

# LOCATION SELECTION TO ESTABLISH AN AGRICULTURAL PRODUCT DISTRIBUTION CENTER CASE STUDY: UDON THANI PROVINCIAL COMMUNITY ENTERPRISE GROUP

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## ABSTRACT

Abstract—This research aims to 1) to analyze and select the location of the agricultural product distribution center in Udon Thani Province; and 2) to study the transportation and distribution patterns of agricultural products. Agricultural Distribution Center Use a qualitative research model. The population used in the research was community enterprise group There were 2,717 groups in Udon Thani Province. Twenty groups of samples were selected by purposive sampling method. The instrument used in the research was the Center of Gravity analysis, which was a suitable method for selecting the location. The appropriate location for the establishment of an agricultural product distribution center in Udon Thani province. The results of the research showed that 1) it was the location of the agricultural product distribution center in Udon Thani province. Located in the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani 2) Direct shipment (new route) Agricultural Distribution Center, Udon Thani Province, indicators: The distance of transportation is reduced by 0.67% and the total cost is lower. accounted for 3.60 percent and it is possible to set up an agricultural distribution center in the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province Therefore, the proper routing of transport with mathematical models. for the transportation of each car line in utilizing the research findings Support information for the establishment of an agricultural product distribution center in Udon Thani province and marketing promotion from community enterprises is essential for wholesale, retail

Keywords—Location, Distribution center, Community enterprise group

## INTRODUCTION

Community development office Udon Thani Province Saw the economic problems in the province in decline. Agricultural products are priced lower. The price of fuel is higher (diesel). The income from the sale of agricultural products is reduced. From the policy of Udon Thani Province. Department of Community Development, Ministry of Interior and Government. Provide support, help, mentoring, advice to enhance the potential of community leaders. Community organizations and networks have a market development plan from the concept to promote the agricultural sector of the province and the region. Aiming at community organizations in community management in Udon Thani Province. To raise the level of service and transportation. as well as adding a complete range of products Especially agricultural products. such as imported goods. And export to upgrade to foreign countries. Suan Sunandha Rajabhat University Udon Thani Provincial Education Center come to help find solutions to problems. So contact the community development office. Udon Thani Province to request research support because of economic problems in the province Agricultural products are priced lower. Higher fuel prices (diesel).Community enterprises are unable to maintain sales and profits. Community enterprises may have lower profits and lower capital. being in a difficult situation The reason for the current cost of transportation is higher. And the central market that will be the distribution center for agricultural products in Udon Thani province is in the city. is Udon Muang Thong market. It's a private market. Renting space is quite expensive. However, Suan Sunandha Rajabhat University Udon Thani Provincial Education Center and community development office Udon Thani Province There is a guideline for surveying the area of agricultural distribution centers in Udon Thani Province. to reduce the rent of space. Transportation cost. This is in line with the master plan under the national strategy. (2018-2037).

The objectives of this research were 1) to study problems arising in the production process of community enterprises; 2) to create guidelines for increasing efficiency in the production process. Data collection uses in-depth interviews, observations, and note-taking to conduct studies, analyzes, and improvements. production process This research was to provide consultation, improvement and correction of 2 groups of community enterprises, namely 1) Pla Ra Bong Tha Tum Community Enterprise and 2) Fern Watermelon Rice Community Enterprise.

## LITERATURE REVIEWS

Subject research "Selecting a location to establish an agricultural distribution center, a case study of a community enterprise group in Udon Thani Province" which studies the documents, textbooks, and related researches as follows.

(Phanarat laopongcharoen, 2016) Warehouse location selection by using center of gravity method and factor rating method case study : food ingredients imports business. The purpose of this independent study is to study factors influencing location selection, select warehouses to satisfy customers' requirements rapidly by using Center of Gravity method to find the suitable location. The location from calculation is 146/26 Bangwak, Bangprai, Bangkae, Bangkok 10160 where doesn't have any warehouses for rental and no facility at all. The scope of finding locations was expanded to radius of 30 kilometers. Factor Rating Method was used to define the significant variants. The concerned persons of the company were interviewed. Factors and weights were concluded from the interviews as follows: 1.Transportation Cost 18% 2.Infrastructure/ Environments 18% 3.Operation Cost 17% 4.Warehousing Cost 16% 5.Market Access 16% 6.Regulations 15%. Each choice of warehouse was weighted by these factors. The highest score is SubSriThai Warehouse Public Company Limited.

(Chakraphat Chaunin & Busaba Pruksaphanrat, 2014) has studied decision-making models related to investment, location selection and product distribution, which are included in the selection of suitable long-term investment plans. The purpose is to find the investment model that has the lowest present value of total cost possible. The location is also suitable and has the highest level of customer service value. with the method of transforming multi-objective problems to single-objective problems. with a single objective approach (Single Objective Approach) by setting goals that are less important

## METHODS.

### 1. Population and sample.

Sesearch site The location of this research was determined to conduct the research in Udon Thani Province. Get information from the Udon Thani Provincial Community Development Office. Collecting community enterprise information and OTOP products, Udon Thani province. using information to carry out various activities At the author of the research, look for names, names and addresses. Community Enterprise/Community Enterprise Network, Udon Thani Province. All 2,717 groups

### 2. Research tools.

Tools used in selecting a specific sample (Purposive sampling). It is a selection of a sample based on the decision of the researcher himself. Consistent with the research of (Supachai Muenpho, 2017). Analysis of the center of gravity (Center of Gravity). It is a suitable method for choosing a suitable location for establishing an agricultural distribution center in Udon Thani Province. Information of community enterprises and OTOP products, Udon Thani Province. Consistent with the research of (Panarat Laopongcharoen, 2017). Milk runs are delivered from origin by combining goods from many carriers. to deliver to multiple end users consistent with the research of (Hotrawaisaya C., 2018).

### 3. Data collection.

1. Purposive sampling. It is a selection of samples by analyzing the quantity of products that are purchased in each district. And a total of 20 samples were randomly drawn from 2,717 groups. In the area of Udon Thani Province. By comparing the amount of delivery of each community enterprise. The data contains data on average demand for goods in February 2022 (baht per month). which summarizes the list of random samples and Data on the average demand for goods in February 2022 (baht per month). The researcher brings summary information to

a random sample of community enterprises. Come find the location of all 20 community enterprise groups on the website (<https://www.google.co.th/maps>.) in the area of Udon Thani Province. The red mark is the location of all 20 community enterprise groups. Summary as shown in Table 1.

**Table 1**  
**List of sampling groups and average demand for goods in February 2022 (baht per month)**

District.	Community enterprise group.	Average product demand (month).	
		Value (Baht)	Quantity (Kg.)
Mueang Udon Thani	1 Cattle-Buffer Development Group.	150,000	500
Kut Chap	2 Ban Sang Paen Rice Planting Group	220,500	1,000
Nong Wua So	3 Mango growers in Na Lom Nong Kham	175,000	3,500
	4 Ban Huay Rai mango growers	155,000	3,100
Kumphawapi	5 Pandon Good Rice Group	105,000	3,000
Non Sa-at	6 Beef feed producer group.	125,000	415
Nong Han	7 Weaving group of silk-cotton mudmee dyed with indigo.	102,000	50
Thung Fon	8 Fisheries raise fish in cages.	98,500	1,400
Chai Wan	9 Weaving group and pie bags (bags).	100,500	45
Si That	10 Group of large plots of rice in Champee Sub-district.	95,500	1,910
	11 Beef cattle raising group Ban Prong Enterprise.	175,000	580
Wang Sam Mo	12 Royal Palace Mango Plantation Group	165,000	3,300
Ban Dung	13 Srisuttho Rice Planting Group.	120,500	3,400
	14 Ban Khok Kham Lai community shop.	250,200	5,000
Ban Phue	15 Watermelon fern leaves.	145,000	950
Nam Som	16 Ban Dong Phatthana Rubber Group.	275,000	750
Phen	17 Ban Dong Samphan Cattle Raising Group.	150,500	500
Nong Saeng	18 Sangthong Sugar Cane Juice Processing Group.	100,500	900
Phibun Rak	19 Clothing business group.	150,250	50
Kuk Kaeo	20 Banjeet Drinking Water, Moo 6.	165,000	11,000
SUM		3,023,950	41,350

#### 4. Data analysis

1 Analysis of the center of gravity (Center of Gravity). Based on the study of location selection methods. Center of Gravity method. It is a suitable method for selecting a suitable location for setting up a small distribution center of a case study company. Steps required to determine the appropriate location for establishing a small distribution center in different sectors. across the landscape. with each point acquired Which has the method used to consider the following from the formula Taking because is a way to find a location that gives you the cost. or the lowest overall duration in case of multiple endpoints. which method analyzes the center of gravity. It is one of the most popular ways to find a distribution center. with the goal of having the least amount of capital in product distribution. By Analyze the center of gravity (Center of Gravity).The appropriate location was calculated by means of analyzing the center of gravity (Center of Gravity). of community enterprise groups in each district. in the area of Udon Thani Province where the X-axis follows.

**From Equation 1** The calculation of the center of gravity position of the X axis is as follows:

$$\begin{aligned} \bar{X} &= \frac{\sum Q_i \times x_i}{\sum Q_i} && \text{Equation 1} \\ &= \frac{\sum (150,000 \times 17.2808) + (220,500 \times 17.4918) + \dots + (165,000 \times 17.1742)}{\sum (150,000 + 220,500 + \dots + 165,000)} \\ &= \frac{52465038.945}{3023950} \\ &= 17.3498367846691 \end{aligned}$$

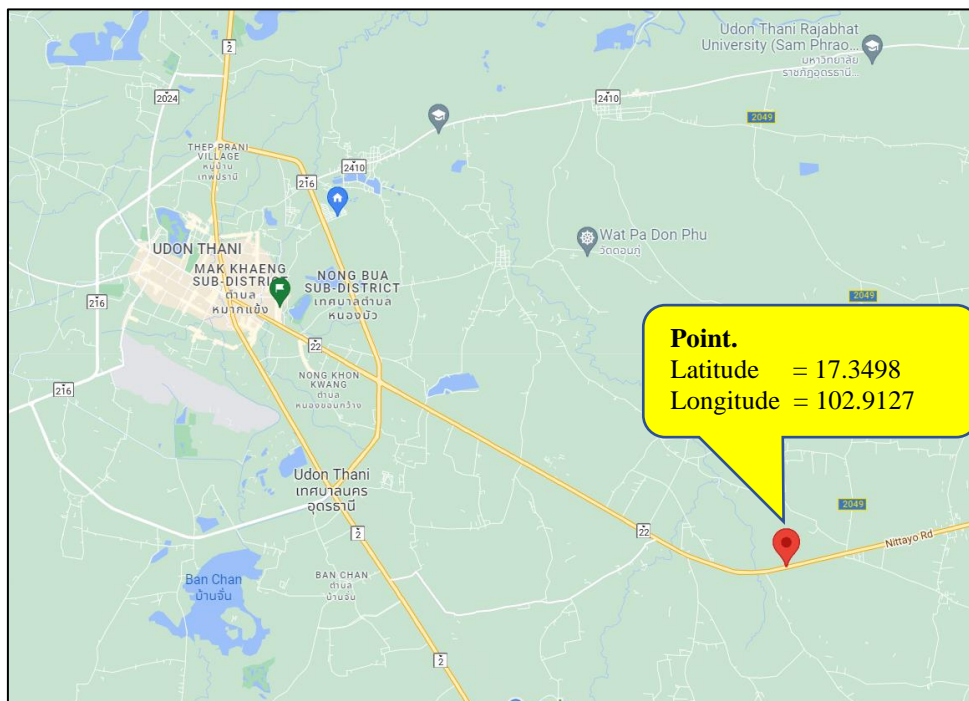
Summarize the position of the center of gravity of the X axis is 17.3498.

**From Equation 2** The calculation of the center of gravity position of the X axis is as follows:

$$\begin{aligned} \bar{Y} &= \frac{\sum Q_i \times y_i}{\sum Q_i} && \text{Equation 2} \\ &= \frac{\sum (150,000 \times 102.9061) + (220,500 \times 102.6651) + \dots + (165,000 \times 102.6651)}{\sum (150,000 + 220,500 + \dots + 165,000)} \\ &= \frac{52465038.945}{3023950} \\ &= 102.912738051704 \end{aligned}$$

Summarize the position of the center of gravity of the Y axis is 102.9127.

**Figure 1**  
**The location of the distribution center of agricultural products.**



From Figure 1, the researcher brought information to find the location of the agricultural distribution center. on the website (<https://www.google.co.th/maps>) in Udon Thani. area The red mark is the location of the agricultural distribution center. It is located in the area of Nong Na Kham Subdistrict, Mueang District, Udon

Thani Province, next to Nittayo or National Highway No. 22, Udon Thani - Nakhon Phanom route. It is a west-east highway. Connect Udon Thani Province. Sakon Nakhon Province And Nakhon Phanom Province together. It has a distance of approximately 240.746 kilometers. and is part of the Asian Highway 15.

2. Transportation and distribution of agricultural products Researchers find a mode of transportation that facilitates a linkage service system within the Udon Thani Agricultural Storage and Distribution Center. Indicators Number of trips in transportation. and the total cost is less. By testing trucks weighing no more than 2 tons (pickup trucks), brand Toyota. Model Hilux Revo Standard Cab 204 horsepower, fuel consumption rate 12 kilometers / liter. The driving speed does not exceed 60 kilometers per hour. Maintenance costs for trucks weighing no more than 2 tons (pickup trucks) in a cycle of 50,000 kilometers. Transmission and rear gear oil The fee amounts to 14,000 baht. Or per kilometer 0.28 baht. The price of oil per liter is 39.14 baht per liter. The average diesel price in February 2022 is based on the retail price of Bangkok and its vicinity for the year 2022 ([https://www.pttor.com/th/oil\\_price](https://www.pttor.com/th/oil_price)). In each enterprise, it takes 30 minutes to get on and off at each point. And the wages of the driver are 450 baht per day. The assessment is measured from the initial distance to set up the agricultural distribution center, latitude 17.3498. Longitude 102.9127. to all 20 community enterprise groups by bringing 2 forms of transportation. 1) Direct shipment (old route). 2) Direct shipment (new route). Let's analyze the shortest distance (kilometers). The lowest total cost (baht). And compare all costs.

1) Direct shipment (old route) transported from all 20 community enterprises. Send to Udon Muang Thong market. Udon Thani Province The researcher studied direct shipment routes from all 20 community enterprises to Udon Muang Thong Market. Udon Thani Province Where all 20 community enterprises use their own cars (pickup trucks), a total of 20 cars are used. The number of trips in transportation is 32 trips. The calculation of the transportation route (round trip) sums up the total distance of 3,556 kilometers. Total fuel cost 22,878 baht. Truck maintenance cost, driver's wage 14,400 baht. Truck maintenance cost 995 baht. And total cost 38,267 baht.

2) Direct shipment (new route) transported from all 20 community enterprises. Send to the location of the distribution center of agricultural products. In the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province. The researcher studied direct shipment routes from all 20 community enterprises to the agricultural distribution center. Udon Thani Province Where all 20 community enterprises use their own cars (pickup trucks), a total of 20 cars are used. The number of trips in transportation is 32 trips. The calculation of transportation routes (round trip) sums up a total distance of 3,532 kilometers. Total fuel cost 21,492 baht. Truck maintenance cost. Driver's labor cost 14,400 baht. Truck maintenance cost 989 baht and total cost 36,887 baht.

3. Comparison of transportation modes for agricultural distribution centers. A form of transportation that facilitates the linkage service system within the Udon Thani Agricultural Distribution Center. Indicators The lowest total cost (baht). By using 2 modes of transportation. 1) Direct shipment (same route). 2) Direct shipment (new route). Comparison results of transport patterns for agricultural distribution centers. Direct shipment format (new route) is the least. 1) Number of trucks, using 20 cars. 2) Number of trips in transit 32 trips. 3) Transportation distance 3,532 km. 4) Total transit time 75 hours. Fuel cost 21,492 baht. 6) Car maintenance cost 989 baht. 7) Employee wage 14,400 baht. 8) Employee's OT cost 0 baht. 9) Total cost 36,887 baht. Direct shipment (new route) with Udon Muang Thong Market Udon Thani Province Direct shipment (old route). Indicator results, the transportation distance is reduced by 0.67 percent and the total cost is reduced by 3.60 percent and it is possible to set up an agricultural distribution center. In the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province. Summarized as Table 2.

**Table 2**  
**Comparison of transportation modes for agricultural distribution centers.**

No.	Description.	Direct shipment (Original route)	Direct shipment (New route)	Note.
1	Number of trucks.	20 Ton.	20 Ton.	
2	Number of trips in transportation.	32 time	32 time	
3	Transportation distance.	3,556 Km.	3,532 Km.	
4	Total transit time.	75 Hr. 30 Min.	75 Hr.	
5	Fuel cost.	22,878 baht	21,492 baht	

6	Car maintenance.	995 baht	989 baht	
7	Employee wages.	14,400 baht	14,400 baht	
8	Employee's OT.	0	0	
9	Total cost.	38,267 baht	36,887 baht	

## RESULTS

This research has an objective. 1) To analyze and select the location of the agricultural product distribution center in Udon Thani Province. 2) To study the mode of transportation and distribution of agricultural products. Agricultural product distribution center, Udon Thani province. starting from data collection study the sample Analysis and location selection of agricultural product distribution centers in Udon Thani Province. Find the right mode of transport. Agricultural Product Distribution Center, Udon Thani Province The results from the implementation of the objectives are summarized as follows.

1. To analyze and select the location of the agricultural product distribution center in Udon Thani Province. The location of the agricultural product distribution center on the website <https://www.google.co.th/maps>. in the Udon Thani area It is the location of the distribution center for agricultural products in Udon Thani Province. Located in the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province, next to Nittayo or National Highway No. 22, Udon Thani - Nakhon Phanom route. It is a west-east national highway. Connecting Udon Thani Province Sakon Nakhon Province And Nakhon Phanom Province together.

2. To study forms of transportation and distribution of agricultural products. Agricultural product distribution center, Udon Thani province. in distributing products to all 20 community enterprises in Udon Thani Province. When comparing the transportation mode of agricultural products distribution center Direct shipment (new route). with Direct shipment (same route). Indicator results, the transportation distance is reduced by 0.67 percent and the total cost is reduced by 3.60 percent and it is possible to set up an agricultural distribution center. In the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province.

## CONCLUSION AND FUTURE WORK

Research on Location Selection for Establishment of Agricultural Distribution Centers. Case Study. Community Enterprise Group, Udon Thani Province. The researcher discusses the results of the findings according to the research objectives as follows.

1. Objective No. 1 "to analyze and select the location of the distribution center of agricultural products in Udon Thani Province" The results of the study were found. Location of the distribution center for agricultural products in Udon Thani Province. can be a distribution center for agricultural products in the upper northeastern region due to being addicted to Nityo or National Highway No. 22, Udon Thani-Nakhon Phanom route. It is a west-east national highway. Connect Udon Thani Province. Sakon Nakhon Province and Nakhon Phanom Province 10 kilometers away from Udon Thani city. This is due to the analysis of the center of gravity (Center of Gravity). According to the study. It is a suitable way to choose a suitable location to set up a distribution center. The results of this research are consistent with the research of. (Laksapol Uthaphap, 2015). The study found. Design and layout of the factory of. limited partnership T.T.N.Stainless Steel.

2. Objective No. 2 that "to study the mode of transportation and distribution of agricultural products distribution center for agricultural products." The results of the study showed that. When the location of the agricultural product distribution center in Udon Thani Province change new point In the area of Nong Na Kham Subdistrict, Mueang District, Udon Thani Province. Reduce traffic jam problems The truck can run well. This is due to the analysis of transport patterns. A suitable new route can be planned. The results of this research are consistent with the research of. (Wachira Vijitpongsa, 2020). Study findings. Inter-City Freight Transport Mode Selection Model for Border Areas : A Case Study of Chiang Rai Province.

Research results: The researcher found that The results of this research should be taken. Go make a marketing plan. Transport with community enterprises in terms of price. because the customer is satisfied with the service of the distribution center But when comparing prices. It is still not at a satisfactory level, so marketing promotion from community enterprises is very necessary for distribution centers. Especially in the present era of wholesale

trade. Retail .By department stores with wholesale departments are advancing all over the country now. Consistent with research results (Napassawan Kumklong, Phirayu Seanbudda & Amornrat Muenjitnoy, 2022)

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