

# Delivery Price Adjustment for Increasing Customer Satisfaction, Income, and Utilization of Resources

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**Abstract**—The paper presents an approach to understanding and accommodating customer requirements in terms of delivery service of the case study company. Assuming that the delivery price is set too high, the paper investigates transportation management cost, delivery cost and price setting to see if the price can be reduced. As a result, the delivery price adjustment can be made, according to the historical data. This can increase customer usage as well as increase resource utilization of the company while the delivery price can be decreased by 1-34%. When the resource utilization and the delivery usage can be increased, the simulation showed an expectable increase in income by 6-17%.

**Keywords**—transportation management, transportation management cost component, delivery cost and price setting

## I. INTRODUCTION

Logistics costs in Thailand are exceedingly high, officially reported at 14.1% of Nominal GDP according to “Thailand’s Logistics Report 2020” by the Office of the National Economic and Social Development Council [1]. The high logistics cost affects the competitiveness of the country in today’s global fragmented supply chain [2]. Currently, in Thailand, logistics and supply chain management knowledge, technology accessibility, as well as performance, are limited [3-4].

The issue has been a concern by the Thai government. The counteractive policies have been deployed in several related government agencies. The Department of Industrial Promotion within the Ministry of Industry is specifically assigned as responsible to leverage the logistics performance of the Thai industry. One of the well-recognized examples is the factory logistics improvement project which is a continuously funded project by the department and thousands of factories in Thailand have been promoted [5].

Transportation and distribution management has long been a gigantic obstacle to Thailand’s industrial logistics development [6-7]. There are many attempts for improvement in cost, speed, reliability, and quality with several tools and concepts and yet there is still room for improvement [8-9]. Looking beyond organizational performance, customer satisfaction is also targeted [10-11].

The paper presents a recent successful case study of the factory logistics improvement project in the year 2022 where the case study concrete fabrication factory participated in the project. Among many facing problems, the company wished to increase customer satisfaction and increase utilization of the company resource. The following presents an approach to understanding and accommodating customers, focusing on the delivery service provided by the company. In the current situation that the customers do not clearly convince by the delivery price of the company and choose other LSP to perform the task. The paper then investigates the company’s transportation management cost, delivery cost, and rate setting to see if they can be adjusted to satisfy customers’ requirements for this service.

## II. THE CASE STUDY COMPANY

The case study company is one of the largest fabrication plants of precast concrete products in Northern Thailand. The products include plank slab, hollow core slab, post-tension system, concrete piles, reinforced concrete box culvert, etc. The sales of the company are over 300 million THB/ year.

The following summarized key information of the case company’s supply chain, including inbound, production, and outbound activities.

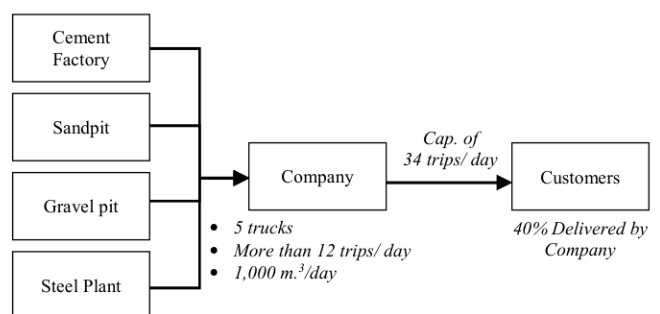


Fig. 1. Supply Chain of the Case Study Company

### Inbound

The supply chain of the company is uncomplex (see Fig.1). There are 4 main raw materials for production, i.e., cement, sand, natural gravel, and steel wire. Sand and gravel

are mostly from nearby sites. There are 5 trucks incoming per day for each material. Cement and steel wire are from rather far sites, e.g., in central Thailand. Cement and steel wire are delivered 2 times per day each. All incomings are insourced as the company uses 5 18-wheelers own fleets to pick up the materials from the suppliers. In total, more than 1,000 cubic meters of raw material are used for production daily.

### Production

The production processes and complexity vary from product to product. For example, hollow core production processes include, preparation of casting beds, prestressing, concrete batching and distribution, casting, detailing, curing, detensioning, cutting, stripping of beds, and storage.

For the case of the plank slab production, it requires 2 days from raw material issuing to the finished product warehouse receiving.

The size of the finished product warehouse is 4.7 acres, located around the production facility.

### Outbound

Due to the very high density of the products, most customers are the close-by construction sites. 70% of the customers are within a 50 km radius of the plant. The plant provides a delivery service as well as an installation with the in-house fleet. There are 3 6-wheeler/6.5-ton trucks, 9 10-wheeler/13-ton trucks, and 5 18-wheeler/23-ton trucks.

However, despite the company-provided delivery service, only 40% of the sales order are included with the delivery. The other 60% are sales orders without delivery service. This raises the question of why most customers do not use the provided service. The first observation is if the delivery rate, time, or quality of the service is not competitive with other LSPs.

## III. PROBLEM IDENTIFICATION

### Transportation Management Performance Assessment

To identify the problems or opportunities for improvement, the Industrial Logistics Performance Indicators (ILPI) [12-13] are used here. Focusing on the transportation management perspectives, there are 3 ILPI indicators related, i.e., Transportation Cost Per Sales (TCPS), Average Delivery Cycle Time (ACDT), and Transportation DIFOT Rate (TDIFOT).

The diagnostic showed that the company has TCPS at 7.72% per sales. ACDT ranged from 0.25 to 7 days with the average ACDT at 1.25 days. TDIFOT of the company is at 99.8%.

Here, compared with the Thai industry average [13], it is found that the transportation cost of the company is relatively high, when compared to the average TCPS of the Thai industry which is 3.80%. The delivery cycle time of the company is consistent with the Thai industry average ACDT at 1.26 days. TDIFOT of the company, on the other hand, is comparatively high whereas the Thai industry average TDIFOT at 87.59%.

The finding is also aligned with the second performance assessment tool used to diagnose the company, The Supply Chain/ Logistics Scorecard (LSC) [14-15]. The self-assessment LSC shows that the company is weak in logistics

cost management, especially transportation management activity.

Here, the focus of the study is then on the transportation management cost, which is the baseline cost for the delivery price that is offered to the customer.

### Transportation Management Cost Structure

Focusing on transportation management, the cost structure normally comprises 3 main costs, i.e., terminal cost, linehaul cost, and capital cost [16]. Where terminal costs are costs that are related to loading and unloading, the linehaul costs are a function of the distance of the transportation. The capital costs are the physical assets of transportation, including infrastructures, terminals, and vehicles.

For the case study company, the terminal costs are mostly labor costs. It carries 19% of the total TCPS. For the linehaul cost, 35% are petrol and 22% are maintenance costs. Capital cost is the depreciation of the fleet at 19% and other related cost (e.g., registration and insurance) at 5% (see Fig.2).

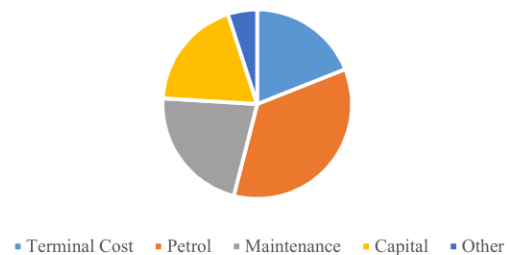


Fig. 2. Transportation Management Cost Structure of the Case Study Company

Currently, the company uses its own fleets and labors. Thus, if considering as the fixed costs, i.e., terminal and capital costs, there is 43%. The variable cost is 57%. Here, the fixed cost is relatively high, compared to the variable cost.

### Delivery Cost and Price Setting

Currently, the company set the delivery price based on the delivery cost. Where the cost is divided into terminal cost, linehaul cost, and capital cost, the cost components vary from truck size and distance of delivery. Terminal and capital cost is based on activity and resource required per truck utilization. Linehaul cost varies with the distance and is mapped into the delivery zone. Delivery zones, provided by the company, cover distances from 15 km., 25 km., 30 km., 35 km., ..., and 300 km. Fig.3 shows an example of the cost structure for a 6-wheeler truck in zones 15-50 km.

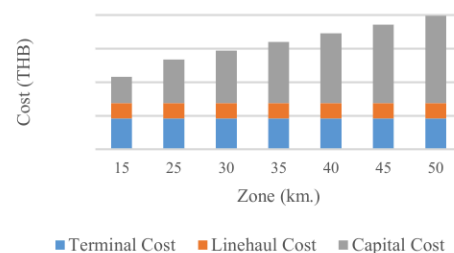


Fig. 3. Cost Structure of Delivery Services – 6-Wheeler Truck – 15-50 km.

The company added 20% to the cost as the company's profit. As the cost varies from truck size and distance of delivery, the company has set a price list, offered to the customers.

#### IV. INVESTIGATION

##### Cost Investigation

The cost structure is then investigated. Where at first, the linehaul cost was determined using the maximum distance within the zone of delivery. The company provides service with the price and cost that are based on the zone of delivery, calculated by the distance from the company. However, the historical data for the previous year shows that the average delivery distances are less than the maximum. For example, the average service distances of 6-wheeler, 10-wheeler, and 18-wheeler trucks in zone 15 km. are 10.08 km., 9.77 km., and 7.3 km., respectively. Thus, the first investigation is that the linehaul cost can be overpriced.

The second investigation is based on the fixed cost where the utilization rate of the fleet and labor is currently at 45%. This cost was shared and allocated to the delivery cost. This results in high depreciation and labor cost per delivery trip. Here, if the utilization rate can be increased, the depreciation and labor cost per trip will be dropped and the delivery cost can be reduced.

##### Competitor Price

Investigating other LSPs as the direct competitor of the company's delivery service, it can be found that LSP offered 10-15% lower delivery prices than those of the company. There are many possible reasons for this, e.g., the LSPs do not include Value Added Tax (VAT) in their service. Also, LSPs are likely to take lower safety factors in transportation. Thus, they can offer more tonnage of delivery per trip.

#### V. RESULT SIMULATION

##### Price Adjustment

Based on the cost investigation, it is interesting to see if the price can be decreased and how much, according to the average real distance. After careful calculations, some zones are exceedingly overpriced, especially the close-by zones, i.e., zones 15 km. and 25 km., at 40% and 21%, respectively. And for the past year, 20% of the deliveries were within this 25 km. distance. The further zones are stepped with 5 km.-advancement, and they are relatively reasonable, with a different rate between 1-8%. 50% of the deliveries were within 50 km. distance. Fig. 4 illustrates the distribution of the deliveries in the year 2021.

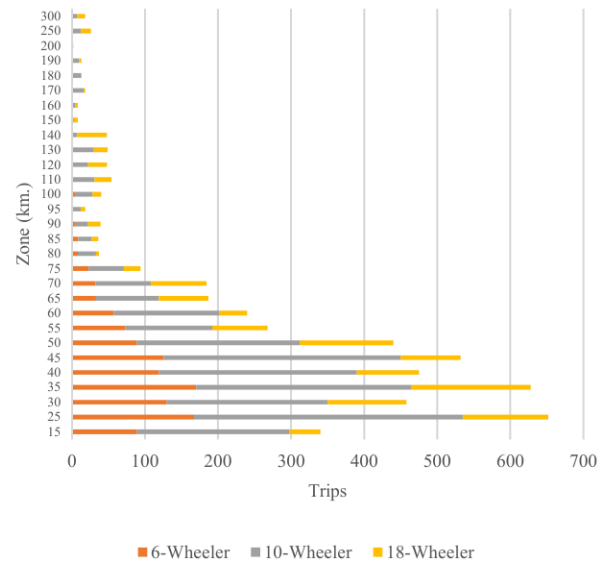


Fig. 4. Distribution of the Deliveries in the Year 2021

Here, with an add-on margin, the delivery rate can be adjusted by 1-34% (see Fig.5) and the new price list can be set accordingly.

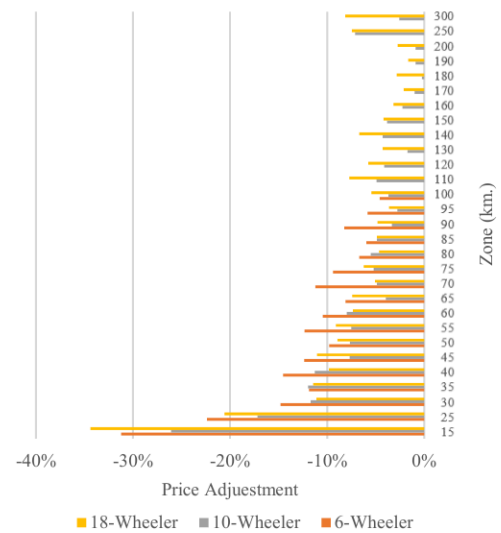


Fig. 5. Price Adjustment Possibility

##### Sensitivity of Price

Whilst the income will be decreased due to the delivery rate adjustment, the cost, on the other hand, can be assumed to be reduced. Focusing on the cost component of the delivery service, the investigation showed that the majority of the terminal and capital costs are based on truck and labor utilization. Today, the utilization rate is only 45%. The further calculation is aligned with the company's customer survey on price sensitivity. Where all customers prefer to use the company delivery service if the price is competitive. It is interesting to see if the resource utilization can be increased with the same fixed cost but the cost per trip is reduced.

Here, the Monte-Carlo Simulation engine [17-18] is used to explore the possibilities of such cases. The most likely case is if the utilization of the resource increases by 30%. The simulation is bounded with the worst and best cases, an increase of 15% and 50%, respectively.

The income is then simulated based on the assumptions above. The result shows that the scenarios are preferable where the income can be increased from 7-32% for the case of 6-wheeler (see Fig.6). The most likely causes are the increase of the income of 17%, 15%, and 6% for 6-wheeler, 10-wheeler, and 18-wheeler trucks, respectively.

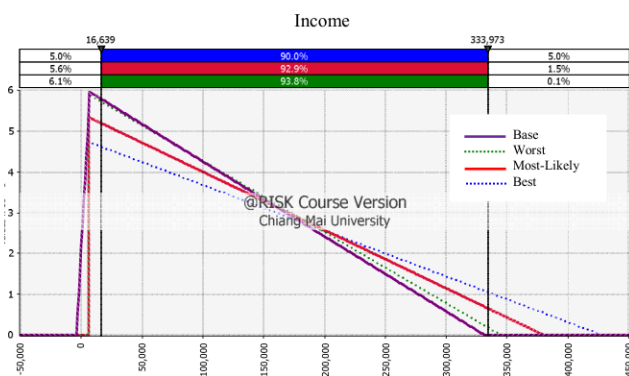


Fig. 6. Income Possibilities with 3 Scenarios – 6 Wheeler Truck

## VI. DISCUSSION

The paper illustrates how a company can strategically improve its service to the customer without losing income and profit. By deeply investigating the transportation management cost, delivery cost, and rate setting, the delivery price adjustment is possible. Such strategy can increase customer satisfaction and increase utilization of the company resource.

However, with the current uncertainty of Thai petrol price, the strategy is very sensitive and therefore is pended by the company. As the data in this study was based on the current government subsidy program, Thai diesel prices are currently ceiled at 35 THB per liter. Yet, the program will soon expire. It was expected that Thai diesel prices might go up to 30% of the current price, without any subsidy program.

## VII. CONCLUSION

The paper preliminarily investigates the logistics management performance of the case study company using the Industrial Logistics Performance Indicators (ILPI) and Supply Chain/ Logistics Scorecard (LSC). It is suggestive that the transportation management cost of the company is quite high and uncompetitive. As a result, the customers tend not to use the company-provided delivery service due to the high price. Then the transportation management cost, delivery cost, and rate are investigated. The cost structure is revealed. The study showed the possibility of cost adjustment where currently the cost is considerably high and is not set according to the real situation. The linehaul cost is overpriced. The resource utilization rate is low. This, the price adjustment is simulated, and it is found that the delivery rate can be adjusted by 1-34%. And if the lower price can increase customer usage of the service, the simulation showed positive outcomes within the scenarios of interest. The income can increase by 6-17%.

## ACKNOWLEDGMENT

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