

## Capability Enhancement for Administration of Automotive Parts Warehouse Space with Integration Concept

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Independent Study on Optimization of Warehouse Management in Automotive Parts Industry with the integrated concept. The purpose is to (1) search for knowledge kits. For warehouse space management in automotive parts industry. (2) To develop warehouse management model with integrated concept. For enhancements in automotive parts industry (3) to convey knowledge of warehouse space management with integrated concept. Employees of the Company to utilize and optimize the operation more and. (4) to measure and evaluate the efficiency of pattern adoption. "Automotive Parts Warehouse Management with Integrated Concepts" was used. The samples used in the research were the operating personnel of Tokico (Thailand) Co., Ltd. 100 samples. The instrument used for data collection was the warehouse management, automotive parts industry, with integrated concepts, questionnaires, interviews and statistics used in data analysis such as frequency, percentage, mean, deviation standard Regression Analysis

The finding revealed that,

1. the cost of goods stored from 12,665 baht was reduced to 5,404 baht, decreased by 7,261 baht; The transportation of the delivery vehicles from 11 to 167 square meters, reduced to 5 persons or 77 square meters, reduced by 6 to 90 square meters. (3) Reduce the time to move the goods into storage. From 5.5 hours. 1.3 hours, down 4.2 hours. (4) Reduce the amount of packaging material for the examination in 2800 decreased to 720 in 2080, down boxes box.

2. Group 1 to collect the questionnaire in Part 2. Results of data analysis. Administrative Optimization Warehouse area for automotive parts industry with integrated concept. Levels of ideas for implementing warehouse space optimization concepts. The employees who responded the most were 88.8 %. The average score of the respondents was 4.36. The standard deviation was 4.38. Warehouse Management Optimization the employees who responded the most were 86.22%, the average score of employees who answered the questionnaire was 4.33 and the standard deviation was 4.35.

3. Group 2: In-depth Interview Qualitative data analysis Part 1: Interviewer interview data most interviewers had 5-9 years of work experience. Graduation diploma none of the graduated fields. Part 2: The opinions of the respondents about the optimization of warehouse space management. Part 3 Optimization of Warehouse Management Most respondents agreed most, except for round-trip transportation (Milk Run) to reduce traffic problems in the warehouse. Except for the diminished density during transit (Milk Run), it improves warehouse space efficiency

**Keyword.** Warehouse space optimization, warehouse space management integration

## 1. Introduction

Currently, manufacturing and service sectors are highly competitive. Especially in the automotive parts industry. Thailand is the world's third largest manufacturer of motor vehicles. In 2016, Thailand has the third highest production car in the world, and exports up to 9.2 million units. The export value of Thai products is 12%. With a high volume of production, it is imperative that the production planning team coordinate with the warehouse team. So that the number of products produced would have enough space in the warehouse to store enough inventory to wait for distribution. The storage area must be managed to the maximum. Including the warehouse department will need to coordinate with the shipping department. To accelerate out of the warehouse. By effectively working together, the three parties can reduce the cost of logistics operations. There are 600 manufacturers of automotive parts in Thailand. These manufacturers are classified as 1) Manufacturers who have their own factories, warehouses and transportation systems. 2) Manufacturers whose factories have warehouses. 3) The manufacturer has its own factory. But rent a warehouse floor and use external transportation services.

## 2. Literature Review

Independent Research Optimization of warehouse space management in the automotive parts industry with an integrated concept. Independent researchers have studied theoretical concepts and related literature reviews, which are divided into six sections, as follows:

Part 1: Concepts and theories involved

- 1.1 optimization ideas
- 1.2 Warehouse Management Concepts
- 1.3 Inventory Management Concepts
- 1.4 The concept of milk delivery system (Milk Run)
- 1.5 Lead time concept
- 1.6 Timely system concept (Just-in-Time: JIT)
- 1.7 The Kanban System Concept
- 1.8 Performance Measurement Concepts

Part 2: Information about the company as a case study.

Part 3: The Company's Warehouse Situation and Problem Solving

Part 4: Structural elements of warehouse space management. Integrated

- 4.1 Main factors and variables Warehouse Management for Automotive Parts Industry with Concept Integrated
- 4.2 Measurement of warehouse space management, automotive parts industry, with integrated concepts.

Section 5: Structural Elements for Warehouse Management Optimization

- 5.1 Main factors and variables Warehouse Management for Automotive Parts Industry with Concept Integrated
- 5.2 Measurement of warehouse space management in the automotive parts industry with an integrated concept.

Part 6: Conceptual Framework for Research

Toshinori Katsuhiko and Masataka. (2010) Milk Run study on precision and delivery of small (Small) Lost) in more frequency to reduce inventory, it is very successful in Japan. Toyota Samrong will be divided into 5 zones. 120 Supplier Timely tracks has a display and will use a production system called TPS (Toyota production system) and JIT system. The replenishment parts will use Kanban. So Toyota 's company look at inventory reduction is to minimize KANBAN, the quickest refill. To target Tok town center Thailand is the center of Toyota Motor Corporation and uses parts from supplier within the country to 80%, Toyota's Thailand has implemented the Milk Run system and used TTKL to care for Milk Run. Reduce the number of trips. Reduced Running Distance Reduce fuel consumption, but since Milk Run requires a good management system, so it is imperative that road and road conditions are met and that the packaging needs to conform to the standard. Toyota is designed to be the same standard and can be loaded in the truck properly. Finally, Milk Run consists of several parts. Like a buyer, a manufacturer, a government shipper, so all parties. Be involved and be serious about the development.

QuLinZuo (2012) Study on designing and studying a new route model for milking mills. With the existing routes to reduce freight costs and inventory holdings and to increase Inventory efficiency Include frequent frequencies to receive the pieces from the shameless.

Dipteshkumar et al. (2014) studied the reduction of losses and cost reduction. In large scale industries, especially large scale industrial handling, there is an enormous amount of materials that need to be delivered in various locations to solve the best possible problems, optimizing truck utilization, loading performance. Inventory Costs, Inventory and Transportation Costs, Incorporated by Research Techniques, Operations to Develop Mathematical Model Lahore to solve a specific route. The result of the study is that it reduces the number of trucks on the road as well, which in turn causes the traffic problems to decrease, so ultimately the burning of fossil fuels. It is reduced and carbon dioxide emissions. In the environment it is reduced during the design. The new Milk Run route will be developed and overall flexibility. Can be increased according to the needs of customers or suppliers.

Bianca Siqueira Martins Domingos and group. (2014) studied the reduction of losses due to excess inventory and unnecessary movements in multinational industries, machinery and equipment located in Sao Paulo, Brazil. The use of kanban within the organization can be reduced. Stock volatility and help link supplier / producer relationships, application. Lean manufacturing systems for receiving, distributing, moving, storing information.

Xufeng Zhang and group. (2016) studied the optimization. Delivery routes and increase vehicle loading rates. Combined with location In terms of picking points, transport frequency, and carrier capacity, Milk Run technology can increase transportation efficiency. By adding delivery with the best transportation routes. Best return on investment

### 3. Research methodology and the case company

This independent research is based on the mixed methodology developed during research development. Quantitative research Quantitative Research and Qualitative Research. As a result of research development, it is possible to produce concrete work. Can be used to manage warehouse space, automotive parts industry with an integrated concept. To use in the company. Quantitative research can collect data in a wide range and apply to all areas and store large amounts of data in a short time. The cost is cheaper. Interviews will give you more insights. This is more useful and effective than using the questionnaire. For information on complex issues. Because there is talk and discussion between each other. Despite the high cost of interviewing people. Then the data obtained from both methods was validated (validity). The reliability and relevancy of the data because the qualitative method does not use the questionnaire, so the answer may be other than the questionnaire. It needs to be re-examined. Make sure the answer is correct. The answer is to check the consistency of the content context with the questionnaire and consistency with the observations during the interview. Also check with the environment and other existing information. This will indicate whether the

information obtained is reliable and if the answer or the information is not reliable. It will check for additional information from other sources.

#### Data collection

For data collection Independent researchers have the following methods to collect data.

(1) A letter of application from a company for use as a case study for research purposes.

To collect information for the thesis.

(2) have collected the trial data. Warehouse Management for Automotive Parts Industry with Integrated Concept By organizing seminars to transfer knowledge. To use it. Then follow up by handing out the questionnaire. It takes about 1 week to collect data and has a close follow-up process.

With a variety of communication channels. (Especially with phone and line tracking) to get a complete and complete questionnaire. The data were collected by in-depth interviews from selected samples.

(3) Upon receipt of the questionnaire. The researcher will check the completeness of the questionnaire. It will then be taken to the data analysis stage to interpret the results. The results of in-depth interviews were also included.

#### Data analysis

1) Quantitative data analysis from the questionnaire. Descriptive statistics were used.

- Analysis of basic statistics on general information of respondents by the percentage.

- Analyse the level of feedback on the questions. Warehouse Management for Automotive Parts Industry with Integrated Concept And optimization of warehouse space management.

Descriptive statistics were used to determine the mean and standard deviation of the results.

2) Qualitative data analysis from in-depth interviews. By recording interviews and using methods.

Analysis of content consistency from structured interviews.

#### **4. Research methodology and the case company**

Tokai RIKA (THAILAND) CO., LTD. Is a manufacturer of Automotive Part, Security Product, Switch Control and Electronics Part. It has a staff of 1700 people. The investment of 3000 million baht is a business of Japanese business for 15 years. It is located at Amata City Industrial Estate, Tambon Mab Yang, Amphoe Pluak Daeng, Rayong, with factories in Japan as the first factory and in Thailand. The second plant produces 208,333 pieces per week, 833,333 per month, or about 10,000,000 pieces per year, with a capacity of 11,000,000 per year. Toast the domestic and foreign countries. Company Profile As shown in Figure 1.



Figure 1. Auto-close System (Security System)

The problem of the company's warehousing and problem solving as the following

1. The use of parking spaces transported to work too concurrently. The area of 105 square meters.

Up to one in four of the receiving areas.

2. Excessive space during quality control (QC) before operation.

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Moving to 70 pallets takes up 84 square meters of space, resulting in low space utilization.

3. It takes a long time to move and rearrange the items after being inspected. Quality Control (Quality Control: QC) to store on the shelves. The 2,800 cartons take 5.5 hours, which takes almost a full day to complete.

4. The Warehouse Department cannot know the exact time of delivery of the Supplier.

Production cannot be planned in advance. As a result, the storage plan has problems.

The company needs to address such issues. To optimize the warehouse space management of the company.

Independent Research "Optimization of Warehouse Management in the Automotive Parts Industry with Integrated Concepts." This research utilizes a mixed methodology developed through research, research, and quantitative research. Quantitative Research and Qualitative Research. As a result of research development, it is possible to produce concrete work. Can be used to manage warehouse space, automotive parts industry with an integrated concept. To use in the company actually. The researcher concluded the data analysis as follows.

From the introduction of the barcode system, it is used as a replacement for the conventional kick box system. The results are shown in Table 1.

Item	Before Improvement	After Improvement	Result
1	Loss time before sending order no.	Excluding the cumbersome bar code and printing information with automated ordering	Reduce work hours 3 hours a day and reduce the number of people from 3 to 1 person.
2	Can not specify the number of the node.	Specify the number of visits by running the number	Can control the amount of exposure
3	KANBAN 1 PC can be used throughout.	1 cumbersome to 1 order	Can control the amount of exposure
4	Copies of all order information	The system automatically stores data.	Prevent employees from forgetting and reduce work time
5	Will order any time	When the deadline is not available, wait for the next round.	Prevent employees from forgetting their mistakes

The experiment was conducted in the warehouse management of the automotive parts industry with three integrated concepts. The experiment was conducted from November to December, 1960.

The results are as follows.

1. Reduce cost of goods from 12,733 baht to 6,832 baht, down by 5,901 baht

(The amount comes from the box of 2800 boxes multiplied by the storage charge of 0.25 baht per box) plus (167 square meters multiplied by the area of 70 baht per square meter) plus (moving time 5.5 hours multiplied by 15,000 / 30/8) = 62.50 baht = 700 + 11,690 + 343.75= 12,733 baht

2. Reduced parking spaces for transporting and dispatching works from 11 to 167 square meters, reduced to 5 persons or 77 square meters, reduced by 6 persons to 90 square meters (77 by 70, equivalent to 5,300).

3. Reduce transit time from 5.5 hours to 1.3 hours, reduced by 4.2 hours.

(1.3 multiplied by 62.50 is equal to 81.25)

4. Reduce the number of boxes to check 2800 boxes reduced to 720 boxes decreased 2,080 boxes. (2,080 multiplied by 0.25 equal to 520)

Summary of the interview. Both managers, supervisors, supervisors and practitioners.

1. The technique of milking and turning around to deliver more. The trial can reduce the floor.

Warehouse and warehouse space optimization.

2. Prepare schedules to control milk delivery, run Amata Nakorn. Can control the delivery time.

The milk runs to the system. "Timely delivery" reduces storage space. Reduce storage time Reduce the number of boxes for inspection. And reduce traffic in the warehouse. Make changes to the KANBAN system using Manual.

The bar code to sort out the status of the component box and from the distributor of the parts to control the number of cambia. The result is a systematic work. "Timely delivery" reduces storage space. Reduce storage time Reduce the number of boxes for inspection. And reduce traffic in the warehouse.

## 5. Discussion and summary

Independent Study "Optimization of Warehouse Management in Automotive Parts Industry with Integrated Concept" aims to: 1) study how to reduce the cost of goods stored in warehouses; 2) To study how to reduce the time to transport goods into the warehouse. 3) To study how to reduce the number of boxes to be inspected by the Quality Control Department (QC). 4) To study how to reduce the number of parking spaces at the same time. Can measure and evaluate the efficiency of pattern adoption. "Automotive warehouse space management with integrated concept". The tools used in this independent research. Warehouse Management for Automotive Parts Industry with Integrated Concepts, Questionnaires and Interviews. The questionnaire used for collecting quantitative data was divided into 2 parts. There were 18 questions, using 5 rating scale. The average IOC was 0.93, which was verified by experts in logistics and supply chain. Confidence = 0.98 and then analysed using regression analysis. The researcher divided the topics into summary and discussed the results respectively.

### Research result

Implementation of warehouse space management for automotive parts industry with integrated concept. The experiment was conducted from November to December 2017.

1. Reduce cost of goods from 12,665 baht to 5,404 baht, down 7,261 baht
2. Reduce the parking space for transporting cargoes to and from the same time from 11 to 167 square meters, reduced to 5 persons or 77 square meters, reduced by 6 persons to 90 square meters.
3. Reduce transit time from 5.5 hours to 1.3 hours, reduced by 4.2 hours.
4. Reduce the number of boxes to check 2800 boxes reduced to 720 boxes decreased 2080 boxes.

Outcome to answer research questions.

Question :

1. What are the tools that reduce inventory costs in the warehouse?
2. Tools that reduce the time to move goods into the store behind the product.
3. What will be the number of boxes waiting to be inspected by Quality Control (QC)?
4. Traffic management to reduce the waiting area of the transport vehicle to send goods at the same time.

Answer:

1. Deliver the milk delivery system (Milk Run) and use it to change the cycle (Cycle Time) in the delivery. Make a Shipping Time Chart Milk Run and Changing the KANBAN from Manual Use the barcode to separate the status of the box. And call from the supplier (Supplier).

Summarize the results to answer the research hypothesis.

Hypothesis: Warehouse Management of Automotive Parts Industry with Integrated Concept Direct impact on Optimization of warehouse space management. Test results "accept the hypothesis"

Discussion of research results. Independent Research "Optimization of warehouse space management for automotive parts industry with integrated concept". Case study of Tokai factory (Thailand) Co., Ltd., a factory of automotive parts. In the Amata City. This time focus on the subject. Implementing Warehouse Management Techniques in many ways. To optimize warehouse space management, automotive parts industry. In the case study:

1. Changing the traditional kanban system using conventional printing. The barcode is used to identify the status of the parts and to use products from the supplier to meet the production just in time, which is consistent with the training materials of Toyota. This is a very effective tool to make the production of filler fulfillment a reality. Overhaul of production, display of retrieval and production data, Visual Control tools, Kaizen tools, and Camcorders are also controlled by sight. one time

2. Implementing the Milking Technique and Cycle Time to increase the frequency of delivery and Reduce transport parking space. Reduce transit time Reduce the number of boxes for inspection. This reduces the cost of storage in the warehouse, resulting in improved warehouse management. This is in line with on Milk Run Delivery Systems. The logistics service provider manages the Milk Run system by sending trucks to pick up parts from the manufacturer and delivering them to the factory. After that, the empty packaging will be returned to the component manufacturer for reuse and will result in reduced traffic congestion. Since the original deliverer, all parts must be shipped at the factory. Traffic congestion in front of the factory. Due to the Milk Run system, we can receive a wide variety of raw materials, which is a factor supporting the success of the JIT production system. Frequently delivered Inbound Shipment or Incoming Shipments must conform to the time cycle, process and production schedule. In the case of a 3-shift (24-hour) production line, the manufacturer specifies that the delivery parts are 8 times during the shift. That is, the component manufacturer must supply the inputs for each factory. To support continuous production and delivery of goods

3. Schedule Amata Nakorn Shipping Chart (Amata Nakorn). Supplier cannot determine the exact production plan because it is not known whether the supplier (Delivery) will arrive at the time notified or not after the fever can know when the product will arrive at the factory. According to the schedule of Shipping Time Chart Milk Run, which is consistent with the concept of production just in time (Just In Time), which is consistent with the research of Pongsak Petrarak and Sirat Tuntrak. Usually Education system of production Toyota model used in the automotive parts industry. By the way. The concept is to produce the kind of product needed. In the required quantity When is the time needed? It is called "timely" production. In the assembly process. To produce a car. Sub-assemblies required from the previous process must arrive at the assembly line. When it is time to include the required amount of fit, if the "timely" condition is thoroughly observed in the company, then unnecessary supplies in the plant will be eliminated completely.

Based on this independent research. "Enhancing warehouse space management in the automotive parts industry with an integrated concept" is the application of multiple warehouse management techniques in the automotive parts industry to provide more efficient warehouse space management. The findings are in line with other research studies conducted in the automotive industry that use the "Milk Run" technique to increase delivery cycles and reduce inventories. Improve the delivery from the supplier to the assembly plant to better warehouse space management. The difference in this practice and study is that the gap in education that other graspers do not have and that they are integrated to maximize space management. This optimization of warehouse space management for the automotive parts industry will involve four parties: Production Planning Department must coordinate with Warehouse Department so that the number of manufactured goods will have space. In stock, stock is sufficient to store before distribution. Storage space must be managed to the maximum efficiency, and the warehouse department will need to coordinate with the shipping department. In order to expedite the warehousing and warehousing, the order must be made to the Supplier in a quantity that is appropriate to the production of the production department in order to have sufficient storage space. By effectively working together, all four parties can reduce operational costs. Logistics

Recommendations from the research.

This independent research focuses on Implementation of warehouse management techniques, automotive parts industry. Many styles come into the warehouse management. In the factory case study to change the form of delivery of raw materials and automotive parts from the same supplier delivery at a convenient time and ready. For Distributors The delivery is a milkshake. The factory is self-executing in the delivery of raw materials exchange, the supplier of parts undercut shipping costs to the rest of the goods. It will bring down the cost in the way. Both sides of the logistics. The findings of this research are as follows.

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1. Applying techniques to optimize the warehouse space management of the automotive parts industry with an integrated concept. It is used as a coordinated 4 parties, so the information in the communication is very necessary. So should be. Information technology is applied in data communication between parties and suppliers.
2. Milk Run is the coordination between buyers. (Factory assembly) with the carrier (Fleet Vender). Must be able to control and meet the needs of the buyer as well as an emergency plan in case of force majeure such as flood.
3. Expansion of the milk production system to the supplier in another 4 zones. In addition to Amata Nakorn is the Eastern Seaboard, Ayutthaya Pinthong.
4. Forecast should be focused on suppliers to be accurate, close to the truth to prevent delivery errors of distributors or if unable to do so must have an emergency plan. To support in such cases.

Suggestions for the next research.

1. This study was conducted before and after adjustment. In the case of the case study, only the factory of the supplier is not included in the case. Therefore, the statistical efficiency measure is not complete. The resulting supply may not be complete. In the future, should include the research of the supplier.
2. Better technology should be added to improve the automotive parts inventory than this research, such as identifying storage locations. Pre-storage calculation after ordering, etc.

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