IMPROVING VEHICLE TRACKING IN A HOLDING CARPARK

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ABSTRACT

This research was conducted to improve the operation of a parking area for vehicles waiting for export, and reduce the cost of management fees, through implementation of a barcode system. Barcoding is an automated identification system which is powerful technology and applied in many fields. A barcode system was designed and tested to see if it could solve the parking problem.

The focus company in this research manufactures vehicles in Thailand for export. Its internal operations are very good, but identifying where each vehicle is in the special parking area awaiting export was rudimentary. To begin to solve this problem, all relevant data was collated, such as the current ABC Company information and operation, historical data of cost, company volume, and the parking problem. All this was analyzed so as to develop a new and improved parking process. To implement the barcode system, ABC Company had to invest in equipment and software. The Company also modified the parking area by installing stud bars on the ground. Calculation of the Net Present Value of the returns from this project shows that the investment is valuable to the organization.

When all the improvements were finished and applied, the researcher compared the old operation with the new operation, concerning the process and cost. The results of implementing the barcode system not only solved the problem but also improved the vehicle export operation process. This project eliminates non-value added activities and enhances the skill of manpower. Communication inside and outside the Company is easier, accurate, and reliable. All concerned parties quickly dealt with urgent issues. The Company's supply chain is more efficient and effective than before. The Company reduces costs, gains advantage over its competitors and improves collaboration with its partners.

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บทคัดย่อ

การวิจัยฉบับนี้ได้ทำการศึกษา บริษัท เอบีซี ที่กำลังประสบปัญหาเกี่ยวกับความผิดพลาดของพนักงานในกระบวนการทำงานและไม่มีระบบหรือเครื่องมือเทคโนโลยีจัดการในลานจอดพักรถกระบะในธุรกิจการส่งออกรถกระบะ ซึ่งตั้งแต่รถยนต์ทำงานตรวจเช็คขั้นตอนสุดท้าย จนเข้าไปจอดในลานจอดรถยนต์ ทางบริษัทใช้พนักงานควบคุมกระบวนการจัดการเป็นส่วนใหญ่ เนื่องจากไม่มีระบบในการควบคุมสินค้าหรือระบุตำแหน่งสินค้า ทำให้บริษัทประสบปัญหาในเรื่องเกี่ยวกับความผิดพลาดทางเอกสารในการทำศุลกากรขาออกจากประเทศและสินค้าที่จัดส่งให้ทางลูกค้าไม่ตรงกัน ปัญหาในการใช้เวลานานในการเช็คเลขเครื่องยนต์รถกระบะในลานจอด มีการจ้างพนักงานประจำที่ลานจอดรถที่มากเกินความจำเป็นแต่ไม่สามารถแก้ปัญหาความผิดพลาดที่เกิดขึ้นประจำวันได้ ในฝั่งพนักงานสำนักงานใช้เวลานานในการออกเอกสารในการทำศุลกากร เนื่องจากต้องพิมพ์รายละเอียดเลขเครื่องยนต์ลงในระบบ และในบางครั้งไม่สามารถหาสินค้าที่ลูกค้าต้องการด่วนให้ทันตามความต้องการ ดังนั้นด้วยการที่นำระบบบาร์โค้ดมาติดตั้งในส่วนของลานรับและลานจอดพักรถ ระบบบาร์โค้ดช่วยให้บริษัทสามารถระบุตำแหน่งรถยนต์ในลานจอดได้อย่างแม่นยำ อีกทั้งยังลดข้อผิดพลาดและลดเวลาในทำงานของพนักงานทั้งในส่วนของสำนักงานและพนักงานหน้างานได้ เพราะใช้บาร์โค้ดในการอ่านข้อมูลแทนการเขียนหรือพิมพ์ หลังจากที่ทางบริษัทได้นำเทคโนโลยีบาร์โค้ดเข้ามาใช้ในธุรกิจรถยนต์กระบะส่งออก ข้อผิดพลาดในการทำงานทางด้านเอกสารไม่เกิดขึ้น ระยะในการทำงานของพนักงานสำนักงานและหน้างานลดลงอย่างชัดเจน ทางบริษัทสามารถลดพนักงานหน้างานได้เจ็ดคน ซึ่งสามารถลดต้นทุนได้ 2,247,072 บาท ต่อปี

INTRODUCTION

Manufacturers have many operational processes which organize the production line, supply of raw materials, conversion into finished goods, then sale and delivery to the customer. Most manufacturers have inventory problems. Some have many types of materials, each with small numbers and small items that are very difficult to control manually. Therefore, a barcode system seems to be needed, and is very popular in the many businesses. A barcode on an item is a visual representation of data which is scanned and interpreted for the information it contains. A barcode works as a tracking technology and is represented in a sequence of lines or other shapes. Using the barcode system in inventories can help the business track where the merchandise is located and what amount is available. A worker will be able to know updates in each inventory and locations in the warehouse, by just keying the code in the computer system. It can save time in the operation, and inventory will be accurate and minimize the risk of error and human error. There are many advantages of this system and it is less expensive compared with other tools. That is the reason why barcode is a very

popular tool to improve supply chain for an organization's efficiency and effectiveness.

Statement of the Problem

ABC Company was faced with two main problems in its vehicle export operation. The first is human error in the operation. Second is its inability to track vehicles in the parking area, which causes wasted time to find the location.

To deal with human error in the operation, ABC Company has a system to control raw material, finished goods in and out, and all processes in the production line. But, for the export vehicle part of the business, after the vehicle has been checked completely at the final quality shop, there is then no control system in the parking area. A transportation firm has to drive the vehicles to the parking area, finding an available space. Control of the parking area is manual; there is no tracking system.

There are many manual processes involved, both in the office side and the factory side (yard management at parking area). For the factory side, staff have to write down the engine number, lot number and unit number. It often happens that staff write down the wrong details. For the office side, staff have to key the engine number into the system. That is a waste of time and an error risk. Documents are very important for the export business because they are needed by the government, such as the Excise Department and Customs Department. Documents have to be declared to the government sectors and be subject to retroactive audit every five years. It is a risk to ABC Company's reputation, incurring a penalty fee, or even termination of its export license, if the details in documents contain a mismatch (intentionally or unintentionally), have wrong data, or are fraudulent.

The current operation could not track where the finished vehicle was located in the for-export parking area. After the transportation staff checked the external appearance, he or she drives the vehicle to the parking area. The responsibility of the transportation staff is to drive the vehicle to any available parking slot. If the office staff need to check, they have to find the vehicle in the yard by walking through the rows of vehicles. That is a waste of time. Sometimes, office staff have to wait 15 to 30 minutes to identify the location detail. The transportation company is frustrated, as are customers checking on progress.

LITERATURE REVIEW

Yard Management

Clara (2000) stated that the Ford Motor Company is able to reduce the cost of the management fee within this type of area because of the reduction of labor in the

yard operation. The company is able to identify the vehicle in the yard and deliver the vehicle to the customer with a shorter lead time. Therefore, it has increased the efficiency in the supply chain because of less hours spent to locate the vehicle in the yard. The result is that Ford Motor is able to save millions of dollars in this aspect of its business through implementing a yard management system.

Stockyard Layout Planning

Dawood and Marasini (2001) stated that the precast concrete product industry manages the stockyard layout planning that helps to ensure the time promised to supply the product to customers. It helps this industry manage the stock layout, and to reduce the cost of delivery by 5-10 percent. This industry uses the concept of make-to-stock because the sales volume is high in the summer and low in the winter. The precast concrete product industry uses a computerized system.

Automated Identification

Xie and Sarathchandra (2015) stated that many organizations still use a manual tracking system to manage their inventory. This system entails a long lead time which is time consuming because lots of inventories and data have to be checked. Also, human error occurs. An automated inventory management system helps the supply chain efficiency and reduces labor-intensive costs. There are many types of common automated identifications, such as barcode, radio frequency identification, biometrics, magnetic strips and optical character recognition. Shepard (2005) indicated that the favoured automated identification technology is the barcode. Barcode technology is not expensive, is easy to use, and is used worldwide.

Barcode system

Coyle-Camp (1994) mentioned that many organizations face the problem of not being able to control their assets and inventory. Some assets have to be insured to cover their risks; sometimes a firm pays the insurance premium even though not sure whether the assets exist in the company or not. They have to pay these insurance charges every year. If the managers do not know how much inventory availability they have, and some is past its sell-by date, they cannot control the cost nor the company budget. For this situation, a barcode system can control and track the inventory in the organization, and is an inexpensive solution.

Radio Frequency Identification

Hellstrom and Wiberg (2010) indicated that Radio Frequency Identification (RFID) is a technology that provides accurate, time efficient and reliable data and information to the organization. They further emphasized that RFID provides many benefits to the organization, such as inventory control, location tracking, process control, production control, and availability. Research had proved the

benefit of a pilot implementation using RFID in the production line and assembly process in nine stations.

RESEARCH METHODOLOGY

This part of the research aims to identify the current problems that cause inefficiency and ineffectiveness of the supply chain in the export part of a vehicle manufacturer's operations. The methodology for this research consists of four steps: data collection, data analysis, a proposed model, and evaluation. These four steps helped the organization to see the problem clearly, understand the weak points in the process, find the solution, develop a better process, and improve the supply chain in the organization. The analysis was based on data for the whole twelve months of 2015.

Data Collection

The researcher collected real data from the ABC Company, which has detailed raw data and other information. A description of the essential data collected for this research follows below.

Internal data

Monthly meeting, records or reports about problems, and emails from customers complaining about delivery mistakes and delayed delivery.

Interviews

The researcher had two types of interview: staff in the office, and staff in the factory. The researcher wanted to ascertain whether or not the current solution was working well or had problems. In addition, the researcher wanted to know whether the operation would improve or not if the company provides a new solution such as automated identification.

Observation

The researcher observed the operation in the factory. The researcher wanted to know how the parking area workers responded to solve a problem when contacted by the office staff. Furthermore, the researcher wanted to know how long it took for the worker to find a specific vehicle when needed.

Data Analysis

In this part, the researcher had to know first the current operation and process. After observing the overall current operation, the researcher found that the process starts from the production line completing the vehicle, and ends in the loading of the vehicle onto a trailer for delivery to the customer at Laemchabang Port by the transportation company.

Table 1: ABC Product Classification

Type of error	Jan'15 – Dec'15 (Case)	Percentage
Human error both office & transport	271	96%
Delayed delivery	7	2%
Cannot find the vehicle	3	1%
Deliver wrong vehicle	2	1%
Total	283	100%

Source: ABC Company

Table 1 shows the problems in the vehicle export business. In the whole of year 2015, there were 283 cases that occurred in the process. The majority of the problems, which came from the human error both office and transportation company, was 96 percent. Human error in this case means writing down the wrong engine number and inputting the wrong engine number in the system. The ABC Company had to focus on these errors and solve the location problem.

Proposed Model

After the researcher found the causes of problems in the vehicle export business operation, ABC Company needed to install an automated identification to reduce the errors and lead time and improve the operation. A barcode system is the best alternative because it is easy to adopt in the ABC Company business. The cost of investment is inexpensive. In the vehicle export business, there are many parties both internal and external with whom the company is concerned. The Product Planning and Supply Chain Logistics departments cannot install the implementation activity by themselves. Therefore, the researcher had to set the agenda for the barcode system and propose the project implementation steps to management.

Evaluation

After the ABC Company had implemented the barcode system in the vehicle export operation for around one month, the researcher conducted an assessment review and investigation. The researcher wanted to ensure that the error, lead time and process were improved.

PRESENTATION AND CRITICAL DISCUSSION OF RESULTS

This section presents the result of the analysis, and consists of comparison of the new process with the previous process. The barcode system helps to eliminate the human error, reduce the lead time in issuing the delivery order, convert the manual process and reduce the cost of manpower in the specified parking area. All of these topics are explained below, in the parts labelled Complete Process Flow, Trial Implementation, and Cost Analysis.

Complete Process Flow

After implementing the barcode software and technology in the operation, the process and manpower were expected to change. ABC Company had to link the yard management software to the main system. Using the barcode system in the operation, instead of the staff handwriting the details, there were many tools that ABC Company had to prepare, such as barcode scanning, printer, and internet router. The barcode system had to cope with the division of the parking area into three zones based on the customer destinations in the Laemchabang Port Freezone. In the parking area, aluminium studs bars had to be punched with a barcode tag on the ground for each vehicle parking slot. The purpose of these studs bars is to track the vehicle location in the parking area zones. Using the new process was expected to reduce human error, convert the manual process, reduce lead time, and make the operation accurate, efficient and effective.

Trial Implementation

After a cross-functional meeting, all concerned departments had to complete their assigned tasks. During this period, the System department operated the main system and the yard management software. Production Planning and Supply Chain Logistics departments and transportation companies prepared the new operation for the vehicle export business. The factory side prepared the process in the parking area by punching the studs bars into the ground and separating the parking area zones. The trial period lasted from July to August 2016, a total of two months. ABC Company had to retain all transportation staff in the vehicle export operation in this trial period.

As for the factory side at the receiving area, the operation was much smoother compared with the previous operation. The transportation staff do not need to write down the vehicle details onto paper or concentrate on the number and alphabet in delivery sheets. They use only the barcode reader to scan the barcode on the sheet. Lead time has reduced, and there is flexibility for the staff when working at the receiving area. Transportation staff can stand in the receiving area and scan the barcode. The human error is eliminated because the barcode

technology is very accurate. As for the office side, the staff no longer need to input the engine numbers one by one into the system. The barcode system can eliminate this manual process from the operation. Actually, the office staff continued the delivery order process for around two hours. But, the barcode system helps to improve the process and reduce the lead time in the operation. As for the customer side, the staff receive the delivery order and vehicle faster. Thus, they can prepare for the operation early, such as preparation of the document, staff inspection of the vehicles and the area for parking. When the customer likes to check the current status of an urgently needed vehicle or to request an urgent vehicle, the office staff can respond and inform the customer immediately.

Cost Analysis

ABC Company has reduced the manpower in its vehicle export business from 29 to 22 persons. The manpower cost has reduced from 9,920,544 baht to 7,673,472 baht. The amount of money that ABC Company is able to save is 2,247,072 baht per year. Cost reduction is around 22 percent.

CONCLUSION

The purpose of this research is to reduce human errors, lead time, manual processes and cost of manpower in the parking area of this vehicle export business. Improving the current process situation in the ABC Company, the researcher recommends the automated identification technology which is the barcode system. Much data and information, such as the current operation, advantage and disadvantage of barcodes, and expense in the vehicle export operation, had to be studied. A barcode system was developed in order to solve the major location tracking problem and improve the company's performance.

The barcode system can eliminate problems in the operation. It can reduce the cost of management, and the process is efficient and effective. According to the objectives of this research, the results can solve the company's problem and improve the vehicle export operation process. The barcode system can help the company to eliminate non-value added activities and reduce the cost of manpower. ABC Company gains a competitive advantage over other companies. The supply chain in the company is improved and customer satisfaction increases.

After the manual process was eliminated, the office staff did not have to waste time to conducting manual operations. The department has assigned a staff member to monitor and control the whole process rather than to key in the vehicle details in the system. The purpose is to motivate the staff and to ensure their career paths in the future.

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