THE OPTIMIZATION OF WAREHOUSE MANAGEMENT SYSTEM (WMS) TO INCREASE THE EFFICIENCY & EFFECTIVENESS OF PRODUCTION PROCESS IN AN AUTOMOTIVE COMPANY

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"I hereby declare that have read this report
and in my opinion this report is sufficient
in terms of scope and quality for the award of the
Bachelor of Technology Management (Innovation Technology)"

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Report submitted in fulfillment of

the requirement for the award of

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JUNE 2013

"I declare that report entitle

'The Optimization of Warehouse Management System (WMS)

to Increase the Efficiency and Effectiveness of Production

Process in Automotive Company'

is the result of my own research except as cited in the references"

Signature : ….....

Name : NUR FATEHAH BINTI HARUN

Date : 25th JUNE 2013

For the very special……..

My Family;

Harun bin Ibrahim,

Arif, Adibah, Amira & Zarina

Thank you for everything.

The support and the help…

I will always love you all and really appreciate it…

Special thanks;

Madam L. Ganagambegai & Dr. Chew Boon Cheong

Ever patient and always encouraging.

Your guidance has made me through....

Thanks for everything..

ABSTRACT

In manufacturing industry, supply chain management (SCM) is one of the sections which are equally important in ensuring the smooth of production process. It also must be integrated together with warehousing management system (WMS) as a distribution centre which is will consist of materials and inventory control before being distributed to assign workstation to be assembled which is focusing on automotive industry. There are few ways that has been recently practiced by the organisation in lead to well- managed of WMS which results in effective and efficient production operation process such as just-in-time (JIT) concept. This research has been conducted to discover the impact of well-managed warehouse system on production operation process and examine the process integration that involves in handling the parts distribution to production line in assessing the effectiveness of the system. In gaining the data, questionnaire is distributed as a technique to obtain the primary data that is full description of running process of WMS in automotive company to seek for understanding based on the current process flow of the WMS in the company and it has been analysed by using mono method that is quantitatively. The data is supported by the secondary data from the journal and previous research paper that based on performance in attaining the lean production process. Therefore, it can be concluded that the effectiveness of the good WMS in automotive company totally will improve the efficiency of production process in producing their products instead of reducing the lead time and bottleneck that comes together with the application of an appropriate technology in their system to ensure the process can become lean. This will assure that the process in an orderly organize manner and has good flow of information between parties involves.

Keywords: automotive industry, WMS, effectiveness, lean production process.

ABSTRAK

Dalam industri pembuatan, Pengurusan Rantaian Bekalan (SCM) merupakan salah satu bahagian yang penting dalam memastikan kelancaran proses pengeluaran. Integrasi perlu antara pengurusan tersebut dengan sistem pengurusan gudang (WMS) yang bertindak sebagai pusat pengagihan di mana terdapat bahan dan kawalan inventori sebelum diagihkan kepada bahagian kerja yang telah ditetapkan untuk dipasang yang berfokus kepada industri automotif. Kebelakangan ini, terdapat pelbagai cara telah dipraktikkan oleh organisasi untuk ke arah pengurusan gudang yang baik di mana akan menyumbang ke arah operasi pengeluaran yang berkesan dan efisyen seperti konsep Just-In-Time (JIT). Kajian ini dijalankan bertujuan mengenalpasti impak sistem gudang yang baik terhadap proses pengeluaran serta bagi mencari tahu integrasi proses yang terlibat dalam pengurusan pengagihan barang ke bahagian pengeluaran di samping menilai keberkesanan sistem tersebut. Dalam perolehan data primer, set soalan telah digunakan sebagai teknik pengumpulan data dan diagihkan oleh kerana teknik tersebut berpotensi memperoleh penerangan terperinci mengenai perjalanan proses WMS dalam syarikat automotif serta mendalami pemahaman terhadap aliran proses WMS. Data yang diperoleh dianalisis dengan menggunakan teknik mono iaitu secara kuantitatif. Data tersebut disokong oleh data sekunder daripada jurnal dan kertas kajian lepas berdasarkan prestasi dalam mencapai proses pengeluaran yang sempurna (lean). Oleh hal demikian, dapat disimpulkan bahawa keberkesanan WMS dalam syarikat automotif akan meningkatkan sistem pengeluaran yang efisyen di samping mengurangkan gangguan dan masa diturut serta dengan penggunaan teknologi yang bersesuaian bagi memastikan proses berjalan lancar. Hal ini akan memastikan proses berada dalam keadaan tersusun dan mempunyai sistem penyaluran maklumat yang baik.

Kata kunci: industri automotif, WMS, keberkesanan, proses pengeluaran 'lean'.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABBREVIATION

ABC	Activity Based Costing
BOM	Bill of Material
CKD	complete-knock-down
DSS	decision support system
DV	dependent variable
DW	data warehouse
ERP	Enterprise Resource Planning
IV	independent variable
JIT	just-in-time
OPPS	order picking planning system
PPC	production planning and control
RFID	Radio Frequency Identification Device
SCM	Supply Chain Management
SKU	stock keeping unit
WIP	work-in-process/work-in-progress
WMS	Warehouse Management System

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

1.1 Background

It is known that the effective system applies in the manufacturing industry will contribute to the high efficiency of operation process and reduce other pitfalls too. It also being applied in automotive industry especially company that has their own manufacturing plant and having an integrated process between the production line and their stock keeping unit (SKU) also known as warehouse system. It is significant to have an effective link between these two sections to ensure the information flow through the supply chain channel can reach to the right person at the right time. Therefore, warehouse management system (WMS) is one of the systems which are crucial in internal process in a manufacturing plant to ensure that the operation process going on smoothly and integrate the data gained from multiple sources. A certain optimization techniques for WMS system is applicable due to common problems that arise in logistic or WMS system such as (Solstroff, P. & Rosenbaum, R., 2012):

a) High traceability levels have to be reached.
b) Optimization of warehouse fills rates.

c) Reduction of order leads time

WMS is a process which involves in handling the inventory, work-in-progress (WIP) goods or might be finished products before being distributed to production line to produce a finish product. It also acts as an intermediary between the manufacturer and customers. It plays the roles as a distribution centre and move to the assign workstation to distribute the parts for assembling process to produce a unit of finished product. Hence, this research is conducted to study the impact of optimization of well-managed WMS in production operation process on how it affects the operation process in terms of lead time and reducing the bottleneck.

The delivery process of parts in line section is vital to ensure there is enough quantity of parts is sent to the assign workstation to avoid processing delay or interrupted due to unavailability of parts for assembling process. Consequently, it shall affect the process in achieving the production target which results in reducing the volume of products. The WMS is important in the distribution process whereby to assure the right information is conveyed and the right part is being distributed to the right place at the right time in the right quantity. Thus, time waste and parts shortage can be avoided.

As the conclusion, the effectiveness of the integration process can be seen through the efficiency of the production process and the application of the current technology such as scanner and barcoding system to enhance the productivity.

1.2 Research Question

The common problem faced by the manufacturing plant is mixed parts such as complete-knock-down (CKD) parts that have been placed in a container once they receive them at the loading dock. As a result it requires them to segregate the parts accordingly based on the model of the vehicles that they would like to produce before it being distributed to a body shop, paint shop and general assembly line section. Hence, here is where the WMS requires practicing an operative distribution process to ensure there is no disruption arises during the delivery process. Thus, a

few questions are emerging as below to figure out the problem of the relationship between the well control of inventory in the warehouse and the effectiveness of production process regards the distributed parts:

a) Why it is vital to implement the WMS system in the production operation process?
b) How to implement the WMS system in the production operation process?

1.3 Objectives

The objectives of this research is to determine the answer for the problems based on the scenario that happened in the automotive manufacturing plant and clarify the infirmity of the current WMS system. Those are:

a) To examine the impact of the well managed warehouse system on the production process.
b) To discover the process integration of parts handling between warehouse and production.
c) To find out the sequence of the distribution process of parts.

1.4 Scope

The research project is focusing primarily on the process conducted in warehouse starting from parts received, the segregation of parts to be distributed to line section until the delivery process, only involve the internal process. The packaging process and ordering process which is related to outbound logistics activities is not being covered in this research project. It is only being conducted in warehouse and production line that involves the distribution process those are body shop and a general assembly section which consists of three sub-sections; engine and axle, chassis line, and trim line. The paint shop is not included as it only focuses on the painting process of the body frame/cab. Besides, the researcher also has to face the delay in the process that happen due to order parts from vendor cannot be delivered as scheduled and it causes downtime in the process. In short, the researcher face problem to study the process flow in one proper flow and cause the researcher to miss out certain process to proceed study another process that involves while waiting

everything back to normal. The limitation that faced by researcher is the accessibility to distribute the questionnaire in certain automotive company which seems difficult to get their ample time to answering the questionnaire.

1.5 Importance of the project

The significance of the research is conducted regarding on warehouse system is to carry out in-deep study about the current process flow that has been practiced in the manufacturing plant and determine the improvement that can be made to upgrade the process. Furthermore, the research also shall lead to identification of new technology that can be implemented in the warehouse system to intensify the distribution process so that the parts can be delivered on time to the assign workstation. Those technologies that probably can be applied are such as barcoding system, scanner or data integrated software like Enterprise Resource Planning (ERP) system along with Radio Frequency Identification Device (RFID). All of these technologies may contribute to increase the production volume and more efficient operation process which will lead to lean manufacturing process.

In fact, the current warehouse system can be turned into more flexible and agile which consequently will improvise the communication between the line section in ensuring the information and other data can be conveyed in proper manner and received by the right person at the right time and place. Moreover, the expenses incurred for any rejected parts or reorder the new parts due to unavailability also may be reduced.

1.6 Summary

On the whole, WMS system is equally important in supply chain management (SCM) and it needs to be optimized in the operating system to become more effective as it practices together with current advanced technology to increase its productivity and performance. Besides, in providing a successful WMS system, distribution and operation process must be practical and has its flexibility so that it can adapt to any changes of technology or management process and yet the distribution process still can be conducted in any obstruction that exists. This will lead to better communication propagation among the workers in each section that involves in distributing and receiving parts.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A review of the literature or the source of the reference used in research is important to develop an understanding regarding the research topic that is being studied. Through the literature review the researcher is able to get a helicopter view on the topic that has been studied and insight of it that relates to the iron triangle; the topic itself, the research questions and the objectives. The outline and framework of the study are drawn out and the key of the research is identified to give a full of attention on the problems that become the questions about the research. Besides, from the reading made regards the research topic; the optimization of warehouse management system (WMS), it has been specified and narrowing down to the main problems arise that researcher have an in-deep study of the topic for a better understanding and clarify about it that is to study how the effectiveness of the system applied gives impact to the production.