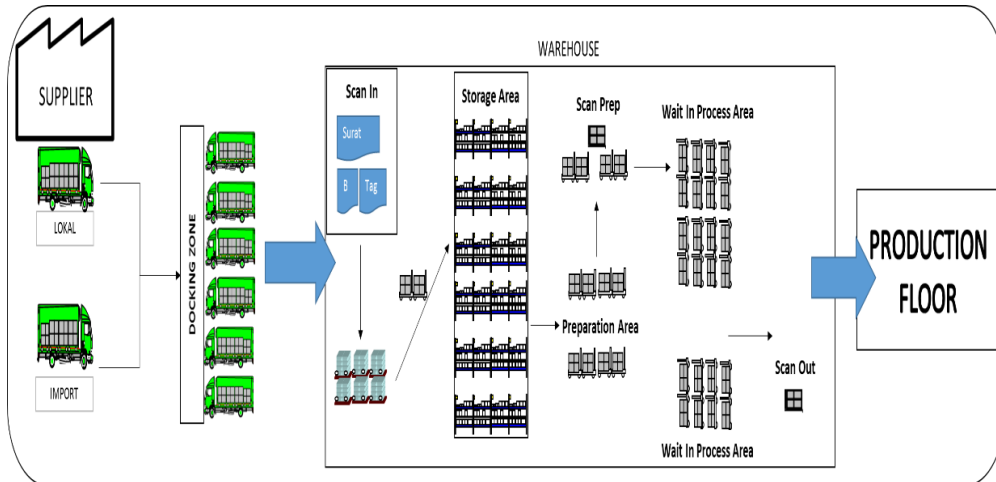
Figure I.3 Process Flow of Raw Material Warehouse

Raw material 1 warehouse covers 1026 parts of raw material processed into main components in the assembly of motorcycles which consist of small parts, big parts, electric parts and gensub. Parts held in raw material 1 warehouse is classified into two categories, discontinued or parts that are no longer used in the production process and become waste and continued or parts that are still used in the production process which inventory control is not managed properly and cause overstock in the warehouse.
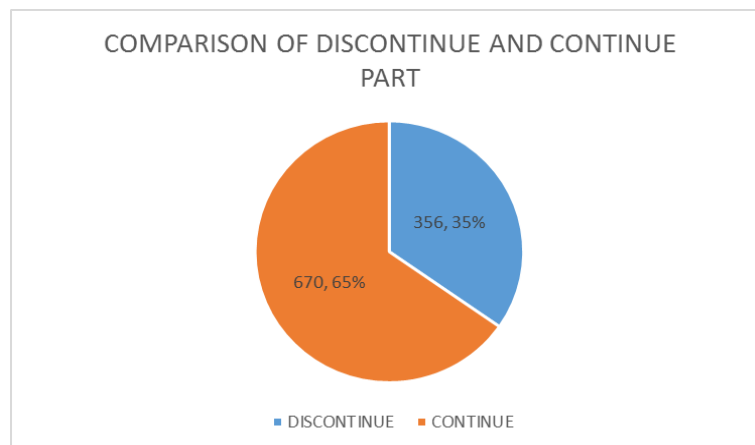

Figure I.4 Comparison of Part

Table I.1 Comparison of Stock and Demand

| Year	DEMAND / MONTH	SKU					
		GEAR BOX ASSY, SPDMT		BRIDGE,FORK TOP NH-303M		CUSHION ASSY,REAR	
		STOCK	DEMAND	STOCK	DEMAND	STOCK	DEMAND
2013	MAY	63099	29800	93625	28906	50699	22008
	JUNE	50691	34400	91538	31000	64258	25600
	JULY	48768	31200	90116	39300	61865	30000
	AUGUST	47609	18900	76142	28100	59017	21000
	SEPTEMBER	29400	26000	79358	39300	63084	35600
	OCTOBER	93213	34000	85245	37300	73495	32100
	NOVEMBER	76036	28700	86374	35400	59687	25200
	DECEMBER	104958	23096	78374	29400	52984	20400
2014	JANUARY	154316	20900	109339	33010	61407	20400
	FEBRUARY	106712	39400	119816	44400	77530	30800
	MARCH	118235	43600	116091	46200	89280	34000
	APRIL	121675	48000	133207	40250	76284	29100
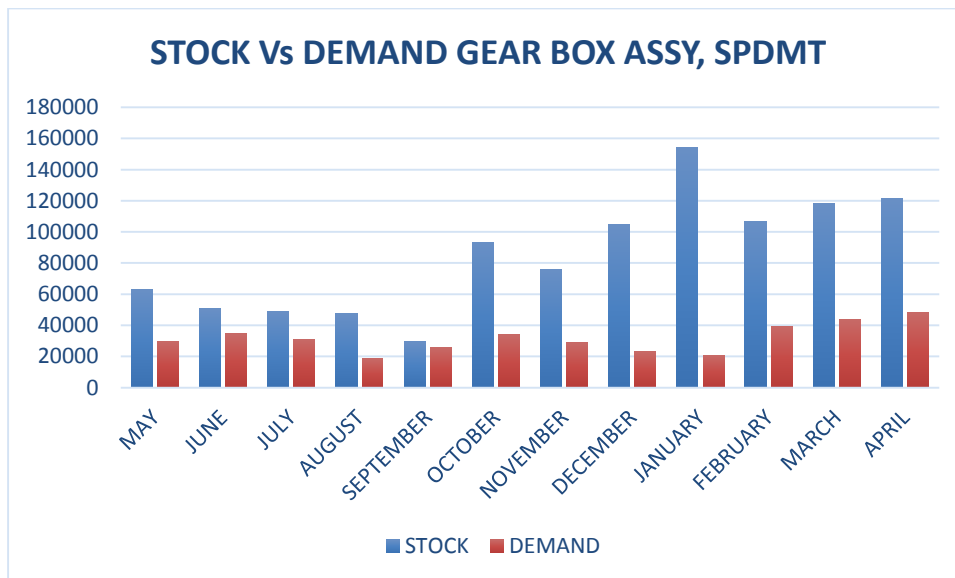
Figure I.5 Comparison of Stock and Demand Gear Box Assy, SPDMT

(Sumber: Data Identification)

Based on Figure I.1.5, it is known that the on hand inventory of gear box assy part, SPDMT is always greater than its demand.
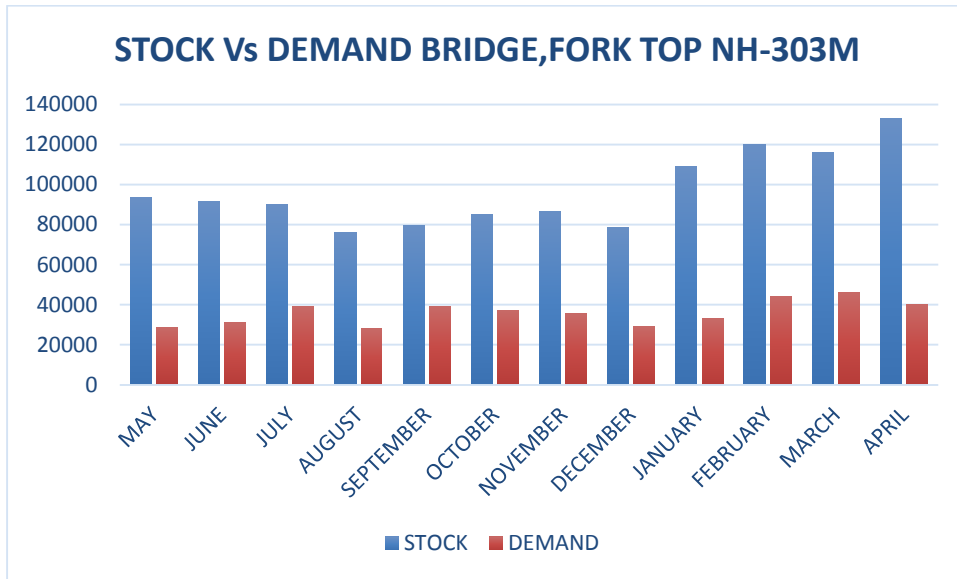
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Figure I.6 Comparison of Stock and Demand Bridge, Fork Top NH-303M

(Sumber: Data Identification)

Based on Figure I.1.6, it is known that the on hand inventory of Bridge part, Top NH-303M is always greater than its demand.
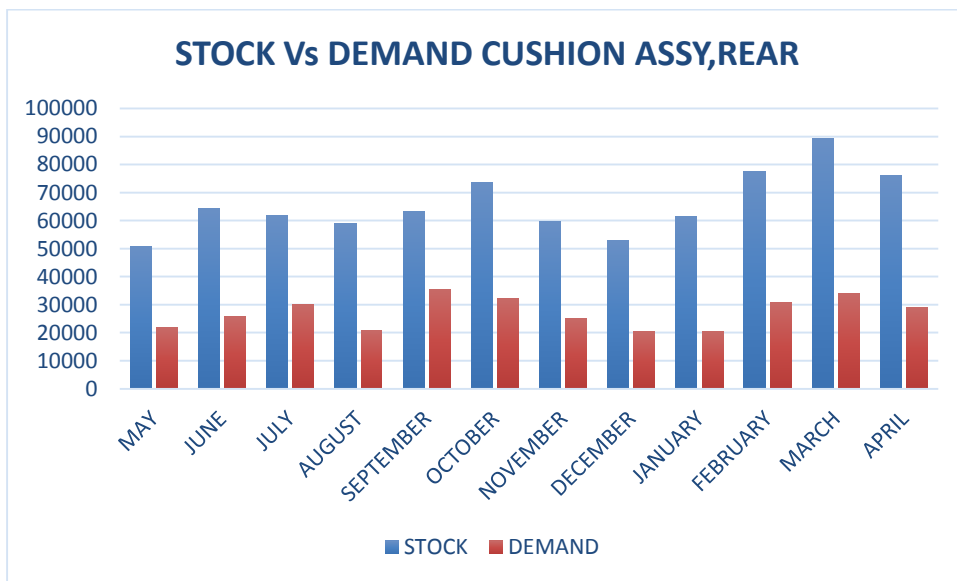

Figure I.7 Comparison of Stock and Demand Cushion Assy, Rear

(Sumber: Data Identification)

As can be seen in Figure I.1.7 that the on hand inventory of Cushion Assy part, Rear is always greater than its demand, thus it can be inferred that the three aforementioned parts are overstocked in the warehouse.

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Parts that pile up in a warehouse due to overstock will perturb the flow of part delivery to the production floor, which in turn result in late arrivals and unfulfilled customer demands. Incorrect quantity of goods available in warehouse causes additional costs. The value of investment in the form of inventory varies from 25-35% on the total asset of a company (Indrajit & Djokopranoto, 2003).

Table I.2 Holding Cost Gear Box Assy, SPDMT

| Year	DEMAND / MONTH	SKU GEAR BOX ASSY, SPDMT		GAP	HOLDING COST/MONTH	TOTAL HOLDING COST
		STOCK	DEMAND			
2013	MAY	63099	29800	33299	Rp 12.000	Rp 399.588.000
	JUNE	50691	34400	16291	Rp 12.000	Rp 195.492.000
	JULY	48768	31200	17568	Rp 12.000	Rp 210.816.000
	AUGUST	47609	18900	28709	Rp 12.000	Rp 344.508.000
	SEPTEMBER	29400	26000	3400	Rp 12.000	Rp 40.800.000
	OCTOBER	93213	34000	59213	Rp 12.000	Rp 710.556.000
	NOVEMBER	76036	28700	47336	Rp 12.000	Rp 568.032.000
	DECEMBER	104958	23096	81862	Rp 12.000	Rp 982.344.000
2014	JANUARY	154316	20900	133416	Rp 12.000	Rp 1.600.992.000
	FEBRUARY	106712	39400	67312	Rp 12.000	Rp 807.744.000
	MARCH	118235	43600	74635	Rp 12.000	Rp 895.620.000
	APRIL	121675	48000	73675	Rp 12.000	Rp 884.100.000
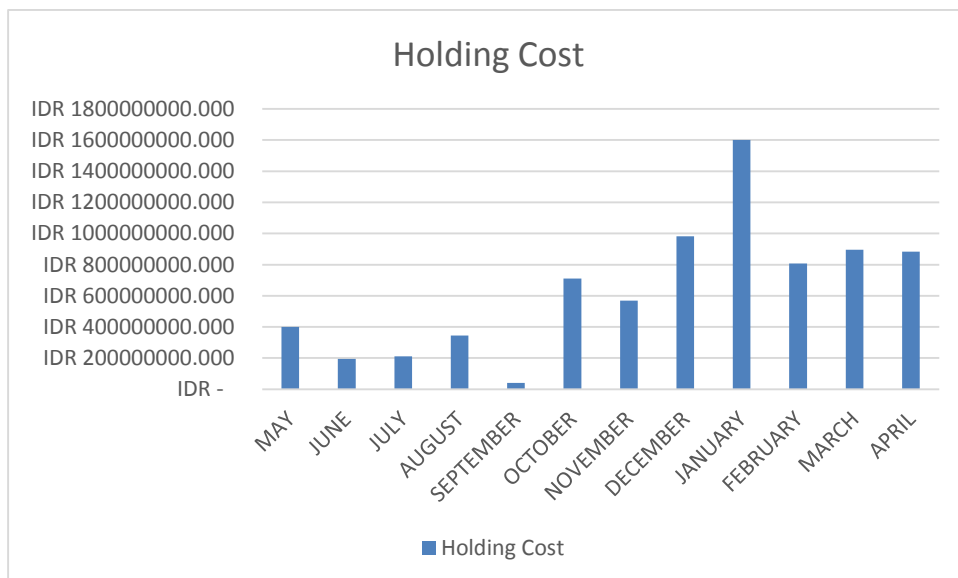
Figure I.8 Graphic of Holding Cost

As can be seen in Figure I.1.8, the monthly holding cost is proportional to the amount of stock held, thus overstock brings about higher holding cost.

An analysis on material utilization is deployed in the determination of the optimal order quantity, reorder point, maximum level of inventory and safety stock. Continuous review approach (s, S) can be used to ascertain the strategy for material needs fulfillment which results in total inventory cost decrease at 1,01% and service level increase at 3,10% (Hidayat, 2012)

Berdasarkan permasalahan tersebut, pengendalian persediaan dalam gudang bahan baku 1 menjadi salah satu hal penting bagi perusahaan untuk melakukan minimasi total biaya persediaan yang harus dikeluarkan perusahaan.

I.2. Problem Identification

Based on the explanation on research background, the identified problems that are to be covered are:

1. How to determine the optimal order quantity in order to avoid shortage and overstock of raw materials in raw material 1 warehouse at PT. SMA?
2. How to determine the optimal safety stock quantity of raw materials in raw material 1 warehouse at PT. SMA?
3. How to determine the suitable reorder point for the inventory of raw material in raw material 1 warehouse at PT. SMA?
4. How to determine the maximum inventory level of each raw material in order to fully maximize warehouse performance?

I.3. Research Objectives

The objectives of this research are:

1. To determine the optimal order quantity in order to avoid shortage and overstock of raw materials in raw material 1 warehouse at PT. SMA.
2. To determine the optimal safety stock quantity of raw materials in raw material 1 warehouse at PT. SMA.
3. To determine the suitable reorder point for the inventory of raw material in raw material 1 warehouse at PT. SMA.

4. To determine the maximum inventory level of each raw material in order to fully maximize warehouse performance.

I.4. Research Boundaries

Problem restrictions are given in an attempt to focus the research on accomplishing its objective and create a scope for the research. The boundaries of this research are:

1. Research is subjected on inventory held in raw material 1 warehouse for main components at PT. SMA.
2. Historical data used in this research is demand data in May 2013 to April 2014.
3. Demand for each part is probabilistic.
4. Inventory cost is fixed.
5. Calculation of total inventory cost is only subjected on inventory held in raw material 1 warehouse for main components at PT. SMA.
6. Research is only conducted until improvement phase.

I.5. Research Benefits

Benefits that can be gained from this research are:

1. Obtaining recommendations for determining the optimal order quantity of each product, the quantity of goods available as safety stock and the optimal reordering time/point for each product in warehouse.
2. Obtaining improvement on warehouse utilization until approximating 100%.
3. Obtaining recommendations for reducing stockout and possible shrinkage due to spoilage and missing goods so as to increase company profit.
4. Applying classroom knowledge and literature study in real world context.
5. As a reference for further research which pertains to inventory management.

I.6. Writing Systematics

Systematic sequence of the research is as follows:

Chapter I   Introduction

This chapter covers the background of the research, problem identification, research objectives, research boundaries, research benefits and the writing systematics.

Chapter II   Theoretical Basis

This chapter contains literature studies relevant to the problems researched, such as inventory policy planning and theories that support problem solving so as to prove that the methods employed are fitting. This chapter also covers the results of previous researches.

Chapter III   Research Methodology

This chapter describes the systematic order of the research in detail: problem identification phase, hypothesis forming, research model development, data collection and processing, data processing analysis, conclusions and recommendations that are to be given to the company.

Chapter IV   Data Collection and Processing

This chapter goes into the details of data collection, both primary and secondary data, used as input in the research and data processing.

Chapter V   Data Analysis

This chapter contains an analysis on the result of data processing which forms the basis for improvement recommendations concerning inventory policy.

Chapter VI   Conclusions and Recommendations

This chapter contains the conclusions in accordance with the objectives of the research and recommendations for both the company and further research.