

**EVALUATION OF E-SEAL IMPLEMENTATION
IN THAI CUSTOMS PROCESS**

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Thesis
entitled
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IN THAI CUSTOMS PROCESS**

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ABSTRACT

The Customs Department of Thailand set an organizational target of being a “world class customs” by improving the working system, job description and its responsibilities to promote the best services and focus on customer orientation.

The pilot project of using e-seal in a paperless system for e-customs in the goods transportation process of the e-freezone. The Customs Department of Thailand and the Western Digital Company coordinated in a trial between 2007 and 2011, inclusive, testing goods transportation control between three industrial estates, Nava Nakorn industrial estate, Bang Pa-in industrial estate, and the Hi-tech industrial estate. This research is qualitative, using three methodologies: documentary research, participatory observation, and in-depth interviews.

The project was successful because both the government and the private sector were cooperating in the design of the system. All concerned personnel accepted the system at the highest level in the three variables of compatibility with the organization’s policy, the effectiveness of the system, and the working skills of the stakeholders. This system is able to be enhanced for general use in the future.

KEY WORDS: E-SEAL / E-CUSTOMS / E-FREEZONE / RFID / E-LOCK

123 pages

การประเมินผลสัมฤทธิ์การใช้ดวงตราอิเล็กทรอนิกส์ในพิธีการศุลกากร

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บทคัดย่อ

กรมศุลกากรได้กำหนดเป้าหมายการพัฒนาสู่ “ศุลกากรมาตรฐานโลก” โดยปรับปรุงระบบงาน, ภาระหน้าที่และความรับผิดชอบสู่ความเป็นเลิศของการให้บริการโดยยึดผู้ใช้บริการเป็นศูนย์กลาง

โครงการทดลองใช้ดวงตราอิเล็กทรอนิกส์ในระบบศุลกากรอิเล็กทรอนิกส์แบบไร้เอกสารเพื่อควบคุมการขนถ่ายสินค้าในเขตปลอดอากรอิเล็กทรอนิกส์ (e-freezone) เป็นความร่วมมือระหว่างกรมศุลกากรกับบริษัทเวสต์เทิร์น ดิจิตอล (ประเทศไทย) ระหว่างปี 2550 ถึง 2554 เป็นระยะเวลา 5 ปี ระหว่างนิคมอุตสาหกรรม 3 แห่งคือ นิคมอุตสาหกรรมนวนคร, นิคมอุตสาหกรรมบางปะอิน และ นิคมอุตสาหกรรมไฮเทค (บ้านหว้า) ในการวิจัยครั้งนี้เป็นการวิจัยเชิงคุณภาพ โดยใช้วิธีการค้นคว้าวิจัยจากเอกสาร, การสังเกตการณ์จากการร่วมปฏิบัติการและการสัมภาษณ์เชิงลึกในการเก็บข้อมูล

ผลการวิจัยพบว่า โครงการนี้ประสบผลสำเร็จเพราะความร่วมมือกันเป็นอย่างดีระหว่างกรมศุลกากรและผู้ประกอบการในการออกแบบระบบและดำเนินการพัฒนาร่วมกัน, บุคคลที่เกี่ยวข้องกับพิธีการศุลกากรทุกฝ่ายให้การยอมรับในระดับสูงสุด ทั้งปัจจัยด้านความสอดคล้องกับนโยบายขององค์กร, ความสัมฤทธิ์ผลของการใช้งานและทักษะการปฏิบัติงาน ซึ่งสามารถนำไปขยายผลในพิธีการศุลกากรอิเล็กทรอนิกส์แบบไร้เอกสารต่อไป

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CHAPTER I

INTRODUCTION

1.1 Background and Problem Statement

Bureaucracy began around since the Roman Empire or Ancient Egypt that has group of people to build pyramid, army force, agriculture, etc. Although the term was not defined but it is one of the government model (King and Stivers, 1998).

In the past, people would have a negative attitude towards the bureaucracy because the bureaucracy in almost people mined about bureaucratic red tape, complicated and formal (King and Stivers, 1998).

The objectives of bureaucracy reformation are improved performance of government managed and good governance (Plangprasopchoke, 2007). That is one of methods to the destination for a good life of people and country stabilization.

The bureaucracy reformation is now noticed as main subject policy of Thailand. In order to modernize the civil organizations to be downsizing, but best practices by using new administration methods. In principle these administration methods should be based on a good governance principle. This reformation caused by three royal acts which are as following:

- The State Administration Act (Volume 5) of B.E. 2545
- The Government Organizations Restructuring Act of B.E. 2545
- The Royal Decree on Good Governance of B.E. 2546

According to the three royal acts, the civil organizations have been reorganize to decrease duplication meanwhile bring up the continuous jobs or similarly jobs that scatter in many organizations grouping in the same organization. The new administration methods emphasized on transparency, fairness and be able to inspection (Plangprasopchoke, 2007).

The customs department is also a civil organization that need to be changed by this policy. Since he announced his vision to be “World class customs

organization to enhance the competitiveness of the country and protect society” (The Customs Department, 2010).

The logistic system is one of the services that play an important role in several businesses from retail shops, department stores, until large factories. The companies, in many industries, attempt to develop the business process or use more IT device to increase efficient for many benefits such as cost reduction, working time reduction, process reduction and etc.

The Western Digital is a company that produces IT products and manufacture hard disk drive as a main line productive in Thailand. In the past, the documents were used in the process of transferring products or materials between plants. And to inform customs officer to check the products before shipping, then customs officer will allowed to tranfer the products and seal with the "Lead seal". The customs officer will recheck the product after the truck is arrived at destination plants.

By the customs department has a policy to use paperless and e-seal (Electronic-seal) in e-freezone. The Western Digital Company, which is the first company that has been tested in this project. From the experience of the researcher to work as project manager at that time, and developed the e-seal system for the Western Digital Company. It strongly drives to know the effecitvness of using e-seal in customs. In this pilot project, e-seal were used instead of in every containers and also used Electronic Data Interchange (EDI) to exchange data in import and export process within e-freezone. Customs officer can monitoring from paperless system. The containers were secured by e-seal during a shipment. In case of the process has no problem, the customs officer is not need to check container again.

According to the RFID Institue of Thailand (2009), e-seal is needed for e-customs system to improve the efficiency as following:

- To create more efficiency includes decreasing the elapsed time.
- To prevent or change the goods in the container during journey.
- To reduce the cost in customs and goods inspection.
- To decrease the overhead charge such as officer overtime payment.
- To reduce the warranty fees.

These present the vision and important of technology that were used in the logistic and the process for both the Western Digital's operation officer and the customs officer that are convenience and faster.

1.2 Objectives

The main objectives are following:

1.2.1 To study the evolution of customs service of using Electronic Seal or e-seal in the paperless system.

1.2.2 To study the structure and procedures of goods transportation and inspection in e-freezone.

1.2.3 To evaluate the acceptance status and benefits of using e-seal in e-freezone of the pilot project.

1.3 Scope of the Study

1.3.1 This research focuses on pilot project which the Thai Customs Department and the Western Digital Company trialed in e-freezone of Nava Nakorn industrial estate, Bang Pa-in industrial estate and Hi-tech industrial estate between 2007 and 2011.

1.3.2 Using data collected by documents review, participatory observation and in-depth interview.

1.3.3 The in-depth interview technique uses five cluster sampling as manager and executive groups, data entry group, driver group, IT support group and customs officer group.

1.4 Major contributions

The major contributions are:

1.4.1 Knowing the evolution of customs service of using e-seal in the paperless system.

1.4.2 Discovering the working structure and working procedures for goods transportation and inspection in e-freezone.

1.4.3 Knowing the acceptance status of e-seal in e-freezone and make use of the research results to improve the e-customs.

1.4.4 Revolution the work model of customs.

1.5 Terms of definitions

In this research, the meanings of definitions are as the followings:

1.5.1 E-customs means shipping service by using the electronic system of paperless system instead of using papers to declare the customs in e-freezone.

1.5.2 E-freezone means e-freezone responsible by Western Digital Company consist of four plants are following:

- Nava Nakorn industrial estate
- Bang Pa-in industrial estate
- Hi-tech industrial estate
- Suwannabhubi airport cargo

1.5.3 Data entry means workers who responsible to entry transfer orders for shipping system in e-freezone.

1.5.4 Transfer order means the part of a transfer order that specifies detailed information about a request to transfer a specific item to a different warehouse in e-freezone.

1.5.5 Driver means the person who responsible to drive a logistic truck for Western Digital Company and project partner and also responsible to use e-seal in this project.

1.5.6 Customs officer means customs officer who responsible to e-freezone in this project.

1.5.7 IT Support means a group of technician who responsible to support IT usages for implementation of the system.

CHAPTER II

LITERATURE REVIEW

2.1 Purposes of Thai bureaucracy reform

Sirisampan (2007) stated that the main purposes of Thai bureaucracy reform are to create high performance organization and also high ethic organization. For these concepts, Jantasorn (2007) described the evolution of improving organization as below:

An Ancient Greek, Socrates sighted that state was a big organization composes of small part of knowledge people and major part of unknown ledged people, so that the organization development might be emphasized onto educational. Everyone would be survived by self-dependency.

Plato classified the organization to be three levels which are the lowest was private sector, the middle was state and the highest was governors. So that it necessary to divide the job and use of benefit to reward for create more productivity.

Aristotle believed that everyone was not complete. So that rule of law was necessary for accuracy, equality and fairness, which caused human behavior to be responsible and honesty.

In Roman period, Polibius sighted that the important mechanism to ensure the organization was check and balance, in order to make equity system and prevention for public benefits.

In European period, Bodin sighted that the organization quality improving was depended on factors of individuals that based on their background knowledge. It was necessary to select good person to strengthen the organization.

Adam Smith accepted that the quality of the organization correlated with personal benefits. That causes competitive system, innovation and production tool.

Max Webber, Father of big organization formulation, made use of organization strength by "Law and Reasons". He emphasized on efficiencies by separated the job in the flat level and divided to personal based on specialized

capability. It caused line of function and consideration for the whole organization, made use of merit system in personal promotion and also use “Law and Regulations” for practices.

F.W. Taylor, Father of industrial organizations formulation, presented that the quality of the organization based on separating the job and knew every step of work flows. Every step needed people to run in order to get repetition for work skill and preventing faults. This idea was used in production line in Japan industry by accepted that the product outcomes were more important than human relationships.

Chester Barnard, President of the Newjersy telephone corporation, presented idea to improve the organization that based on “personal benefits and organizational benefits must be ongoing together”. This caused paying commission for working staff in the insurance company.

Hebert A. Simon who gathered the Nobel Prize in economy suggested that organizations had to do everything correctly not correct as one person but also by 10 thousand, 100 thousand or 1 million persons. So that it needed to record the right judgments of everyone in computer program that caused the development of MIS and IT system in the present time.

Alwin Tofflur (1970) presented the new administration methods by using ad-hocracy to run big job in the organization and he also presented concept of “Third Wave” to change the world to information technology era and use IT to develop organization qualities.

Albert O. Hiraikman who gathered the Nobel Prize in Economy in 1970, presented the theory of public selections in order to get more people satisfactions. The idea of “One stop service” and various channels for customer services were occurred.

2.2 Radio frequency identification (RFID)

2.2.1 RFID technology

RFID was gaining popularity as a technology of automatic identification (Roberts, 2006) and allowed for complete information integration within the supply chain (Nikam and Satpute, 2006).

Wen et al. (2009), stated that the global industry for RFID technology has been growing steadily since past few years and was expected to grow rapidly before stabilizing and settling on a steady growth path.

RFID is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal, or person. RFID is coming in industry as an alternative to the bar code. The RFID improves on bar code scanning by allowing for the identification of items without line-of-sight being necessary between the reader and the tag (Curtin et al., 2007). Both reader and tag can communicate through many middleman such as water, plastic, glass or black body (Senewong Na Ayuthaya, 2004).

A RFID tag is better known as a small object that can be attached to or incorporated into a product, which stores a unique ID number and can be sent via radio frequency (RF) (Hou and Huang, 2006).

The main advantage of the RFID technology is the switch from direct line of sight scanning, as in the case of the infrared readers for bar code technology, to proximity scanning without direct line of sight (Veronneau and Roy, 2009).

Companies use RFID mainly for three purposes: to reduce cost, to better serve customers and to support business growth through, for example, increasing market share (Hassan and Chatterjee, 2006). RFID system is still developing common standard and protocol for use in supply chain (Vic, 2006).

A RFID system consists of three components: an antenna, transceiver (often combined into one reader) and a transponder (the tag). The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. Tags may be active or passive and read-only, write-once, or read-write. Below is a description of each:

Active tags have a battery, which runs the microchip's circuitry and enables the tags to send a stronger signal to the reader, and have a read range of approximately 100 feet as shown in figure 2.1.

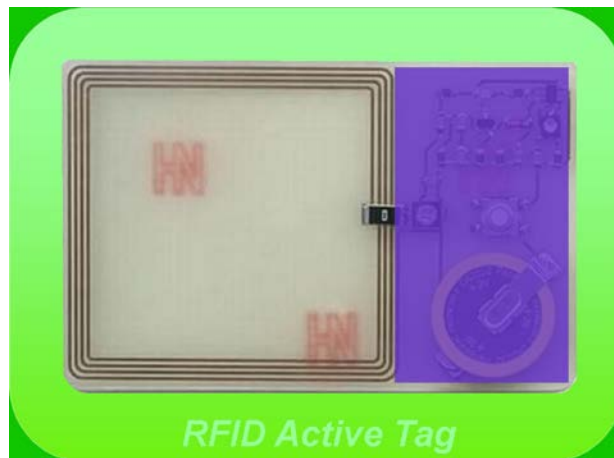


Figure 2.1 Active Tag

Source: Netrand Co.,Ltd. (2011)

Passive tags have no battery. Instead, they draw power from a reader, which sends electromagnetic waves that induce a current in the tag's antenna and powers the microchip's circuits. The chip then modulates the waves the tag sends back to the reader. Passive tags have a read range of approximately 30 feet as shown in figure 2.2.

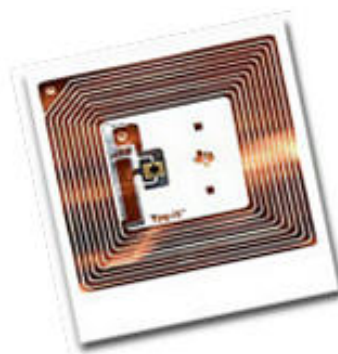


Figure 2.2 Passive Tag

Source: Vcharkarn dot com Co.,Ltd. (2011)

Read-only tags contain data, such as a serialized tracking numbers, which are pre-written onto them by the tag manufacturer or distributor. Read-only tags are



Figure 2.4 Handheld RFID reader

Source: GAO Group Inc (2011)

2.2.2.2 RFID readers embedded into mobile data collection devices as shown in figure 2.5.



Figure 2.5 Mobile embedded RFID reader

Source: Cell Phone Digest (2007)

2.2.2.3 Fixed readers, which are mounted to read tags automatically as items pass by or near them as shown in figure 2.6.



Figure 2.6 Fixed RFID reader

Source: Net Resources International (2011)

2.2.3 RFID middleware

Both middleware and software applications are required in an RFID environment. A major issue for companies seeking to implement an RFID solution is the lack of sufficient middleware to link RFID systems and enterprise applications. Middleware software or applications are needed to manage the flow of data from readers and send the data to back-end management systems. RFID middleware assist with the following:

- Retrieving data from readers.
- Filtering data feeds to application software.
- Generating inventory movement notifications.
- Monitoring tag and reader network performance.
- Capturing history.
- Analyzing tag-read events for application tuning and optimization.

2.2.4 Electronic Seal

The definition of electronic seal (e-seal), by Decker et al. (2004) is an electronic seal that can be applied on physical goods in order to provide the guarantee of important aspects of the protection of those physical goods. The e-seal does not

physically protect the sealed goods but can provide propositions and evidence of authenticity and integrity.

According to Hayachi (2007) states that e-seal and similar technology can also be used for logistic devices other than ocean containers, such as airfreight containers or trucks. Passive e-seal have no battery. This kind of e-seal only works when it is read by e-seal readers. The seal becomes active when it receives radio waves from a reader. The chip activates itself with the power it receives from the radio wave and then sends its identifying number back to the reader. At the moment, the price of e-seal is estimated to be 10 to 20 US dollars per unit after mass production (Tirschwell, 2006).

Electronic seal or e-seal is shown in figure 2.7 are made of relatively fragile materials such as plastic or thin wire/sheet metal. They can be easily severed by common tools and therefore do not provide any physical protection. The purpose of indicative seals is to reflect tampering. These seals are tied through a hasp or around a lock/handle. E-seal has a unique identification number, which is an alphanumeric number, up to ten digits long, on their surface. If e-seal was broken before get permitted, this tampering can be detected.



Figure 2.7 Electronic seal

2.3 Related theories

2.3.1 Adoption theory

Rogers (1995) defined the adoption process as “the mental process through which an individual passed from first hearing about an innovation to final adoption”. The five steps in this process were as following:

Step 1: knowledge (awareness): The individual was exposed to the innovation but lacks complete information about it.

Step 2: persuasion (interest): The individual became interested in the new idea and sought additional information about it.

Step 3: decision (evaluation): The individual mentally applied the innovation to his present and anticipated future situation and then decided whether or not to try it.

Step 4: implementation (trial): The individual made full use of the innovation.

Step 5: confirmation (adoption): The individual decided to continue the full use of the innovation.

2.3.2 Innovation diffusion theory

Rogers (1983) explained the process of innovation diffusion as one which was dictated by uncertainty reduction behavior amongst potential adopters during the introduction of technological innovations. Although innovations typically offer its adopters novel ways of tackling day-to-day problems, the uncertainty as to whether the new ways will be superior to existing ones presented a considerable obstacle to the adoption process. To counter this uncertainty, potential adopters were motivated to seek additional information, particularly from their workplace peers (Brancheau and Wetherbe, 1990).

Rogers (1995) also suggested a total of five categories of adopters in order to standardize the usage of adopter categories in diffusion research. The adoption of an innovation follows an S curve when plotted over a length of time as shown in figure 2.8.

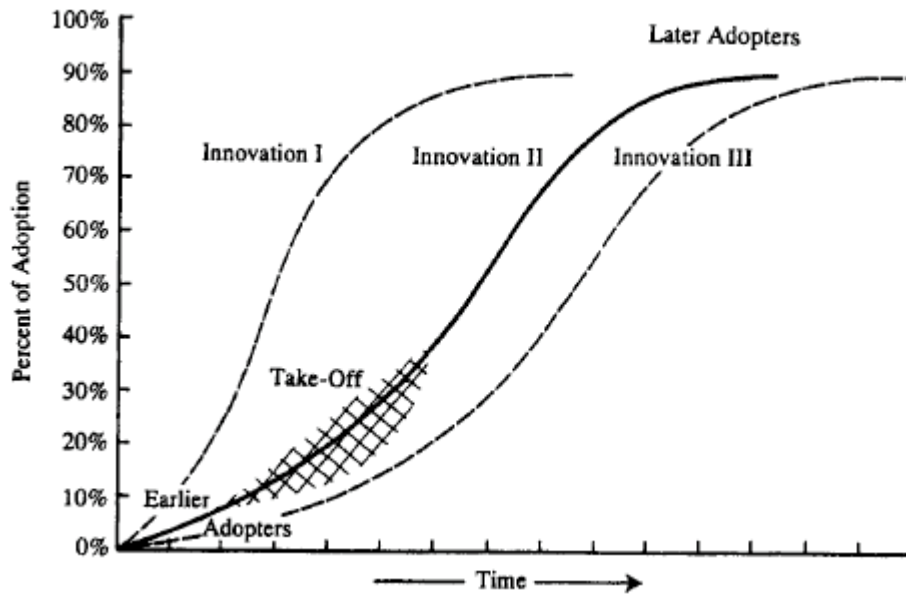


Figure 2.8 Adoption of an innovation.

Diffusion is the process by which (1) an Innovation (2) Communicated through certain channels (3) Over time (4) Among the members of a social system

Source: Rogers (1962)

The five categories and definitions of adopters (Rogers, 1962) were shown in table 2.1

Table 2.1 The categories and definitions of adopters

Adopter category	Definition
Innovator	Innovators are the first individuals to adopt an innovation. Innovators are willing to take risks, youngest in age, have the highest social class, have great financial lucidity, very social and have closest contact to scientific sources and interaction with other innovators. Risk tolerance has them adopting technologies which may ultimately fail. Financial resources help absorb these failures.

Table 2.1 The categories and definitions of adopters (cont.)

Adopter category	Definition
Early adopter	This is the second fastest category of individuals who adopt an innovation. These individuals have the highest degree of opinion leadership among the other adopter categories. Early adopters are typically younger in age, have a higher social status, have more financial lucidity, advanced education, and are more socially forward than late adopters. More discrete in adoption choices than innovators. Realize judicious choice of adoption will help them maintain central communication position.
Early majority	Individuals in this category adopt an innovation after a varying degree of time. This time of adoption is significantly longer than the innovators and early adopters. Early Majority tend to be slower in the adoption process, have above average social status, contact with early adopters and seldom hold positions of opinion leadership in a system.
Late majority	Individuals in this category will adopt an innovation after the average member of the society. These individuals approach an innovation with a high degree of skepticism and after the majority of society has adopted the innovation. Late Majority are typically skeptical about an innovation, have below average social status, very little financial lucidity, in contact with others in late majority and early majority, very little opinion leadership.

Table 2.1 The categories and definitions of adopters (cont.)

Adopter category	Definition
Laggards	Individuals in this category are the last to adopt an innovation. Unlike some of the previous categories, individuals in this category show little to no opinion leadership. These individuals typically have an aversion to change-agents and tend to be advanced in age. Laggards typically tend to be focused on “traditions”, likely to have lowest social status, lowest financial fluidity, be oldest of all other adopters, in contact with only family and close friends, very little to no opinion leadership.

According to Rogers (1995) there is usually a normal distribution of the various adopter categories that forms the shape of a bell curve (shown in figure 2.9). Innovators, those who readily adopt an innovation, make up about 2.5% of any population. Early adopters make up approximately 13.5% of the population. Most people will fall into either the early majority (34%) or the late majority (34%) categories and laggards, those who will resist an innovation until the bitter end, comprise about 16% of the population. The concept of adopter categories is important because it shows that all innovations go through a natural, predictable, and sometimes lengthy process before becoming widely adopted within a population.

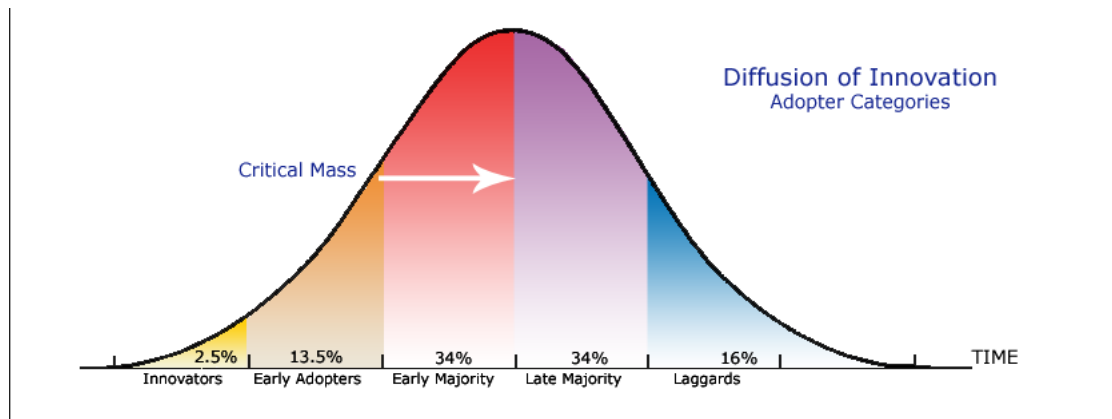


Figure 2.9 Adopter categories.

Source: Pochanukul (2011)

2.3.3 S-R (Stimulus-Response) theory

S-R (Stimulus-Response) or Operant Conditioning. Skinner (1957) stated that the reaction response may not be by one stimulus. The stimuli would cause the same response if the conditions were right. The principle of Stimulus-Response were as following:

- Reinforcement was an encouraging response or learning behavior as needed such as reward or punishment.
- Practice was a repeated exercises or training for the skills to solve related problems.
- Feedback was a result from practice.
- Generalization was a summary of the rules, and were be able to experience various concepts until the conclusion of the rules will apply.
- Discrimination was what the learner could distinguish more clearly the information which will make it easier to choose a response.
- Continuity was a teaching that took into account the proximity between stimuli and response which were suitable for teaching.

2.4 Logistics

There were many definitions for logistics from Thai National Shippers' Council (1994) as following:

- A process of supply chain or supporting planning, flow controlling effectively.
- Effective planning processes presentation and flow control also goods storage, services and relevant data from the start to the end of consuming in order to respond customer demands. This definition includes internal and external movements and returns of goods.
- Business planning structure for service providing, materials management, information and investment flows including complex information, communication and control processes which are suitable for business environments.
- Science of planning, transportation management and maintenance which consist of designing, developing, storage, transportation, distribution and materials control. The definition includes providing officer welfares, constructing, operating, maintenances and control constructions.
- Science of planning, organization management and management activities that effect production and service providing.
- Science of planning, presentation and resource spending in order to support system operation.

2.5 Related researchs

Dejnumpanyachai (2010) concluded his study about Factors in the adoption of e-customs by companies in Thailand (Eastern area of Thailand as a case study),(2007) stated that by the ending of system of EDI in 2007, e-customs would be considered as a major part in improving Thai organizational competitiveness in the global market. E-customs had improved the efficiency of communication among customs department, importer and exporter, freight forwarders and shipping agents. In his study, mainly emphasized on the factors in adoption of e-customs by business companies in eastern area of Thailand. Using questionnaires and interview for data gathering. He found that the companies tended to accept e-customs caused by five factors of a good training program, a cleary regulations, understanding about e-customs, benefits and the pressure among industrial companies.

Wen et al. (2009) concluded their study about Determinants of RFID Adoption in Supply Chain among Manufacturing Companies in China: A Discriminant Analysis. Using a questionnaires survey to study the adoption of RFID by China's manufacturing industry that registered under Federation of China Manufacturers. This study revealed that the environment, organization, technology and product had the impact on the adoption of RFID in China. They made a suggestion for a organization should be given strategic attention to improve employee participation in adopting RFID as a strategic tool.

McCormack et al. (2010) concluded their study about Evaluating the Use of Electronic Door Seals (E-Seal) on Shipping Containers. The tests involved a series of international container movements, mainly from the Puget Sound ports of Seattle and Tacoma, but also through the land border at Laredo, Texas. Participants in the project included ports, marine shipping lines, trucking companies and U.S. federal border enforcement agencies. Several different types of e-seal were tested between 2001 and 2008. They found that traveled though ports, over borders and on roadways that using these RFID device could increase supply chain efficiency and improve the security of containerized cargo movements particularly when e-seal replaced common mechanical seals.

The International Trading Study Center (2003) made a survey research of Thai exporters to use e-seal for sea freight to USA by using telephone call interview of 300 samplings. Found that 55.5% of the exporters submitted to use e-seal to lock the goods containers freight from Lam Chabang port to Seattle port of USA for safety and security from terrorism urged by USA. The 45.5% disagree caused by more investment and its complicated to the GPS used in the freight.

CHAPTER III

MATERIALS AND METHODOLOGY

3.1 Materials

Research materials consists of

Hardware:

- Laptop or desktop computer
- Digital recorder
- Camera

Software:

- SPSS

Data gathering tool:

- In-depth interview questions

3.2 Methodology

This research is a qualitative research consists of five steps work flow; define problem and variable factors, research tools development, data collection, data analysis and the last step is result conclusion and presentation. Figure 3.1 presented the steps of this research.

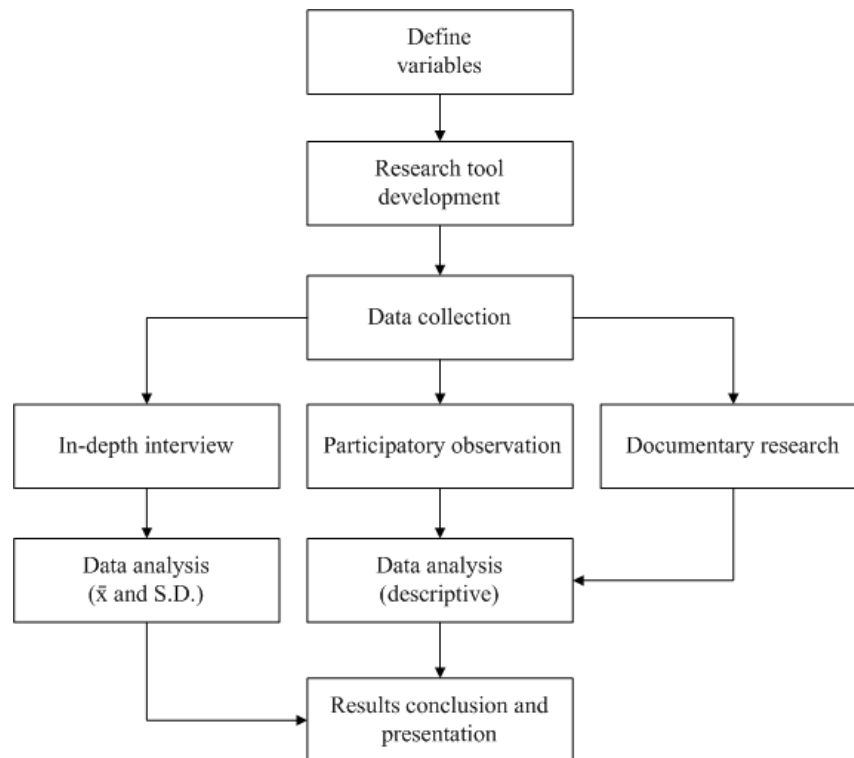


Figure 3.1 Steps of this research

3.2.1 Define problem and variable factors

Thai bureaucracy reformation caused every official organization changed the strategies and responsible. To emphasize on service improvement, participation from private sectors and make use of IT in administration system for transparency, fair practices and accountability. The pilot project of using e-seal in paperless system for e-customs had been setup by the customs policy to serve the strategy of “The World Class Customs”. This policy would be reached the target if the stakeholders agree with the policy, the obviously benefit of trying it and also the new working procedures fit for their working skills. So that, the variables for this research are as followings:

- Policies of the organization
- The effectiveness of the system
- Working skills of stakeholders

These variable factors lead to setup the research hypothesis which is

H1: e-seal is affected to the acceptance of e-customs in e-freezone.

3.2.2 Research tool development

In order to receive the precise result of the acceptance level of the concerning samples, this research setup five steps of interview the question development as followings:

Step 1: Study the component of the variables

All components concerning of the three variables (the organization policies, the effectiveness of the system and the working skill of the stakeholders) had been found out and grouping for developing the interview questions.

Step 2: Setting up the interview outline

An appropriate interview outline had been set, running by the organization policies, the effectiveness of the system and the working skill of the stakeholders, the same kind component had been combined together for brief and concise questions.

Step 3: Developing full script of interview questions

Developing full questions from the interview outline and decided indicator indexes for determining acceptance level of each interviewee.

Step 4: Testing the interview questions

Using to sample of the interviewee to trial the interview questions and interpreted for acceptance level. Made use of this testing to develop the interview questions for in-depth interview usage.

Step 5: Implementation of the interview questions

Using face to face interview for each sample in the working sites. Some evidence should be raised up for more understanding of the interviewee, using sound recorder to record all message and take photograph that concern to the activities.

The interview questions for in-depth interview as shown in appendix b.

3.2.3 Data collection

This research emphasizes on the factors that make the stakeholders in the system satisfaction and also can improve their job. A suitable qualitative research must be used for this research which are:

3.2.3.1 The evolution of customs service of using e-seal: Using the documentary research for gathering information from both sides of the Customs Department and the Western Digital Company consists of organization policies,

working processes of adoption e-seal, result of using e-seal for customs and also planning for enlargement in the future.

3.2.3.2 The working structure and working procedures: Using the participatory observation during April to October, 2008 in the research area of Nava Nakorn industrial estate, Bang Pa-in industrial estate and Hi-tech industrial estate.

3.2.3.3 Evaluate the acceptance status of using e-seal: Using the in-depth interview with five groups of people who concern in this project, in order to gathering information about their behaviors, opinions, feelings and experiences of trying this pioneer of e-customs project.

The sample size of 25 interviewees selected by using cluster sampling method consists of five groups (five persons for each group) are as followings:

- Manager and executive
- Data entry
- Driver
- IT supporter
- Customs officer

3.2.4 Data analysis

For in-depth interview, use Likert's scale to determine the level of acceptance for the samples in every questionnaires (Likert, 1932) are shown in table 3.1.

Table 3.1 Level of acceptance

Level	Definition
5	Strongly agree
4	Agree
3	Neither agree or not
2	Disagree
1	Strongly disagree

Using mean (\bar{x}) and standard deviation (S.D.) to explain the result of acceptance level in every groups. The raking of acceptance is shown in table 3.2 (Likert, 1932).

Table 3.2 Ranking score of acceptance

Score	Definition
4.50 - 5.00	Strongly agree
3.51 - 4.50	Agree
2.51 - 3.50	Neither agree or not
1.51 - 2.50	Disagree
1.00 - 1.50	Strongly disagree

For the documentary research and participatory observation, using the descriptive method to explain the results of working structure and working procedures of using e-seal in paperless system in both sides of the Customs Department and the Western Digital Company.

3.2.5 Results conclusion and presentation

The conclusion of this research shows summarize of research and the suggestion by using descriptive method to explain and present the result.

CHAPTER IV

RESULTS

4.1 The evolution of customs service of using e-seal in paperless system

The results of the study about using e-seal in paperless system in pilot project which the Thai Customs Department and Western Digital Company trialed in e-freezone of Nava Nakorn industrial, Bang Pa-in industrial and Hi-tech industrial between 2007 and 2011. This could be summarized in four compendiums are as followings:

- Concepts and the purposes of the system
- Evolution of the system
- Process to develop a complete e-customs
- Benefits from a pilot project of using e-seal

4.1.1 Concepts and the purposes of the system

According to the bureaucracy reformed of Thailand, the Royal decree on good governance of B.E. 2546 has caused change in the bureaucracy system from top thru every level of public administration. The government should design an administration plan appropriate to the regulations of the Strategy Formulation B.E. 2547. When the administration plan approved by the cabinet, all the government agencies should followed up this policy. From this bureaucracy reformed force the Customs Department of Thailand to set an organization target to be a “World Class Customs” by improving the working system, job description and its responsibilities to promote the best services and focusing on customer’s orientation. E-customs has been developed to meet the target in 2006. The Customs Department used the electronic system to manage a customs privilege.

The Customs Department signed a letter of intent to implementation the standard of World Customs Organization (WCO) in May 9, 2006 to operate the

customs system. WCO are consist of 178 member countries and divided into six regions. WCO has to hold an annual conference to specify an appropriate strategy to run out together. That would cause every country to follow up in order to set the international standard to facilitate cross-border trades and securing the international trade supply chain. Thai Customs Department and the associated agencies have to do in both import and export customs process.

Thailand vision towards a Knowledge-Based Economy 2001-2010 (IT2010) plan defined the five flagships to lead Thailand to be a knowledge-based society with both economic prosperity and social stability. It obviously showed that the Customs Department plan was compatibility to the first strategy (Information technology to the development of the government or e-government) in the fifth topic of the IT2010 plan determine the government services to use IT to improve service efficiency to be more convenience, fast, thoroughly and more efficiency, and also the third strategy (Information technology to the development of the industry or e-industry) in the second topic of the IT2010 plan determine to support the industry development by using IT for more competitive.

For these reasons and the project founder of using e-seal in paperless system (Mr.Thanat Suwatanabethakul, Former Deputy Director-General) who got the idea in 1984 during his study time in Germany, he founded the way of using RFID to control the ten thousand cows by using ear tags that needs only three farmers to operate.

For this method, it can implement by using RFID in customs logistic system by using e-seal in paperless system to control transportation and tracking system. Then he designed to trail it with Western Digital Company for a five years pilot project of using e-seal in paperless system to control the transportation of goods between three industrial estates. This pilot project was using e-seal and GPS to control and tracking the containers of hard disk drive component parts which import from foreign country, that exempt from tax under the free zone benefits to assembly in another estate (e-freezone) for export only. For this pilot project, Western Digital Company invested all equipments and employed TIFFA EDI Services Company to develop the system of using e-seal and paperless system with the Customs Department to make the control system more security. This pilot project responds for both the

Customs Department and the private sector to improve e-customs for enhancing in the future.

4.1.2 Evolution of the system

The RFID technology was adopted and implemented in various fields of work in many countries. Thailand was the first country in Southeast Asia to bring the tracking system by using RFID technology for checking and tracking goods in complete customs system in order to create more competitive, decreasing working steps to facilitate customers, decrease the elapsed time and cost for exporter.

This designed system has been connected to e-customs to make more efficiency in customs system and also more security of goods in transportation system.

In 2008, the Customs Department launched its budget of 95 million baht to setup computer server for collect and evaluate electronic data in standard format. The user of RFID technology must be feed to the system by using radio frequency to send the data thru electronic device called “e-seal”, that equipped in the closing door of the container of the truck or van opaque. By this system, e-seal would send signal to the RFID reader device that post at the specified location. When the reader receives the signal, it would send the data into the customs computer network. In order to evaluate in transfer order document, invoice and manifest data in electronic forms, then it would provided enough and prompt administrative data and management data for the customs officers to practice and use the update data for their jobs. It means that the process of collecting customs tax would be more efficiency. The goods checking procedures at the checking post should be fast and accuracy, decrease illegal of smuggles and avoids customs tax. This was the better way compare with using lead seal for the former used.

Since 2005 besides the using of RFID technology for customs in free zone of Western Digital Company. The Customs Department is also testing the RFID technology for instant transportation goods from Sa-dao customs barrier (Customs Department region four) to bonded warehouse of Friendly Group Company in 2006. And also goods container controlled from Lam cha bang terminal port to ICD Lad kra bang in 2007.

These showed that the RFID technology made use for control and tracking goods transportation for various types that compatibility for multimodal transport include via road freight, sea freight and air freight.

In 2012, the Customs Department continues using the RFID technology to control and tracking transportation as a parallel system to normal system in Suwannabhumi airport cargo free zone to follow its action plan phase 1 – 4. There are four entrepreneurs desired to test the system such as Western Digital Company, TIFFA EDI Services Co.,Ltd., DHL Express (Thailand) Co.,Ltd. and TNT Express worldwide (Thailand) Co.,Ltd. From July 27, 2009 that have been testing the system by sending e-seal message into the customs server and connected to e-export more than 45,000 sets.

4.1.3 Process to develop a complete e-customs

The Western Digital Company used e-seal instead of lead seal for container secured and also installs GPS on the truck for route checking and driving speed. After using e-seal for four years, Western Digital Company and the Customs Department desired to use e-lock. The newest device (e-lock) is e-seal combined with GPRS and GPS properties in one device for controlling goods transportation from Hi-tech industrial estate to Suwannabhumi airport cargo.

In October 2011, the mega flood occurred and damaged all RFID readers of this project which caused the Western Digital Company designed to use e-lock instead of e-seal. Because of cost benefit and more efficiency for investment.

In 2012, the Western Digital Company is allowed to use e-lock in goods transportation from Hi-tech industrial estate to Suwannabhumi airport cargo for testing e-customs system per one shipment dairy.

Moreover for the ASEAN level, the Asean Economics Community (AEC) will effective in 2015. Thai Customs Department has been prepared for cross border trade by using National Single Window (NSW) to exchange international customs data for ASEAN Customs Declaration Document (ACDD) or sharing the transfer order documents among ASEAN countries for cross border trade. In general, it is necessary for Thai Customs Department to develop working system of using e-lock for

e-customs. The technology and the man power for using RFID are already prepared just only wait for launching customs regulations to support working system.

4.1.4 Benefits from a pilot project of using e-seal

Results from documentary research showed that both Thai Customs Department and Western Digital Company were shared benefits of using e-seal in paperless system are as followings:

4.1.4.1 Customs control: The RFID technology for this project was used for tracking goods transportation and collecting the essential data for evaluation or determine on customs risk to decreasing customs tax, preventing customs tax evasion and creating common data for new dimension of customs control that emphasizes on customers facilities.

4.1.4.2 The operational for customs at checking post: For this technology, it was possible to reduce checking process for customs officer at checking post, and it also reduces the human errors.

More over, for the destination checking post, by using this technology, the customs officer could easily make decision for shipment allowance by using the e-seal message of the system. That can save at most time of 90 minutes per shipment as shown in appendix e.

4.1.4.3 The efficiency of decrease operational cost and elapse time: The RFID technology can replace the previous system of using paper in checking post for export and import or any documents for customs system. It can reduce the operational cost for the entrepreneurs.

The Federation of Thai Industries (2012) found out in the previous system, the entrepreneur had to prepare transfer order documents and present to the customs officer for issuing. In this process, it took at least 45 minutes for checking documents. But it just took 5 - 10 minutes by using RFID technology. So that it could save elapse time of 35 to 40 minutes per shipment. More over the precision also raised up from 70 – 80 percentage to 95 - 100 percentage by using this technology.

4.1.4.4 Safety for social and international trade: The reformation of customs services by reducing control measure to provide social security

and international trade is necessary to develop and connect data for both bilateral and multilateral to reduce customs procedures and integration of necessary data.

4.1.4.5 Transparency of working system: By using technology replaced manpower had made transparency of works. It also decreased officer judgments that might be cause corruptions and bribes in customs process. And also got data from the system to analyze and evaluation for modernized working process.

4.1.4.6 Decrease entrepreneur's cost: By using e-seal in paperless system let Western Digital Company decreased operational costs such as employee wages, over time payments, reduced the amounts of paper used about 39,000 sheets per month or 475,200 sheets per year and also reduced the whole expenses for transportation by 60 percentages. This obviously cost reducing for transportation, which was using this technology and policy supported. Western Digital Company could save the customs fee of 200 baht per shipment (appendix e). As in the paperless system record in September, 2011, Western Digital Company issued 5,100 shipments that could save 1,020,000 baht for customs fee in this month.

Benefits of using e-seal and RFID technology for Western Digital Company is shown in table 4.1

Table 4.1 Showed the benefits of using e-seal for Western Digital Company

Effectiveness	Manual System	e-seal and Paperless System
1. Time used in checking transfer order document per shipment	45 Minutes	5-10 Minutes
2. Precision of transfer order data	70-80 %	95 – 100%
3. Inspection time at destination	Not over 90 Minutes	0 Minute
4. Customs fee of September, 2011 (5,100 shipments)	1,020,000 Baht	0 Baht
5. Document error	Approx: 3	Less than 2

4.2 The structure and procedures for goods transportation and inspection in e-freezone

For this study section by using participatory observation occurred between April to October 2008 in the area of practicing e-seal in paperless system for e-customs in e-freezone of Nava Nakorn industrial estate, Bang Pa-in industrial estate and Hi-tech industrial estate in Ayutthaya. E-seal has been used to control goods transportation in three routes of the pilot project those were as followings:

- Freight between Nava Nakorn industrial estate and Bang Pa-in industrial estate
- Freight between Nava Nakorn industrial estate and Hi-tech industrial estate
- Freight between Bang Pa-in industrial estate and Hi-tech industrial estate

The facts gatherings from participatory observation for six months were divided to three parts for presentation as followings:

4.2.1 General Information

4.2.1.1 This pilot project was settled up and desired to cooperate by Customs Department and Western Digital Company during 2007 – 2011 for five years practice. The main purpose was to make use of RFID technology to control goods transportation responsible to Western Digital Company in free zone not for in general used.

4.2.1.2 E-seal was brought to stead of lead seal for locking truck container of goods in paperless system that settled up by the Customs Department. At the former used of lead seal just only for prevention from opening the container during transportation. By using e-seal was to bring RFID technology to control goods transportation to be more security. In this pilot project, Western Digital Company also settled up GPS for controlling freight route and driving speed.

4.2.1.3 The Customs Department was responsible for setup working system and regulations for best practices of using e-seal in paperless system, compatibility to the customs legal and associated laws. Western Digital Company, the user of this project was responsible to invest all concerning equipments and setting up

RFID system for this project. Western Digital Company desired to hire TIFFFA EDI Services Co.,Ltd. to develop RFID system include providing for equipments and setting up, training all concerning personnel to use the system and also co-working as IT supporter and supervisor.

4.2.1.4 In this pilot project, the associated entrepreneurs of Western Digital Company in working sites such as CEVA Logistic Co.,Ltd., Agility Logistic Co.,Ltd. and DHL Express Co.,Ltd. also joint to use e-seal in paperless system on behalf of Western Digital Company.

4.2.2 Operational structure

Every work sites consist of personnel from three groups working together separately on their jobs as followings:

4.2.2.1 The entrepreneur who used the e-seal and paperless system responsible to input manifest data of goods to the paperless system to complete a transfer order document, select e-seal number for locking goods container, specified the driver, specified the truck using in the shipment and also specified the origin and destination. These data have also to put into the paperless system.

4.2.2.2 The Customs Department had to assign his officers working at the checking post in every industrial estate in order to control and checking for legal transportation and customs regulations.

4.2.2.3 The TIFFFA EDI Services Co.,Ltd., who setup RFID system, had to assign his personnel to control and supervise in running the system. This IT supporter responsible to check e-seals, readers and e-seal clearing machines to be in good condition for using, trainings and consults personnel to use paperless and e-seal. It supported for problems solving and also made a report of goods transportation and e-seal effectiveness. The working structure as shown in figure 4.1.

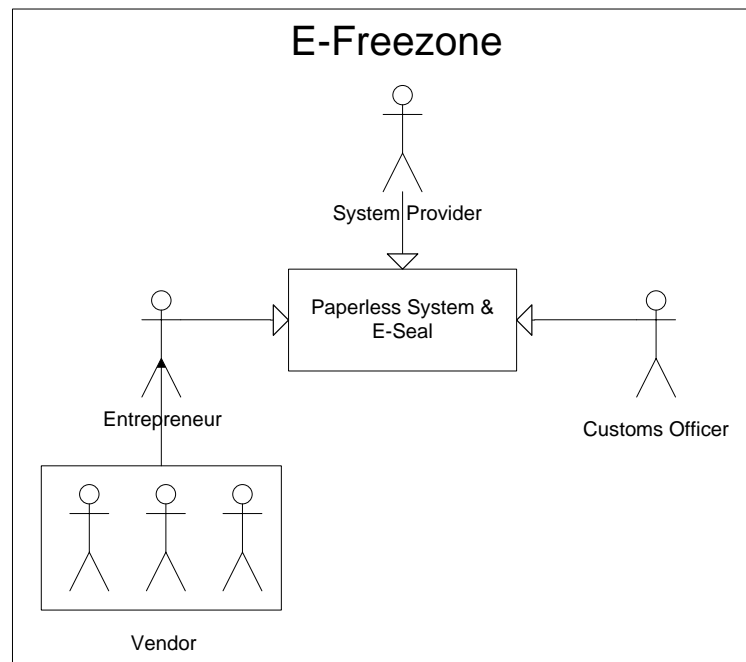


Figure 4.1 Working structure for implementing e-seal in paperless system

4.2.3 Conceptual framework of freight controlling by using e-seal in paperless system

In order to use e-seal in paperless system, the main objective was that for more security and more effectiveness of freight controlling in customs process. These following five conceptual frameworks were as followings:

4.2.3.1 The data entry used the paperless system for issuing transfer order via the internet.

4.2.3.2 When the truck container passed thru the gateway, the RFID reader (at departure) would read and send RFID data consists of RFID reader number, e-seal number, e-seal status and timestamp into the paperless server of Western Digital Company and the Customs Department.

4.2.3.3 E-seal continued working during the freight for security control.

4.2.3.4 When the truck container passed thru the gateway of destination, the RFID reader (at destination) would read and report RFID data of RFID reader number, e-seal number, e-seal status and timestamp into the paperless server of Western Digital Company and the Customs Department.

4.2.3.5 Customs officer could follow up the result via internet. If any problem occurred for example the e-seal status was tempered or new issuing transfer order requested, the warning signal would show in the system.

The conceptual frameworks of freight controlling by e-seal in paperless system is shown in figure 4.2.

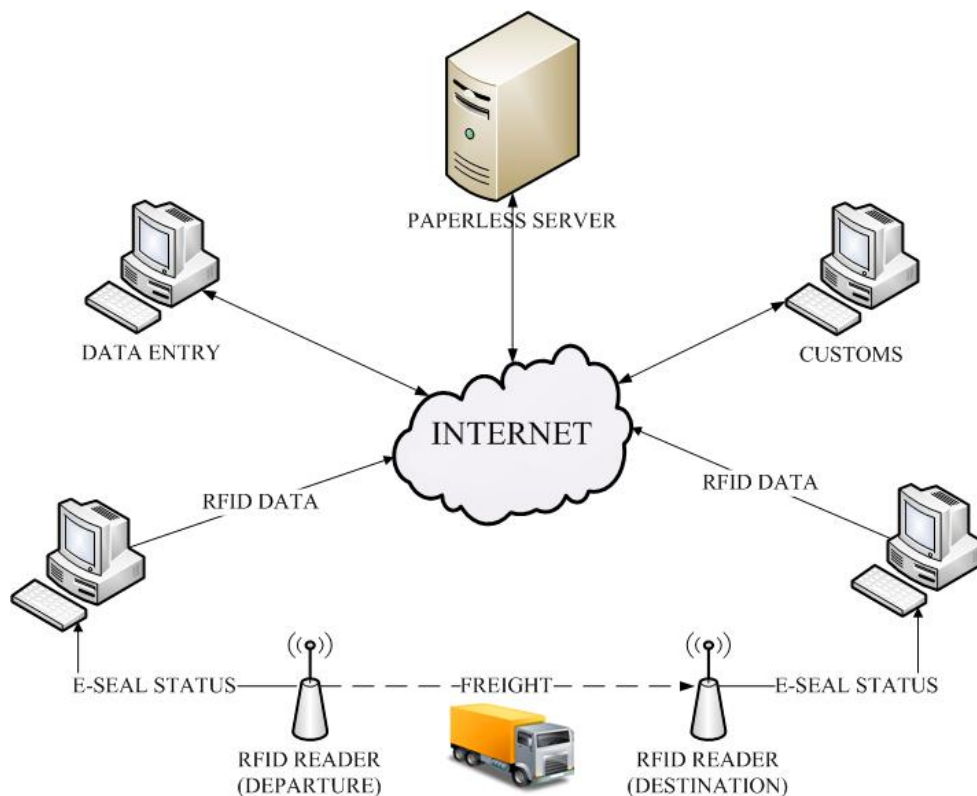


Figure 4.2 Showed conceptual framework of freight controlling by RFID

4.2.4 Working procedures and troubleshooting

Working procedures found in this project consists of nine steps to complete one shipment as followings:

Step 1: Transfer order document creation.

The data entry typed manifest data into paperless system in order to complete a transfer order document consists of the number of transfer order (automatically generate by paperless system), invoice, type of goods, amounts, values, numbers of pallet and etc.

The main problem found in this step was incorrect typing or inputting manifest data in paperless system that could be corrected before submit to the system.

Step 2: Preparation for shipment

The data entry determined the goods for filled up in the truck's container by selecting from transfer order documents in order to get suitable and efficiency freight. Three cases for selecting were as followings:

Case 1: one transfer order document for one truck

Case 2: more than one transfer order document for one truck

Case 3: one transfer order document for more than one truck

After that the data entry had to identify e-seal number, driver and truck using for that shipment in controlling and checking process.

The main problems found in this step were making mistake of selecting transfer order documents or wrong e-seal number that offend appeared in case 2 and 3, because of most of the shipment ordinary use one transfer order document for one truck. Besides this sometime, it was necessary to change the selected driver and truck for convenience purpose.

Step 3: Identification origin, destination and transit time

The data entry had to assign origin, destination and maximum transit time for transportation as followings:

Case 1: Between Nava Nakorn industrial estate and Bang Pa-in industrial estate, the maximum transit time was 60 minutes.

Case 2: Between Nava Nakorn industrial estate and Hi-tech industrial estate, the maximum transit time was 90 minutes.

Case 3: Between Bang Pa-in industrial estate and Hi-tech industrial estate, the maximum transit time was 60 minutes.

These assigned times for transportation were assign by the entrepreneur receive by calculating the distance, traffic condition and suitable speed drive of 60 kilometers per hour.

When the data entry had already processed these step. They would submit the transfer order document into the paperless system to inform to customs officer. For this step, when comparing with the manual system, it was the step of manifesting the transfer order document to the customs officer for checking goods and transfer order

document before transportation. The data entry could not modify or cancel this shipment by themselves. If any problems occurred, they had to report to supervisor who responsible for that work site immediately.

For the shipment cancelation procedures, the supervisor had to report the incorrect shipment to his manager for cooperation with IT supporter and customs officer at the checking post to cancel the incorrect shipment as shown in figure 4.3.

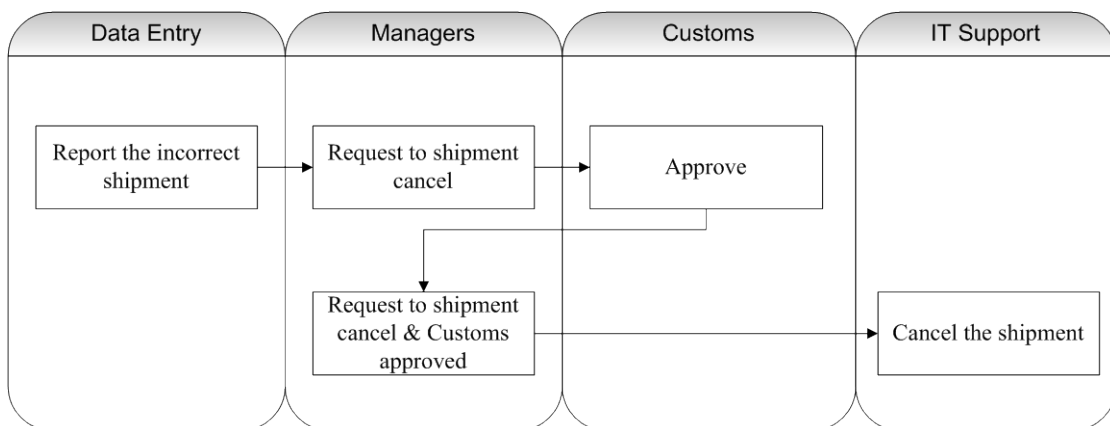


Figure 4.3 Procedures to cancel incorrect shipment

Step 4: Shipment inspection in origin checking post

After the data entry submitted the shipment, the customs officer could see all shipment transaction from the paperless system and able to request for checking shipment before the beginning of transportation. In this step, the customs officer have fifteen minutes for making decision to inspect the shipment after the shipment data had been submit in paperless system.

Step 5: Procedures of shipment inspection

Step 5.1 Inspection operation

If the customs officer request for shipment inspection, the driver had to drive the container truck and also bring the associated documents to the checking post, where customs officer working at any industrial estate in order to precise the customs officer for shipment inspection before closing the container doors and locked e-seal at the container in sight of the customs officer before drive the truck to the destination as shown in figure 4.4 and 4.5.



Figure 4.4 Process of locking e-seal at container truck



Figure 4.5 Container truck has been already locked by e-seal

Step 5.2 Goods suspended and acting of customs practices

If the shipment inspection showed that there was something wrong, for example the shipment intended to make false manifest data, the customs officer might be suspend the goods and took action of appropriate customs practices.

Step 6: Goods transportation

After fifteen minutes of the shipment submitted in paperless system and the customs officer did not request for inspection. It noticed that the customs officer has already permitted for goods transportation within that shipment, so that the driver allowed to lock e-seal insight of the security guard and began to drive the truck to the

resigned destination by using drive speed and driving time as showed in step 3. During the transportation, the concerned person could track from GPS to know the transportation status.

Problems found in this step concerned with job assignment that was not appropriate to use the driver to lock the e-seal. Because of not his direct responsibility and also sometime, the mistakes of locking e-seal was not firm enough. These caused the RFID reader made an error results. It may read misunderstanding that the container was not safety during the transportation. For this case, the data entry had to promptly report to his supervisor and the customs officer at the checking post to recognize and understand the real situations.

Step 7: The requisition for shipment inspection at the destination

During goods transportation, the customs officer could request for shipment inspection at the destination checking post by informing thru the paperless system. When the data entry found the requisition, he had to inform the driver by making a telephone call.

Step 8: The permission of opening the container

When the goods container arrived the destination, the e-seal message would be sent into the paperless system to show the detail of arrival and e-seal status, whether be opened during the transportation or not. In case of, it was opened, the warning sign would appear in the paperless system to warn the customs officer for suspension the goods and took action of appropriate customs practices. And if it was not found any problems, the customs officer at the destination checking post would allow to open the container and move the goods to keep in the warehouse. The e-seal unlock as shown in figure 4.6.



Figure 4.6 E-seal unlock for opening goods container door

Step 9: E-seal clearance

After the driver had already unlocked e-seal and opened the goods container door. He had to bring e-seal to clearing machine to clear the used data for re-using in the next shipment. The e-seal clearing machine as shown in figure 4.7. It was a personal computer installed program for clearing e-seal that connected to RFID reader short range type. When brought the used e-seal to the reading able range, data in that e-seal would be deleted and the computer monitor would show e-seal status such as battery charge and e-seal usage status. If found that, the battery was low charge and not enough for using or the using status of e-seal was incorrect, the data entry had to collect and return them to the IT supporter for investigation.



Figure 4.7 E-seal clearing machine

The nine steps of working procedures flowchart showed in figure 4.8.

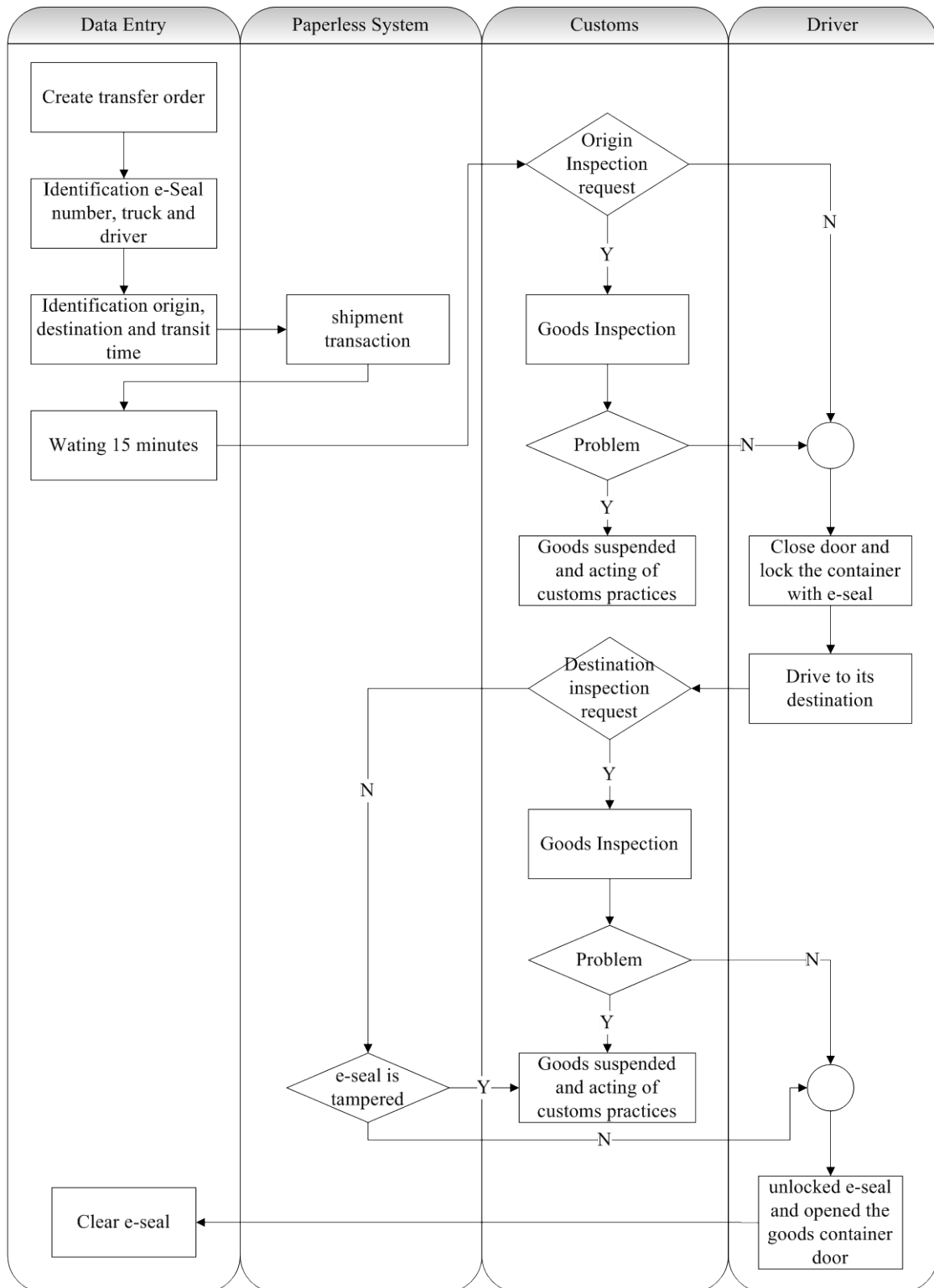


Figure 4.8 Flowchart of working procedures of using e-seal in paperless system

The comparison of using lead seal in manual system and using e-seal in paperless system, it obviously changed the working procedures as shown in table 4.1.

Table 4.2 The comparison of manual system and paperless system

Topic	Manual System	Paperless System
Transfer order document issuing	Typing data and print out for present to the customs officer (approx: 6 papers / shipment)	Typing into the paperless system
Weight and warty calculation	By people	Automatically sum up
Data collection	In paper	In database
Document declaration	Present directly to the customs officer before transportation	The customs officer view the shipment data via paperless system
Permission for transportation	After customs officer allowed	Wait 15 minutes for the decision of the customs authorities
Locking goods container	Use lead seal	Use e-seal
Checking shipment data during transport	Cannot	Able to check via the internet
Inspection at destination checking post	After truck arrival by checking lead seal condition and transfer order document for making decision of inspection	E-seal message show the arrival status and e-seal status whether be opened during transportation or not for decision making of inspection
Seal reusability	Cannot	Reusable
Report	Use the manual	Automatically to generate report
Past data checking	Difficulty	Ease

Most of the problems were solved in the working process. Two benefits of using e-seal in paperless system which are decreasing of time in customs process and decreasing shipment cancelation that actually in manual system found three times a year but in paperless system found only not more than two times a year.

4.2.5 Technical problems of using e-seal in paperless system

The main technical problems in this project were as followings:

4.2.5.1 The internet for sending RFID data failure that affected to send RFID data into the paperless system.

4.2.5.2 The computer of controlling RFID reader not functioning for sending the RFID data into the paperless system.

4.2.5.3 The electricity at the checking post cut down that affected to RFID reader can not be in use.

The problems in 4.2.5.1 and 4.2.5.2 had to be proved by the IT supporter and the problem in 4.2.5.3 had to inform electrician immediately.

4.2.6 The personnel's working skill development

According to the participatory observation, found that training for personnel's working skill was very important and had been done besides the administration reform as making a "Learning Organization" (Senge, 1990).

4.2.6.1 Training before implementation: There were setting up specified training courses appropriated for each concerning group to reach the training needs of the trainees as the followings:

Group 1: The manager and executive groups were the administrators of the Customs Department, Western Digital Company and TIFFA EDI Services Co.,Ltd. that coordinated in policies making, working plan, directed and followed up working process and also joined in problem solving. The training course for this group was emphasized on administration managements for the pilot project, format of goods transportation reports and the concerned regulations.

Group 2: The data entry group was the entrepreneurs' personnel ages between 20 to 30 years capable for using computer and internet very well, ready for change and accept the new technology for improving their responsible tasks. The training content for this group focused on the whole structure of using e-seal in paperless system for e-customs, working step of entering shipment manifest data to the paperless system, process of tracking goods container, specified signs using in paperless system and also their responsibility in the work procedures included forehand troubleshooting. This group showed a quick capable of knowledge and easily

to change because the working practices was in the same way as before. And also the e-seal and paperless system could help them for decreasing mistakes, they just added up the skill for data administration for the new system that need careful working for every step of work and difficult to correct the mistaken.

Group 3: The driver group was also the entrepreneurs' personnel between 25 to 40 years old, having a good skill of driving container truck. This group has been trained to know the whole work system, process of bringing the goods container to the checking post for customs inspection, process of locking and unlocking e-seal and process of bringing truck thru RFID reader and the most important condition of following up the time resigned and secure control commitment during the goods transportation. So that the training curriculum had emphasized on regulations and control system of e-customs not for the driving skill.

Group 4: The IT supporter was the personnel responsible to support IT and solve the problems for running the project. This group knew the policies and the working procedures excellently because they were the working groups of technical providers. So that they would be the expertise of using e-seal in paperless system, could consult and solve the IT problems as well. The training course for this group was emphasized on project management and technical problem solving.

Group 5: The customs officer group had been assigned to work at the checking post in any industrial estates in the pilot project, mostly over 30 years old, good understanding in customs regulations and customs inspection, different in using computer and internet experiences. The young generation was better and more acceptable for using IT than the elder generation, so that the training course had been emphasized on changing the working attitudes and the acceptance of using e-seal and paperless system, process of new methodology of goods inspection both the origin checking post and the destination checking post, the concerned regulations and the procedures of tracking for e-seal status and container status. The high level customs officer had to explain the customs officer on detail for practicing for RFID technology by visiting every concerning customs barrier in order to make confidence for practicing the new technology.

4.2.6.2 On the jobs training: In every working sites found that there were classified the personnel into three levels as primary level, medium level and expert. For upper level, they must be coaching the personnel in lower level.

For primary level, the personnel was just assigned to use e-seal in paperless system. They had to work under controlled of the expertise for coaching. Personnel in the medium level had fair working skill, slow working and offend make mistakes, so that the expertise had to help them to solve the problem and coaching. The expert level was the personnel that could use e-seal in paperless system fluently, could consult the personnel in medium and primary as well. And also responsible for forehand problem solving in the working site. The classification of personnel's skill level are shown in figure 4.9.

No.	ID	Name	Position	Receipt Product From WD-BPI	Receiving in Mittec	Paperless System
1	700853	Mr. Thanapon Sinpeng		☹	☹	☹
2	700999	Mr. Wanchai Burawong		☹	☹	☹
3	701029	Mr. Yuttasard Yothakaree		☹	☹	☹
4	7338	Mr. Manop Uhthasri		☹	☹	☹
5	701002	Mr. Kittisak Phukhung		☹	☹	☹
6	8569	Mr. Boonlert Tongkampanit		☹	☹	😊
7	700926	Mr. Kampee Samart		☹	☹	☹
8	10710	Mr. Niwat Jongtep		☹	☹	
9	9114	Mr. Sirisak Trisaksree		☹	☹	😊
10	9116	Mr. Artid Immano		☹	☹	😊
11	11292	Mr. Nattapun Phoncharoen		😊	😊	

Figure 4.9 Board of personnel skill level of CEVA Logistic in Bang Pa-in site

4.2.6.3 The orders and the regulations: According to the pilot project of using e-seal in paperless system in e-freezone. It was using a principles of decentralize and cooperation with the private sectors to make more effectiveness in working, so that the Customs Department had to set specific regulations appropriated to customs and associated laws. And also for the entrepreneurs had to make his own

orders for personnel to work compatibility to authority regulations. In this case, it found that the entrepreneurs set up a clearly orders and working steps for his personnel. Especially for the security guards and the drivers as shown in figure 4.10 and 4.11.

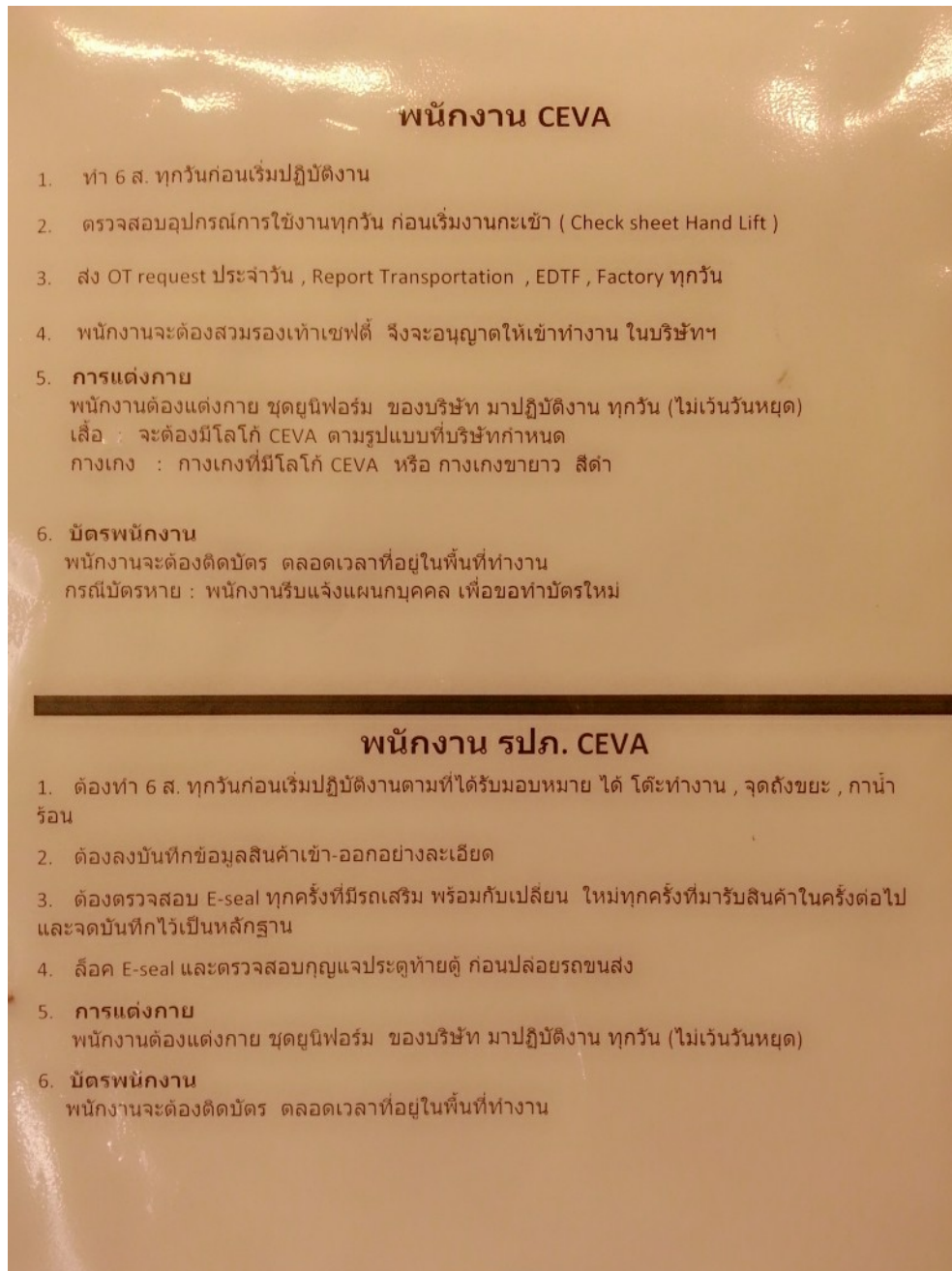
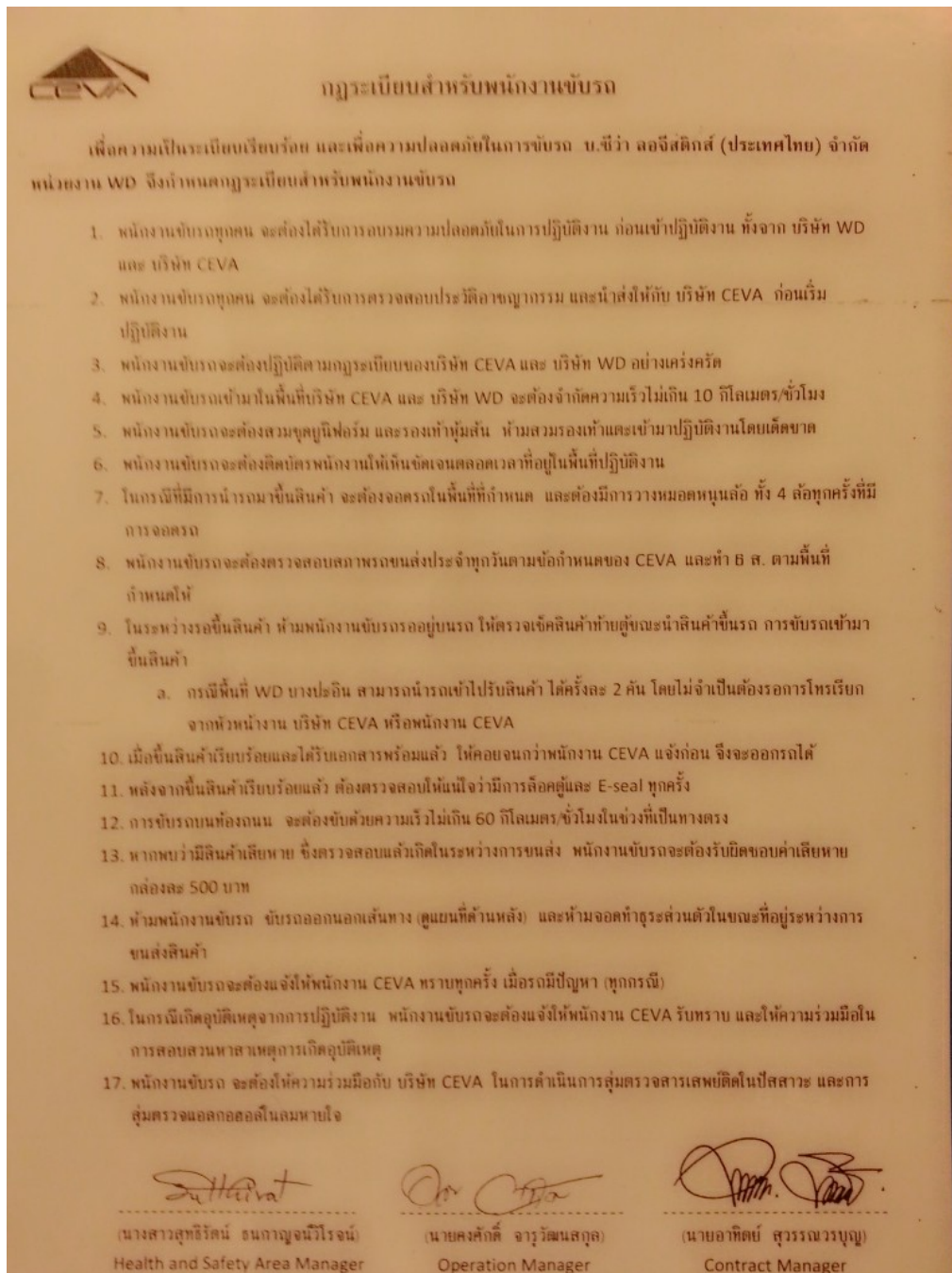


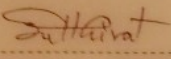
Figure 4.10 Working steps of CEVA Logistic personnel (Data entry) and security guards

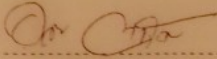


กฎระเบียบสำหรับพนักงานขับรถ

เพื่อความเป็นระเบียบเรียบร้อย และเพื่อความปลอดภัยในการขับรถ บ.ซี.วี.เอ. ลอจิสติกส์ (ประเทศไทย) จำกัด หน่วยงาน WD จึงกำหนดกฎระเบียบสำหรับพนักงานขับรถ

- พนักงานขับรถทุกคน จะต้องได้รับการอบรมความปลอดภัยในการปฏิบัติงาน ก่อนเข้าปฏิบัติงาน ทั้งจาก บริษัท WD และ บริษัท CEVA
- พนักงานขับรถทุกคน จะต้องได้รับการตรวจสอบประวัติอาชญากรรม และนำส่งให้ถึง บริษัท CEVA ก่อนเริ่มปฏิบัติงาน
- พนักงานขับรถจะต้องปฏิบัติตามกฎระเบียบของบริษัท CEVA และ บริษัท WD อย่างเคร่งครัด
- พนักงานขับรถเข้ามาในพื้นที่บริษัท CEVA และ บริษัท WD จะต้องจำกัดความเร็วไม่เกิน 10 กิโลเมตร/ชั่วโมง
- พนักงานขับรถจะต้องสวมชุดยูนิฟอร์ม และรองเท้าหุ้มส้น ห้ามสวมรองเท้าแตะเข้ามาปฏิบัติงานโดยเด็ดขาด
- พนักงานขับรถจะต้องติดบัตรพนักงานให้เห็นชัดเจนตลอดเวลาที่อยู่ในพื้นที่ปฏิบัติงาน
- ในกรณีที่มีการนำรถมาขึ้นสินค้า จะต้องจอดรถในพื้นที่ที่กำหนด และต้องมีการวางหมอดหนุนล้อ ทั้ง 4 ล้อทุกครั้งที่มีการจอดรถ
- พนักงานขับรถจะต้องตรวจสอบสภาพรถขนส่งประจำทุกวันตามข้อกำหนดของ CEVA และทำ 6 ส. ตามพื้นที่ที่กำหนดให้
- ในระหว่างรอขึ้นสินค้า ห้ามพนักงานขับรถอยู่บนรถ ให้ตรวจสอบสินค้าท้ายตู้ขณะนำสินค้าขึ้นรถ การขับรถเข้ามาขึ้นสินค้า
 - กรณีพื้นที่ WD บางปะอิน สามารถนำรถเข้าไปรับสินค้า ได้ครั้งละ 2 คัน โดยไม่จำเป็นต้องรอการโทรเรียกจากหัวหน้างาน บริษัท CEVA หรือพนักงาน CEVA
- เมื่อขึ้นสินค้าเรียบร้อยแล้วควรรีบออกสารพร้อมแล้ว ให้คอยจนกว่าพนักงาน CEVA แจ้งก่อน จึงจะออกรถได้
- หลังจากขึ้นสินค้าเรียบร้อยแล้ว ต้องตรวจสอบให้แน่ใจว่ามีการล็อกตู้และ E-seal ทุกครั้ง
- การขับรถบนท้องถนน จะต้องขับด้วยความเร็วไม่เกิน 60 กิโลเมตร/ชั่วโมงในช่วงที่เป็นทางตรง
- หากพบว่ามีความเสียหาย ซึ่งตรวจสอบแล้วเกิดในระหว่างการขนส่ง พนักงานขับรถจะต้องรับผิดชอบค่าเสียหายถดถอย 500 บาท
- ห้ามพนักงานขับรถ ขับรถออกนอกเส้นทาง (ดูแผนที่ด้านหลัง) และห้ามจอดทำธุระส่วนตัวในขณะที่อยู่ระหว่างการขนส่งสินค้า
- พนักงานขับรถจะต้องแจ้งให้พนักงาน CEVA ทราบทุกครั้ง เมื่อรถมีปัญหา (ทุกรถ)
- ในกรณีเกิดอุบัติเหตุจากการปฏิบัติงาน พนักงานขับรถจะต้องแจ้งให้พนักงาน CEVA รับทราบ และให้ความร่วมมือในการสอบสวนหาสาเหตุการเกิดอุบัติเหตุ
- พนักงานขับรถ จะต้องให้ความร่วมมือกับ บริษัท CEVA ในการดำเนินการคุ้มครองสารเสพติดในปัสสาวะ และการคุ้มครองแอลกอฮอล์ในลมหายใจ


 (นางสาวสุทธิรัตน์ ธนกาญจน์โรจน์)
 Health and Safety Area Manager


 (นายคงศักดิ์ จารุวัฒน์สกุล)
 Operation Manager

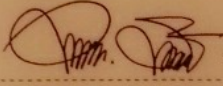

 (นายอาทิตย์ สุวรรณบุญ)
 Contract Manager

Figure 4.11 The orders for the drivers

Besides this, the transportation route and transit time had been announced for the drivers to follow in transportation process. Every truck had been setup GPS for tracking and control the transportation status as shown in figure 4.11.

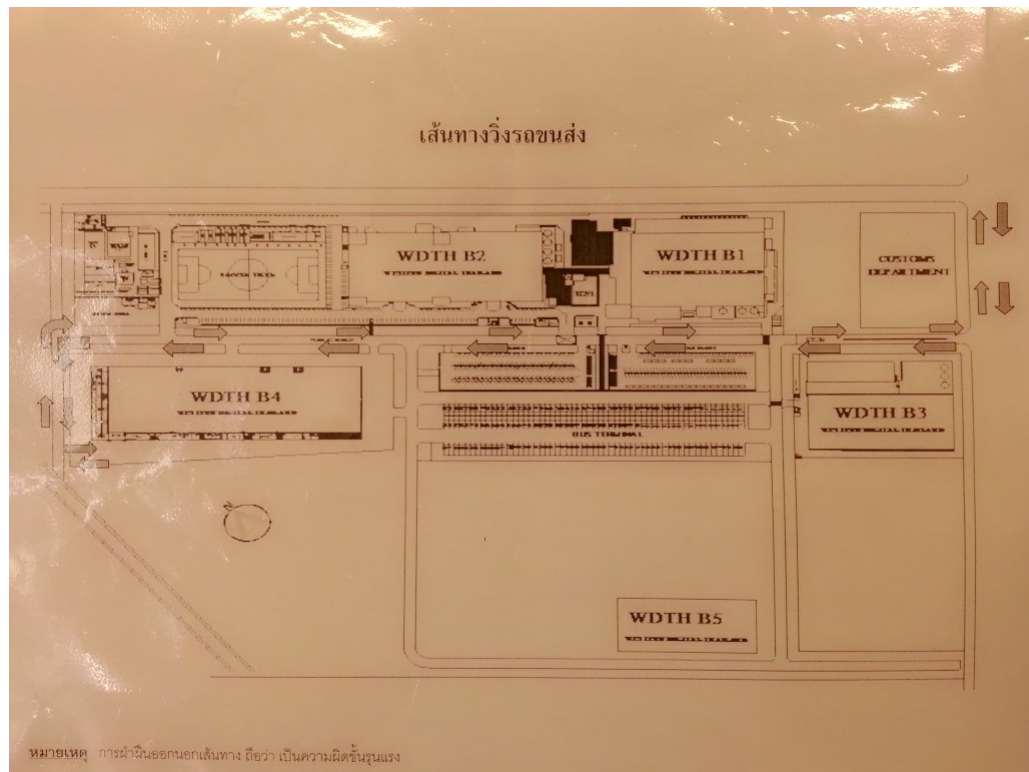


Figure 4.11 The transportation route in plant area of Bang Pa-in industrial estate

4.3 The acceptance status of using e-seal in e-freezone of the pilot project

The acceptance status of using e-seal in e-freezone by using the in-depth interviews to collect the data from five samples each group, as the manager and the executive group, the data entry group, the driver group, the IT support group and the customs officer group. The during period of data gathering was October 1 - November 30, 2012. The list of interviewees is shown in appendix a, the guideline of the in-depth interview is shown in appendix b and the results interpretation is shown in appendix c.

The acceptance status of using e-seal in e-freezone had been classified into five levels (Likert, 1932) by using acceptance indexes for interpretation and used SPSS program for investigation. The average of acceptance level (\bar{x}) and the standard deviation (S.D.) had been used for research interpretation. The results from the in-depth interviews of each group showed in the following tables and descriptions.

4.3.1 The manager and the executive groups

The result from in-depth interview of the manager and the executive groups is shown in table 4.3.

Table 4.3 The acceptance level of the manager and the executive groups in using e-seal in paperless system

Variables	P1	P2	P3	P4	P5	\bar{x}	S.D.
Policies of the organization	5	5	5	5	5	5	0
The effectiveness of the system	5	5	5	5	5	5	0
Working skills of stakeholders	5	5	5	5	5	5	0

From the table 4.3, it obviously showed that the managers and the executives group accepted to use e-seal in paperless system for e-customs absolutely in the highest level for the three variable factors of policies of the organization, the effectiveness of the system and the working skill of stakeholders.

From the in-depth interviews found that the policy makers for this pilot project were by the administrator of three parties of Customs Department, Western Digital Company and TIFFA EDI Services Co.,Ltd., so that consensus judgment had been already done for policy making before the implementation plan.

For the effectiveness of this project, the entrepreneur (Western Digital Company) could save the transportation expenses by 60 percent and also found that it provided more effective in goods transportation control, more secured and more transparency in working procedures that affected to change the policy of the Customs Department, which emphasize on gathering tax purpose to emphasize on quality of services purpose.

For the working skill of stakeholders, the working regulations had been setup by administrative meeting. That it made clear for every step of workflow, having enough training and coaching for every level to make a learning organization for running the project and made use of feedback to develop their jobs. Seven recommendations from this group were as followings:

- Suggested to enhance of using e-seal in paperless system for general use and also for the ASEAN countries.
- To use e-lock instead of e-seal for more efficiency in tracking process and transportation control.
- To improve the customs laws and associated regulations for implementation e-lock and paperless system for e-customs in general use.
- An appropriate seminar should be held for all shipping entrepreneurs to stimulate them to use this technology.
- The entrepreneurs who make use of this technology had to pay for their own devices.
- The Customs Department might be responsible for specify the device specification and invest RFID reader for common uses.
- The Customs Department should setup the compliance regulation unit to ensure continuity and development.

4.3.2 The data entry group

The result from in-depth interview of data entry group is shown in table 4.4.

Table 4.4 The acceptance level of the data entry group in using e-seal in paperless system

Variables	P1	P2	P3	P4	P5	\bar{x}	S.D.
Policies of the organization	5	5	5	5	5	5	0
The effectiveness of the system	4	4	5	5	5	4.6	0.49
Working skills of stakeholders	5	5	4.67	4.67	4.67	4.8	0.16

The data entry group accepted the policies of using e-seal in paperless system at the highest level of 5 and also showed high acceptance level of 4.6 in the effectiveness of the system and 4.8 in the working skill of the stakeholders.

From the in-depth interviews found that, the samples did not feel any differences between the previous manual system and the new paperless system for

entering the shipment data. But by using e-seal in the paperless system, could help them for correct typing and summed up the data such as amount of goods, values, gross weights and etc. in the transfer order document.

The problems found in this group concerned with the complication procedure of correcting any mistakes found after the shipment submitted to the paperless system. Two recommendations from this group were as followings:

- Cancel or reduce the waiting time for origin shipment inspection.
- The permission of some errors correction after submit to the system especially for not important issue as changing the selected driver and the truck in accidental case.

4.3.3 The driver group

The result from in-depth interview of the driver group is shown in table 4.5.

Table 4.5 The acceptance level of the driver group in using e-seal in paperless system

Variables	P1	P2	P3	P4	P5	\bar{x}	S.D.
Policies of the organization	5	5	5	5	5	5	0
The effectiveness of the system	4	5	4	5	4	4.4	0.49
Working skills of stakeholders	4.67	5	5	5	5	4.93	0.13

The result showed that the driver group accepted the policies of the organization in the highest level of 5 but accepted the effectiveness of the system for the satisfy level of 4.4 and the working skill of the stakeholders at the highest level of 4.93.

The in-depth interview found that, this group considered the organization policy as the working conditions of their jobs for making the transportation secured. So that it affected the acceptance in the highest level of 5, but for their acceptance level for the effectiveness of the system was in the satisfy level of 4.4 caused by some mistake of locking e-seal not firmed enough, that affected the e-seal status to showed “Unlocked e-seal”. And sometime, the RFID reader could not read the e-seal status

when they drove thru the RFID reader. So that their acceptance for this factor just determined by the problems that they found in working time.

For the working skills found that the drivers had to use the e-seal in paperless system, just by follow up the command orders, regulations setup by their entrepreneur and working under control of the supervisor. They could do as well and caused them for the highest acceptance level of 4.93 for working skills. Two suggestions from this group were:

- To change the assignment of locking e-seal and clearing the used e-seal for the responsible authority to make more system effectiveness.
- To improve the e-seal device by setting light sign (LED) or LCD screen to show the working status for use more efficiency.

4.3.4 The IT support group

The result from in-depth interview of IT support group is shown in table 4.6.

Table 4.6 The acceptance level of the IT support group in using e-seal in paperless system

Variables	P1	P2	P3	P4	P5	\bar{x}	S.D.
Policies of the organization	4.67	5	5	4.67	5	4.87	0.16
The effectiveness of the system	5	5	5	5	5	5	0
Working skills of stakeholders	5	5	5	5	5	5	0

It obviously showed from the table 4.6 that the IT support group accepted the working skill and the effectiveness of using e-seal in paperless system at the highest level of 5. For the reason found that personnel in this group took actions of the system development and IT provider for using e-seal in paperless system.

But for the policies of the organization although in the highest level of acceptance (4.87). They were hesitated in the continuity of the policy of using e-lock instead of e-seal for more good properties, but the Customs Department still in the process of setting up a regulation for implementation and just tried to use e-lock for

one shipment daily in goods transportation from the Hi-tech industrial estate to Suwannabhumi airport cargo for testing the system. Five suggestions from IT support group were as followings:

- To use e-lock instead of e-seal because of the higher qualification for developing the administrative system.
- To minimize the e-lock device for more suitable usage.
- To create Corrective Actions / Preventive Actions (CAPA) for project improvement (appendix f).
- Provided more specific training courses for the data entry and the driver group for more understanding of using e-seal in paperless system.
- Provided more public relations in order to motivate another entrepreneurs for using e-lock and for the good image of e-customs for social recognition.

4.3.5 The customs officer group

The result from in-depth interview of the customs officer group is shown in table 4.7.

Table 4.7 The acceptance level of the customs officer group in using e-seal in paperless system

Variables	P1	P2	P3	P4	P5	\bar{x}	S.D.
Policies of the organization	5	5	5	5	5	5	0
The effectiveness of the system	5	5	5	5	5	5	0
Working skills of stakeholders	5	5	5	5	5	5	0

The results showed that the customs officer working at the barrier office of this project included the Suwannabhumi airport cargo were consensus accepted the policies of the organization, the effectiveness of the system and also the working skills of stakeholders at highest level of 5 as the administrator group (manager and the executive groups). It was found in-depth interview that the customs personnel had well directly instruction and orientation from their head officer to know to clearly policy

and also attended the training course for practicing with working manual. During the working time, the system let them able to control and cooperate with the entrepreneur personnel directly, helping for immediately troubleshooting that saving the time and more convenience in working caused by the directed communications. Four suggestions from this group were as followings:

- It should be used e-seal in paperless system for all shipments to make the uniqueness of the customs practices.
- The e-seal locker should be the responsibility of the customs officer for more confidential in controlling goods container.
- Adding more information in the transfer order document obviously as in the using of manual system.
- Developing the technology for stable working process and able to international connected for bilateral and multilateral trades.

4.3.6 The conclusions of e-seal in paperless system acceptance

As describe above, the conclusions of acceptance level for the whole concerning personnel is shown in the table 4.8.

Table 4.8 The acceptance level of using e-seal in paperless system

Variables	G1	G2	G3	G4	G5	\bar{x}	S.D.
Policies of the organization	5	5	5	4.87	5	4.97	0.05
The effectiveness of the system	5	4.6	4.4	5	5	4.8	0.25
Working skills of stakeholders	5	4.8	4.93	5	5	4.95	0.78

Note

G1 = The manager and the executive groups

G2 = The data entry group

G3 = The driver group

G4 = The IT support group

G5 = The customs officer group

From the table 4.8, it obviously showed that the whole stakeholders accepted for using e-seal in paperless system at highest level of the three variable factors. As the acceptance level of 4.97 for the policies of the organization, the acceptance level of 4.80 for the effectiveness of the system and the acceptance level of 4.95 for the working skills of the stakeholders and also they suggested to make use of the pilot project for in general use of e-customs in the future.

CHAPTER V

DISCUSSION

5.1 The result discussion

The results found in this study showed significance compatibility to the setup research hypothesis that the acceptance level of using e-seal in paperless system varied on three variable factors as followings:

- The policies of the organization
- The effectiveness of the system
- The working skill of the stakeholders

5.1.1 The compatibility to the policy of the organization

The policy of using e-seal in paperless system in e-freezone was the consensus judgment of the government authority (the customs department) and the private sector (Western Digital Company) compatibility to the bureaucracy reformed, IT development reformed and also compatibility to the customs development plan of using the new technology for administration to meet customers need. The Western Digital Company had around to practice in e-freezone for controlling his goods transportation for more convince and safety that also the same purpose of the Thai customs development for “World class customs” that having a universal standard of safety, transparency and accountability for global acceptations.

The aspect of customs services changed from customs imposition orientation to customer service orientation. For that compatibility caused the highest acceptance level of 4.97 for the concerned personnel and just found a little value of 0.12 in standard deviation of the organization policies acceptance. Especially for every concerning group accept the IT support group showed a highest level of 5 and the level of 4.8 for the IT support group, that was just unsure of policy continuity in using e-lock caused by waiting for customs regulation issued.

For these result, it obviously showed the important role of the Thai bureaucracy reformation policy for pushing this pilot project and affected a high acceptance of the concerning personnel. As found in the in-depth interview, all the interviewee accepted that, by using e-seal and RFID technology for e-customs should provide good image for their organization. This should be reinforcement the organization working targets. Especially, for the private sector, the certainty of logistic system caused by using this technology affected directly to their production plan successfully.

5.1.2 The effectiveness of the system

Both the customs department and the Western Digital Company satisfied the working system of the pilot project for the jointed participation in planning and developing. This project includes the beginning, during and post action. It was found from this research that the working procedures were provided a directed communication among the users during their work. They could join in problems solving promptly and made use of feedbacks in the process of project development for more efficiency of the e-customs. The feedbacks were as the aspects of safety in goods transportation control, tracking for transportation status, decreased working steps, especially in the goods inspection process, decreased the personnel mistakes and decreased the entrepreneur expenses by 60 percent and also decreased the elapsed time in customs procedure. The effectiveness as mentioned caused the sample group for their acceptance average in the highest level of 4.80 and its standard deviation of 0.25. This result showed their compatibility in the effectiveness of the project. Especially, for the results found in the three groups of the manager and executive groups, the IT support group and the customs officer group were the highest level of 5 and 0 in standard deviation as shown in table 4.3, 4.6 and 4.7. Only for the data entry group and the driver group found a little different, those were the average acceptance level of 4.6 and the standard deviation of 0.45. For the data entry as shown in table 4.4 and for the driver group found the average acceptance level of 4.4 and the standard deviation of 0.49 as shown in table 4.5. That were caused by the mistake collecting procedure of the data entry and the problem found in locking e-seal for the driver.

As found in the documentary research, that using e-seal and RFID technology could save at most of the time for goods inspection at the destination checking post by 90 minutes per shipment (appendix e). So that for this effectiveness, it should be good for using e-seal and RFID technology for controlling food and agriculture goods freight that easy damaged by the inspection process.

The effectiveness of the system found in this pilot project caused by using e-seal and the RFID technology instead of manpower, that served the strategy of bureaucracy reformation policy and also served the adoption theory of using feedback to improve the working procedures.

5.1.3 The working skills of the stakeholders

Two factors affected the working skills of the stakeholders were the enough pre-trainings and on the job trainings. This project also made use of direct feedback from the system for working improvement and led the project reached its targets.

The training courses had been setup for each group separately, to serve the training needs. The clearly work orders had been used in order to get systematic workflow. So that it mainly created good working attitude of the personnel. There were also settings up an expertise level of the personnel, the classification table had been declared for work coaching and transfer working knowledge from the higher expertise to the lower class and also by using the paperless system. It provided enough data for administration and direct cooperation for troubleshooting via the direct communication. The other hand, the training procedures led to make a learning organization. It was very useful for human resources development support in the future works.

The acceptance level for personnel working skills was in the highest level of 4.95 in average, with a little standard deviation of 0.78. If consider by each group found that, the working skills were in manager and executive groups, the IT support group and the customs officer group. The average acceptance level were at the highest level of 5 and the standard deviation of 0 as shown in table 4.3, 4.6 and 4.7. The acceptance level of the data entry group and the driver group also at the highest level but shown a little lower at the average acceptance level of 4.8 and the standard

deviation of 0.16 and the average acceptance level of 4.93 and the standard deviation of 0.13 for the driver group as shown in table 4.4 and 4.5. It caused by some problems found in the working procedures.

The pilot project of using e-seal in paperless system was collaboration of the customs department and the Western Digital Company with TIFFA EDI Services Co.,Ltd. for IT support and personnel training showed a successful project of using e-seal in paperless system. These results could be implementing for in general use. Because of its compatible to organization policies in efficiency work and benefit both for the authority and the private sectors.

The working skills of the personnel mainly caused by enough training methods. And coaching method in this project were ongoing with the adoption theory and the innovation diffusion theory to make more acceptances of the personnel. Besides these, the RFID technology and e-lock used in this project were scientific trials, it proved the John Dewey's theory of "Learning by Doing" (Dewey, 1916) as the best way to run the project.

In this research, the results of using e-seal in paperless system showed a significant satisfaction of the concerning personnel in the highest acceptance level of the policies of the organization, the effectiveness of the system and the working skill of the stakeholders. It caused by good cooperation among official and private sectors in using IT technology supported. The adoption steps were as followings:

Step 1: RFID technology had been informed to the private sector (Western Digital Company and TIFFA EDI Services Co.,Ltd.) and made joint decided to operate e-customs.

Step 2: Cooperation in specified the freight and area for practicing e-customs.

Step 3: Cooperation in preparation and setting up IT system to support of using e-seal and paperless system.

Step 4: The Thai custom department setting up working procedures fitted for the customs laws and concerning regulations.

Step 5: Personnel acknowledgment with specific training courses for using e-customs.

Step 6: Trialed by practicing together (concerning personnel of customs officer, private sector and IT supporter) followed the working procedures.

Step 7: Evaluating and using feedback to improve working procedures (for more secured freights and best practices).

The adoption stages in using e-seal for RFID technology is shown in three stages as figure 5.1.

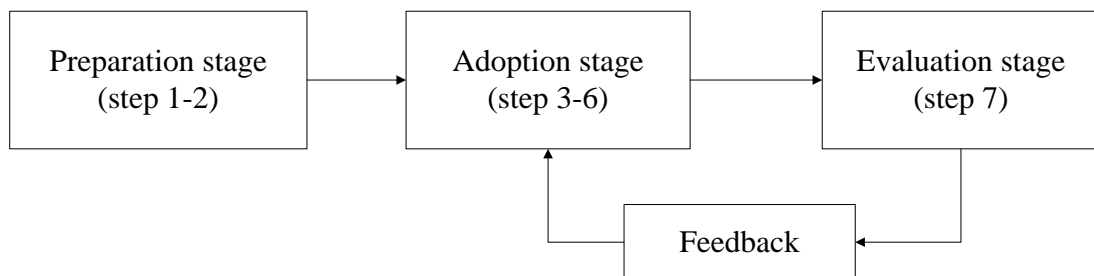


Figure 5.1 Showed three adoption stages of using e-seal for RFID technology

This pilot project had been stop caused by the mega flood in 2011. On settled equipments had been damaged and needed for new investment for using e-lock instead of e-seal for running e-customs in e-freezone and in general use.

So that, the further trying of e-customs by using e-lock instead of e-seal, these adoption steps should be used for implementation.

The development of using e-lock instead of e-seal in paperless system, it also necessary to set appropriate regulations compatibility to the customs laws and associated regulations for general use of e-customs.

5.2 The suggestion for prevention technical problems

The technical problems as showed in 4.2.5 would be important threat of running the RFID technology. So that the redundancy measures should be prepared in the further use is shown in table 5.1.

Table 5.1 Showed protection measures of technical failure

Problems	Consequence effects	Protection measures
The internet for sending RFID data failure	RFID data could not send into paperless system	Setup internet backup link
Computer for controlling RFID reader not functioning	RFID data could not send into paperless system	- Always check the computer working status - Setup alert system to IT support
Checking post power outage	RFID reader shutdown	Setup appropriate UPS for emergency use

5.3 Comparison of e-seal and e-lock properties

One of the suggestions from manager and executive groups in 4.3.1 was to use e-lock instead of e-seal. The different technical properties among e-seal and e-lock is shown in table 5.2.

Table 5.2 The comparison properties of e-seal and e-lock

Topic	E-seal	E-lock
Technology	RFID	RFID, GPS, GPRS
Mobile simcard support	No	Yes
RFID Reader	Require	Optional
Points of timestamp record (departure/destination)	RFID reader checking post	Specific area
Truck tracking	By GPS installed in the truck	By GPS bundled in device
Tamper detection	By internal circuit set its status from un-tamper status to tamper status	Send lock or unlock status into paperless system via GPRS
Tamper interpretation	By device	By paperless system
Tamper alert	When truck arrival at destination	Instantly showed with tampered time and position

Although using e-seal in paperless system caused more security in freight control, but it cannot safe from robbery, the same as e-lock itself just add up the properties for freight tracking.

CHAPTER VI

CONCLUSION

6.1 The research conclusions

6.1.1 The research topic of “EVALUATION OF E-SEAL IMPLEMENTATION IN THAI CUSTOMS PROCESS” was the main concerning part of the pilot project of using e-seal in paperless system for e-customs in goods transportation process of e-freezone. The customs department and the Western Digital Company coordinated to trial during 2007 to 2011. For five years testing in goods transportation between three industrial estates as Nava Nakorn industrial estate, Bang Pa-in industrial estate and the Hi-tech industrial estate. This pilot project used the new technology of RFID in customs process by using e-seal in the paperless system for control goods transportation and setup the GPS in every truck to control the transportation route and driving speed for customs process secured.

6.1.2 The research purpose were that for evaluate the acceptance of the concerning personnel and also to identify the concerning factors affected to the acceptance level, in order to develop e-seal using for e-customs in general use.

The research hypothesis setup that the e-seal using in the paperless system was acceptable in customs procedures in e-freezone. For its concerning factors of compatibility to the organization policies, the effectiveness of the system and the working skills of the stakeholders. The research methodology consisted of the documentary research, the participatory observation and the in-depth interviews by using five samples for each concerning stakeholder groups of the manager and executive groups, data entry group, driver group, IT support group and customs officer group. Using acceptance indicators to determine the acceptance level followed the Likert’s scale ranking score of acceptance in five levels (Likert, 1932). The average score and its standard deviation had been used to interpret the acceptance status of the three variables and using a descriptive method for data analyzed and presentation.

6.1.3 The results found that the pilot project of using e-seal in paperless system for goods control in e-freezone. This had been accepted for the three variables of the compatibility to the organization policies, the effectiveness of the system and the working skills of the stakeholders as the hypothesis setup.

The reason for acceptance of organization policies were by using e-seal in paperless system was directly response to improve the customs services for the “world class customs” strategies and responsible to the bureaucracy reformation. That emphasized on services improvement, participation from private sectors and made use of IT in administration system for more transparency, fair practices and accountability. The stakeholders showed a significant of the highest acceptance average level of 4.97 and its standard deviation of 0.05.

The effectiveness of the system found that the pilot project created a standard of safety in customs control. The system could serve for tracking goods transportation at any time of shipment procedure, decreasing the human errors of the previous used, decreasing the working steps of goods inspection to save the usage time and expense for personnel and also for the entrepreneur could save their expense of paper used and payment for goods transportation by 60 percent. The factor of effectiveness of the system had been accepted for all groups at the highest acceptance level of 4.8 and its standard deviation of 0.25.

The working skills of the stakeholders were caused by the coordination of the administrator of three concerning parties to setup and appropriated working system, setting up clearly orders and regulations for practices with working manuals and prepared specified pre training course for each group, setup an expertise matrix skills of three levels for coaching their personnel and made use of the system for directed communication among the stakeholders for prompted problem solving. The feedback from the system had been used to improve working procedures and informing each other's. So that the average acceptance level for this factor was in the highest level of 4.95 and its standard deviation of 0.78.

6.2 The suggestions from research

6.2.1 An appropriate public relations plan should be setup for widely publics recognize and setup a seminar for all concerning entrepreneurs to attend for enhancing this technology in general use.

6.2.2 Using e-lock instead of e-seal for more effectiveness of the e-customs.

6.2.3 Using the logic of “Who uses who pay” to continue this project as the e-lock device. This should be the entrepreneurs responsible to invest and the RFID reader should be responsible of the customs department. The shipment manifest data should be feed to the customs department server for more safety customs procedure and be able to connect to NSW for concerning offices and international use.

6.2.4 The appropriate pilot project for e-lock in goods transportation should be setup for testing e-customs in general use.

6.2.5 The appropriate regulations for using e-lock should be issued for support the working procedures compatibility to the customs laws and associated regulations.

6.2.6 The customs department should be the representative of Thailand in pioneer using e-lock for ASEAN. Because of using experiences and acceptance of the ASEAN countries as Malaysia and Singapore used to send their representatives to learning visit this project. And also nowadays, the customs department had been setup the NSW system for practicing the ACDD for the ASEAN countries in border trade.

6.2.7 A compliance regulation unit should be setup to impel the project of e-customs for continuity and completed work system and also to impel Thailand for the center of the e-customs development in this region.

6.4 Suggestions for further researches

6.3.1 Research on readiness and acceptance of using e-lock for all shipments entrepreneurs.

6.3.2 Research for the investigation of testing e-lock in e-freezone of Western Digital Company for further implementation.

6.3.3 To support the action research of improving e-lock device for more convenience and more efficiency usage.

REFERENCES

- Brancheau, J.C. and Wetherbe, J.C. (1990). The adoption of spreadsheet software: testing Innovation Diffusion Theory in the context of end-user computing. *Information Systems Research*, 1(2): 115-143.
- Cell Phone Digest (2007), *Samsung Develops New RFID Reader for Mobile Devices* [online], available: <http://www.cellphonedigest.net/news/2007/11> [accessed 20 Sep 2011].
- Curtin, J., Kauffman, R.J. and Riggins, F.J. (2007). Making the most out of RFID technology: A research agenda for the study of the adoption, usage and impact of RFID. *Information Technology and Management*. 8(2): 87-110.
- Decker, C., Beigl, M., Krohn, A., Robinson, P. and Kubach, U. (2004). *Pervasive Computing*. Sydney: Springer Berlin Heidelberg Publisher.
- Dejnumbanyachai, W. (2010). *Factors in the adoption of E-customs by companies in Thailand (Eastern area of Thailand as a case study)* [online], available: <http://www.km.nida.ac.th/home/images/pdf/5-3.pdf> [accessed 21 Feb 2013].
- Dewey, J. (1916). *DEMOCRACY AND EDUCATION*. New York: The Macmillan Company.
- GAO Group Inc. (2011), *RFID Asset Tracking News* [online], available: http://www.gaorfidassettracking.com/RFID_Asset_Tracking_News/index.php?view=itemandtype=1andnid=173 [accessed 20 Sep 2011].
- Hassan, T. and Chatterjee, S. (2006). "A taxonomy of RFID", in *Proc. IEEE Computer Society Press*, 2006, pp.184b
- Hayachi, K. (2007). *An e-Seal in Container Security Program: How to maximize the benefits of e-Seal in the battle against terrorism*. (M.Sc.), School of Continuing and Professional Studies, New York University.

- Hua, J. and Huang, C. (2006). Quantitative performance evaluation of RFID applications in the supply chain of the printing industry. *Industrial Management and Data Systems*. 106(1): 96-105.
- Jantasorn, W. (2007). *Development of the Thai bureaucratic system*, Prime Minister Office.
- King, C. and Stivers, C. (1998). *Government is Us: Public Administration in an Anti-Government Era*. California: Sage Publications.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 22(140): 1-55.
- McCormack, E., Jensen, M. and Hovde, A. (2010). Evaluating the Use of Electronic Door Seals (E-Seals) on Shipping Containers. *International Journal of Applied Logistics*, 1(4): 13-29.
- Net Resources International (2011), *RFID in the War Zone* [online], available: <http://www.army-technology.com/features/feature1616/feature1616-3.html> [accessed 20 Sep 2011].
- Netrand Co.,Ltd. (2011), *NETRAND GPS and R.F.I.D Features* [online], available: http://netrand.com.my/p_products_details02.php?proID=61 [accessed 20 Sep 2011].
- Nikam, M. and Satpute, S. (2006). *RFID: "Changing the face of supply chain management"* [online], available: http://www.indiaonline.com/content/bschool/Your_Journal/2006/05/30052006/Chan.pdf [accessed 15 Jun 2012].
- Plangprasopchoke, S. (2007). *A guideline to Television of Thailand development in SDU system*, Civil Service Development Institute, Office of the Civil Service Commission.
- Pochanukul, W. (2011), *Innovation process* [online], available: <http://www.pochanukul.com/> [accessed 25 Dec 2011].
- RFID Institute of Thailand. (2009). *The e-seal system for secured containers* [online], available: http://www.rfid.or.th/2012/th/technology/article_dt.asp?id=1 [accessed 9 Feb 2012].
- Roberts, C.M. (2006). Radio frequency identification (RFID). *Computers & Security*. 25(1): 18-26.

- Rogers, E.M. (1962). *Diffusion of innovations*. New York: The Free Press.
- Rogers, E.M. (1995). *Diffusion of innovations (4th edition)*. New York: The Free Press.
- Senewong Na Ayuthaya, C. (2008). *The machinery control in Thailand Wacoal Corporation Limited (PCL)*, University of the Thai Chamber of Commerce.
- Senge, P.M. (1990). *The 5th Discipline*. London: Century Business.
- Sirisampan, T. (2006). *Introduction to Modern Public Management*, Office of the Public Sector Development Commission.
- Skinner, B.F. (1957). *Verbal Behavior*, New York: Appleton-Century-Crofts.
- The Customs Department (2010). *The mission of the Customs Department*, Thai customs department.
- Thai National Shippers' Council (1994), *Logistic definitions* [online], available: <http://www.tnsc.com/html/content/view/380/75/> [accessed 10 Sep 2011].
- The International Trading Study Center. (2003). *A Survey Research of Thai Exporters to Use E-seal*, University of the Thai Chamber of Commerce.
- The Federation of Thai Industries. (2012), *Industry focus* [online], available: <http://www.ftimatching.com/uploads/userfiles/file/Industry-Focus/Industry-Focus-11.2012.pdf> [accessed 8 Apr 2013].
- Tirschwell, P. (2006). The e-seal picture becomes clearer. *Journal of Commerce*. 7(8):46.
- Wen, L., Zailani, S. and Fernando, Y. (2009). Determinants of RFID Adoption in Supply Chain among Manufacturing Companies in China: A Discriminant Analysis. *Journal of Technology Management & Innovation*. 4(1): 22-32.
- Vcharkarn dot com Co.,Ltd (2011), *RFID systems for logistics and supply chain* [online], available: <http://www.vcharkarn.com/varticle/42181> [accessed 20 Sep 2011].
- Ve'ronneau, S. and Roy, J. (2009). RFID benefits, costs, and possibilities: The economical analysis of RFID deployment in a cruise corporation global service supply chain. *International Journal of Production Economics*. 122: 692-702.
- Vic, M. (2006). The Development of a Reaearch Agenda for RFID Adoption and Effectiveness in Supply Chains. *Information Systems*. 3(1): 246-251.

APPENDICES

APPENDIX A

LIST OF INTERVIEWEES

Group 1: Manager and Executive

Mr. Thanat Suwattanamethakul: Former Deputy Director-General of Customs Department

Mr. Apilak Waengwan: Chief Information Officer of TIFFA EDI Services

Ms. Chanpen Duenchai: Logistic Manager of Western Digital Company (Thailand)

Ms. Supalumpai Harntaweepanit: Expert in International Customs of Customs Department

Ms. Suppalak Aeimwongsarn: Expert on Hardware and Data Communication of Customs Department

Group 2: Data Entry

Ms. Kanittha Galong

Mr. U-thai Larparmart

Mr. Kittisak Phukung

Mr. Boonlert Klongthampanit

Mr. Adisak Pilathong

Group 3: Driver

Mr. Saeb Makaew

Mr. Athit Nivat

Mr. Rungsan Tisarum

Mr. Pison Nivatrum

Mr. Chatchai Chakpadou

Group 4: IT Support

Mr. Akawit Warinthira
Mr. Anchana Sudyachai
Mr. Kittikorn Sutthipong
Mr. Chanthapon Yenchuen
Ms. Mavisa Ruangsuk

Group 5: Customs officer

Ms. Kanchana Rungsiwuttisak
Lt. Teerasin Intarasuk
Mr. Chompon Sukpiboon
Mr. Sompong Chanpan
Ms. Sujitra Patikanskul

APPENDIX B

IN-DEPTH INTERVIEW GUIDELINE

- Factor 1: Policy of the organization

1. The policy of implementation good governance in customs department
2. The policy of supporting to use e-seal for e-customs in secured free zone (e-freezone) and in general
3. The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan

- Factor 2: The effectiveness of the system

1. Decreasing the elapse time of running the shipping process
2. More security in checking goods in logistic system
3. More precise and prevent error in identifying goods for shipping process

- Factor 3: Working skills of stakeholders

1. Any problem find out to run the e-seal and paperless system
2. Enough training for workers
3. Convenience and suitable for customs system in Thailand

The acceptance indicators

In order to get the authentic results, the following acceptance indicators were used for interpretation the acceptance level of the in-depth interview.

- Factor 1: Policy of the organization

Variable	Indicators
The policy of implementation good governance in customs department	<ul style="list-style-type: none"> - Having the policy or not - The necessity for usage - The compatibility to the organization - The conceptual thinking of concerning people (agree or not) - The sustainable of the policy continuity
The policy of supporting to use e-seal for e-customs in secured free zone (e-freezone) and in general	<ul style="list-style-type: none"> - Willing practice for the policy - Having a strongly pushing for the policy - Having enough budget plan for running the project - Having a clearly operational and regulations - Probability for enhancing in general use
The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	<ul style="list-style-type: none"> - Policy acceptance - Feedback after using (good or bad) - Compatibility for private sector work - Co-planing for enhancing the project - Compatibility to the master plan of economic development or IT2010

- Factor 2: The effectiveness of the system

Variable	Indicators
Decreasing the elapse time of running the shipping process	<ul style="list-style-type: none"> - Time for issuing transfer order - Time for present transfer order - Time for inspection at departure - Time for inspection at destination - Time for making transfer order report
More security in checking goods in logistic system	<ul style="list-style-type: none"> - Route tracking - Precision of device (RFID reader, e-seal) - Stability of the system. - Warning system - Regulations for security
More precise and prevent error in identifying goods for shipping process	<ul style="list-style-type: none"> - Precision in issuing transfer order - Pre-collection of presenting transfer order - Quality of inspection at departure - Quality of inspection at destination - Using feedback for improving work procedure

- Factor 3: Working skills of stakeholders

Variable	Indicators
Any problem find out to run the e-seal and paperless system	<ul style="list-style-type: none"> - Decreasing problems in working procedure - Co-operation working - Problem in using this technology (e-seal, paperless) - Working task fit for responsibility - Troubleshooting during work operation
Enough training for workers	<ul style="list-style-type: none"> - Enough pre training - Enough on the job training - Enough evaluation and using feedback to improve working procedure - Enough of working manual - Enough of re-training or retreat meeting
Convenience and suitable for customs system in Thailand	<ul style="list-style-type: none"> - More convenience in running customs process - Suitable for Thai customs system - Suitable for general use in Thailand - Suitable for international trade - Good image for Thai customs

APPENDIX C

DATA FROM IN-DEPTH INTERVIEW

Position MO 2nd Executive Company TIFFA

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

คิดว่าจะหาวิธีการปรับปรุงระบบ e-lock, ให้มีประสิทธิภาพมากขึ้น,
เพื่อให้เจ้าหน้าที่สามารถใช้งานได้สะดวกและรวดเร็วมากขึ้น เช่น พัฒนาระบบ NVA AEC

Position MG and Executive Company CUSTOMS

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

การปรับปรุง Regulation Compliance ซึ่งจำเป็นต้องมีการฝึกอบรม,
และเพิ่มการเข้าถึงข้อมูลในระบบมากขึ้น เพื่อให้ผู้ใช้งาน
สามารถใช้งานได้สะดวก, และลดข้อผิดพลาดได้

Position MO and Executive Company CUSTOMS

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

ปรับปรุง e-seal ให้ e-lock, ปรับปรุงระบบตรวจสอบ, ให้เชื่อมโยง ASEAN
กับระบบอื่นๆ

Position MO and Executive Company CUSTOMS

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

ใช้ระบบงาน + อบรมผู้ใช้งาน

Position MB and Executive Company WD

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

1. อบรมเจ้าหน้าที่ Paperless 1122 e-lock

Position DATA ENTRY Company CEVA (KOD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process		✓			
2	More security in checking goods in logistic system		✓			
3	More precise and prevent error in identifying goods for shipping process		✓			

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

Position DATA ENTRY Company CEVA (WD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process		✓			
2	More security in checking goods in logistic system		✓			
3	More precise and prevent error in identifying goods for shipping process		✓			

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

Position DATA ENTRY Company (CEVA (WD))

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders 4.67

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand		✓			

Suggestion for improving e-seal and paperless system in e-customs

เพิ่มการสนับสนุนให้พนักงานได้มีโอกาสเรียนรู้ระบบมากขึ้น

Position DATA ENTRY Company (CEVA CWD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

4.67

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand		/			

Suggestion for improving e-seal and paperless system in e-customs

ลดเวลาการตัดสินใจของเจ้าหน้าที่และยกฐานะกรมขึ้นตั้งเป็นกรม

Position DATA ENTRY Company (CEVA (WD))

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

4.67

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand		/			

Suggestion for improving e-seal and paperless system in e-customs

ให้เจ้าหน้าที่ดูแลการระบบให้แล้ว และ การสนับสนุน (ทั้ง) อบรม
ระบบให้แล้ว

Position Driver Company (CEVA (WD))

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process		/			
2	More security in checking goods in logistic system		/			
3	More precise and prevent error in identifying goods for shipping process		/			

Factor 3: Working skills of stakeholders 4.67

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand		/			

Suggestion for improving e-seal and paperless system in e-customs

ปรับปรุง e-seal, e-lock ให้มีความทันสมัย, มีคุณสมบัติ, ใช้งานได้ง่าย,
สามารถตรวจสอบสถานะ seal ได้จากระบบ LED ที่ติดตั้ง
ไว้ที่ตู้

Position Driver Company (CEVA (W.D))

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

ปรับปรุงการดำเนินงาน (e-lack, e-seal), การฝึกอบรม,
ระบบ e-seal การนำเข้า

Position Driver Company CEVA (KOD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process		/			
2	More security in checking goods in logistic system		/			
3	More precise and prevent error in identifying goods for shipping process		/			

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

กรณี lock e-seal รู้สึกว่าเป็นการกีดกันของระบบด้วย ควรพิจารณาให้
ตัวเสริมข้อมูลเพิ่มมา

Position Driver Company (EVA CWD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in...

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

e-seal, e-label system managers (No LED)

Position Driver Company WD

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process		/			
2	More security in checking goods in logistic system		/			
3	More precise and prevent error in identifying goods for shipping process		/			

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

Position IT Support Company TIFFA

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization 4.67

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department		✓			
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in...

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

-บอกคน e-seal ให้ e-lack ในระบบ (ข้อมูล)
-สอน Training ให้เจ้าหน้าที่ (Train ฐาน Data Entry, Driver)

Position IT Support Company TIFFA

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

- ฝึกอบรมบุคลากรให้สามารถใช้ e-lock และ Paperless
 - พัฒนาระบบให้มีความปลอดภัยมากขึ้น e-lock, Paperless

Position IT Support. Company WD

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

Position IT Support. Company CEVA (WD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization 4.67

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan		✓			

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

Position IT Support. Company CEVA (CWD)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

- ควรจัดทำคู่มือ CA/PA ให้ครอบคลุมการใช้งาน และจัดอบรมให้ + มีเอกสารคู่มือการใช้งาน
- จัดทำ Training คู่มือ Data Entry new Driver ภาย 2-3 เดือน.

Position CUSTOMS OFFICER Company (Suwannabhumi)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

- ฝึกสอนและแนะนำวิธีใช้ (Paperless ง่ายขึ้น ใช้ Manual น้อยลง)
- ส่งเจ้าหน้าที่ Paperless ฝึกอบรมให้เจ้าหน้าที่กรม (Hand copy)

Position CUSTOMS OFFICER Company (Hi Tech)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

- ให้ความรู้และฝึกอบรมบุคลากรเกี่ยวกับระบบ Paperless ให้สามารถพิมพ์ Paper.

Position CUSTOMS OFFICER Company (Hitech)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

- ทำระบบ Paperless ให้สามารถใช้งานได้จริงและลดขั้นตอนการดำเนินงาน

Position CUSTOMS OFFICER Company (Bang Pakd)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	✓				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	✓				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	✓				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	✓				
2	More security in checking goods in logistic system	✓				
3	More precise and prevent error in identifying goods for shipping process	✓				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	✓				
2	Enough training for workers	✓				
3	Convenience and suitable for customs system in Thailand	✓				

Suggestion for improving e-seal and paperless system in e-customs

- ให้ ออ. นศ. เข้าไปช่วย lock ที่คอมพิวเตอร์ หรือ ทำการอบรม
 - ให้ ออ. นศ. เข้าไปช่วย ทำการอบรม หรือ ทำการอบรม
 ให้ ออ. นศ. เข้าไปช่วย

Position CUSTOMS OFFICER Company (Sawasabkomi)

* 5 = Strongly agree, 4 = Agree, 3 = Neither agree or not, 2 = Disagree, 1 = Strongly disagree

Factor 1: Policy of the organization

No	Variable	5	4	3	2	1
1	The policy of implementation good governance in customs department	/				
2	The policy of supporting to use e-seal for e-customs in secured free zone and in general	/				
3	The consistency of the policy such as, having implementation plan, enough money support, organization acceptance, government policy and compatibility to the national economic and social development plan	/				

Factor 2: The effectiveness of the system

Note: Compare with the previous of using manual system, e-seal can provide more effective in....

No	Variable	5	4	3	2	1
1	Decreasing the elapse time of running the shipping process	/				
2	More security in checking goods in logistic system	/				
3	More precise and prevent error in identifying goods for shipping process	/				

Factor 3: Working skills of stakeholders

No	Variable	5	4	3	2	1
1	Any problem find out to run the e-seal and paperless system	/				
2	Enough training for workers	/				
3	Convenience and suitable for customs system in Thailand	/				

Suggestion for improving e-seal and paperless system in e-customs

- ใช้ Paperless ทั่วประเทศ
 - ฝึกอบรม ใช้งาน สัมภาษณ์ Lack of Customer

APPENDIX D
RESEARCH ETHICS CERTIFICATE



บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล
ใบรับรอง เพื่อแสดงว่า

นาย อุไมษ แปลงประสพโชค รหัสนักศึกษา 5336462
คณะ วิศวกรรมศาสตร์

เป็นผู้ผ่านการเรียนบทเรียนอิเล็กทรอนิกส์ หัวข้อ จริยธรรมการวิจัยในคน
ในรายวิชา บทศร 521 จริยธรรมการวิจัย (GRID 521 RESEARCH ETHICS)
บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

เมื่อวันที่ 27 เดือน สิงหาคม พ.ศ. 2555

(รองศาสตราจารย์ ดร.สุชุมาล จงธรรมคุณ)

อาจารย์ผู้รับผิดชอบรายวิชา

APPENDIX E

COMMAND OFFICIAL



ประกาศสำนักงานศุลกากรตรวจสินค้าท่าอากาศยานสุวรรณภูมิ

ที่ 16 / 2551

เรื่อง รายชื่อผู้ประกอบการเข้าร่วมโครงการนำร่องการผ่านพิธีการศุลกากร e-Export
ด้วยระบบตรวจสอบรหัสโดยใช้คลื่นความถี่วิทยุ (RFID)

ตามที่สำนักงานศุลกากรตรวจสินค้าท่าอากาศยานสุวรรณภูมิ ได้เปิดรับสมัครผู้ประกอบการส่งออกสินค้าทางอากาศยานที่ผ่านพิธีการศุลกากร ณ สำนักงานศุลกากรตรวจสินค้าท่าอากาศยานสุวรรณภูมิ เข้าร่วมโครงการนำร่องการผ่านพิธีการศุลกากร e-Export ด้วยระบบตรวจสอบรหัสโดยใช้คลื่นความถี่วิทยุ (RFID) โดยได้กำหนดระยะเวลาการรับสมัครตั้งแต่วันที่ 3 ตุลาคม 2551 ถึงวันที่ 3 พฤศจิกายน 2551 ความละเอียดแจ้งแล้ว นั้น

บัดนี้ การรับสมัครได้เสร็จสิ้นแล้ว ผลปรากฏว่า มีผู้ประกอบการที่สนใจเข้าร่วมโครงการนำร่องดังกล่าว และได้ยื่นใบสมัครภายในระยะเวลาที่กำหนดจำนวนทั้งสิ้น 6 ราย ซึ่งสำนักงานศุลกากรตรวจสินค้าท่าอากาศยานสุวรรณภูมิ ได้ตรวจสอบคุณสมบัติของผู้สมัครแต่ละรายจากข้อมูลใบสมัครและเอกสารประกอบ ภายได้เงื่อนไขและคุณสมบัติตามที่ได้กำหนดไว้เป็นที่เรียบร้อยแล้ว จึงประกาศผลการคัดเลือกผู้เข้าร่วมโครงการนำร่องการผ่านพิธีการศุลกากร e-Export ด้วยระบบตรวจสอบรหัสโดยใช้คลื่นความถี่วิทยุ (RFID) ดังมีรายชื่อต่อไปนี้

1. บริษัท อจิลิตี้ จำกัด
2. บริษัท ทีพีไฟ อี ดี ไอ เซอร์วิส เซส จำกัด
3. บริษัท เวสเทิร์น ดิจิตอล (ประเทศไทย) จำกัด
4. บริษัท ทีเอ็นที เอ็กซ์เพรส เวิลด์ไวด์ (ประเทศไทย) จำกัด
5. บริษัท ดีเอชแอล เอ็กซ์เพรส (ประเทศไทย) จำกัด
6. บริษัท วี-เซอร์ฟ โลจิสติกส์ จำกัด

ทั้งนี้ ขอให้ผู้เข้าร่วมโครงการนำร่องจัดเตรียมเครือข่ายสัญญาณที่ใช้ในการส่งข้อมูลอุปกรณ์เครื่องคอมพิวเตอร์และอุปกรณ์ RFID พร้อมในการทดสอบระบบต่อไป

ประกาศ ณ วันที่ 26 ธันวาคม พ.ศ. 2551

(นายชนันท์ สุวรินทร์ชากุล)

ผู้อำนวยการสำนักงานศุลกากรตรวจสินค้าท่าอากาศยานสุวรรณภูมิ

ที่ กค 0503/ว1071

13 กรกฎาคม 2547

เรียน หัวหน้าส่วนราชการระดับสำนัก กอง และคณบดีทุกแห่ง เพื่อทราบ



(นายรินทร์ กิตยามิตร)

เลขานุการกรม ปฏิบัติราชการแทน

อธิบดีกรมศุลกากร

(สำเนา)

ประกาศกรมศุลกากร

ที่ 62/2547

เรื่อง การกำหนดระยะเวลาในการปฏิบัติงานของเจ้าหน้าที่ศุลกากรสำหรับการปฏิบัติพิธีการใบขนสินค้า

.....

เพื่อเป็นการสนับสนุนและอำนวยความสะดวกในการแข่งขันทางการค้าระหว่างประเทศ และเพิ่มประสิทธิภาพในการดำเนินพิธีการของศุลกากรให้รวดเร็วและโปร่งใส

อาศัยอำนาจตามความในมาตรา 3 แห่งพระราชบัญญัติศุลกากร พุทธศักราช 2469 อธิบดีกรมศุลกากรจึงกำหนดระยะเวลาในการปฏิบัติงานของเจ้าหน้าที่ศุลกากร สำหรับการปฏิบัติพิธีการใบขนสินค้าในขั้นตอนต่างๆ ไว้ดังต่อไปนี้

1. ในประกาศนี้

" ระยะเวลาการปฏิบัติงาน " หมายความว่า ระยะเวลาที่กรมศุลกากรกำหนดให้ การปฏิบัติงานของเจ้าหน้าที่ศุลกากร สำหรับการปฏิบัติพิธีการใบขนสินค้าในขั้นตอนต่าง ๆ ต้องแล้วเสร็จ โดยอยู่ภายใต้เงื่อนไขว่า ผู้ประกอบการต้องยื่นเอกสารและหลักฐานต่าง ๆ ให้ถูกต้องและ ครบถ้วน ตามที่กำหนดในกฎหมายและระเบียบข้อบังคับของทางราชการ

" วัน " หมายความว่า วันทำการตามเวลาราชการของกรมศุลกากร

2. เจ้าหน้าที่ศุลกากร จะต้องปฏิบัติงานสำหรับการปฏิบัติพิธีการใบขนสินค้าในขั้นตอนต่าง ๆ ภายในระยะเวลาการปฏิบัติงาน ดังนี้

2.1 การปฏิบัติพิธีการใบขนสินค้าขาเข้า

(1) ขั้นตอนตรวจสอบเอกสารและคำภาษีอากร

(1.1) จำนวนไม่เกิน 10 รายการต่อใบขนหนึ่งฉบับ 1 ชั่วโมง

(1.2) จำนวนเกิน 10 รายการต่อใบขนหนึ่งฉบับ 1 ชั่วโมง 30 นาที

(2) ขั้นตอนรับชำระค่าภาษีอากรและหรือวางหนังสือค้ำประกัน 15 นาที

(3) ขั้นตอนตรวจปล่อยสินค้า

(3.1) กรณีให้ส่งมอบและยกเว้นการตรวจ 30 นาที

(3.2) กรณีให้เปิดตรวจ 1 ชั่วโมง 30 นาที

- 2 -

2.2 การปฏิบัติพิธีการใบขนสินค้าขาออก

- | | |
|---|---------|
| (1) ขั้นตอนตรวจสอบเอกสารและคำภาษีอากร | 20 นาที |
| (2) ขั้นตอนรับชำระค่าภาษีอากรและหรือวางหนังสือค้ำประกัน | 15 นาที |
| (3) ขั้นตอนตรวจปล่อยสินค้า | 20 นาที |
| (4) ขั้นตอนขอรับใบขนฯฉบับมูลค่าเงิน นับแต่วันส่งออก | |
| (4.1) สำหรับการส่งออกทางเรือและทางบก | 20 วัน |
| (4.2) สำหรับการส่งออกทางอากาศและทางไปรษณีย์ | 10 วัน |

2.3 ขั้นตอนปฏิบัติพิธีการใบขนสินค้าสำหรับเขตปลอดอากรเขตอุตสาหกรรม

ส่งออก หรือ คลังสินค้าทัณฑ์บน

- | | |
|--|-----------|
| (1) กรณีใบขนสินค้าขาเข้า | |
| (1.1) จำนวนไม่เกิน 10 รายการต่อใบขนฯหนึ่งฉบับ | 45 นาที |
| (1.2) จำนวนเกิน 10 รายการต่อใบขนฯหนึ่งฉบับ | 1 ชั่วโมง |
| (1.3) การขออนุมัติยกเว้นอากรเครื่องจักรที่ใช้ในการผลิตสินค้า | 1 ชั่วโมง |

(2) กรณีใบขนสินค้าขาออก

- | | |
|---|---------|
| (2.1) จำนวนไม่เกิน 10 รายการต่อใบขนฯหนึ่งฉบับ | 30 นาที |
| (2.2) จำนวนเกิน 10 รายการต่อใบขนฯหนึ่งฉบับ | 45 นาที |

(3) ขั้นตอนรับชำระค่าภาษีอากรและหรือวางหนังสือค้ำประกัน 15 นาที

2.4 ขั้นตอนตรวจปล่อยสินค้าเพื่อนำเข้าเก็บในหรือนำออกจากคลังสินค้าทัณฑ์บน

- | | |
|--|-------------------|
| (1) การตรวจปล่อยสินค้าเพื่อนำเข้าเก็บในคลังสินค้าทัณฑ์บน | |
| (1.1) กรณีให้ส่งมอบและยกเว้นการตรวจ | 30 นาที |
| (1.2) กรณีให้เปิดตรวจ | 1 ชั่วโมง 30 นาที |
| (2) การตรวจปล่อยสินค้าเพื่อนำออกจากคลังสินค้าทัณฑ์บน | 30 นาที |

3. ประกาศนี้ให้ใช้บังคับสำหรับการปฏิบัติพิธีการใบขนสินค้า ตั้งแต่วันที่ 15 กรกฎาคม

2547 เป็นต้นไป

ประกาศ ณ วันที่ 13 กรกฎาคม 2547



(นายชวลิต เศรษฐเมธีกุล)

อธิบดีกรมศุลกากร

ตารางการจัดเก็บค่าธรรมเนียมตามใบแนบ ศ.๓ สำหรับพนักงานไปประจำการก่อนหรือหลังเวลาราชการหรือในวันหยุดเพื่อความสะดวกแก่ผู้ค้า		
คำสั่งกรมศุลกากรที่ ๕๔/๒๕๔๗ ระยะเวลา ข้อ ๑๘ ๐๒ ๐๓	ข้อสรุปเพื่อใช้ในการปฏิบัติงาน ตามกระบวนการทางศุลกากร	ประเภทการงาน
(ก) การผ่านพิธีการศุลกากร		
- การประจำการของเจ้าหน้าที่เพื่อ รับปฏิบัติพิธีการใบขนสินค้าขาเข้า Manual ^๑ เช่น การตรวจสอบคำร้อง ขอ และการบันทึกข้อมูลใบขนฯ	- การยื่นใบขนสินค้าขาเข้า Manual ต่อ เจ้าหน้าที่ศุลกากร ณ ท่า หรือที่ หรือสนามบิน ที่นำของเข้า	- ใบแนบ ศ.๓ (๔) ^๒
- การประจำการของเจ้าหน้าที่เพื่อ รับปฏิบัติพิธีการใบขนสินค้าขาออก Manual	- การยื่นใบขนสินค้าขาออก Manual ต่อ เจ้าหน้าที่ศุลกากร ณ ที่ทำการศุลกากรทุกแห่ง ^๓	- ใบแนบ ศ.๓ (๔)
- การประจำการของเจ้าหน้าที่เพื่อ รับบันทึกข้อมูลใบกำกับการขนย้าย สินค้า Manual	- การยื่นใบกำกับการขนย้ายสินค้า Manual ต่อเจ้าหน้าที่ศุลกากร ณ ที่ทำการศุลกากร ทุกแห่ง	- ใบแนบ ศ.๓ (๔)
	- การส่งข้อมูลใบขนสินค้าขาเข้า ใบขน สินค้าขาออก ใบกำกับการขนย้ายสินค้า เข้า สู่ระบบคอมพิวเตอร์ของศุลกากรจนได้รับ ตอบกลับเลขที่ใบขนสินค้า โดยเครื่อง คอมพิวเตอร์ได้รับส่งข้อมูลกันโดยอัตโนมัติ ตลอด ๒๔ ชั่วโมง	-ไม่ต้องเสียค่าธรรมเนียม ตามใบแนบ ศ.๓

^๑ ปัจจุบันขั้นตอนพิธีการศุลกากรลดลงเหลือขั้นตอนเดียว กรณีใบขนสินค้า ไม่ต้องตรวจสอบพิกัดราคาและของ ให้รับสินค้า ณ โรงพักสินค้าได้ทันที
กรณีต้องตรวจสอบพิกัด ราคา และของจะพบเจ้าหน้าที่ ณ จุดตรวจปล่อยเพียงขั้นตอนเดียว

^๒ ใบแนบ ศ.๓ (๔) ประจําการ ณ ศุลกสถาน ทำเนียบท่าเรือ โรงพักสินค้า คลังสินค้าทัณฑ์บน หรือที่ซึ่งได้รับอนุมัติแห่งใดแห่งหนึ่ง ในกรณี
ตรวจปล่อยของซึ่งนำเข้าหรือส่งออก หรือในกรณีขนของที่ตรวจปล่อยแล้ว

(ก) เวลาตั้งแต่ ๐๘.๐๐ น. ถึง ๑๖.๓๐ น. ของวันหยุดราชการ(ค่าธรรมเนียม) ใบขนสินค้าฉบับละ ๒๐๐ บาท

(ข) เวลาตั้งแต่ ๑๖.๓๐ น. ถึง ๒๔.๐๐ น.

(ค่าธรรมเนียม) ใบขนสินค้าฉบับละ ๒๐๐ บาท

(ค) เวลาตั้งแต่ ๒๔.๐๐ น. ถึง ๐๘.๐๐ น.

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การขนย้ายสินค้าในระบบพิธีการศุลกากรส่งออกทางอิเล็กทรอนิกส์แบบไร้เอกสาร (e-Export)

<p style="text-align: center;">ตารางการจัดเก็บค่าธรรมเนียมตามใบแนบ ศ.๓ สำหรับพนักงานไปประจำการก่อนหรือหลังเวลาราชการหรือในวันหยุดเพื่อความสะดวกแก่ผู้ค้า</p>		
คำสั่งกรมศุลกากรที่ ๕๔/๒๕๕๗ ประมวลฯ ข้อ ๕ ๐๘ ๐๒ ๐๓	ข้อสรุปเพื่อใช้ในการปฏิบัติงาน ตามกระบวนการทางศุลกากร	ประเภทการงาน
เขตปลอดอากร/เขตประกอบการเสรี		
<p>- ประจําการเพื่อควบคุมการขนย้ายสินค้าเข้ามาภายใน-ออกไปจากเขตรั้วศุลกากร ให้เรียกเก็บค่าธรรมเนียมตามช่วงเวลาขอดำเนินการ</p>	<p>- การขนย้ายสินค้าที่จะส่งออก จากเขตปลอดอากร/เขตประกอบการเสรีไปยังท่าปลายทางเพื่อการส่งออก เจ้าหน้าที่เขตปลอดอากร/เขตประกอบการเสรีมีได้ถูกกำหนดให้ตรวจปล่อยสินค้าเพื่อส่งออกป็นนอกราชอาณาจักร เจ้าหน้าที่ศุลกากรต้องรับผิดชอบทำการควบคุมการเข้า-ออกจากเขตรั้วศุลกากร</p> <p>- การขนย้ายสินค้าที่ตรวจปล่อยสินค้าขาเข้าแล้วจากท่าต้นทาง เพื่อรับเข้าเก็บในเขตปลอดอากร/เขตประกอบการเสรี โดยผู้จัดตั้งเขตปลอดอากรเป็นผู้รับผิดชอบการตรวจสอบ เจ้าหน้าที่ศุลกากรต้องรับผิดชอบทำการควบคุมการเข้า-ออกจากเขตรั้วศุลกากร</p>	<p>- ใบแนบ ศ.๓ (๙) (ก) เวลาตั้งแต่ ๐๘.๓๐ น. ถึง ๑๖.๓๐ น. ของวันหยุดราชการรายละเอียด ๒๐๐ บาท (ข) เวลาตั้งแต่ ๑๖.๓๐ น. ถึง ๒๔.๐๐ น. รายละเอียด ๒๐๐ บาท (ค) เวลาตั้งแต่ ๒๔.๐๐ น. ถึง ๐๘.๓๐ น. รายละเอียด ๒๐๐ บาท</p>
<p>- ประจําการเพื่อตรวจปล่อยสินค้าและควบคุมการขนสินค้าที่ได้ตรวจปล่อยแล้ว ให้เรียกเก็บค่าล่วงเวลาจากผู้ส่งออก ผู้นำเข้าเป็นรายใบขนสินค้า</p>	<p>- การตรวจปล่อยของที่นำออกจากเขตปลอดอากร/เขตประกอบการเสรี ตามใบขนสินค้าขาเข้าโอนย้ายออกจากเขตปลอดอากร (ประเภท C) และการตรวจปล่อยของที่นำเข้าไปในเขตปลอดอากร/เขตประกอบการเสรี ตามใบขนสินค้าขาออกโอนย้ายเข้าเขตปลอดอากร (ประเภท D) ถือเป็น การตรวจปล่อยสินค้าให้เรียกเก็บค่าธรรมเนียมล่วงเวลาเป็นรายใบขนสินค้าฉบับละ เฉพาะใบขนสินค้าขาเข้าโอนย้ายเข้าเขตปลอดอากร/เขตประกอบการเสรี ที่ติดเงื่อนไขความเสี่ยง</p>	<p>- ใบแนบ ศ.๓ (๕)</p>

APPENDIX F

CORRECTIVE ACTION AND PREVENTIVE ACTION

Page 1 of 2

Form no. WD-FQA 009 Rev. 2

Refer to spec WD-PQA001

Corrective Action Request Report (CAR report)

CEVA Logistics (THAILAND) LTD.

60 Moo 2 Hi Tech Industrial Estate.
Tambol Bang Pho . Amphur Bangpa-In,
Ayutthaya 13160 Thailand
Tel. : +66 35 350 668-71
Fax.: +66 35 350 672

Place/ Audit area: **WDFGI HUB HITECH Thailand**

Referred Standard: _____

- Major
- Minor
- Observation

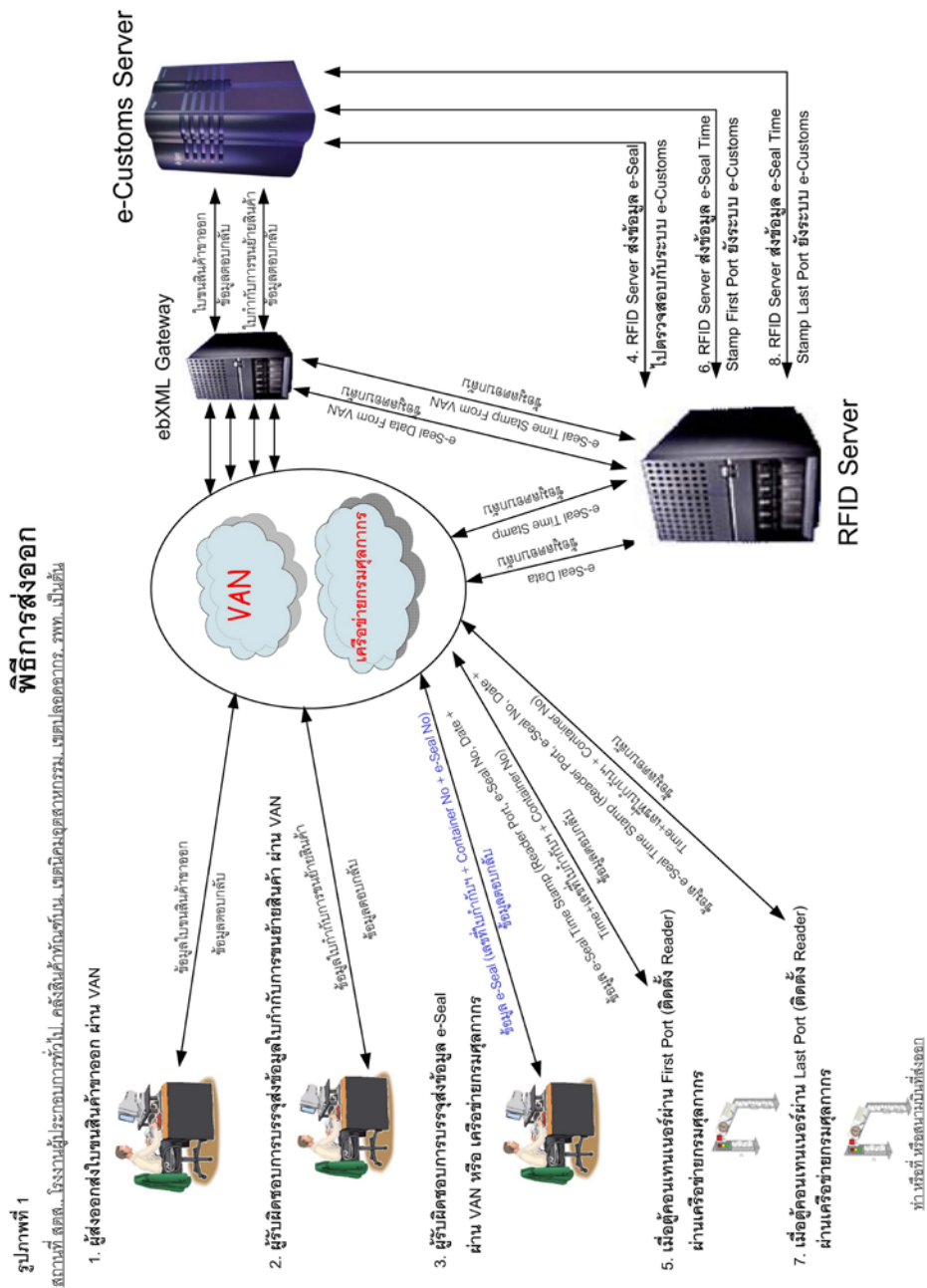
Report No. E10019		
WD Site: CEVA Logistics (Thailand) Co.,Ltd. Hi-tech , Ayutthaya	Reference No.# WD201009304384	DESCRIPTION: Wrong relationship in paperless systems Total Pcs Shipped : 1 Reference number Total Damaged: - Pallet ID: -
Team To Approach/ Auditor	INTERNAL MEMBER/ Auditee	EXTERNAL MEMBER
K. Surakai K. Sawitree	K. Kongsak K. Uthai K. Kittikorn	Natthakorn Saeng-Aroon (WD - Logistic team) Chanpen Duenchai (WD-Logistic team)
START DATE: 30 September 2010		RESPONSE DATE: 7 October 2010
1. Failure Description/ Finding		DATE
What: Wrong data relation in Paperless systems When: 30 September 2010 on 8:19 am. Where:WD-Navanakorn Factory (Mat'L Transferring from Nava factory to FGI Hitech Hub) Who = K. XXXXXXXXXXXX How much = 1 Reference number (WD201009304384)		30-Sep-10
2. Verification – with problem Description		DATE
At 30 September 2010 ,As Khun Natthakorn's information that he found wrong relationship of paperless systems at 8:19 am for Mat'L transferring from WD-Nava to FGI Hitech hub on paperless system. Below is problem detail , Truck License = 70-2843 E-Seal No. = 5806748 Driver name = Weelaphol Ref. No. = WD201009304384 (This reference no is reference number for Agility for Mat'l transferring from VMI Hi-tech hub to WD-Bangpa-in plant) Correct ref. no for CEVA = WD201009304383 (Mat'L transferring from WD-Nava to FGI Hi-tech hub)		30-Sep-10
3. Failure Analysis – With Root Cause analysis		DATE
K.XXXXXXXXXX has wrong mat'l trasferring for data relation in Paperless system due to miss to re-confirm to the reference no. before entry data into system by use refer. No of Agility vendor instrad of CEVA reference no. Root Cause = Human error due to no re-confirm reference no before add relation in paperless system		30-Sep-10

4. Containment Action Implementation	DATE
1)To informed to K. Natthakorn who is WD-Traffic head to support on re-correct data in Paperless systems via mail 2) To corrected shipment data relation follow WD-Traffic instruction 3)To alert all operative staff who work on Nava-factory support for awareness and carefulness to this paperless data entry process	30-Sep-10
5. Exposure & Risk Assessment: Define approximate quantity of non-conforming product shipped to Customer. Provide Risk assessment of said product (DPPM).	DATE
N/A	30-Sep-10
6. Implement Permanent Corrective Actions	DATE
1.Issue Warning letter to Khun XXXXXXXXXXX who make mistaken on this wrong data relation 2.Suspension 5 working days to Khun XXXXXXXXXXX 3. Re-training to all of staff for more understanding and critical process of perless systems 4) To create caution point to the Paperless station for more awareness and remindness to operative staff 5) Supervise by closely monitor and work observation to operative staff who work on paperless process by supervisor	01-Oct-10
7. Prevent Recurrence	DATE
Same as item 6	
8. Verify Effectiveness of Actions with 30 & 60 Day monitoring Reports on CAs	DATE
N/A	
9. Completion verified by Customer and Supplier	DATE
N/A	

Approval by	Date	Verified by	Date
Dept Owner :		Team to approach :	
QA :		CAR/ PAR Status : <input type="checkbox"/> Close <input type="checkbox"/> Open	
SCM:		Reason :	

APPENDIX G RFID FLOW OF E-CUSTOMS

- Flow 1: Customs of export



Source: TIFFA EDI Services

APPENDIX H
CONFERENCE SUBMITTED IN CIT2013







สำนักงานบริหารเทคโนโลยีสารสนเทศเพื่อพัฒนาการศึกษา (UniNet)
สำนักงานคณะกรรมการการอุดมศึกษา
โดย
คณะกรรมการพัฒนาเครือข่ายเทคโนโลยีสารสนเทศเพื่อการศึกษาวิจัย

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National Conference on Computer Information Technologies : CIT2013
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UniNet Network Operation and Management Workshop : UniNOMS2013

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INTELLIGENT EVALUATION FOR E-SEAL ADOPTION IN CUSTOMS

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Abstract

The pilot project of using e-seal in paperless system for e-customs in goods transportation process of e-freezone. The customs department and the Western Digital coordinated to trial during 2007 – 2011 for five years testing in goods transportation between three industrial estates as Nava nakorn industrial estate, Bang pa-in industrial estate and the Hi-tech industrial estate. This pilot project used the new technology of RFID in customs process by using e-seal in the paperless system for control goods transportation. The results showed that the project was successful because government and the private sector are cooperating to design of the system together and all groups of workers were accepted in highest level for the three variables of the compatibility to the organization policy (4.97), the effectiveness of the system (4.80) and the working skills of the stakeholders (4.95).

Keywords: e-seal adoption, e-lock, e-customs, e-freezone, RFID

1. Introduction

1.1 Background and Problem Statement

The objectives of bureaucracy reformation are improved performance of government managed and good governance [1]. That is one of methods to the destination for a good life of people and country stabilization [1].

By the customs department has a policy to use paperless and e-seal (electronic-seal) in e-freezone. The Western Digital as the first company that has been tested in the project. From the experience to work as project manager at that time to develop the e-seal system for the Western Digital Company so that it strongly drives to know the effectiveness of using e-seal in customs and seeking for using it in general. In this pilot project every containers was changed to use e-seal instead of lead seal

and use EDI to exchange data for import and export products between e-freezone and customs officer can monitoring from paperless system. A container was secured by e-seal during a journey if not have a problem (such as, a container was open during transfer) the customs officer is not need to check container again. That is present the vision and important of technology was use in logistic and the process for both Western Digital's operation officer and customs officer are convenience and faster that it need to research for determine what are factors in the adoption and what should be improved and use in the future.

1.2 Objectives

There were three objectives for this research as to evaluate the acceptance status of the stakeholders, to validate the concerning factors of using e-seal for e-customs and also to make use of the research suggestions for enhancing e-customs.

1.3 Scope of the Research

Using data collected by the documentary research, the participatory observation and the in-depth interview. For the in-depth interview, the interviewee consist of five cluster sampling as manager or executive group, data entry group, driver group, IT support group and customs officer group.

2. Literature Review

2.1 Purposes of Thai bureaucracy reform

The main purposes of Thai bureaucracy reform is to create high performance organization and also high ethic

organization [2]. For these concepts, Jantasorn described the evolution of improving organization are as

Adam Smith accepted that the quality of the organization correlates with personal benefits. That causes competitive system, innovations and production tools. Alwin Toffler presented the new administration methods by using ad-hocracy to run big job in the organization and he also presented concept of "Third wave" to change the world to IT period and use IT to develop organization qualities [3].

2.2 Radio frequency identification (RFID)

2.2.1 RFID technology

RFID is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal, or person. Companies use RFID mainly for three purpose: to reduce cost, to better serve customers and to support business growth through for example increasing market share [4].

2.2.2 Electronic seal

Electronic seal is a device developed by RFID. The definition of electronic seal is an e-seal is an electronic seal, which can be applied on physical goods in order to provide the guarantee of important aspects of the protection of those physical goods. The e-seal does not physically protect the sealed goods but can provide propositions and evidence of authenticity and integrity [5].

An e-seals are a special kind of seal that can provide its identification number electronically. An e-seals and similar technology can also be used for logistics devices other than ocean containers, such as airfreight containers or trucks [6]. The truck was locked by e-seal is shown in figure 1.

2.3 Referenced theories

In order to explain the research results, three appropriate theories had been used for reference consists of the adoption theory, the innovation diffusion theory and the S-R (Stimulus-Response) theory.

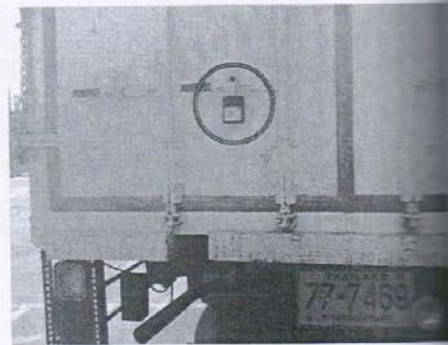


Figure 1 Truck was locked by e-seal

The adoption theory consists of five steps of adoption process [7] for an explanation the preparation of the personnel acceptance the new technology of RFID.

The innovation diffusion theory classified the adopter of new technology by five categories [8] so that used for explain on the job training needs of the personnel for more acceptance of using e-seal in paperless system.

The S-R (Stimulus-Response) or Operant Conditioning theory [9] used to describe the influence of working participation and made use of feedback to develop the working procedures for e-customs.

2.4 Related researches

Dejudompanyachai found in his research about "Factors in the adoption of e-customs in Thailand (A case study in eastern area in 2007)" that affected by the good training program, the clearly regulations, the users knowledge of e-customs and the pressure from concerning industries [10]. According to the RFID was a new technology to support e-customs, Premkumar and Ramamurthy (in Dejudompanyachai) stated that "Technology can make a difference to both the organization and personnel. Thus, the mismatch between technology and human resources may hinder the adoption in technology system" [10]. So that Banerjee and Gollam (in Dejudompanyachai) stated that the technology system used by the organization to be effective or not depended on caring and understanding of personnel with

technology [10]. It was compatibility to Wen et al. concluded their research about determinant of RFID adoption in supply chain among manufacturing company in China that the organization should be given strategic attention to improve employee participation in adopting RFID as a strategic tool [11]. But for the effectiveness of using new technology, Tornatzky and Fleischer suggested that the adoption and implementation of technological innovation would be affected by the technological context, organizational context and the external environment context [12].

3. Research methodologies

3.1 Variable factors

The variable factors that affect the acceptance of e-seal in e-customs are as following:

- Policies of the organization.
- The effectiveness of the system.
- Working skills of stakeholders.

3.2 Data collection

In order to this research emphasizes on the factors that make the stakeholders in the system satisfaction and also can improve their job so that a suitable qualitative research must be used for this research those are:

3.2.1 Participatory observation

The participatory observation for this research occurred between April to October 2008 in the area of practicing e-seal in paperless system for e-customs in e-freezone of Nava nakorn industrial estate, Bang pa-in industrial estate and Hi-tech industrial estate in Ayutthaya. The important evidences found by this observation have been used to fulfillment the research result.

3.2.2 In-depth interview

The in-depth interview with five groups of personnel who concern in this project in order to gathering information about their behaviors opinions feelings and experiences of trying this pioneer of e-customs project. The sample size of 25 interviewees

selected by using cluster sampling method consists of five groups as Manager or executive 5 persons, data entry 5 persons, driver 5 persons, IT supporter 5 persons and customs officer 5 persons.

3.2.3. Documentary research

The documentary research for gathering information from both sides of the customs department and the Western Digital Company consists of organization policies, working processes of adoption e-seal, result of using e-seal for customs and also planning for enlargement in the future.

3.3 Data analysis and presentation

Using five levels of Likert scale to determine the level of acceptance of the samples in every questionnaire and using mean (\bar{x}) and standard deviation (S.D.) to explain the results of acceptance level both finds in the each group and as a whole. The ranking score as showed in table 1. For the documentary research, the important evidences must be pointed out to explain the working process and results of using e-seal for customs in both sides of the customs department and the Western Digital Company and using the descriptive method to explain the results of studies and present them in tabulation.

Table 1 Showed the ranking score of acceptance

Level	Score	Definition
5	4.51 – 5.00	Strongly agree
4	3.51 – 4.50	Agree
3	2.51 – 3.50	Neither agree or not
2	1.51 – 2.50	Disagree
1	1.00 – 1.50	Strongly disagree

Flowchart of this research is shown in figure 2.

4. Results

4.1 Results from the in-depth interviews

Besides the level of acceptance of the concerning groups as showed, the conclusions of acceptance level for the whole concerning personnel could show as in the table 2

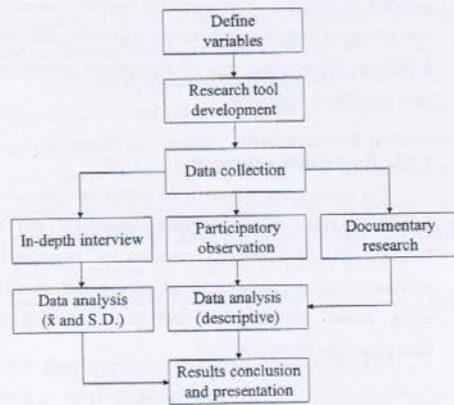


Figure 2 Flowchart of this research

Table 2 Showed acceptance level of using e-seal in paperless system

	G1	G2	G3	G4	G5	\bar{x}	S.D.
V1	5	5	5	4.87	5	4.97	0.05
V2	5	4.6	4.4	5	5	4.8	0.25
V3	5	4.8	4.93	5	5	4.95	0.78

Note

G1 = The managers and the executives group, G2 = The data entry group, G3 = The driver group, G4 = The IT support group, G5 = The customs officer group

V1 = Policy of the organization, V2 = The effectiveness of the system, V3 = Working skills of stakeholders

From the table 2 it obviously showed that the whole stakeholders accepted for using e-seal in paperless system at highest level of the three variable factors as the acceptance level of 4.97 for the policy of the organization, the acceptance level of 4.80 for the effectiveness of the system and the acceptance level of 4.95 for the working skills of the stakeholders.

This result showed that the pilot project of using e-seal in paperless system for goods control in e-freezone had been accepted for the three variables of the compatibility to the organization policy, the effectiveness of the system and the working skills of the stakeholders.

4.2 Results from observation

From the documentary research and participatory observation on using e-seal in paperless system in pilot project which the Thai Customs department and Western Digital Company trialed in e-freezone of Nava industrial, Bang pa-in industrial and Hi-tech industrial between 2007 and 2011. The results of the research can be summarized are as followings

4.2.1 Concepts and the purposes of the system

On May 9, 2006. The customs department signed a letter of intent to implementation the standard of World Customs Organization (WCO) to operate the customs system. In every year, WCO has to held a conference to specify an appropriate strategy to run out together that will cause every country to follow up in order to set the international standard to facilitate cross-border trades and securing the international trade supply chain so that Thai customs department and the associated agencies have to do in both import and export customs process.

Thailand vision towards a Knowledge-Based Economy 2001-2010 (IT2010) plan defined the five flagships to lead Thailand to be a knowledge-based society with both economic prosperity and social stability. It obviously showed that the customs department plan was compatibility to the first strategy (e-government) in the fifth topic of the IT2010 plan determine the government services to use IT to improve service efficiency to be more convenience, fast, thoroughly and more efficiency and also the third strategy (e-industry) in the second topic of the IT2010 plan determine to support the industry development by using IT for more competitive. For this reason, the customs had implement using RFID in customs logistic system with Western Digital for a five years pilot project of using e-seal in paperless system to control the transportation of goods between three industrial estates. This pilot project was using e-seal and GPS to control and tracking the containers of hard disk drive parts that import from foreign country that exempt from tax under the free zone benefits to assembly in another estate (e-freezone) for export only. The Western Digital invested all equipment

and employed TIFFA EDI Services to develop the system of using e-seal and paperless system with the customs department to make the control system more security so that this pilot project responsible to both the customs department and the private sector to improve e-customs for enhancing in the future.

4.2.2 Evolution of the system

Thailand was the first country in Southeast Asia to bring the tracking system by using RFID technology for checking and tracking goods in complete customs system in order to create more competitive, decreasing working steps to facilitate customers, decrease the elapsed time and cost for exporter. In the year 2008, the customs department launched it budget of 95 million baht to setup computer server for collect and evaluate electronic data in standard format that the user of RFID technology must be fixed to the system by using radio frequency to send the data thru electronic device called "e-seal" that equipped in the closing door of the container of the truck or van opaque. By this system, e-seal will send signal to the RFID reader device that post at the specified location when the reader receives the signal it will send the data into the customs computer network in order to evaluate in transfer order document, invoice and manifest data in electronic forms so that it will provided enough and prompt administrative data, management data and customs risk management data for the customs officers to practice and use the update data for their jobs. It means that the process of collecting customs tax will be more efficiency. Since the year 2005 besides the using of RFID technology in customs for free zone of Western Digital, The customs department also testing the RFID technology for instant transportation goods from Sa-dao customs barrier (Customs department region four) to bonded warehouse of Friendly Group Co., LTD. In the year 2006 and also for control goods container from Lam chabang terminal port to ICD Lad kra bang in the year 2007. These showed that the RFID technology made use for control and tracking goods transportation for various types that compatibility for multimodal transport include via road freight, sea freight and air freight.

4.2.3 Process to develop a complete e-customs

After using e-seal for four years, the Western Digital and the customs department desired to use e-lock. The newest device (e-lock) is e-seal combined with GPRS and GPS properties in one device for controlling goods transportation from Hi-tech industrial estate to Suwannabhumi airport cargo. In October 2011, the mega flood occurred and damaged all RFID readers of this project caused the Western Digital designed to use e-lock instead of e-seal because of cost benefit and more efficiency for investment. Nowadays (2012), the Western Digital is allowed to use e-lock in goods transportation from Hi-tech industrial estate to Suwannabhumi airport cargo for testing e-customs system one shipment dairy. Moreover for the ASEAN level, the AEC will effective in 2015, Thai customs department has been prepared for cross border trade by using NSW (National Single Window) to exchange international customs data for ACDD (ASEAN Customs Declaration Document) or sharing the transfer order documents among ASEAN countries for cross border trade so that it is necessary for Thai customs department to develop working system of using e-lock for e-customs in general. The technology and the man power for using RFID are already prepared just only wait for launching customs regulations.

4.2.4 Benefits from a pilot project of using e-seal

- The e-seal was used for tracking goods transportation and collecting the essential data for evaluation or determines customs risk decreasing customs tax, preventing customs tax evasion and creating common data for new dimension of customs control.
- Reduce checking process for customs officer at checking post so that it also reduces the human errors.
- The efficiency of decrease operational cost and elapse time.
- Safety for social and international trade.
- Decreased officer judgments that might be cause corruptions and bribes in customs process.
- Decrease entrepreneur's cost. For this documentary research found the Western Digital decreased operational costs such as employee wages,

over time payments, reduced the amounts of paper used about 39,000 sheets per month or 475,200 sheets per year and also reduced the whole expenses for transportation by 60 percent.

4.2.5 The personnel's working skill development

The training for personnel's working skill was very important and had been done besides the administration reform as making a "Learning Organization". There were setting up specified training courses appropriated for each concerning group to reach the training needs of the trainees as manager and executive group, data entry group, driver group, IT support group and customs officer group.

5. Discussion

The reason for acceptance of organization policy were that by using e-seal in paperless system was directly response to improve the customs services for the "world class customs" strategies and responsible to the bureaucracy reformation that emphasized on services improvement, participation from private sectors and made use of IT in administration system for more transparency, fair practices and accountability. The stakeholders showed a significant of the highest acceptance average level of 4.97 and its standard deviation of 0.05.

The effectiveness of the system found that the pilot project created a standard of safety in customs control in order that the system could serve for tracking goods transportation, decreasing the human errors, decreasing the working steps of goods inspection to save the usage time and expense for personnel and also for the entrepreneur could save their expense of paper used and payment for goods transportation by 60 percent. The factor of effectiveness of the system had been accepted for all groups at the highest acceptance level of 4.8 and its standard deviation of 0.25.

The working skills of the stakeholders were caused by the coordination of the administrator of three concerning parties (The customs department, The Western Digital and the TIFFA EDI Services) to setup

and appropriated working system, setting up clearly orders and regulations for practices with working manuals and prepared specified pre training course for each group, setup an expertise matrix skills of three levels for coaching their personnel and made use of the system for directed communication among the stakeholders for prompted problem solving. The feedback from the system had been used to improve working procedures and informing each other's so that the average acceptance level for this factor was in the highest level of 4.95 and its standard deviation of 0.78.

6. References

- [1] P. Surin, *A guideline to Television of Thailand development in SDU system*, Office of the Civil Service Commission, Bangkok, 2007.
- [2] S. Todsaporn, *Introduction to Modern Public Management*, Office of the Public Sector Development Commission, Bangkok, 2006.
- [3] J. Woradej, *Development of the Thai bureaucratic system*, Prime Minister Office, Bangkok, 2001.
- [4] Z. Usmani, F. Alghamdi, A. Tariq, and T. Puri, (2012, Dec. 1), *Besides Tracking – RFID Marketing and Beyond*, [Online] Available <http://www.scielo.cl/pdf/iotmi/v4n1/art03.pdf>
- [5] C. Decker, M. Beigl, A. Krohn, P. Robinson and U. Kubach, *Pervasive Computing*, Springer Berlin Heidelberg, Austria, 2004.
- [6] K. Hayashi, *An e-Seal in Container Security Program: How to maximize the benefits of e-Seal in the battle against terrorism*, New York University, New York, 2007.
- [7] E. M. Rogers, *Diffusion of Innovations*, Free Press, New York, 1962.
- [8] E. M. Rogers, *Diffusion of Innovations* (4th ed), Free Press, New York, 1995.
- [9] B.F. Skinner, *Verbal Behavior*, Appleton-Century-Crofts, New York, 1957.
- [10] D. Wirot, (2012, Dec. 1), *Factors in the adoption of E-custom by companies in Thailand (Eastern area of Thailand as a case study)*, [Online] Available <http://journal.nida.ac.th/journal/attachments/%E0%B8%9C%E0%B8%9A%E0%B8%97%E0%B8%94%E0%B8%93%E0%B8%92%E0%B8%91%E0%B8%90%E0%B8%8F%E0%B8%8E%E0%B8%8D%E0%B8%8C%E0%B8%8B%E0%B8%8A%E0%B8%89%E0%B8%88%E0%B8%87%E0%B8%86%E0%B8%85%E0%B8%84%E0%B8%83%E0%B8%82%E0%B8%81%E0%B8%80%E0%B8%7F%E0%B8%7E%E0%B8%7D%E0%B8%7C%E0%B8%7B%E0%B8%7A%E0%B8%79%E0%B8%78%E0%B8%77%E0%B8%76%E0%B8%75%E0%B8%74%E0%B8%73%E0%B8%72%E0%B8%71%E0%B8%70%E0%B8%6F%E0%B8%6E%E0%B8%6D%E0%B8%6C%E0%B8%6B%E0%B8%6A%E0%B8%69%E0%B8%68%E0%B8%67%E0%B8%66%E0%B8%65%E0%B8%64%E0%B8%63%E0%B8%62%E0%B8%61%E0%B8%60%E0%B8%5F%E0%B8%5E%E0%B8%5D%E0%B8%5C%E0%B8%5B%E0%B8%5A%E0%B8%59%E0%B8%58%E0%B8%57%E0%B8%56%E0%B8%55%E0%B8%54%E0%B8%53%E0%B8%52%E0%B8%51%E0%B8%50%E0%B8%4F%E0%B8%4E%E0%B8%4D%E0%B8%4C%E0%B8%4B%E0%B8%4A%E0%B8%49%E0%B8%48%E0%B8%47%E0%B8%46%E0%B8%45%E0%B8%44%E0%B8%43%E0%B8%42%E0%B8%41%E0%B8%40%E0%B8%3F%E0%B8%3E%E0%B8%3D%E0%B8%3C%E0%B8%3B%E0%B8%3A%E0%B8%39%E0%B8%38%E0%B8%37%E0%B8%36%E0%B8%35%E0%B8%34%E0%B8%33%E0%B8%32%E0%B8%31%E0%B8%30%E0%B8%2F%E0%B8%2E%E0%B8%2D%E0%B8%2C%E0%B8%2B%E0%B8%2A%E0%B8%29%E0%B8%28%E0%B8%27%E0%B8%26%E0%B8%25%E0%B8%24%E0%B8%23%E0%B8%22%E0%B8%21%E0%B8%20%E0%B8%1F%E0%B8%1E%E0%B8%1D%E0%B8%1C%E0%B8%1B%E0%B8%1A%E0%B8%19%E0%B8%18%E0%B8%17%E0%B8%16%E0%B8%15%E0%B8%14%E0%B8%13%E0%B8%12%E0%B8%11%E0%B8%10%E0%B8%0F%E0%B8%0E%E0%B8%0D%E0%B8%0C%E0%B8%0B%E0%B8%0A%E0%B8%09%E0%B8%08%E0%B8%07%E0%B8%06%E0%B8%05%E0%B8%04%E0%B8%03%E0%B8%02%E0%B8%01%E0%B8%00>

[A7%E0%B8%B4%E0%B9%82%E0%B8%A3%E0%B8%88%E0%B8%99%E0%B9%8C.pdf](#)

[11] L. Wen, S. Zailani, and Y. Fernando, "Determinants of RFID Adoption in Supply Chain among Manufacturing Companies in China: A Discriminant Analysis", *Journal of Technology Management & Innovation*, 4(1), 2009, pp. 22-32.

[12] L.G. Tornatzky, and M. Fleischer. *The Processes of Technological Innovation*, Lexington Books, University of California, 1990.

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