



Holistic Management System for SME Logistics Providers

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Abstract

Logistics providers have become an intrinsic part of the modern global economy. The demand for lean production and just-in-time business practices has put an enormous strain on the logistics business. In answer to today's business environment, logistics providers have turned to informational technologies in an effort to improve their practices. This paper addresses the development and application of a management system for the purpose of assisting the modern day SME (Small-Medium Enterprises) logistics providers in their everyday business.

A multidisciplinary approach was taken for the development of the business management system. In conjunction with computer science, the perspectives of marketing, economics, and industrial design was also taken into heavy consideration during the development of the system. The reason for the multidisciplinary approach was to make certain the real-world implication of the system is highly feasible.

Furthermore, the scope and design of the system was for the use of SME-sized logistics providers doing express parcel delivery business in a densely populated city. It is to be a multipurpose program for managing most of the everyday routine while at the same time being uncomplicated and simple to use. To achieve the tricky goal, the system will propose a new innovation of the RFID invention and integrate it with contemporary popular innovations such as GPRS (General Packet Radio Service) wireless communication, GPS (Global Positioning System), digital maps and web 2.0 applications.

Keywords: Logistics Provider, SME, Business Management System, Multidisciplinary Approach, Innovation

1. Introduction

The parcel delivery sector of the logistics business in Thailand has been growing and developing at a hampered rate in the past history. This is due to the monopolization of the market by the national postal service provided by the government. Coupled with an export oriented business



environment, there has been a generally low demand in the past for domestic parcel delivery, especially intra-city method.

However, as the economy matures creating a sizable middleclass consumer group, the demand a professional intra-city logistics service has become an unsatisfied need. The economy now needs to serve the raising demands of the domestic market. Businesses need the missing link that connects them to potential consumers [1]. The popular ad-hoc practice of hiring service motorcycles is no longer sufficient in terms of scale and security.

An approach with informational technology can greatly improve the efficiency and effectiveness of the logistics business [1]. Hence, the management system proposed in this paper make great use of informational technology alongside human resources to improve the work process of the parcel delivery business. Firstly, the system will replace the old barcode identification system with the application of a new radio-frequency identification system (RFID) for speed, durability and flexibility [3]. Acting as the central component for the system, the RFID innovation will synergize with other innovations to improve other aspects of parcel delivery work. Digital map and GPS is utilized for tracking messengers and parcels while a web application is built for customer access and customer relations. Last but not least, the system will utilize a decision support system for the routing of messengers and job assignments. The system will integrate all of the modules into one data flow to reduce the manual procedure steps in doing business, increasing the speed of each service and transaction. The security concern is also addressed by the tracking system providing both customers and managers the visibility and reliability they need while the data needed for the tracking system is also from the RFID identification method. The reduction of manual labor not only eliminates a source of error but also reduces the variable costs of business operation.

Therefore, this paper aims to present the development of a management system which is an application-software that will be used with a proposed IT heavy parcel delivery business process. Through the application-software, the user can communicate with the customers through the web application, monitor parcels and delivery with RFID tracking system while managing the routing and messenger work load with a decision support module.

2. Conceptual Framework

The economy is not void of local SME logistics providers. Many messenger and delivery service exists in today's economy, from big metropolis to smaller industrial cities. They are, however, very obscure and difficult to access. The business models of these early providers are also very labor intensive. The approach may be practical in the past environment where the labor is cheap and technology expensive, but not when the price of labor has lost its competitive advantage and technology more accessible, as is the case for the current situation.



The current heavy use of labor is also technically unfit for the demand of a business like logistics that requires predictability, reliability, security and speed. Human resource, if famous by their creativity and vision, is also notorious for their frequent errors and sluggish pace.

An analysis of an existing practice for parcel delivery business was conducted to first understand the current business practices. The purpose of the analysis is to learn about the pros and cons of the current practices and see what areas needs improvement or which needs have not been satisfied. The analysis was done by an interview of a firm doing parcel delivery in Bangkok and looking at the business practice of the national postal service in their messenger sector. An observation of practices of firms outside Thailand was done to give a comparative perspective.

The management system was then developed from information gathered. Also, the system will act as the central user interface for the business, as everyone will use the system in doing their work, including managers, customers, inventory staff and messengers.

The concept of the system has also been determined to specifically meet the demands of SME-sized logistic provider. The system was to holistically assist in most of the activities concerning the transportation and logistics side of business. The interface of the system is to be easy to use and the dept not too complex for a small firm with the economy of scale achievable to be small at first but expandable in the later stages. Flexibility of the system is also of high importance for tweaking towards the needs of different firms.

The system consists of three parts, the front office, the back office, and messenger assistance.

2.1. Front Office

The front office, often neglected, is one of the most important aspects of a business, especially a parcel delivery business. It acts as the gateway for consumers to use the services provided by the entrepreneur. Careful tailoring must be made to the front office to effectively invite and communicate to the customers. A good front office can expedite orders making it inviting and easy for customers to use the service. The existing system relies on communication by phone, and aging method, while the system proposes a relatively new access for the customers in Thailand through informational technology.

2.2. Back Office

As with the front office, the system proposes a more hi-tech solution to the back office work process. The back office consists of order processing, job allocation, and inventory management. Two central user interfaces is developed, one for job processing and other for tracking and inventory management. The objective is to reduce man power and manual steps frequent in the existing system while increasing speed and reliability. The faster the orders can be process, the faster the package can be picked up and delivered.



2.3. Messenger Assistance

The third pillar of the system is the messenger assistance. It serves as the link between the central office and the delivering messengers. The current system frequently does not have real time updates on the whereabouts of parcels and messengers. Real-time job allocation and flexible routing is looked at in developing the system. To achieve this, extensive use of GPRS and GPS technology is implemented to establish continuous communication and tracking, respectively.

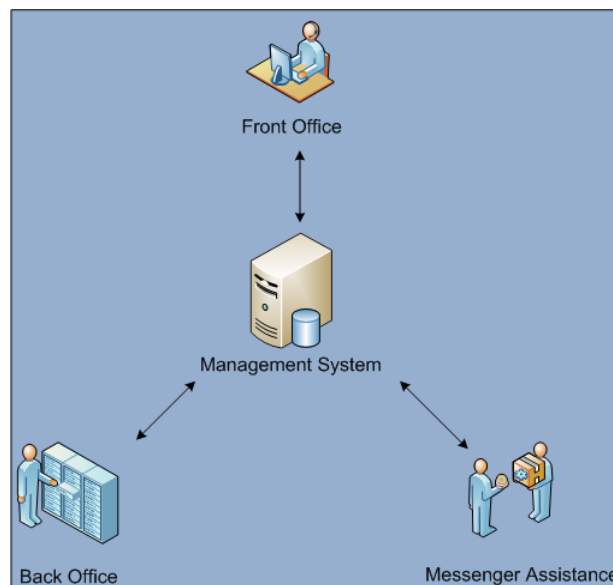


Figure 1: Relationship in a parcel delivery system

3. Methodology

In this section, we examine the existing workflow of the parcel delivery business that relies heavily on labor. The current method of receiving job order is done primary through the telephone and various other ad-hoc approaches such as SMS, instant messaging and mouth to mouth. Once a booking has been made, a messenger is then sent out to the pickup point with only the most basic of information provided by the customer. The messenger than retrieves both the package and complete order information back to the warehouse. Completed information is then given to the service desk for processing. The warehouse management than decides on categorizing and storing the package for delivery. The messenger finishes the job with delivery on the next day and brings back paper work. For the express delivery, most of the paper work is overlooked and the messenger goes straight from pickup point to delivery point.

Communication between messengers and the central office is done discretely through phone conversations. Job allocation is done manually by telephone and real-time tracking is virtually non-existent. For package tracking, the barcode system is the most popular approach.

The existing workflow (see Figure 2) is clearly much too complex for manual labor because it requires many checkpoints for the flow of data. This leaves much room for errors and is very time



consuming. The process in each of the steps may only take a few seconds but can quickly accumulate through all the steps [2].

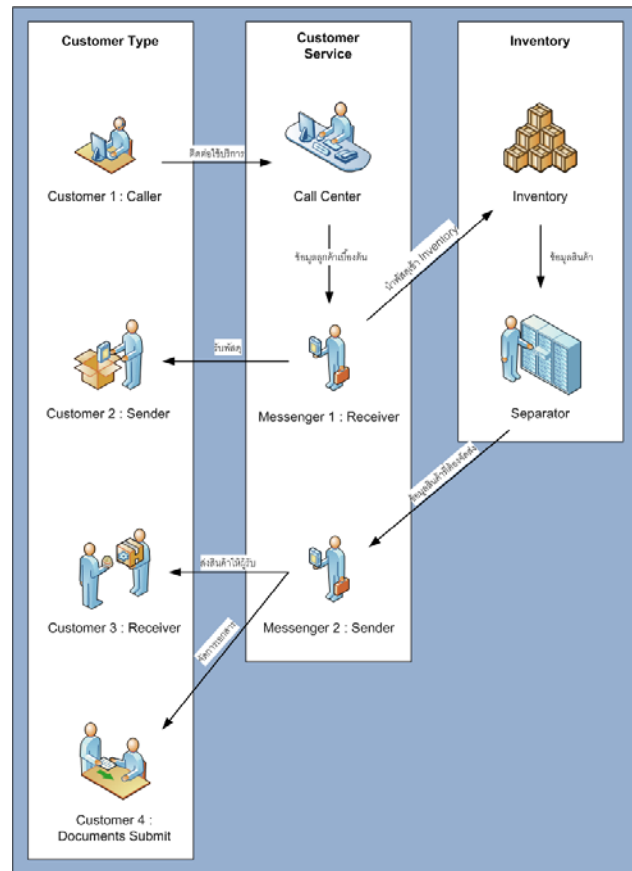


Figure 2: Existing workflow

Secondly, the routing of each messenger is not done sufficiently. Managers only have a vague idea of where each messenger is located making efficient job allocation and routing management very difficult. The flexibility of each messenger is also hampered by the lack of tracking. This lack of flexibility makes handling of emergencies and tailored services almost impossible once taken in a large scale.

Next we'll look at the new system proposed in this paper (see Figure 3). The new management system proposes to switch from relying on labor to instead make heavy use of informational technology. Most of the order processing and documentation will be done by the computer and communications done automatically by GPRS wireless communication. Firstly, the booking of a delivery is done predominately online by a website. All the information will be gathered and entered in one sitting. In the occasional event of any discrepancy, the call center then contacts the customer to verify the data entered.



Once the order has been confirmed, it is allocated to each messenger automatically by the decision support system. The theory used to determine a route to suggest to the messenger is the Nearest Neighbor algorithm to select the most efficient route by selecting the nearest next destination [4]. This algorithm is best used in web applications because of the quickness of the calculations and sufficient results. The system then sends the job description to each messenger into his PDA via GPRS communication. Messenger status updates and parcel updates are also done automatically during pickups and delivery. The manager also has a holistic view of every messenger and parcel through the digital map giving him the flexibility and oversight he needs to handle emergencies and tailored services.

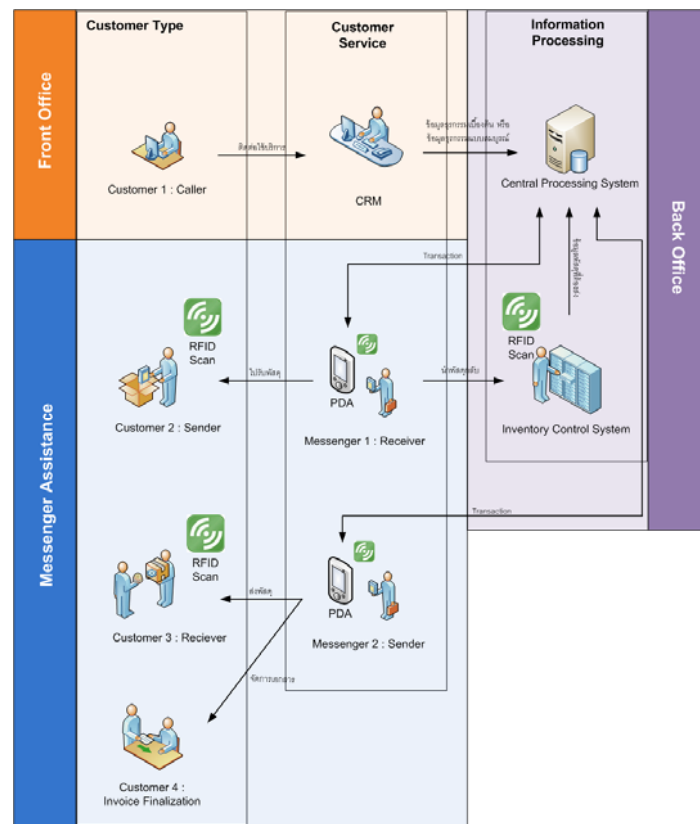


Figure 3: Proposed new workflow

It can be observed that the steps in the developed new workflow are virtually the same as the existing one. The new management system is not aimed to overhaul the existing workflow but to optimize the existing ones with new information technology. The RFID technology is heavily utilized in place of the old barcode system for its versatility and speed. The ability to store information directly into the RFID chip makes it easy to change and check the data. The messenger does not need to access the central system in order to view information in each package. Through the use of



automatic GPRS communication, the flow of information becomes bidirectional. The only manual entry of information is at the beginning by the customer themselves.

4. Experimental Results

The pilot management system has been developed. It was found that the integration between all the systems make it much smoother for the customer and managers to access information needed by each side. The customer can track the package real-time through the web application while the manager will find the decision support system helpful in routing management. The key features of each part, front office, back office, and messenger assistance can be seen as follows.

4.1. Front Office

In three main steps, the customer files the details needed for a booking. The login process gathers the primary address from the user for future bookings. The booking information gathers the pickup and destination address and the last page gives the review of the order for final confirmation. The back office then checks for errors and the order is complete.

Figure 4: Login and Registration



Figure 5: Booking Information

Figure 6: Order review and confirmation



4.2. Back Office

The back office system and interface is used for order processing and job allocation. The order review uses similar interface as the customer while the automatic job allocation relies on a different interface. Through a digital map and search interface, the back office can also track each and every messenger or parcel during delivery for precise management.

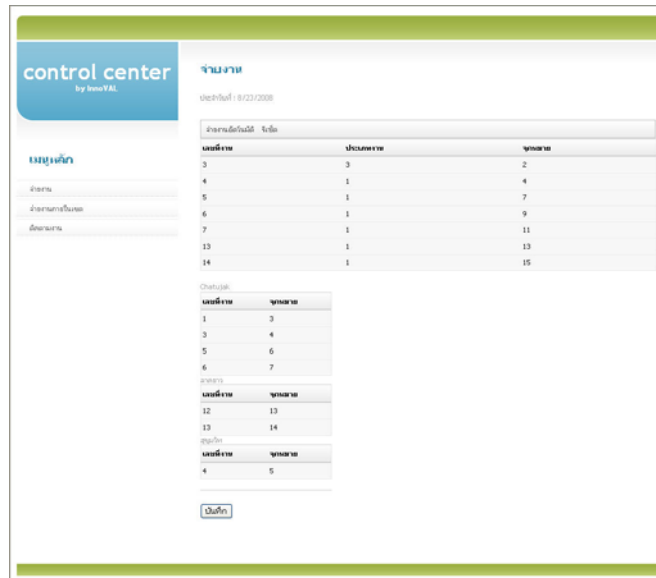


Figure 7: Automatic job allocation

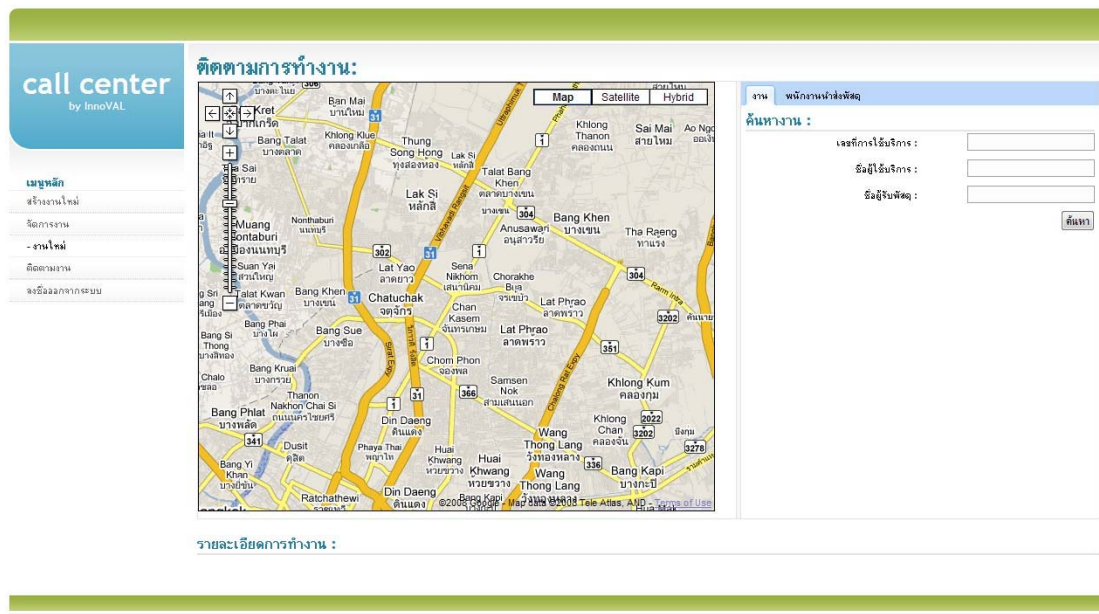


Figure 8: Messenger and parcel tracking interface

4.3. Messenger Assistance

Along with the central system, the messenger also uses a specific application on the PDA. The application is for viewing job description, route recommended and for documentation. The



transaction is done through the PDA and is sent back wirelessly to the central system. The PDA also communicates regularly with the server to update parcel status and messenger location.



Figure 8: Job view and order confirmation

5. System Integration

The system is to be tested in real business process. The system can be used for connecting with customers, order processing and routing management. The system can be tailored for other sectors in logistics such as flower delivery, insurance business, and mass transportation. The system can actually be customized to fit any business that requires short distance travel and can be of great use in conjunction with e-commerce. Previously, information technology like GPS has been incorporated in the trucking sector of logistics business and RFID in the supply chain business. We are now attempting to use both GPS tracking and RFID to improve parcel delivery business.

In the future, considerations of traffic and weather can also be incorporated in the decision support system to make it even more efficient. At the same time, with better mapping technology and GPS positioning system, the system can be expanded to bigger scale, i.e. country wide and even regional. Wireless communication can also be improved with better telecommunication technologies like the 3G or 4G mobile technologies.

6. Conclusion

In this paper, the development of a new approach to managing an SME-sized logistics business specifically the parcel delivery has been presented. The major obstacle to the project is the high costs of private mapping technology. Another factor that can hinder further development of the



project is the change of SD card reader on PDAs to micro SD cards. Despite the difficulties, the pilot project was successfully implemented, through the help of open-source technology, and the front office system, back office system, and messenger assistance was built. The three pillars were integrated to create a management system enabling smooth flow of data.

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