

**A LOGISTICS DEVELOPMENT SYSTEM TO COMPARE
METHODS ON WEB APPLICATION FOR SME BUSINESSES**

TEERAPORN PHAIBOOLRUNGROJ

**A THEMATIC PAPER SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE
(TECHNOLOGY OF INFORMATION SYSTEM MANAGEMENT)
FACULTY OF GRADUATE STUDIES
MAHIDOL UNIVERSITY
2012**

COPYRIGHT OF MAHIDOL UNIVERSITY

Thematic Paper
entitled
**A LOGISTICS DEVELOPMENT SYSTEM TO COMPARE
METHODS ON WEB APPLICATION FOR SME BUSINESSES**

.....
Miss Teeraporn Phaiboolrunroj
Candidate

.....
Assoc. Prof. Panya Kaimuk, M.D.
Major advisor

.....
Asst. Prof. Bovornlak Oonkhanond,
Ph.D. (Chemical Engineering)
Co-advisor

.....
Prof. Banchong Mahaisavariya,
M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

.....
Lect. Supaporn Kiattisin,
Ph.D. (Electrical and
Computer Engineering)
Program Director
Master of Science Program in
Technology of Information System
Management
Faculty of Engineering
Mahidol University

Thematic Paper
entitled
**A LOGISTICS DEVELOPMENT SYSTEM TO COMPARE
METHODS ON WEB APPLICATION FOR SME BUSINESSES**

was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Science
(Technology of Information System Management)

on
December 23, 2012

.....
Miss. Teeraporn Phaiboolrungrroj
Candidate

.....
Lect. Supaporn Kiattisin
Ph.D. (Electrical and
Computer Engineering)
Chair

.....
Assoc. Prof. Panya Kaimuk, M.D.
Member

.....
Mr. Kairoek Choeychuen,
Ph.D. (Electrical and
Computer Engineering)
Member

.....
Asst. Prof. Bovornlak Oonkhanond,
Ph.D. (Chemical Engineering)
Member

.....
Prof. Banchong Mahaisavariya,
M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

.....
Lect. Worawit Israngkul,
M.S. (Technical Management)
Dean
Faculty of Engineering,
Mahidol University

ACKNOWLEDGEMENTS

The success of this thematic paper relates can be attributed to the extensive support and assistance from my major advisor, Assoc. Prof. Panya Kaimuk, M.D. His encouragement, guidance and support were invaluable to my project.

I would like to thank Assoc. Asst.Prof. Bovornlak Oonkhanond, Ph.D. for his support as the co-advisor and thanks to Lect. Kairoek Choeychuen, Ph.D. for advices.

My thanks also go to all the lecturers of Technology Information System Management in Faculty of Engineering, Mahidol University for their valuable advices.

Finally, I am grateful to my family for their entire support, they give me plenty of time to accomplish this project. Moreover, they support me everything; such as, entirely caring, and love. Any usefulness of this thematic paper, I dedicate to my mother, my father, and all teachers who have taught me since my childhood.

Teeraporn Phaiboolrungrroj

A LOGISTICS DEVELOPMENT SYSTEM TO COMPARE METHODS ON WEB APPLICATION FOR SME BUSINESSES

TEERAPORN PHAIBOOLRUNGROJ 5137580 EGTI/M

M.Sc. (TECHONOLOGY OF INFORMATION SYSTEM MANAGEMENT)

**THEMATIC PAPER ADVISORY COMMITTEE: PANYA KAIMUK, M.D.,
BOVORNLAK OONKHANOND, Ph.D. (CHEMICAL ENGINEERING)**

ABSTRACT

The objective of this research is to create a web application for the small and medium enterprises (SMEs) about transportation that uses logistics management. A comparison routing method was developed as a web application. This is for SMEs to resolve the problem of shipping by using the shortest path to minimize the travel distance from warehouse to customer.

This application was developed and based on zoning and involves the Theory of Google Maps API, which uses the Direction Waypoint Algorithm to help in resolving the problems of shipping. The criteria of calculated distances include the latitude and longitude of the customer. This application allows the user to view results with mapping and shipping information.

Finally, the development of logistics in freight transport on a web application is for SMEs. This program is an important factor that helps to reduce the travel distance, the cost of travel, and develop the transportation system more efficiently.

KEY WORDS: LOGISTIC / MAP / SMEs / GOOGLE MAP/ TRANSPORTATION

44 pages

การพัฒนาาระบบโลจิสติกส์ในการขนส่งสินค้า เพื่อเปรียบเทียบวิธีการทำงานบนเว็บแอปพลิเคชัน
สำหรับธุรกิจขนาดย่อม

LOGISTICS DEVELOPMENT SYSTEM TO COMPARE METHODS ON WEB
APPLICATION FOR SMEs BUSINESS

ธีราพร ไพบูลย์รุ่งโรจน์ 5137580 EGTI/M

วท.ม. (เทคโนโลยีการจัดการระบบสารสนเทศ)

คณะกรรมการที่ปรึกษาสารนิพนธ์: ปัญญา ไข่มุก, M.D., บวรลักษณ์ อุนคานนท์ Ph.D.
(CHEMICAL ENGINEERING)

บทคัดย่อ

วัตถุประสงค์ของการวิจัยนี้เป็นการนำเสนอและให้คำแนะนำสำหรับธุรกิจขนาดย่อม
ในการขนส่งสินค้าด้วยระบบการจัดการโลจิสติกส์ โดยใช้การเปรียบเทียบวิธีการหาเส้นทางในการ
พัฒนาบนเว็บแอปพลิเคชันสำหรับธุรกิจขนาดย่อม นี้เพื่อแก้ไขปัญหาในการจัดส่งโดยใช้เส้นทางที่
สั้นที่สุดเพื่อลดระยะเวลาการเดินทางจากคลังสินค้าให้กับลูกค้า

ระบบงานของผู้วิจัยนี้ได้ถูกพัฒนาโดยใช้วิธีการแบ่งโซน โดยทำงานร่วมกับทฤษฎี
Google Maps API ซึ่งใช้ Direction Waypoint Algorithm มาช่วยในการจัดการปัญหาการขนส่ง
สินค้า ซึ่งปัจจัยสำคัญที่นำมาคำนวณหาระยะทางคือ ค่าละติจูดและลองจิจูดของตำแหน่งลูกค้า และ
ผู้ใช้สามารถดูแผนที่เส้นทางและข้อมูลการเดินทางได้

สุดท้ายนี้การพัฒนาาระบบโลจิสติกส์ในการขนส่งสินค้า เพื่อเปรียบเทียบวิธีการทำงาน
บนเว็บแอปพลิเคชันสำหรับธุรกิจขนาดย่อม เป็นอีกหนึ่งปัจจัยที่ช่วยให้สามารถลดระยะเวลาทาง
การเดินทางได้, ช่วยลดค่าใช้จ่ายในการเดินทางและรวมถึงช่วยให้ระบบการขนส่งสินค้ามีประสิทธิภาพ
ยิ่งขึ้น

CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
ABSTRACT (ENGLISH)	iv
ABSTRACT (THAI)	v
LIST OF FIGURES	viii
CHAPTER I INTRODUCTION	1
1.1 Background and Problem	1
1.2 Objective	1
1.3 Scope of study	2
CHAPTER II LITERATURE REVIEW	3
2.1 Definition and components of Small Business Management	5
2.1.1 Definition of Small Business Management	5
2.1.2 Elements of Small Business Management	6
2.1.3 The importance of small business organizations	6
2.1.4 Resources for Small Business Management	6
2.1.5 Benefits of small business management	7
2.1.6 The process Small Business Management	8
2.1.7 Main problems for SMEs	8
2.2 Problems of transport routes	10
2.2.1 Problem behavior on the part of the logistics department	11
2.2.2 Logistics Management	11
2.2.3 Google Maps API	14
CHAPTER III MATERIALS AND METHODS	19
3.1 System Development	19
3.2 Research Tools	20

CONTENTS (cont.)

	Page
3.3 Research Methodology	21
CHAPTER IV RESULTS AND DISCUSSIONS	23
4.1 The results of the transport path management	23
4.2 The comparison of Directions Way Point and Old method	24
4.3 Zoning Method	24
4.4 The issue of loaded goods	32
CHAPTER V CONCLUSIONS	34
REFERENCES	36
APPENDIX	37
BIOGRAPHY	44

LIST OF FIGURES

Figure		Page
2.1	In the management of logistics.	12
2.2	Describes the transportation routes using graph theory	13
2.3	Google Map API	15
2.4	Flowchart of Direction Waypoint	18
3. 1	Flowchart Process	21
3.2	Entity relationship diagrams	22
4.1	Map and Data of Logistics	23
4.2	Results Comparison between Old System and New System	24
4.3	Zoning Method	25
4.4	Central Bangkok Zone	25
4.5	Northeast of Bangkok Zone	26
4.6	Separate to 2 ways	26
4.7	Combine the route	27
4.8	Transport Goods in 2 ways	27
4.9	Combining all route together as Saving Method	28
4.10	Find a spot that is close to the last transport spot	29
4.11	Loop back to the beginning spot	29
4.12	Find the transportation spot	30
4.13	The Route Graph of Transportation Goods	31
4.14	The list of the products	32
4.15	The excess item is cut off from the list	32
4.16	The table of loaded goods in the truck no. 2	33

CHAPTER I

INTRODUCTION

1.1 Background and Problem

According to Thailand economic growth, the number of vehicles increase rapidly and generate heavy traffic which consume more time and more cost. Since year 2000, the energy and fuel price have increased vigorously from 11 baht/litre, 13 baht/litre, 18 baht/litre, and 33 baht/litre in year 2000, 2002, 2004, 2012 accordingly. This fuel price situation effects Thailand economic directly in many aspects.

The role of competition in business is highly involved in present days by meaning of quality, pricing, and services including concerning on delivery and transportation cost. Logistics is aimed to be important role on each competitors. Many management in logistic techniques are applied to gain up efficiency, reduce cost and customer satisfaction is preferred.

Therefore, management on transportation routing is required for logistics and supply chains optimization processes. Many criteria are collected to be used such as number of delivery trucks, source and destination locations and distances. These parameters are carefully and appropriately selected and used to gain best outcome.

This research focused on developing routing methods and comparison methods to reduce cost of time in travelling, fuel consumptions in order to ensure effectiveness and make more trust on any business firm that used this research as a tool.

1.2 Objective

To develop the logistics management system for SMEs Business which is used to compare the methods of cost reduction.

1.3 Scope of study

1.3.1 Single-warehouse SME in Energy beverage business as samples

1.3.2 Bangkok area clients

1.3.3 One type transportation vehicle - 4 Pickup Trucks (Capacity of 40 Unit/truck)

1.3.4 Routing map - Nonthaburi to Bangkok

CHAPTER II

LITERATURE REVIEW

In the development of logistics system on SMEs business aims to shorten the travel time and reduce costs. Researchers also conducted a study and review of theories related to the transportation system as a guideline and references for designing a system.

Small and Medium Enterprises (SMEs)

SMEs is the business has a lot in Thailand. Most of the entrepreneurs in the form of an individual the body of persons or ordinary partnerships other than corporations, limited partnerships, company limited or joint venture which the business of selling, products or services. [1]

The importance of small business

1) Small business have a great influent on Thailand economic and social development because small business contribute to the distribution of income from their business to other group of people, which also involved with the employment and the people revenue. Therefore, they play a major role in the economic and social improvement in Thailand.

2) Small business is fundamental business that supported the big business, The growth of small business can increased production by using technology in their production, finally they will become a big business.

3) Small business is the source for new products development. Basically the innovation and new product are originals from small business. The growth of these small business will lead to the increasing of the market share by the new products.

Classification of business activities of the SMEs

The criteria used to classify the activities of SMEs are medium and small enterprises;

Classification of SMEs by the high value of fixed assets. Can be classified as follows.

1) Manufacturing : Medium-sized enterprises up to 200 million baht, Small enterprises up to 50 million baht

2) Service : Medium-sized enterprises up to 200 million baht, Small enterprises up to 50 million baht

3) Commercial :

3.1) Wholesale : Medium-sized enterprises up to 100 million baht, Small enterprises up to 50 million baht

3.2) Retail : Medium-sized enterprises up to 60 million baht, Small enterprises up to 30 million baht

Classification of SMEs by the number of employment. Can be classified as follows.

1) Manufacturing : Medium-sized enterprises up to 200 people, Small enterprises up to 50 people.

2) Service : Medium-sized enterprises up to 200 people, Small enterprises up to 50 people.

3) Commercial :

3.1) Wholesale : Medium-sized enterprises up to 50 people, Small enterprises up to 25 people.

3.2) Retail : Medium-sized enterprises up to 30 people, Small enterprises up to 15 people.

Management of small SMEs

SMEs as a small business investment in operations are not high. Most of the business in the form of implementation of the family with the head of the family served as a manager and is responsible for the decision. For managing people, money, machines and materials using the management principles. Therefore, the operator management or small business management should be studied in management principles.

2.1 Definition and components of Small Business Management

2.1.1 Definition of Small Business Management

The term "management" generally refers to the practice but term "administration" is generally used for target practice by staff and on Government Administration and business administration. However, both terms are used interchangeably. The administration will focus on the policies management when as management will focus on the implementation of the policy or to activities business.

The following defines "management" in business to contribute to the definition of small business to manage by demonstrating a procedure or function to manage the following.

Management means the management resources to implement for achieve the objectives set out in an efficient and effective. This includes the planning process, control, directing and coordinating the other parties to achieve a smooth. For achieve business success to plans and projects that are planned.

The Small Business Management means organizing the planning process, Management of all aspects of small business operators. The first step consists in bringing the material comes. Through the production process or service is other from the product quality is standards, It's desirable and impress customers.

2.1.2 Elements of Small Business Management

From the definition of small business management mentioned above. As

you can see that the management of small business are the key elements are as follows.

1. Objectives and goals: Small business is the production of goods or services under the specific objectives and goals. For example profits, customer satisfaction, etc.
2. The Small Business Management consists of planning, organization, human resource management, directing and controlling.

2.1.3 The importance of small business organizations

Executive or manager of small business is planned in the resources, i.e., people, money, machines and raw materials. Through five process steps including; planning, organization, personnel management, directing and controlling.

2.1.4 Resources for Small Business Management

Small business management in general to achieve the objectives and goals defined will contain the resource. Small business management which resource consists of 4M as follows.

- 1) Man as resource person who has contributed to the success of small business is enormous due to operation, management or business management. Or control mechanical required to produce other people, mainly task quality and creativity.
- 2) Machines/Material as fixed assets used in the production of other goods or services to customers.
- 3) Money is an important factor that has contributed to the management of other resources for running business smoothly. Funds used in purchases of machinery and building materials etc.
- 4) Method is materials and other goods that are to be used in the production process. Materials should be located near the workplace to save on shipping and confidence in the availability of raw materials feed the factory through the year.

It is concluded that the small business. Managers tend to own their own business. The current funding is less. In addition is a small business if machines are used and what is not broken. Material entering the plant must be of high quality raw materials and a supply of business is small business.

Besides resource management of 4 factors mentioned previously, there are addition 4 factors which are important for business management.

1) Marketing refers to the production of a comparable quality products to that competitors. The next thing to consider is the market size, needs of consumers, etc. However, the value of goods must be comparable with that of the competitors. Therefore, it will determined the method of marketing Such as discounts on the purchase of a large number etc.

2) Regulations, rules, and procedures are needed to be followed. This also includes the process of work which will lead to a safer operation and reduce accidents, resulting in an increasing in the industrial production also.

3) Management is how to manage different types of resources, including people, machines, raw materials which using relationship is efficiency.

4) Motivation is a technique of management to enhance the performance of the work. There are several incentives such as the position promotion or incentive money. However, motivation technique is depending on the technical and management experience.

2.1.5 Benefits of small business management

Benefits of small business management bring benefits are as follows.

1) Allows operators to monitor and analyze the events predicted in the business being conducted.

2) Allows operators to develop a product or service in terms of quality and style using modern technology.

3) Assist coordinate the work of other departments in a business to run smoothly and achieve the objectives.

2.1.6 The process of Small Business Management

The process business is conducted by small business from planning stages of doing business, organization, administrative staff, directing and controlling by the use of existing resources for maximum benefit in order to achieve business objectives and goals.

Small business management the process has 5 steps as follows

1) The planning refers to a situation that expected to occur in the future guidelines and implemented as a plan using the existing resources for maximum benefit. The good planning for the future improvement must be able to measured and evaluated to identify the difficulties and obstacles.

2) Organization refers to the small business, agency, organization or company which the owner operator is manager directly.

3) Management staff refers to the small business have less staff or occasionally is a family business. Therefore, the administration is not meet technical basis.

4) Directing refers to the owner operator or managers will coordinate with the employees themselves if the lack of leadership and knowledge of management will cause problems in the administration.

5) The control refers to the small business is family business using control most of the control eyes and comparison with other employees at the similar task. [2]

2.1.7 Main problems for SMEs

Small and medium enterprises (SMEs) are important to the economy of the country since they contribute more than 90% of the total number of business in Thailand. However, most SMEs business, in Thailand still faces with major problems in terms of inefficiency in the administration. The problem is the lack of information and tools to be used to provide data to support management decision. [3]

The Department of Industry has carried out research and studies in the last 50 years shows that problems faced by the SMEs during the past is enough to summarize briefly.

2.1.7.1 Marketing problems

Most enterprises have a small and medium to meet the needs of the local market or domestic market. The lack of knowledge in the broad market, the transportation, the liberalization of trade, large enterprises and foreign goods to compete with local product produced by the small and medium enterprises.[4]

2.1.7.2 Shortage of funds

Small and medium enterprises often have problems obtaining loans from financial institutions. Investment or expansion or working capital. However, due to the lack of a systematic accounting and lack of collateral for the loan. It must rely on outside financing and to pay a higher interest rate.

2.1.7.3 Management constraints

Most of the SMEs are often started from a family business, which may lack of ability to modify and improve the management structure of the business unlike the venture business that is based on an independent (from family).

Small and medium-sized enterprises often lack of the knowledge management or management system. They carried out the administration by history or personal experience which may be good who the business is not big. However, when the business grew up, the management system is important for the organization development.

2.1.7.4 Production technology

By the beginning of the SMEs is another. Starting a business from the use of technology is not complex. Production is including a communication with customers and stakeholders in the business. Relies is on expertise and the geographic location or business. Close to customers and stakeholders in a solid performance.

In general, small and medium manufacturers tend to simplify the technique of low investment and entrepreneurs. Employees lack the basic knowledge to advanced technical support. The lack of development, product design and development of good quality.

But in real life situations, The growth is inevitable, growth in manufacturing whether in the factory. Manufacturing process changes, Machinery and equipment modernization. Computer programs are used to control the entire

production process as a whole and the manufacturing process and other workers who are accustomed to traditional ways of working need to upgrade. Competent in the use of more advanced technology. It depends on the ability to adapt to each worker's performance of promoting the development and training of SMEs.

At the same time with the transition process. Highlights in the product due to the skill and expertise. A number of mass production, which featured a lot of SMEs, it may be reduced due to concentration of production into the whole industrial system.

2.2 Problems of transport routes

The basic idea of the problem of routing traffic (Vehicle Routing Problem; VRP) is to design routes (tours) are most appropriate. In terms of cost and compliance with restrictions such as capacity and transportation routes will start from the warehouse. Your customers know the number and location of each. And know the exact amount of product demand and return to the path from the warehouse. The limitation is that the clients, each will receive services from a single vehicle car transportation. The quantity delivered shall not exceed the carrying capacity or the capacity of freight cars on the car. [5]

Concepts and theories related to the transport route.

Transport is means of moving people and goods from one place to another. Transport into the following categories of land, water, air and other transport, we can consider it from multiple perspectives by roughly a third view is that we will consider. The infrastructure, vehicles, and operations.

2.2.1 Problem behavior on the part of the logistics department.

Transportation continues to use the telephone to call the customer. The delay in finding a path, and if an error occurs, the path is a waste of time and consumables cost more.

The development of transport in products applications and web applications for this to assist in the development and analysis of the cost of the trip, whether it is to calculate the distance to travel. The Cost of fuel and miles required, as well as a map for a route used to travel.

Therefore, it has developed a system to help reduce shipping time, the shipping cost as logistics management. This is an important step in moving products from the company to customers with maintain the product quality.

2.2.2 Logistics Management

Processes related to planning, implementation and operation of organizations, including data management and related financial transactions by have the movement, storing using effectively and maximum efficiency. However, currently management of logistics is process in management products and services throughout the supply chain. (Supply Chain Management)

The goal of management in the logistics.

- Just in Time Delivery.
- Physical Flow.
- Information Flow.
- The value added in manufacturing and marketing processes.
- Reducing the costs associated with the handling and transportation costs.

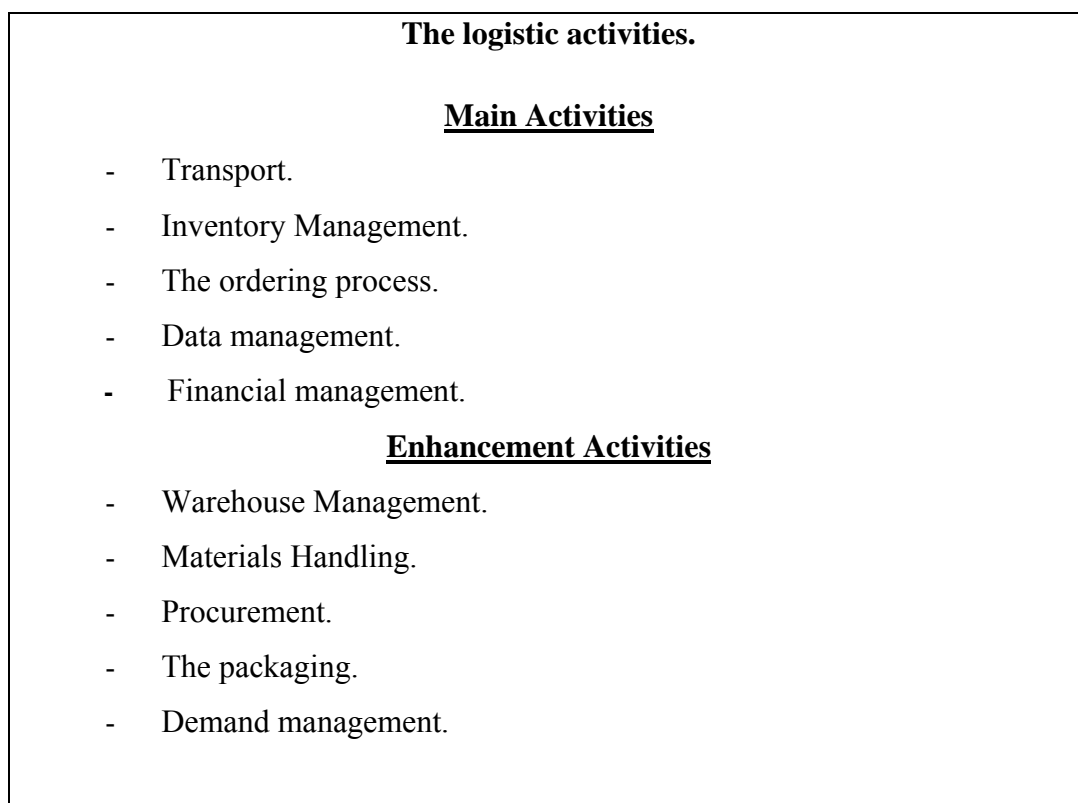
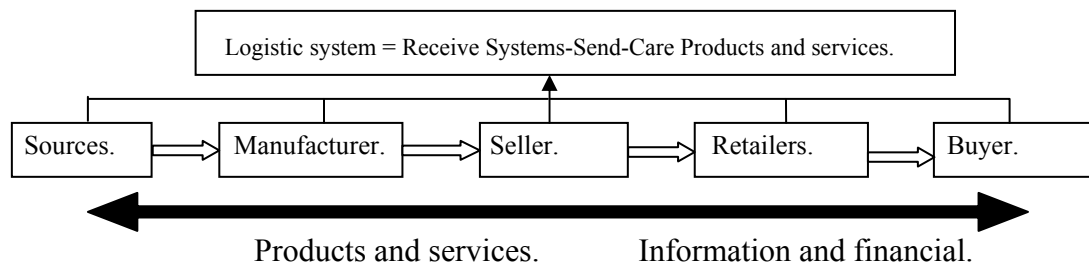


Figure 2.1: In the management of logistics.

From : Office of the National Economic and Social Development Board, 2550

Problems in the rail freight route has been developed from traveling salesman problem (Traveling Salesman Problem, TSP) traveling salesman problem is to find a path that can provide all customers. The distance to all of the required minimum. In this manner, there is no limit on the capacity of the freight car was involved. This is different from the route that is limited in its capacity as a key factor.

The services of a freight car, it must not violate the capacity constraints. In the design of the bus so that it is designed to provide car transportation can work in the transportation under the constraints and objectives are set, so to route traffic to a more complex issue of journey salesman.[5]

The shipping routes can be described by graph theory, n is the number of customers to get goods from one warehouse to transport all the time. This individual will be in the amount of q_i by $q_i = 1, 2, \dots, n_i$ is in the order of the customer. The vehicle is capable of loading Q so to solve the problem or the design of the route. The tour will receive a full product. The tour is very dependent on the Q or the loading of freight cars, each car. Tour or graph (G) is complete with a set of points (Node) and the line is $G = (C, L)$ by the Node is c , where $c = (c_0, c_1, c_2, \dots, c_n)$, where c_0 is the warehouse and c_n is that each client. That will be shipping the line or L is the path where each line is composed of Node, so $L = (c_i, c_j) \in c, i \neq j$ each Node to be related to quantity q_i , each line is concerned. The value t_{ij} represents the travel time between c_i and c_j .

The design goal is to find Tour (Route) will reduce travel time and reduce costs to a minimum. It must start and comeback to c_0 warehouse and within each Node must be at least one shipment of the goods packed in freight cars, each of them must not exceed a specified threshold.

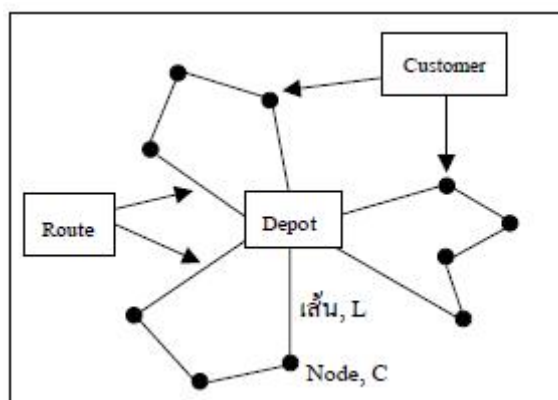


Figure 2.2: Describes the transportation routes using graph theory.

2.2.2.1 The purpose of the design and construction of roads.

The main objective will divide in to three factors. [4]

1. To reduce the number of cars in freight transport each time when the car reduce therefore, the drivers used become lesser.
2. To reduce the travel distance or travel time. If the distance, time and other, variable costs decrease, the incurred in transit time will be reduced accordingly.
3. Designed path for increase satisfaction for the customer.

2.2.2.2 Constraints and variables associated with the shipment.

In the design, the designer needs to know paths in the design of any problems in the design of the cargo. Well aware of the limitations and variables in each trip, Constraints and variables that must be considered in management freight routes which can be classified as follows. [5]

- The warehouse.
- The customer.
- The system in its service area.
- The freight carrier.

2.2.3 Google Maps API

Google Maps API allows us to develop a program for insert Google Maps into a component part of a web page that you want by written html and java script code in a format that is not complicated in the simple map. Google Maps API has extensive capabilities by emphasis on the presentation in the map pin (Push pin / Place marker), which can be set to display the map when the user clicks on a push pin / marker or the map line (Polyline), area (Polygon) and image (Ground overlay). The Google Maps service is started since the middle of 2005 is a free service for users around the world. Expected to be used as advertising on the map as income but first term will not also include advertising. The basic components are attractive to users of the Google Maps is extremely, the maps and satellite images which covers the whole surface of each scale as appropriate. The further development of what Google

provided it is of interest without investing scarce resources and expensive to use in projects that had been in the past. [6]

As a Google Maps API is an open source code (Open source program) in Java Script. Therefore, the user is a developer you can see the details of the program code and the program can modify. So, the Google Maps API is widely used. The two major reasons that encourage more users. The maps and satellite images quality products to support the mapping has to cover a wide range of areas and reputation of the Google Earth application with added services like Google Local.

Google API as one of the Google Web Service API is available. Google API consists of 2 parts.

1. Web Service Server on a Google Map is available map data.
2. Web Service Client is a user created to run the Web Service.

Google Map API is one of the Google Web API, which is popular nowadays with that we can use, developers can develop this high resolution map in the application such as traffic and survey has to be very useful in the present.



Figure 2.3: Google Map API

The basis for the development of the Google Map API application needed the development in the Google Maps which should include the following.

1. html/ xhtml
2. javascript

Discussed widely in the community of developing applications that use the internet are composed of at least two sections, the application program interface (API) and support resources from the server of the provider and the second is that the programs and resources the development of the application. (Installed at the site of the developer) for the case of a Google Maps is a Web developer web site created to contain a map that can be interactive with the user. The base map provided by Google as part of it. The map data and overlaying the pins of the pin (The underlying message is that when users want to see them), or other characteristics that are more complex.

Routing by using the Google Map API, then there are a number of ways. Each method is used to calculate and form a different route. In this research used. The algorithm called Direction Waypoint, which is allow to calculate routes through additional locations, in which case the returned route passes through the given waypoints.

A waypoint consists of the following fields:

- Location (required) specifies the address of the waypoint.
- Stopover (optional) indicates whether this waypoint is an actual stop on the route (true) or instead only a preference to route through the indicated location (false). Stopovers are true by default

By default, the Directions service calculates a route through the provided waypoints in their given order. Optionally, you may pass optimize Waypoints: true within the Directions Request to allow the Directions service to optimize the provided route by rearranging the waypoints in a more efficient order. (This optimization is an application of the Travelling Salesman Problem.) All waypoints must be stopovers for the Directions service to optimize their route.

Direction Waypoint Algorithm is process are as follows.

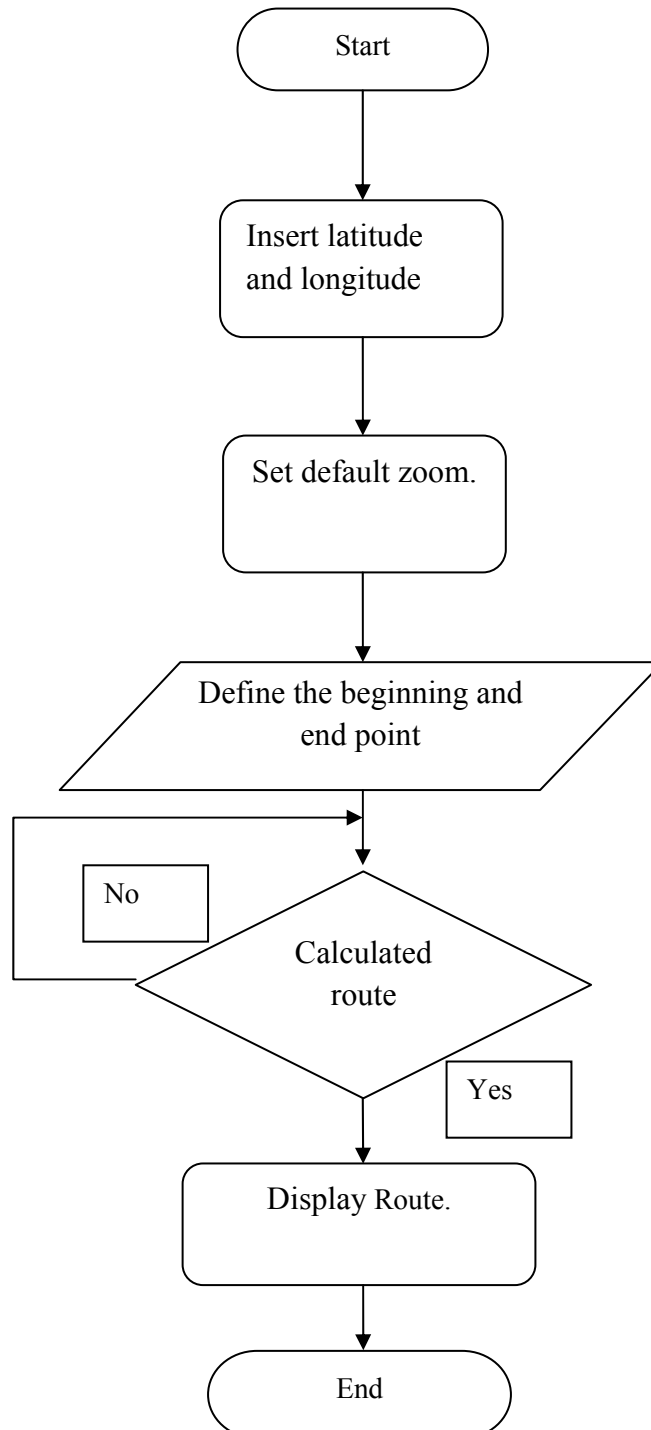
In function initialize :

- Set the latitude and longitude of the warehouse.
- The map option provides a centralized warehouse and set the default zoom.

In function calcRoute :

- Define the beginning and end point of the route.
- Define var waypts = [] is array to store the stopovers at each point.
- The value of each point was calculated route. Using the Travelling Salesman Problem.
- Display summary information.

Flowchart of Direction Waypoint Algorithm

**Figure 2.4:** Flowchart of Direction Waypoint

CHAPTER III

MATERIALS AND METHODS

This chapter describes the research tools and research methodology of this study such as follows:

Operations research to the system, Logistics information systems to manage the transport of goods on the Web Application procedures are divided into seven sections.

1. Education Management Systems and working in the part of the logistics.
2. Education the problem in the inner part of the logistics.
3. Analysis and system requirements of information technology.
4. Develop logistic system on web applications.
5. Install and test the programs.
6. Evaluation of logistic system on web applications.
7. Provide instruction in the use of logistic system.

3.1 System Development

Software and programming language in this project is freeware, widely use and reliable. The software selected is:

- 3.1.1 Database Software using MySQL.
- 3.1.2 Programming Language using PHP.
- 3.1.3 Google Map.

3.2 Research Tools

Tool used in this study are consisted of two parts:

- 3.2.1 Hardware: hardware used for the study consists of:

- CPU Intel Core 2 Duo CPU
- RAM 2 GB
- Hard disk 320 GB

3.2.2 Software: software used for the study consists of:

- Operating System
OS is Microsoft Windows XP Professional
- Database Engine
MySQL, PHPMyAdmin
- Web Server
Appserve
- Programming Language
PHP, HTML
- Web Interface Tools
Macromedia Dreamweaver
- Web Browser
Mozilla Firefox
- Graphic Tool
Adobe Photoshop
- Document Generator
Microsoft Office 2007

3.3 Research Methodology

In order to achieve a successful research project, the research process needs to be constructed in a substantial systematic way, particularly for this research in which various sources of data involved. Therefore, Software Development Life Cycle (SDLC) is used as a base research methodology as below:

3.3.1 Flowchart Process

System operation of this program is to show the performance of the system since beginning to destination by starting to get order products and information customers until the last step. (Figure 3.1)

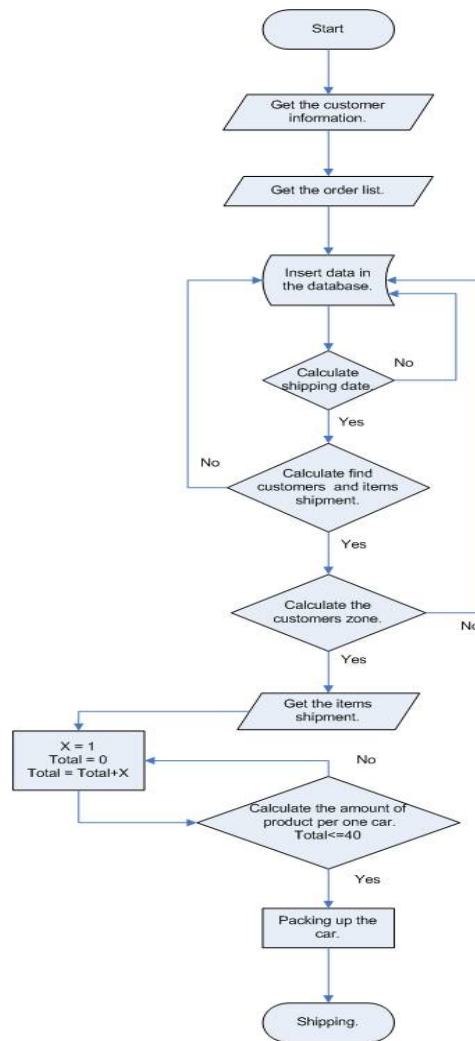


Figure 3.1: Flowchart Process

3.3.2 ER-Diagram

Describes the data that support the business process in an organization. During the analysis phase, the data model presents the logical organization of data without indicating how the data are stored, created, or manipulated. In this study, the data modeling suit as below: (Figure 3.2)

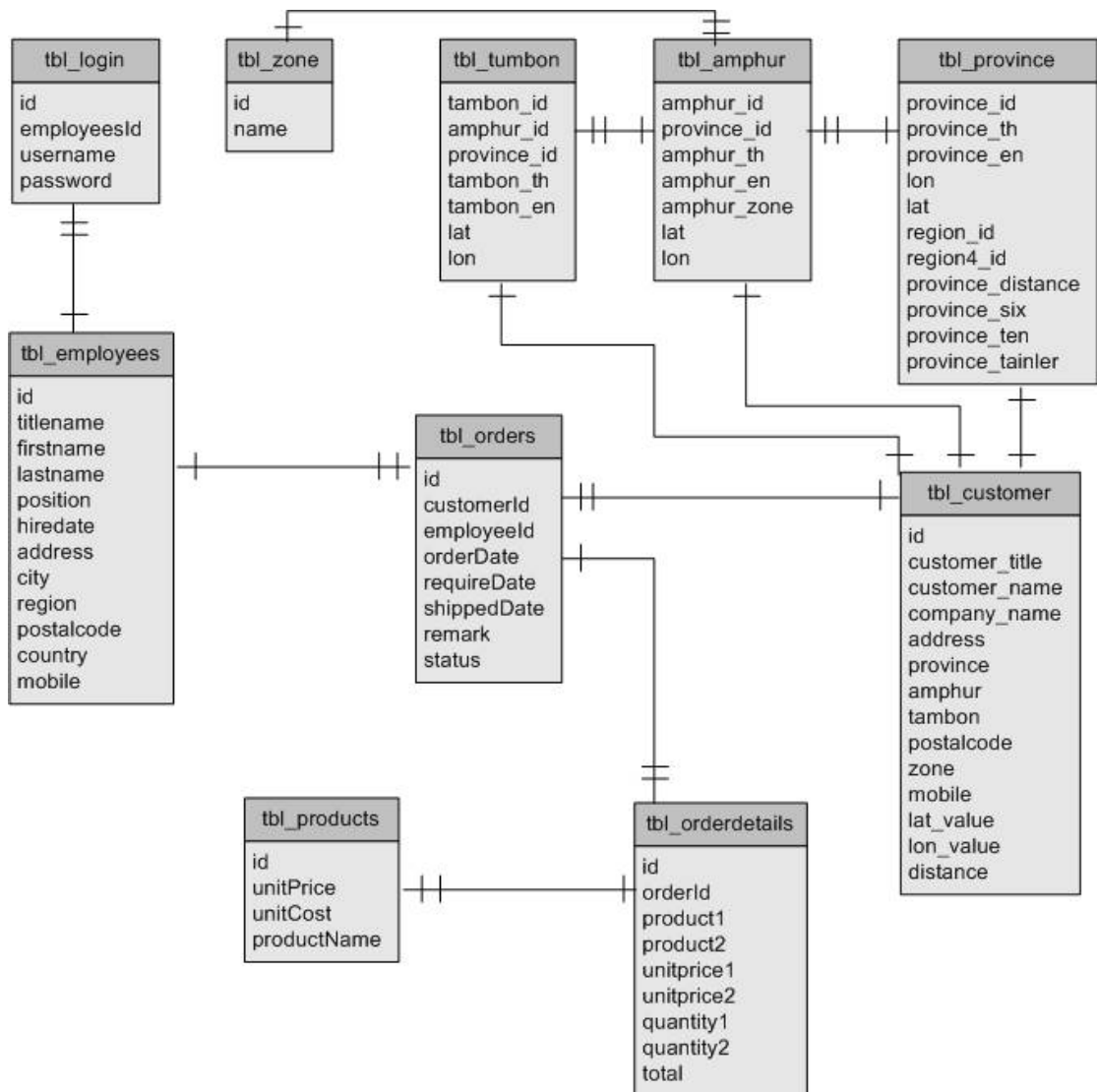


Figure 3.2: Entity relationship diagrams

CHAPTER IV

RESULTS AND DISCUSSION

The results of the Logistics Development System is to compare methods on web applications for SMEs business which can be divided into 4 parts.

4.1 The results of the transport path management.

This research is conducted to develop a transportation system using logistic development and freight management for the small business. The results of this research can solve the transport problem in the part of route calculation. It also reduces the transportation cost. Moreover, it is convenient for the personnel carriers by providing the maps and route information for them. (Figure 4.1)

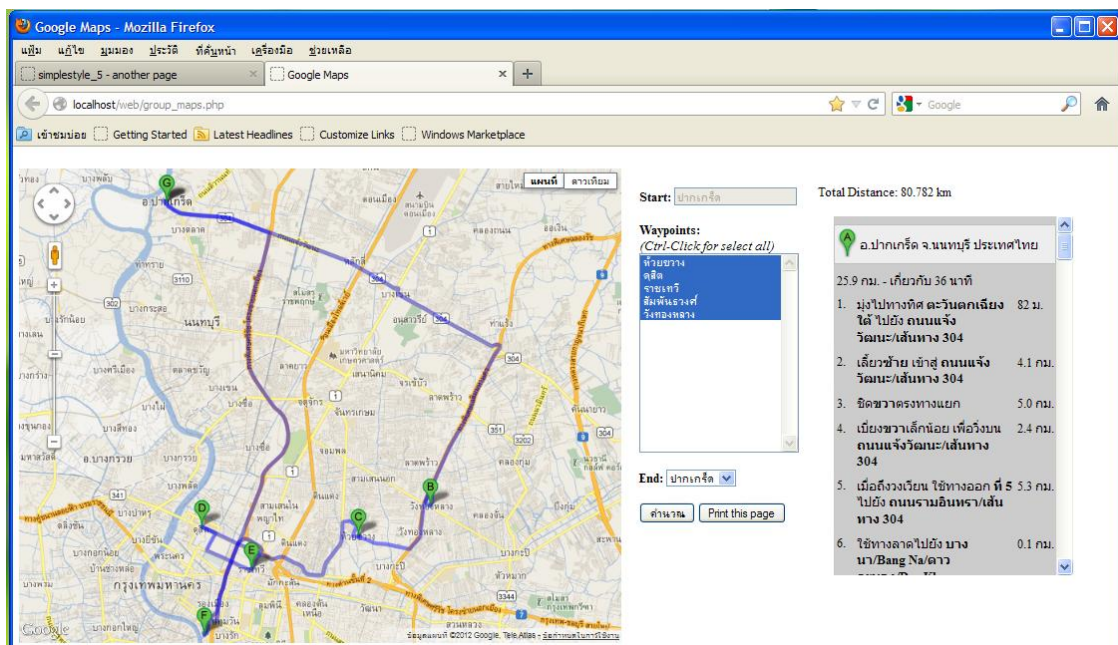


Figure 4.1: Map and Data of Logistics

The maps and route information for transportation was integrated using Google Map API to find the position of the source and destination of the route. It should be routed and must have a process of routing. This process repeatedly use an algorithm based on the data and the purpose of its use. In this study the Algorithm, so called Directions Waypoint, was used to manage the transport route.

4.2 The comparison of Directions Way Point and Old method.

From this research, the result shows that the route management can reduce the transporting time from goods to outlet stores more efficient than the old method. For a map and directions to travel, it helps to facilitate the driver to go to the destination more efficiency. It can reduce the overall distance of transportation. The cost of transportation is lower than the original method. This is approximately 50% reduction of the cost of the original system. (Figure 4.2)

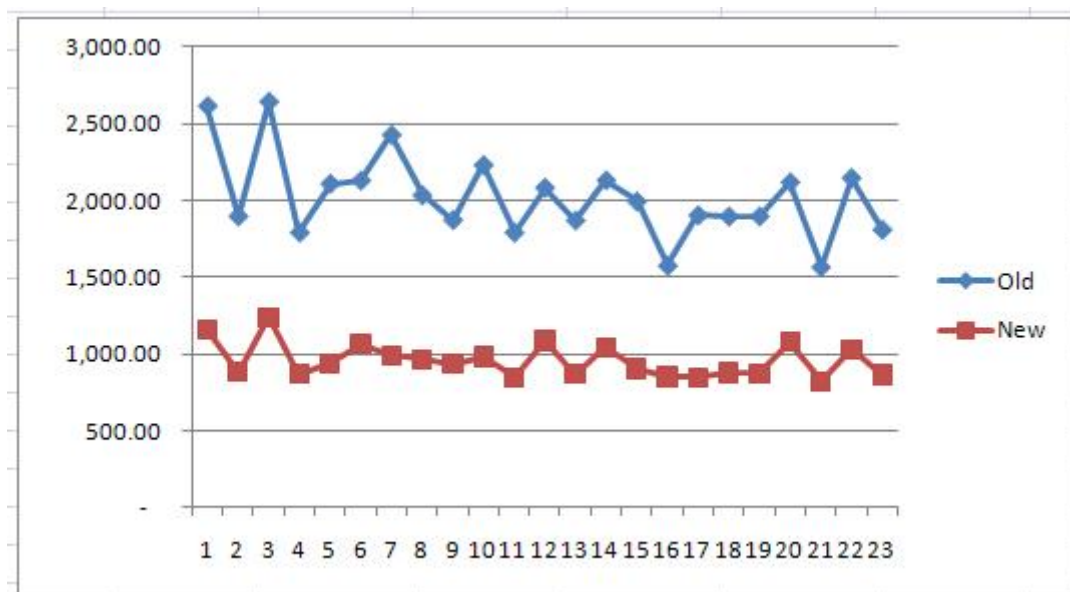


Figure 4.2: Results compared between Old System and New System

4.3 Zoning Method.

For this program used the zoning method as the first step of the operation. This method will divide the customer locations into four zones: 1. Central Bangkok Zone, 2. Southern Bangkok Zone, 3. Northeast of Bangkok Zone and 4. Thonburi Zone. This zoning method helps to reduce the distance between the warehouses and the store. (Figure 4.3)

หน้าแสดงเส้นทางรถขนส่งสินค้า.

กรุงเทพกลาง	กรุงเทพใต้	กรุงเทพตะวันออกเชิงเหนือ	กรุงธน
1 ประกอบ ประกอบ	1 กัลยา ทองสวย	1 จริงใจ ฝ่รุ่งเรือง	1 พรใจ พรใจ
2 เสริมมิตร เสถียรกุล	2 ชลนา ทรัพย์สิน	2 สดใส สว่างไสว	2 คงคลัง คงคลัง
3 จิตใจ จิตใจ	3 กรกนก กรกนก	3 กนก เจริญจิต	3 ประภาพร ภาพร
4 ประการ ประการ	4 จิตรา จิตตรี	4 สรสมร สมร	Cal Map
Cal Map	5 ประจิต จิตจงดลี	Cal Map	

Figure 4.3: Zoning Method

However, the zoning method may not be the best way for the transporting route. This may depend on the other factors of each company and the place of customers. For example, when goods are in routing with the neighborhood area or the adjacent area but it is in a different zone groups. This causes of a higher fuel consumption and consume more time for transportation. The transporting vehicle will go back to the warehouse without benefit. (Figure 4.4 and Fingure 4.5)

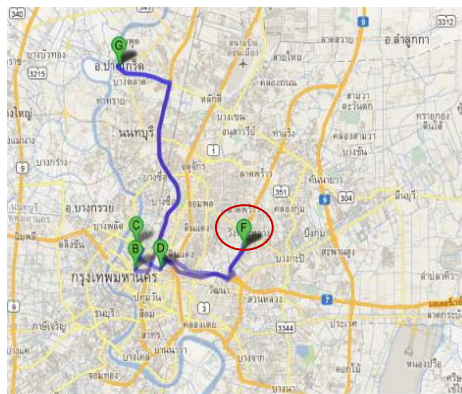


Figure 4.4 Central Bangkok Zone

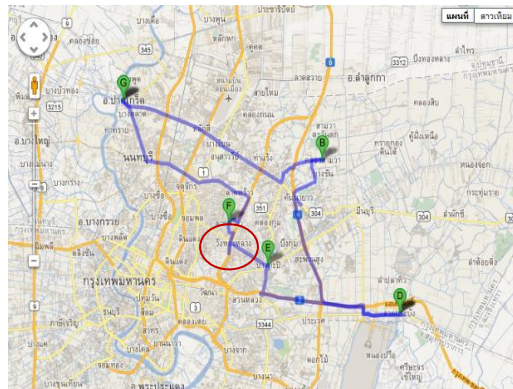


Figure 4.5 Northeast of Bangkok Zone

For this problem can solve the problem by using a various methods to solve the problem. Such as:

4.3.1 Saving: Clark and Wright saving Method.

- Saving: Clark and Wright saving Method is the way to gather all the spot of delivery to the main route. It is better than carrying the goods to 2 routes (Figure 4.6). This method can help to save the time of transportation. This method will take the second delivery spot to combine with the main route of first delivery spot (Figure 4.7) as below:

$$\text{Saving} = (2D_{a1} + 2D_{a2}) - (D_{a1} + D_{12} + D_{a2}) = D_{a1} + D_{a2} - D_{12}$$

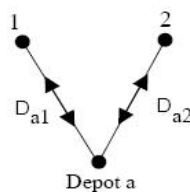


Figure 4.6 Separate to 2 ways

$$\text{Saving} = (2D_{a1} + 2D_{a2}) - (D_{a1} + D_{12} + D_{a2}) = D_{a1} + D_{a2} - D_{12}$$

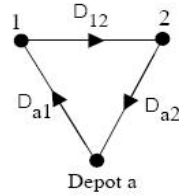


Figure 4.7 Combine the route

As the information of the delivered goods, the distance from each location is calculated and put into the equation then results were shown in figure 4.8

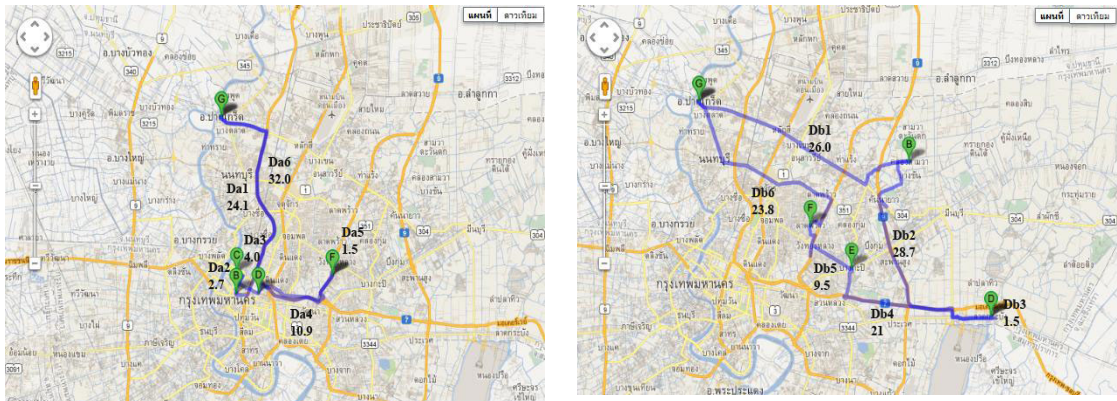


Figure 4.8: Transport Goods in 2 ways

To find the distance from divided into 2 groups, the result will be:

$$\begin{aligned} \text{Saving Da} &= Da1 + Da2 + Da3 + Da4 + Da5 + Da6 \\ &= 24.1 + 2.7 + 4.0 + 10.9 + 1.5 + 32.0 \\ &= 75.2 \text{ Km.} \end{aligned}$$

$$\begin{aligned} \text{Saving Db} &= Db1 + Db2 + Db3 + Db4 + Db5 + Db6 \\ &= 26.0 + 28.7 + 1.5 + 21 + 9.5 + 23.8 \\ &= 110.5 \text{ Km.} \end{aligned}$$

$$\begin{aligned} \text{Total} &= Da + Db \\ &= 185.7 \text{ Km.} \end{aligned}$$

If the Saving method is used the above 2 routes were combined as shown in figure 4.9

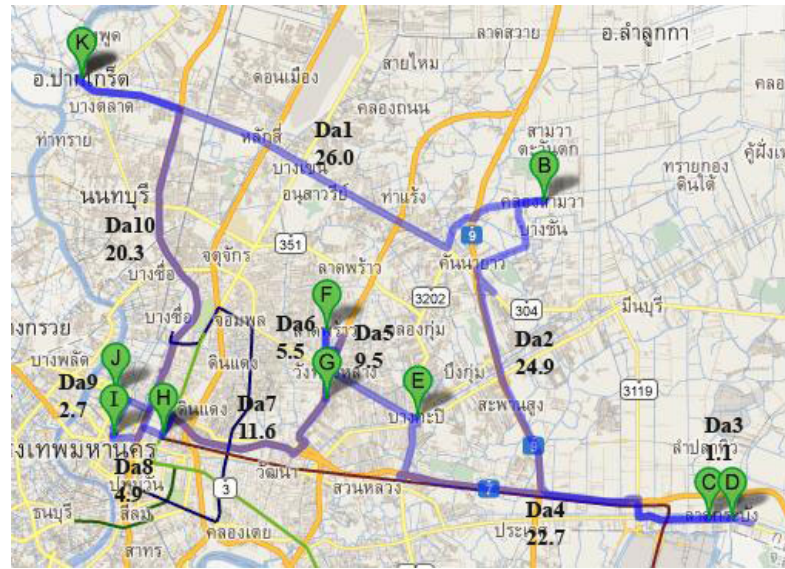


Figure 4.9: Combining all route together as Saving Method

$$\begin{aligned}
 \text{Saving} &= (Da1+ Da2+ Da3+ Da4+ Da5) + (Da7+ Da8+ Da9+ \\
 &\quad Da10) - Da6 \\
 &= (26.0+24.9+1.1+22.7+9.5) + (11.6+4.9+2.7+20.3) - 5.5 \\
 &= 123.7 \text{ km.}
 \end{aligned}$$

The Saving Method result shows that this method can reduced the distance of delivery more efficient than the Zoning Method. The cost savings may be determined by the capacity of the transport vehicle. However, this method need to be concerned about the route of delivery which is based on the real situation and the possibilities of routing to combine all the delivered spot to the destination or not.

4.3.2 Nearest Neighbor Procedure Method.

- Nearest Neighbor Procedure Method is the method that solves the problem by searching the spot of delivery which is the nearest location to the depot (Figure 4.10). The volume of the product does not exceed the capacity of the transport vehicle. If the quantity of the product exceeds the capacity of the vehicle, a new route

will be created. However, in the term of nearness may be considered by the distance or transport time as suitability. The way to create the route starts from setting up the beginning of the route. This point must be closed to the warehouse. Then, the next nearest destination is added to the route until all destination are incorporated then loop back to the origin.(as Figure 4.11).

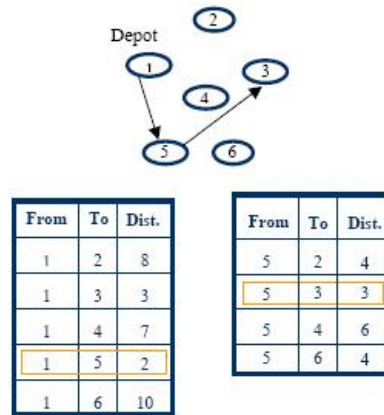


Figure 4.10 Find a spot that is close to the last transport spot

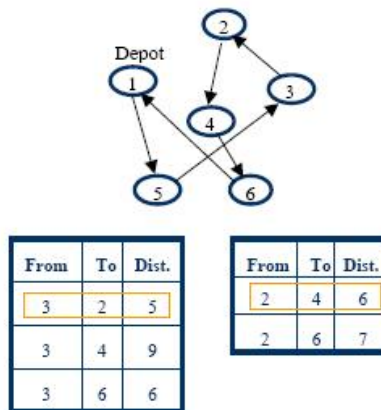


Figure 4.11 Loop back to the beginning spot

For Nearest Neighbor Procedure Method, by gather the information to calculate the distance. The result of the transportation distance is from the beginning spot to the last spot as below table (Figure 4.9)

From	To	Dist.
6	5 รังทองกลาง	2.1
6	7 คลองสามวา	18
6	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	29.3
6	9 ถนนลาดกระบัง	25
6	10 บางกะปิ	8.7
6	11 ลาดพร้าว	3.3

a

From	To	Dist.
5	7 คลองสามวา	20.5
5	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	27.2
5	9 ถนนลาดกระบัง	22.9
5	10 บางกะปิ	6.7
5	11 ลาดพร้าว	5.8

b

From	To	Dist.
1	2 ป้อมปราบศัตรูพ่าย	24.1
1	3 ดุสิต	23.2
1	4 ราชเทวี	23.4
1	5 รังทองกลาง	27
1	6 รังทองกลาง ถนนประดิษฐ์มนูธรรม	26.9
1	7 คลองสามวา	26
1	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	52.3
1	9 ถนนลาดกระบัง	48
1	10 บางกะปิ	29.7
1	11 ลาดพร้าว	25.3

c

From	To	Dist.
3	2 ป้อมปราบศัตรูพ่าย	3
3	4 ราชเทวี	4
3	5 รังทองกลาง	13
3	6 รังทองกลาง ถนนประดิษฐ์มนูธรรม	12.9
3	7 คลองสามวา	32
3	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	34.3
3	9 ถนนลาดกระบัง	30
3	10 บางกะปิ	16.4
3	11 ลาดพร้าว	16.2

d

From	To	Dist.
2	4 ราชเทวี	3.5
2	5 รังทองกลาง	14.9
2	6 รังทองกลาง ถนนประดิษฐ์มนูธรรม	14.8
2	7 คลองสามวา	32.8
2	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	35.2
2	9 ถนนลาดกระบัง	30.9
2	10 บางกะปิ	18
2	11 ลาดพร้าว	18.1

e

From	To	Dist.
4	5 รังทองกลาง	10.9
4	6 รังทองกลาง ถนนประดิษฐ์มนูธรรม	10.8
4	7 คลองสามวา	29.9
4	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	32.2
4	9 ถนนลาดกระบัง	27.9
4	10 บางกะปิ	14.3
4	11 ลาดพร้าว	14.2

f

From	To	Dist.
11	7 คลองสามวา	16.7
11	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	27.9
11	9 ถนนลาดกระบัง	23.6
11	10 บางกะปิ	7.8

g

From	To	Dist.
10	7 คลองสามวา	15.1
10	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	21.4
10	9 ถนนลาดกระบัง	17.1

h

From	To	Dist.
7	8 ขอยสัมฤทธิ์อุทิศ/ลาดกระบัง 15	30.6
7	9 ถนนลาดกระบัง	26.3

i

Figure 4.12: Find the transportation spot

From the table, it shows all distance from the source spot at Pakkret to each spots (Figure 4.12a). The nearest distance is Spot 3(Dusit) which is approximately 23.2 km distance. Then, find the next route which is starting from the Spot 3, Dusit (Figure 4.12b). Find that Spot 2, Pomprab Sattrupai, it is the shortest distance which is approximately 3 km distance. After that, search the next route by starting at Spot 2, Pomprab Sattrupai (Figure 4.12c). Rachatewi, Spot 4 is the next spot which is approximately distance 3.5 km distance and the repeat this action which is from the shortest distance to all spot until the last spot of the route. The last spot is Soi Sumrit Utit / Ladkrabang 15 (Figure 4.13i)

As the entire route table (Figure 4.12), This method can show the graph of the route as below (Figure 4.13)

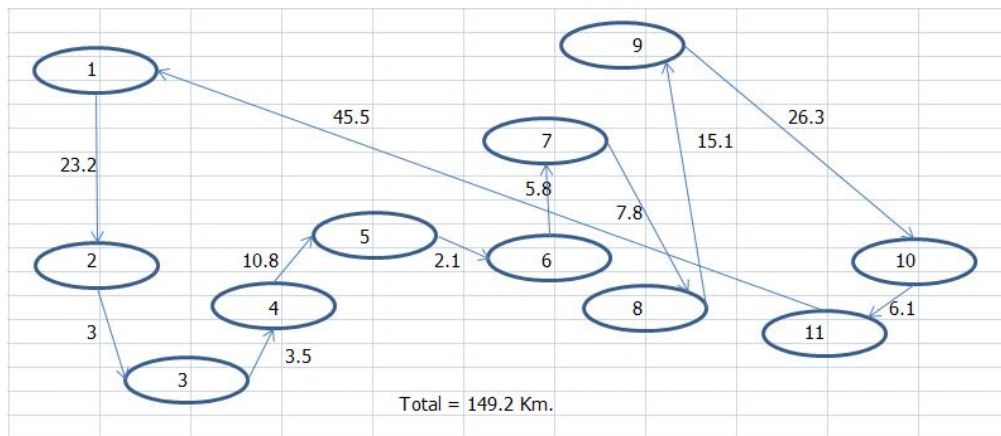


Figure 4.13: The Route Graph of Transportation Goods

For the result of the Nearest Neighbor Procedure Method, all distance of this transport route is 149.2 km distance.

From the tested for all 3 methods, can be concluded that the best method is Saving: Clark and Wright saving method. This method is considered the best way to save and decrease the transport time and distance. The second is Nearest Neighbor Procedure Method. The third is Zoning Method. As the result can see that the Zoning Method may have the problem when the transport vehicle is unloaded.

4.4 The issue of loaded goods.

The loading goods to the cargo truck is the another problem. This program will calculate for each routing path to examine the number of the goods that reach the specified level or not. In this system, the cargo truck can be loaded only 40 boxes per truck. The program is not flexible if comparing with the employees who can arrange the packing goods to the truck.

The case of data is from the list of products (Figure 4.14). It is showed as table below:

	Product 1	Product 2	Total
แหวน จำกัด	4	2	6
สวยงาม จำกัด	6	5	17
จงจิต จำกัด	5	3	25
จิตใจ จำกัด	4	1	30
กรจิต จำกัด	7	6	43
	รวมทั้งหมด		43

Figure 4.14: The list of the products

This list of the products is transferred within 1 truck. Total of the product is 43 boxes. However, the truck can load only 40 boxes per truck. The program will recalculate the new catalog list. It will be cutting off the excess item in the last catalog. Then, it will store that product in the buffer to wait for next cargo truck. After that, the truck will deliver the goods in the next day (Figure 4.15).



	Product 1	Product 2	Total
	4	2	6
	6	5	17
	5	3	25
	4	1	30
	Stock maximum.		
	7	6	13

Figure 4.15: The excess item is cut off from the list.

For this delivery method, the customers may not satisfy with the service of the organization. They will not receive the entire product from this delivery within one day. As the result of the limited amount of freight, the delay of transportation will be occurred. The way to solve this problem is to deposit the exceed goods with other cargo trucks. That cargo trucks must have the same route delivery or deliver on the same day (Figure 4.16). For this solution must have the staff to assist in the freight management as appropriate.



	Product 1	Product 2	Total			
	4	2	6			
	6	5	17			
	5	3	25			
	4	1	30			
	2	2	4			
	3	1	8			
	3	3	11			
	4	5	20			
	4	1	25			
	7	6	25			
		6	38		Stock maximum.	

Figure 4.16: The table of loaded goods in the truck no. 2

For this problem solving, can reach to the customers need and enable to satisfy their need effectively. The customers don't need to wait for the product in next day. In this reason, the organization will not lose the customers.

CHAPTER V

CONCLUSIONS

This research is conducted to develop a transportation system using logistic development and freight management for the small business. The results of this research can solve the transport problem in routing calculation. Research can be used for reducing the transportation cost.

By using map location and route information via the Google Map API and Directions Waypoint algorithm for the shipping route. This method reduces the cost of transport more than the original model which the approximately 50% of the cost of the original system.

A comparison results by several methods found that the result from the zoning have the distance is equal to 185.7 Km. and Saving: Clark and Wright saving method have the distance remaining is 123.7 km, and Nearest Neighbor Procedure method have total distance is 149.2 Km.

From the testing distance calculation on several methods with the same information example as the third methods. The outcome concluded that method which obtain the shortest distance in first rank is Saving: Clark and Wright saving method The second rank order is the Nearest Neighbor Procedure method, And the third rank effect of the distance to the most is zoning method.

5.1 Limitation

1. The system is for the shipping of box.
2. This system is determined for the term of delivery. It will be separated the route for specific zone.
3. The condition of the delivered date may be improved for controlling and managing the day of delivery as per customer requirement.
4. This logistic system is just for limited area, Bangkok only.

5.2 Recommendations

1. This theory of Logistics can be applied to other business. It is very useful and convenient to other type of business.
2. It should have the term of delivered date. The customer should be able to assign the day of delivery.
3. The Logistic system should be improved to cover to other type of product such as: fresh food, frozen food, fruits and etc.
4. It should develop the Google Maps API to be more useful. We may apply the theory of Google Maps API to use in this system.

REFERENCES

- 1 <http://www.idis.ru.ac.th/report/index.php?topic=791.0>, online
- 2 The Institute for the Promotion of Teaching Science and Technology (IPST),
online
- 3 Supatra Wilavan, (2000), “SMALL AND MEDIUM ENTERPRISE -
DECISION SUPPORT SYSTEMS (SME-DSS)”
- 4 http://www.sara-dd.com/index.php?option=com_content&view=article&id=199:main-problems-for-smes&catid=25:the-project&Itemid=72, online
- 5 Miss Khruewan Champangern, (2004), “The Development of Decision Support
System for Consumer Goods Transportation Routing to Convenience
Stores in Petrol Stations in Changwat Nonthaburi”
- 6 http://www.mcs.most.go.th/map_api/index.php, online
- 7 Mr.Tanit Sorat, (2003), “What is Logistics And Supply Chan Management”,
9789749210772 ISBN

APPENDIX

Data Dictionary

Attribute : tbl_products

Description : table product detail

Attribute Name	Contents	Type	Require	Pk / Fk	Reference
ID	Product ID	int(10)	Y	PK, FK1	Tbl_order details. PRODUCT T 1
PRODUCT_NAME	Product Name	Varchar(255)	Y		
UNITCOST	Unit of Cost	int(50)			
UNITPRICE	Unit of Price	int(50)		FK2	Tbl_order details.UN ITPRICE 1

Attribute : tbl_orders

Description : table orders

Attribute Name	Contents	Type	Require	Pk / Fk	Referenc
ID	Order ID	int(5)	Y	PK, FK1	Tbl_orde rdetails. ORDER ID
CUSTOMER ID	Customer ID	int(5)	Y	FK2	Tbl_cust omer.ID

EMPLOYEE ID	Employee ID	int(5)	Y	FK3	Tbl_employees.ID
ORDER DATE	Order Date	date			
REQUIRED DATE	Required Date	date			
SHIPPED DATE	Shipped Date	date			
REMARK	Remark	varchar(255)			
STATUS	Status	varchar (50)			

Attribute : tbl_orderdetails

Description : table order details

Attribute Name	Contents	Type	Require	Pk / Fk	Referenced
ID	Supplier Code	int(5)	Y	PK	
ORDER ID	Order ID	int(5)	Y	FK1	Tbl_order.ID
PRODUCT 1	Product 1	varchar(50)		FK2	Tbl_products.PRODUCT_NAME
PRODUCT 2	Product 2	varchar(50)			
UNITPRICE 1	Unitprice 1	varchar(50)		FK3	Tbl_products.UNITPRICE
UNITPRICE 2	Unitprice 2	varchar(50)			
QUANTITY 1	Quantity 1	varchar(50)			
QUANTITY 2	Quantity 2	varchar(50)			
TOTAL	total	varchar(50)			

Attribute : tbl_customer**Description :** table customer

Attribute Name	Contents	Type	Require	Pk / Fk	Referenced
ID	Customer ID	int(10)	Y	PK	
CUSTOMER TITLE	Customer Title	varchar(255)			
COMPANY NAME	Company Name	varchar(255)			
CUSTOMER NAME	Customer Name	varchar(255)			
ADDRESS	Address	varchar(255)			
PROVINCE	Province	varchar(255)		FK1	Province.P ROVINCE ID
AMPHUR	Amphur	varchar(50)		FK2	Amphur.A MPHUR ID
TAMBON	Tambon	varchar(50)		FK3	Tambon.TA MBON ID
POSTAL CODE	Postal Code	varchar(255)			
ZONE	Zone	int(5)		FK4	Tbl_zone.id
MOBILE	Mobile	varchar(255)			
LAT VALUE	Latitude	double			
LON VALUE	Longitude	double			
DISTANCE	Distance	double			

Attribute : tbl_employees**Description :** employees of company

Attribute Name	Contents	Type	Require	Pk / Fk	Referenced
ID	Employees ID	int(11)	Y	PK	
TITLE NAME	Title Name	varchar(255)			
FIRST NAME	First Name	varchar(255)			
LAST NAME	Last Name	varchar(255)			
POSITION	Position	varchar(255)			
HIREDATE	Hire Date	Date			
ADDRESS	Address	varchar(255)			
CITY	City	varchar(255)			
REGION	Region	varchar(255)			
POSTAL CODE	Postal Code	int(11)			
COUNTRY	Country	varchar(255)			
MOBILE	Mobile	varchar(255)			

Attribute : tambon**Description :** table tambon

Attribute Name	Contents	Type	Require	Pk / Fk	Referenced
TAMBON ID	Tambon ID	int(11)	Y	PK	
AMPHUR ID	Amphur ID	int(11)	Y	FK1	Amphur. AMPHUR ID
PROVINCE ID	Province ID	int(11)	Y	FK2	Province. PROVINCE ID
TAMBON TH	Tambon thai name	varchar(64)			
TAMBON EN	Tambon eng name	varchar(64)			

LAT	Latitude	Double			
LON	Longitude	Double			

Attribute : amphur**Description : table amphur**

Atteribute Name	Contents	Type	Require	Pk / Fk	Referenced
AMPHUR ID	Amphur ID	int(11)	Y	PK	
PROVINCE ID	Province ID	int(11)	Y	FK1	Province. PROVINCE ID
AMPHUR TH	Amphur Th name	varchar(64)			
AMPHUR EN	Amphur Eng name	varchar(64)			
AMPHUR ZONE	Zone in bangkok	int(5)	Y	FK2	Tbl_zone.I D
LAT	Latitude	Double			
LON	Longitude	Double			

Attribute : province

Description : table province (Using bangkok is province)

Attribute Name	Contents	Type	Require	Pk / Fk	Reference
PROVINCE ID	Province ID	int(10)	Y	PK, FK1	tbl_customer. PROVINCE
PROVINCE TH	Province TH	varchar(64)			
PROVINCE EN	Province EN	varchar(64)			
LON	Lon	double			
LAT	Lat	double			
REGION ID	Region ID	int(11)			
REGION4 ID	Region4 ID	int(11)			
PROVINCE DISTANCE	Province Distance	int(11)			
PROVINCE SIX	Province Six	int(11)			
PROVINCE TEN	Province Ten	int(11)			
PROVINCE TAINLER	Province Tainler	int(11)			

Attribute : tbl_zone

Description : table province (Using bangkok is province)

Attribute Name	Contents	Type	Require	Pk / Fk	Reference
ID	ID of zone	int(5)	Y	PK	
NAME	Name of zone	varchar(255)			

BIOGRAPHY

NAME	Miss. Teeraporn Phaiboolrungrroj
DATE OF BIRTH	27 April 1985
PLACE OF BIRTH	Songkla, Thailand
INSTITUTIONS ATTENDED	Rachamangala University of Technology Thanyaburi, Thailand, 2002 – 2006: Bachelor of Science Mahidol University, 2008 – 2012: Master of Science (Technology of Information System Management)
HOME ADDRESS	43/413, Pruksa C, Soi 11/2, Khlongsam, Khlongluang, Pathumthani, 12120, Thailand Tel. 0875506104 E-mail : mayear_2@hotmail.com