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## **EFFECTS OF LOGISTICS CAPABILITIES ON EFFICIENCY OF AUTOMOTIVE PARTS INDUSTRY IN THAILAND**

### **Abstract:**

This research aims to study the effects of logistics capabilities in terms of customer services, flexibility, and technology on the efficiency of automotive parts industry in Thailand and its efficiency in terms of costs, time, and reliability. 408 questionnaires were sent to selected automotive parts companies in Thailand listed in "Thai Automotive Industry Directory 2014" agribusiness organizations in Thailand. Descriptive and inferential statistics were conducted for data analysis including percentages, averages, standard deviations, and multiple regressions.

Of 408 responders, most organizations have the registered capitals of less than 50 million Baht, Thai nationality, average number of employees of 173.4, and average operation period of 18.95 years. Most responders are assistant managers, male, bachelor degree, and average age of 30.15 years old with 10.12 years of experiences.

Hypothesis tests indicate that customer service capability has an effect on cost and reliability efficiencies, flexibility capability have an effect on time efficiency, and information technology capability has an effect on cost, time and reliability efficiencies.

### **Keywords:**

Logistics Capabilities, Efficiency, Automotive Parts Industry

**JEL Classification:** M10

## Problems and statement

Under current economic volatility, it is widely known that logistics development is one important strategy for Thailand to compete in the world market. The 11<sup>th</sup> National Economic and Social Development Plan, 2012-2016, indicates the regional economic integration and economic restructuring focusing on value-added creation, which implies a need for continuous and sustainable logistics development in Thailand.

There are many aspects of logistics capabilities that can add values and competitiveness to the organization. This research will cover three important logistics capabilities; i.e., customer service, flexibility, and information technology. To provide services to customers, the logistics company should thoroughly understand its process, which can be different among industries and sub-markets, and recognize complexity of customer management. The process should be flexible and able to adapt in response to unexpected situations or any changes such as goods, transportation time, and quantity in order to cope with the pull production. Besides, information technology becomes a necessary tool since speed and accuracy are important for quick responses to the customer's requirements. Consequently, it will improve the production and distribution efficiencies, maximize the customer's satisfaction, and reduce transportation cost leading to the success of the organization.

As Thailand's automotive parts industry relies on logistics in many aspects, it is unavoidable for the company to encounter some problems and issues rising from:

- Factors affecting logistics such as high logistics costs in comparison to international standards.
- Logistics facilities such as transportation routes
- Logistics activities such as uncertain forecast.
- Uncertain demands due to pull production.
- Lack of logistics information systems such as resource planning system and automatic storage and retrieval system, which are too expensive for small to medium entrepreneurs.

From the abovementioned issues, logistics management becomes very important for business operation of Thailand's automotive parts industry.

As the automotive parts industry must be prepared to deal with problems in the future and compete at the world class level, logistics can be a solution for these problems. Accordingly, it is our interest to study the logistics capabilities that affect the efficiency of automotive parts industry in Thailand, in hope that our findings could be beneficial for the automotive parts industry.

## Research Objectives

1. To study the effects of logistics capabilities (i.e., customer service, flexibility, and information technology) on the efficiency of automotive parts industry in Thailand.
2. To study efficiency of automotive parts industry in Thailand in terms of costs, time, and reliability.

## Expected Benefits

### Academic Benefits

New knowledge on the effects of logistics capabilities in terms of customer service, flexibility, and information technology on the efficiency of automotive parts industry in Thailand.

### Applied Benefits

Results from this research can be applied to improve the efficiency of business operations in automotive parts industry. Other businesses can also apply research result as appropriated.

Above of all, the researcher expects that knowledge from this research could help the industry, leading to the development of Thailand's economy.

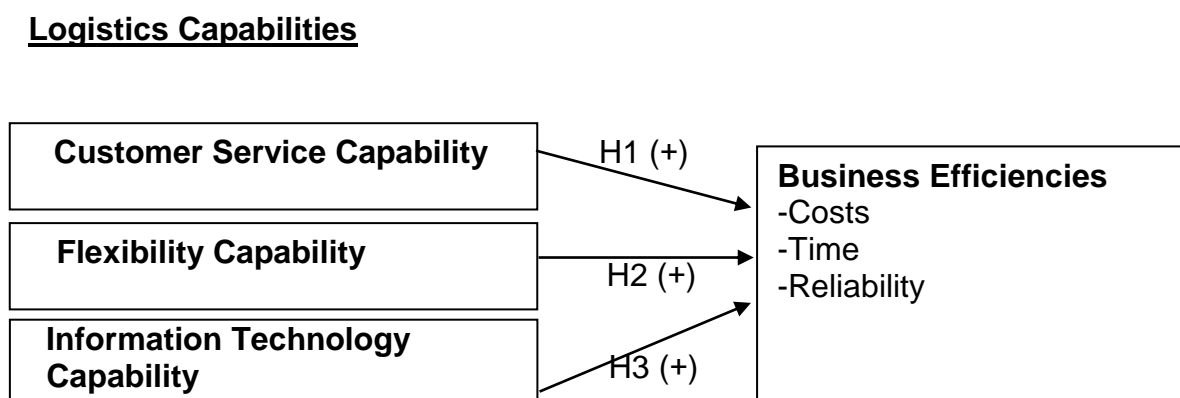
## Scope of Research

This research focused on 1,964 automotive parts companies in Thailand listed in the "Thai Automotive Industry Directory 2014" by Thai Autoparts Manufacturers Association – TAPMA) 2014.

## Conceptual Framework

The conceptual framework of this study is as follows.

Figure 1: Conceptual Framework



## Research Hypotheses

Hypothesis 1: Customer service capability has a positive effect on the efficiency of automotive parts companies in Thailand.

- 1.1 Customer service capability has a positive effect on costs.
- 1.2 Customer service capability has a positive effect on time.
- 1.3 Customer service capability has a positive effect on reliability.

Hypothesis 2: Flexibility capability has a positive effect on the efficiency of automotive parts companies in Thailand.

- 2.1 Flexibility capability has a positive effect on costs.
- 2.2 Flexibility capability has a positive effect on time.
- 2.3 Flexibility capability has a positive effect on reliability.

Hypothesis 3: Information technology capability has a positive effect on the efficiency of automotive parts companies in Thailand.

- 3.1 Information technology capability has a positive effect on costs.
- 3.2 Information technology capability has a positive effect on time.
- 3.3 Information technology capability has a positive effect on reliability.

## Research Procedures

### 1. Population and sample size

Population in this research is 1,964 automotive parts companies listed in “Thai Automotive Industry Directory 2014” by Thai Autoparts Manufacturers Association – TAPMA) 2014. The sample size calculated by using Taro Yamane’s formula. (1967, pp. 886-887) was 332 companies. To assure a better reliability of the results, this research used the sample sizes of 400. From the literature reviews, the questionnaire response rates were 49.4% (Lu & Yang, 2009, p 287), 24.65% (Yang, Marlow & Lu, 2009, p.8), and 45.63% (Kornkanok Thiparos and Chokchai Suvechwatanakool, 2010, p. 11). Thus, this research estimated the questionnaire response rate of 39.89. As a result, the sample size was increased to 1,003 ( $400 \times 100/39.89 = 1,002.75$ ). The simple random sampling plan was applied in this research.

### 2. Research Instrument

This research used questionnaires for data collection, and the questionnaire can be divided into 5 parts as follows:

- Part 1: Questions related to customer service capability.
- Part 2: Questions related to flexibility capability.

Part 3: Questions related to information technology capability.

Part 4: Questions related to company's efficiency in terms of costs, time, and reliability.

Part 5: Questions related to company profile and details of questionnaire responder.

### 3. Assessment of Research Instrument

#### 3.1. Content Validity

The content validity is measured as IOC by three experts in the studied field. The questionnaire is considered acceptable if the IOC is equal or larger than 0.5.

#### 3.2. Construct Validity

The construct validity was conducted by mailing questionnaires to 100 executives of the selected companies. 60 questionnaires were sent back, so the response rate was 60%. All answers were coded and missing answers were scored. The missing value of each indicator was replaced by an average value of that indicator and the results was used in reliability analysis.

#### 3.3. Reliability test

Reliability is a measure to determine the congruence of each parameter. A high reliability means a high correlation among all indicators. In this research, Cronbach's alpha coefficient was used for the reliability test. From the analysis, no question had been eliminated since alpha coefficients of all parameters were larger than 0.7 (Nunnally, 1978) and item-total correlation value of each question was larger than 0.3 (Field, 2005).

#### 3.4. Data collection

Questionnaires were mailed to entrepreneurs in automotive parts manufacturers in Thailand. Companies that had been selected for the reliability test were excluded at this stage.

#### 3.5. Data analysis

(1) Reliability test by using cronbach's alpha coefficient (Cronbach, 1951, pp.297-334)

(2) Discriminant validity test. This analysis will determine whether all variables are different or not. Correlation between each pair of variables was determined to obtain a confidence interval at a 95% confidence level. The variable are different if the confidence interval does not include 1 or the value close to 1.

(3) Assessment of tolerance and variance inflation factor (VIF). The multicollinearity may not be an issue if the tolerance is larger than 0.1 and VIF is less than 10.

(4) Descriptive statistics: frequency distributions, percentages, averages, and standard deviations.

(5) Inferential statistics: Ordinary Least Squares (OLS) was used to assess the relationship between logistics capabilities and efficiencies.

## **Result summary**

### General information of companies and responders

- 408 responders provided information of their companies as follows:
- 63.48% of companies have registered capitals of less than 50 million Baht.
- 60.05% of companies are Thai companies.
- 56.625 of responders are at the assistant manager level.
- 66.17% of responders are male and 33.83% are female.
- 51.72% of responders have bachelor degrees.
- Average number of employees in the company is 173.64.
- Average year of business operation period is 18.95.
- Average year of responder's experience in the industry is 10.12.

### **Logistics capabilities and company's efficiencies**

Preliminary analysis on logistics capabilities shows that averages of information technology capability, customer service capability, and flexibility capability are at 4.16, 4.02, and 3.92, respectively. Thus, it can be concluded that the responders' opinions on all logistics capabilities are at the high level. Preliminary analysis on company's efficiencies shows the averages of costs, time, and reliability at 4.19, 4.05, and 3.99, respectively, indicating the high level of opinions on the company's efficiencies.

### **Hypotheses Test**

#### Cost efficiency

Information technology and customer service capabilities have positive effects on cost efficiency.

#### Time efficiency

Information technology and flexibility capabilities have positive effects on time efficiency.

## Reliability efficiency

Information technology and customer service capabilities have positive effects on reliability efficiency,

## **Discussion**

Hypothesis 1: Customer service capability has a positive effect on the efficiency of automotive parts companies in Thailand.

Customer service capability has a positive effect on costs with a statistical significance. The result is consistent with the previous research indicating an effect of the customer services such as on-time delivery, no damaged goods, before and after sales services, and customer responses on the company's cost efficiency (Lu & Yang, 2009, pp. 284).

Customer service capability has a positive effect on reliability with a statistical significance. The result is consistent with the previous academic research indicating factors to be considered on the customer service and logistics for different among industries and sub-markets and the recognition of complexity in customer management that can affect ordering, readiness of inventory, and delivery reliability (Withaya Suharuethadumrong, 2008, p 63).

Hypothesis 2: Flexibility capability has a positive effect on the efficiency of automotive parts companies in Thailand.

Flexibility capability has a positive effect on time with a statistical significance. The result is consistent with the previous academic research indicating that current operating systems in the company such as pull system and just-in-time system provide flexibility in response to production quantity and product requirements, and consumers efficiently, which have an effect the company's costs (Jacob & Chase, 2008, pp. 344-345).

Hypothesis 3: Information technology capability has a positive effect on the efficiency of automotive parts companies in Thailand.

Information technology capability has a positive effect on costs with a statistical significance. The result is consistent with the previous academic paper stating information technology as a key success factor to lower the logistics cost and team collaboration (Thanit Soratana (2008).

Hypothesis 3.2 Information technology capability has a positive effect on time with a statistical significance. The result is consistent with the previous research stating that the organization with good information technology capability will be able to shorten the lead time for delivery and give advantages to both logistics company and customer (Chan et al., 2006, pp, 641-645).

Hypothesis 3.3 Information technology capability has a positive effect on reliability with a statistical significance. The result is consistent with the previous research stating the correlations between key indicators for the logistics efficiency, e.g., lead time and on-time delivery (Novack & Thomas, 2004, pp.308). All parties, such as customers, suppliers, and logistics providers have participation in the logistics services.

## Recommendations

1. To obtain good cost efficiency, the organization must give a priority to the customer service capability by considering appropriate price quotation along with good product quality, fill rate, and cycle time. The ordering information must be efficient and the delivery frequency must be consistent and incessant. In addition, the organization must emphasize on information technology capability, especially the application of data management such as collection, storage, processing, communicating, and service systems, which will create linkages in the supply chain and mitigate unnecessary operating costs.

2. To obtain good time efficiency, the organization must give a priority to flexibility capability that can simply adapt processes in response to unexpected situations. Quantity flexibility should be agreed to define ranges of quantities delivered between sellers and customers. This agreement needs coordination to create flexibility on quantity and delivery dates. Both parties can reduce negative effects on the uncertainty of demand and supply, and the service level can be beneficial from a faster fill rate.

3. To obtain good reliability efficiency, the organization must give a priority to customer service capability by considering customer service processes related to before and after sales and customer responses in order to maximize customer's satisfaction. In addition, the organization must give a priority to flexibility capability for quick responses to customer's requests in order to build the customer's confidence. Delivery time and production quantity must be flexible and ready for any changes of the customer's demand. Lastly, the organization also must give a priority to information technology capability by implementing a system for worldwide communication along with supply chain operation such as web communication.

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