A FEASIBILITY STUDY OF THE SMART GARDS SYSTEM APPLICATION AT THE CUSTOMS DEPARTMENT

by

Ms. Thiraporn Phosaard

A Final Report of the Three - Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
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Project Title	A Feasibility Study of the Smart Cards System Application at the Customs Department
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The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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ABSTRACT

This project is conducted to the Administration System Analysis and Design of Royal Thai Customs Department, in particular to the emphasis on the Bangkok Port Customs Import and Export Bureau. The possibility of investment is assessed both qualitative and quantitative analysis. Analyzing problems of the existing system, the users' requirements are essential factors in formulating the appropriate solution as the recommended system.

The main purpose of this project is to present analysis of the current administration system, especially the Customs procedures, the import and export procedures, and the clearance of goods. Thus the Smart Card is designed as a proposed system that is strongly determined to solve the problems of the Customs Department so as to create better understanding and a new image by streamlining the working process (paperless), organizational management, human resources development, including the participant of the private sector for joint cooperation on the resolution of problems. The proposed system is specified by user requirements.

Nevertheless, smart card system still plays an important role to many businesses in Thailand, so the trend of smart card progression is expanding to many features and applications in the near future. Assessment of risk evaluation is a basic tool for supporting the recommended system. Further, the feasibility analysis for the proposed system leads to the decision of the investment, including cons and pros of the smart card system when is installed in the Customs Department. Gantt chart or implementation plan of the proposed system is defined briefly and easily to understand in real task and the highest productivity or beneficial outcome will be achieved by investing on the recommended system. Finally, the recommendation will also help to support the security system as a new feature in Thailand.

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I. INTRODUCTION

1.1 Background of the Project

Towards the end of 1997, the Customs Department initiated a Customs modernization reform program. Up until now, several measures have been launched to improve the services given to the public by focusing on the simplification of Customs procedures and, in particular, on facilitation to importers and exporters. With its strong determination towards service improvement, the Customs Department has since in the beginning of the fiscal year 1998 realigned the principal service.

In the present, many new technologies have been invented and developed in order to facilitate people satisfaction in their daily lives. Such technologies play an important role to personal needs and they still play an important role to the business area in the world. Not only the foreign countries have been developing high technologies but also there are many occurring changes in innovation in Thailand. Especially, Management Information System (MIS) which compounds with many parts in the system and operation such as the Internet system, Information Technology (IT) system, Asynchronous Transfer Mode (ATM), Electronic Fund Transfer (EFT), Electronic Data Interchange (EDI), etc. Because of their efficiency, they have more effects with many businesses and government organizations that work for a lot of information or data transaction.

Smart Card, which is a plastic card, embedded microcomputer chip for data storage, supervision and security. It is a new generation of portable computer. The smart card is a modern technology used in the Customs tasks speeding up procedures, drawback, and development of International Customs enforcement for the protection of honest entrepreneurs, risk assessment, and development of human resources. The

system will create morale on rendering services based on the principle of good governance, and creating more credibility and transparency.

This project is conducted to analyze and improve the administration system of The Royal Thai Customs Department, which has the main roles of collecting revenue and facilitating business transactions both domestically and internationally. It emphasizes on the Import-Export Department of seaboard. Nowadays, there is the expansion of many the import and export businesses in Thailand so the entrepreneurs have to prepare and collect many documents for the execution of Customs formalities, the import and export procedures, and the clearance of goods. The Customs Department is regarded as the country's import and export gate, being tasked with the examination of imported and exported goods to see if they comply with Customs regulations, for instance whether such goods are accompanied by a correct license from the concerned agency if they are so required. The Customs official play an important role to check all related documents and inspect the import and export goods before releasing from the Bangkok Port. They keep documents in files or folders that make them be difficult to look for and it is also a waste of time and process is costly. Because of slow and repeated process, it will affect in increasing in bribery between the entrepreneur or shipping and the officer is easily.

Moreover, this organization must work on many paper-documents related to entrepreneurs' data. The existing system is collecting data to be files or folders that people work many steps in operation. Hence, it has to reduce the waste of time, cost, and unnecessary documents so that the processes will reduce in each step to the system.

Fortunately, the smart card system is considered to be a proposed system. Because of high security, the smart card system will protect the unauthorized users who want to access this system. For the potentiality of smart card, it will also prevent the bribery in

the organization. All entrepreneurs' data are kept in only one card that is designed for text store thus, they can use it to contact and operate transaction without many documents. Additional, it also simultaneously gives users the satisfaction they want from their work and it still gets the productivity and efficiency it needs to look-over the new features in the future.

1.2 Objectives of the Project

The objectives of the project are to evaluate and develop the existing system by designing the smart card system to be the proposed system. To analyze the possible factors that have direct effect on work performance and identify the users' requirements of a new system. Furthermore, it will show many applications of Thai Customs Department Smart Card in the future. There are recommendations of the steps needed to penetrate the new system to all users, including feasibility analysis on the proposed system to check whether it provides the worthwhile solution.

1.3 Scope of the Project

The scope of the project is to study only The Customs Department in Thailand, especially the Import-Export Department of seaboard. It analyzes the administration system that collects a lot of information on paper work and improves it. To identify users' requirements which the current system cannot achieve. To suggest the smart card system as the proposed system for long-term solution and to recommend the trend of smart card features in Thailand.

II. LITERATURE REVIEW

This chapter will propose the definition and features of smart card, the history and evolution of the smart card. Furthermore, it also provides the structure of smart card, types of smart card including advantages and disadvantages, and the application of the smart card in several areas. Also, the theories about data flow diagram and economics are necessary for the analysis of this project.

2.1 Definition of Smart Card

According to McCrindle (1990), a smart card is defined as a plastic card, usually about the same size as a magnetic stripe card that has electronic logic to store data and, in some case, a microprocessor that can process data.

Bright (1988) also defined the smart card as a portable data storage device with intelligence and provisions for identity and security.

Therefore, smart card can be defined as a plastic card in which a specialized microprocessor chip is embedded for data storage, supervision and security.

Like other computers the smart card can be programmed to do any task within its processing power and memory capacity. Data stored in card memory are managed by the microprocessor, which continuously supervises data flow and access restrictions. Card memory may be divided among different files whose access rules are separately established.

Its practical applications can be divided into three broad categories:

(1) Data carrier. Here the card is used as a convenient, portable and secure means of storing information; for example, medical records or equipment maintenance records.

(2) Identification. Here the card provides a secure means of identifying the holder so as to allow access to a computer or a football stadium, for example.

(3) Financial. Here the card can be used for transactions as a replacement for cheques or pensions, for example.

Some applications fit into more than one of these categories. For instance, a smart card acting as a train season ticket would provide both identification at the ticket barrier, or on the journey, and financial payment for the journey.

In addition, the card is not restricted to a single application. It could contain emergency medical data relating to the cardholder (data carrier), provide a means of gaining access to a building where the person works (identification), and be used in vending machines at the place of work (financial) (McCrindle 1990). Figure 2.1 shows just a few of the many applications for which smart cards can be used. This is by no means a comprehensive list - applications are limited only by one's imagination.

Figure 2.1. Some of the Many Applications of Smart Card (McCrindle 1990).

2.2 Security Features

One of the most important features of the smart card is security. It is of primary importance in many of the applications to which the smart card can be put. For instance, when used as a medical card, the card must be able to protect sensitive data from access by unauthorized persons or, when used in financial applications, it needs to be very secure to prevent monetary fraud. Unlike passive devices, such as magnetic stripe cards, the smart card, with its on board computing power, is able to use its "intelligence" to counter attacks from unauthorized persons intent on fraud or on reading confidential data stored in the card.

Security features to prevent such attacks can be grouped under the three headings:

(1) Physical and manufacturing security.

(2) Personal identification security.

(3) Communications security.

2.2.1 Physical and Manufacturing Security

Smart cards are very difficult to reproduce without the right facilities and expertise. Manufacture of the chips requires very complex and expensive equipment-not the type of equipment that could easily be obtained by a "small-time" criminal and set up in a back room for the manufacture of fake cards. Even if stolen chips are used, their bonding to the substrates and their encapsulation into the card both require specialized equipment. Custom chips for smart cards are not publicly available and would not be easy to obtain. Also, any attempt to decipher the contents of a chip from an existing card would, at least, need access to an electron microscope.

2.2.2 Personal Identification Security

There was a security threat from someone stealing a card from the owner and presenting it at the system for personal gain. Currently, for magnetic stripe cards, the

most commonly used method of identifying the owner of a card is the PIN. The card is entered into the system, the identity number stored on the card is read by the system and the PIN is generated from it by an algorithm. This is compared with the PIN typed in on a keypad by the person who presented the card. If the two agree, then it is assumed that the person presenting the card is the genuine owner of the card. Alternatively, the PIN may be stored in the host computer instead of having an algorithmic link with the identity number.

Where PINs are used, the smart card offers four distinct advantages over magnetic stripe cards as follows:

(a) As it has computing power, the smart card can carry out the PIN comparison itself and does not have to reveal its identity number to the system, thus avoiding a security weakness of the conventional system.

(b) The PIN that is keyed in can be encrypted and, because the smart card has intelligence, can be decrypted by the card. So, if somebody succeeds in tapping the line, the PIN cannot be read.

(c) The card can recognize whether a number of attempts are being made to enter different numbers until the correct PIN is found. After a set number of attempts (three for instance), it can invalidate itself so that it cannot be used again until it is reinitialized by the card issuer. On line magnetic stripe card systems can equally offer this feature but the number of failed attempts is stored on the system computer rather than the card.

(d) With a smart card, the owner is able to change the issued PIN, any number of times, to a different one which may also be more easily remembered. The card could even be programmed to protect the user against himself by refusing to accept a PIN which is too obvious, such as 1234. With magnetic

stripe cards, the banking system allows only one change of PIN.

Identification, through the use of a PIN or password, can only prove that someone knows the key to the system. It does not prove that the person using the card is the authorized cardholder. So, in this example, somebody who has difficulty remembering the PIN, and has written it on the card, provides all that is necessary for the card thief to gain access to the system. To link the person positively to the card requires some additional or alternative method of personal identification.

The memory capacity of the smart card makes the use of alternatives possible. These alternatives are known as "biometrics" which involve the measurement of a unique personal characteristic of the cardholder, followed by digitization of the measured characteristic and the recording of it in the card. Some of the characteristics being considered for this purpose are dynamic signature verification, fingerprint, voice patterns, hand geometry, and retinal eye patterns. The biometrics is shown in Figure 2.2.

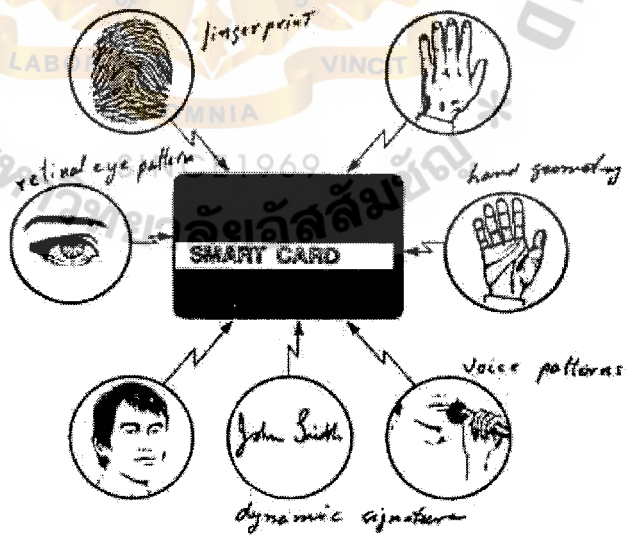


Figure 2.2. Biometrics Methods for Unique Identification of the Cardholder (McCrindle 1990).

(1) Dynamic Signature Verification

There are two ways of checking whether a signature is genuine: dynamic, which traces the way in which the signature is written; and static, which compares the way the signature looks after it is written. Dynamic signature is shown in Figure 2.3.

Analysis of the dynamics of writing offers important and useful distinctive features for the recognition process. It is much more difficult to copy the way a signature is written than it is to copy a signature for static checking.

Figure 2.3. The "Sign/On" Dynamic Signature Tablet Can Operate with the GEC Contactless Smart Card (McCrindle 1990).

(2) Fingerprint Verification

The location and orientation of these small features are used by both manual and machine methods of verification. There are, typically, between 50 and 200 minutiae per finger and 20 are sufficient for positive identification.

Manual methods of identification include dusting areas with powder to develop prints, and taking fingerprints from suspects using an ink pad. Machine identification is usually carried out by placing the finger on a reading area where a technique, such as total internal reflection with a glass plate, is used to create an image of the print. The image is then scanned to determine the location and orientation of the minutiae. Variations in the exact positioning of the finger on the plate may make it necessary for the computer to be able to rotate the image until a best match is made.

In tests, it was found that it was more difficult to identify prints in cold weather but easier with dirty, particularly greasy, fingers. There was a higher error rate for women than for men, and manual workers and people with DIY hobbies were difficult to identify.

Fingerprint identification is said to be unpopular with the public because of its association with criminal investigation. It requires, typically, between 300 and 1,000 -plus bytes of memory to record a fingerprint.

(3) Voice recognition

For a computer to be able to recognize a voice, it has to be programmed to compare measured features of the voice with a recorded original. Typically, when first introduced to the system, a subject is asked to speak certain words and phrases into a microphone. The voice pattern is then analyzed to extract the necessary information required for identification.

Research has found that particular speaker training techniques can reduce the number of errors in voice recognition systems but factors outside the speaker's control, such as throat infections or emotional stress, can

affect the voice to the extent that he or she will be rejected.

(4) Hand Geometry

Research has shown that individual hands have unique features such as finger lengths, skin web opacity and radius of curvature of fingertips. Systems have been produced which measure hand geometries by scanning with photo electric devices.

(5) Retina Pattern Verification

The subject's retina is scanned using a low intensity infra-red beam as shown in Figure 2.4.

Figure 2.4. Eye-Dentify Retinal Pattern Verification System (McCrindle 1990).

For a comparison of the principal biometrics techniques which have just been described as in the Table 2.1.

Table 2.1. Comparison of Principal Biometrics Identification Methods (Zoreda 1994).

Characteristics	Typical memory requirements	Typical false acceptance
Signature	40-200 bytes	1 in hundreds
Fingerprint	300-1000 + bytes	1 in million
Voice	100-200 bytes	1 in thousands
Hand geometry	10-200 bytes	1 in thousand
Eye retina	30-40 bytes	1 in billions

2.2.3 Communications Security

To be of any use, all cards, unless they are only used for visual identification purposes, have to communicate with another device.

Since security is one of the main features of smart cards, smart cards may also be able to test (or "challenge") the eligibility of the external device being used for data reading. Unauthorized access is avoided by the card, by reversible self-blocking or even by self-destruction. Moreover, built-in data enciphering is included in many cases. These features make smart cards the best solution for carrying sensitive information and for applications in restricted environments.

As data security is provided by the card itself, off-line operations and transactions (i.e. transactions conducted without a connection to a centralized system) can be safely carried out. This opens up the number of applications, as off-line transactions can be performed in many places and situations where on-line transactions are not applicable, such as vending machines, phones, parking lots, public transports, and the like. Several independent applications may be implemented in the same card (Zoreda 1994).

2.3 The History of Smart Cards

Wolfgang and Wolfgang (1997) said that the proliferation of plastic cards started in the USA in the early 1950s. The low price of the synthetic material PVC enabled the production of robust, long-lasting cards, much more suitable for use in everyday life

than the previously conventional paper or cardboard equivalents, which were not equipped for coping with mechanical and climatic damage.

Today, plastic cards allow the traveller to shop across the world without cash. The holder is never without means of payment, yet avoids exposure to the risk of loss through theft or other hazards which are difficult to guard against, particularly whilst travelling. Besides, having a card does away with tedious currency exchange when travelling abroad. These unique advantages have helped plastic cards to become widely and rapidly established world-wide. Many hundreds of millions of cards are now produced and issued annually.

At first, the cards' functions were quite simple. Initially, they served as data-carriers protected against forgery and tampering. The general data, such as the issuer's name, was surface-printed while individual data elements, like the cardholder's name or the card number, were embossed. Furthermore, many cards carried a signature field, in which the holder could sign his or her name for reference. Protection against forgery, in these first-generation cards, was provided by visual features, such as security printing and the signature field. As consequence, the system's security depended quite fundamentally on the quality and care of the retail staff accepting the cards. However, this was not a huge problem due to the cards initial exclusivity. With increasing proliferation, these rather basic features no longer proved sufficient, all the more so since the danger represented by organized crime was growing apace.

On the one hand, the increasing pressure of handling and bank charges made a machine-readable card necessary; and on the other, the card-issuers' losses due to customers' insolvency and fraud grew from year to year. It became apparent that security measures against fraud and tampering, as well as the cards' functions, had to be extended and improved.

The first improvement consisted of a magnetic stripe on the back of the cards. This allowed further digitized data to be stored in machine-readable form, in addition to the visual data and that obtainable by printing out the embossed data. This type of embossed card with a magnetic stripe is still the most commonly used as a method of payment.

Magnetic stripe technology suffers from a crucial weakness, however, in that the data stored on the stripe can be read, deleted and rewritten at will by anyone with access to the appropriate read/write device. Hence, it is unsuitable for the storage of confidential data. Further measures are needed to ensure confidentially, as well as to protect against tampering. That is why most systems which employ a magnetic stripe card are connected on-line to the system's host computer. However, this generates considerable costs related to the need for data transmission. In order to keep costs down, a solution had to be found enabling card transactions to be executed off-line, but without putting the system's security at risk.

The development of the smart card, in parallel with the expansion of electronic data-processing, opened up completely new possibilities for solving this problem. The huge progress in microelectronics in the 1970s made it possible to integrate data storage and arithmetic logic on a single silicon chip measuring a few square millimetres. The idea of incorporating such as integrated circuit into an ID card was announced, and a patent applied for by the German inventors Jurgen Dethloff and Helmut Grotrupp, as far back as 1968. This was followed by a similar application by Kunitaka Arimura in Japan in 1970. However, the first real progress came with Roland Moreno's announcement of his smart card patents in France in 1974. It was only then that the semiconductor industry was able to supply the required integrated circuits at a reasonable price. Nevertheless, many technical problems still had to be solved before the first prototypes,

with two partly-integrated chips, became a reliable product which could be manufactured with sufficient quality, in large number and at sensible price.

The great breakthrough was achieved in 1984, when the French PTT (Postal and Telecommunications Services) successfully carried out a field trial with telephone cards. Significantly, the breakthrough came not in the traditional bank card market, but in a new application. Such an application enjoyed the great advantage that no account needed to be taken of compatibility with existing systems, and thus the options offered by the new technology could be fully exploited.

A comparative pilot project was conducted in Germany in 1984-1985, using telephone cards based on a variety of technologies: magnetic stripes, optical storage (so-called holographic cards) and smart cards.

The smart card proved the hero of this pilot study. In addition to a high degree of reliability and security against tampering, smart card technology promised the greatest flexibility in future applications.

With the general expansion of electronic data-processing in the 1960s, the field of cryptography experienced a quantum-leap. Modern hardware and software permitted the implementation of complex and demanding mathematical algorithms, which made possible a degree of security unparalleled till then. Moreover, this new method was available to anyone, whereas previously cryptography had been a covert science and the preserve of military and secret services.

With these modern cryptographic procedures, the power of the security mechanisms built into electronic data-processing systems could be proved mathematically. It was no longer necessary to rely on the very subjective assessments used in conventional methods.

The smart card was the ideal medium for ensuring a high degree of security, based on cryptography and available to everyone, since it could safely store secret keys and carry out cryptographic algorithms. In addition, smart cards are so small and so effortless to use that they can become a part of everyday life. Thus, the chip-incorporating bank card made possible the highest degree of security in the field of private payment transactions.

Especially in European countries and Japan, smart card has been pervasively applied in many aspects such as payment card or personal record card. Malaysia also plans to introduce an electronic national smart card which will incorporate the identity card, driving license and passport. The card would include features such as the capability to withdraw cash from banks, contain one's health data, traffic offences, convictions and immigration violations. The smart card would allow immigration check points to clear travelers faster and it also contains the holder's photo and thumbprint in an embedded microchip (Bangkok Post 2000).

In Thailand, on August 1993, Thai Farmer Bank incorporated with Loxbis (Thailand) Co., Ltd., Gemplus Technology Asia Co., Ltd. and Veriphone (Singapore) Co., Ltd. had issued smart card in the form of credit card. TFB-Smart card, as its name, was a card which magnetic stripe card was attached on the back and microchip was embedded on the left side of the card for health record, secret code of cardholder, etc.

In the middle of 1995, Thai Military Bank had also done smart card market survey and in the beginning of 1996 they launched credit card which microchip has attached on the left side of the card as a card that is widely used in the present.

However, we have seen the smart card can influence to the people (cardholder) two years ago and some company start to join their smart card with other company or government sections.

Starting with the EGV Co., Ltd., movie theatre business, and the Microbus, transportation company, these two companies design the smart card to apply to their business with the purpose of the convenience of the card holder. So, we can use this Smart card to buy ticket' movies and bus ticket. It can be refilled when the credit is not enough. They also announce to expand their company's member in the future with the purpose to see the smart card as the multipurpose card.

Later, the Shell (Thailand) Company also had an idea to join with many companies such as Robinson Department Store, Shinawatra Communication company, etc. to design the "Smart Point" project. This project will provide to their member (Cardholder). Whenever the cardholder use their smart card, the cardholder can collect the "point" which is set by the company in the same time to get the reward in the end of the year. This rewards include the air ticket, monetary, gift, etc. which can attract the cardholder to use the card. From this case, we can see how to use IT/IS concept and marketing strategy together to apply in "smart card."

On February 1997, Caltex incorporated with Thai Military Bank and Posnet (a branch of Samart Corporation) also launched the electronic card, called "Star card" which is the first form of smart card for filling gas in the gas station. They aimed at penetrating in the large sized companies and organization that need to effectively control the gas expenses.

Further, CP Seven-Eleven Co., Ltd., in corporation with three large banks (Krung Thai Bank, Bangkok Bank, and Thai Commercial Bank) and the international investment group, on behalf of cashcard group, have set up the company which will be expected to finish at the middle of next year. With this corporation, they will provide services about e-money under the "E-Purse" project. Such e-purse is in the form of smart card or chi card that can record as much information as the purse. Also, in the

future Seven-Eleven has aimed to develop e-purse (in the form of smart card) to be the perfect e-purse, that is, it can be used as telephone card, bus card, taxi card, BTS skytrain card including ID card and driving licence card (ไทยรัฐ 2543).

Recently, the Thai government section also change the previous "ID. Card" into new "Smart ID. Card." This smart card can combine many important information in many areas such as police station, tax department, etc. This smart card can be used in many government section and provide the more convenience for the cardholder.

Therefore, smart card's high functional flexibility, which allows a card already in service to be reprogrammed for new applications, has opened up completely new fields beyond the card's traditional applications.

2.4 Evolution of Smart Card

The evolution of the smart card is the story of two parallel product developments that were to merge into one product in the 1970s. The two products are the computer, or to be more specific a miniaturized computer – the microcomputer chip, and the magnetic stripe card.

2.4.1 The Microprocessor Chip

The history of the computer could be said to begin when man was first faced with performing calculations and recording data. Early forms of computing devices included the abacus which allowed calculations to be performed by moving beads on a frame of rods and wires according to a set of rules.

The first mechanical calculator is considered to be the invention of a French philosopher, Blaise Pascal. The Pascaline, as his machine was known, could add and, if adjusted, subtract. It consisted of interlocking cogs and wheels on different axles. The rotated when a number was dialed and the result was shown in a small window.

In the early nineteenth century Babbage pushed the development of the computer forward with the invention of his "Difference Engine." This was designed to perform arithmetic calculations which were advanced enough to generate complex tables. His machine was partly built bit never completed because engineers of the time were unable to make the machine to his specifications. It is now known, however, that the Difference Engine would have worked engineering techniques had been sufficiently advanced to allow it to be built. Babbage moved on to design another, more general purpose, machine called the "Analytical Engine." This machine was not constructed but Babbage spent some time, until his death in 1871, considering design problems and making some of the parts.

A tabulating machine was used for the first time in the American census of 1890. Herman Hollerith and John Shaw Billings had the idea if using punched cards to mechanize the processing of data derived from the census.

Mechanical calculators continued to be improved and developed during the nineteenth and early twentieth centuries but it was nit until the 1930s that the crucial step was taken to incorporate valves into what were still essentially mechanical machines. A team headed by Vannevar Bush, working at the Massachusetts Institute of Technology, invented the Differential Analyzer having realized that using exclusively mechanical parts would impose considerable restrictions. Hence the team decided to use valves to store valves as voltages. The resulting machine was very large but could carry out general-purpose calculations.

The next important step in the computer was taken by a German, Konrad Zuse, who made his first computer, the Z-1, in 1936. His second computer, the Z-2, was completed in 1939 and in this design he made the advance of using electromagnetic relays instead of mechanical switches is some sections. He describes his next computer,

the Z-3, as "the first program-controlled computer which worked as a complete entity." It is unfortunate that only the improved version of the Z-3, which was designated Z-4, survived the Berlin air raids.

Meanwhile, in Britain work on computers was concentrated on producing a code-breaking machine. A team of top mathematicians and electronics experts were installed at Bletchley Park during the early years of the war and set to work. They developed a series of electromagnetic machines known as the Robinson series. This was followed by the Colossus series. A paper tape provided the data input at a speed of 5,000 characters per second. In all, ten of these machines were built and they represented the first digital computers. They were much faster than any mechanical or electromagnetic machines of the time but were limited in their scope as they had only been developed for a dedicated purpose.

2.4.2 The Magnetic Stripe Card

In 1930s, some embossed metal and plastic cards were introduced and the use of credit cards was increasing and it was becoming important for the information to be extracted from the card as quickly as possible.

The following thirty years saw the market for credits cards expand rapidly. Banks became interested and started issuing cards in the 1940s. The retailing industry continued to be a particularly keen user of credit cards but new industries, such as the travel and entertainment industries, began to issue their own cards.

In 1969, the first magnetic stripes were added to the embossed cards, as a result the magnetic stripe readers were installed immediately in every place to accept credit cards. The new magnetic stripe cards were used intentionally and standards were needed to ensure that they could be used worldwide. Thus, the International Standards Organization (ISO) laid down standards to cover various aspects of the cards including

the dimensions, embossing and location of the magnetic stripe. Later, the magnetic stripe card was being used in many parts of the world by the mid 1970s. However, losses through fraud and bad debts were high. In order to counter this, security features such as holograms, fine background printing and signature panels were added to the cards. The banks have also introduced measures to enable them to identify an occurrence of fraud more quickly and the legal penalties for card have been strengthened.

2.4.3 The Merging of the Microcomputer Chip and Card

Computers and magnetic strip cards gradually began to come together when computers were used increasingly in processing card transactions. In 1974, Roland Moreno, a French journalist, had the idea of putting a chip inside a conventional plastic card. He patented his idea and founded a company, Innavatron, to promote it. In 1976, CII Honeywell Bull obtained a worldwide licence for the development of the card. Flonic Sclumberger followed suit in 1979 and in the same year Phillips obtained a licence for France only. Smart Card International was the first US company to obtain a licence and today there are many companies which have been licensed by Innovatron to manufacture and sell smart cards.

Interest in smart cards was beginning to grow in other countries by the early 1980s and in Japan, a programme of smart card development and investment was under way.

Development was also taking place in a slightly different direction, with patents being field for contactless smart cards. Work was being done on contactless cards in the USA, by AT & T, and in Britain, by GEC. The development of the GEC card had begun in 1982 at the Marconi Research Center. The team at GEC had recognized the potential of smart cards but saw some disadvantages in using metallic surface contacts to power

the card. GEC's intention was to produce a card which could be powered and could communicate without being inserted into a slot. The success of this early research world led to a new company, GEC Card technology, being set up to manufacture and sell contactless smart cards.

In Japan and the USA, some people were taking the smart card a stage further and designing the concept of a smart card with a display and keyboard. This concept became known as the super smart card.

In 1985, the ISO set up an international steering committee to look at the possibility of agreeing standards for contact smart cards. The standards were intended to cover such items as the contact position, interface protocol and information content and control.

Towards the end of 1985, the French banks made a decision to begin replacing all their magnetic stripe cards with smart cards. The development stages of the GEC contactless card, leading to the ISO standard size version, and the historical evolution of smart cards are summarized in Figure 2.5 and Figure 2.6.

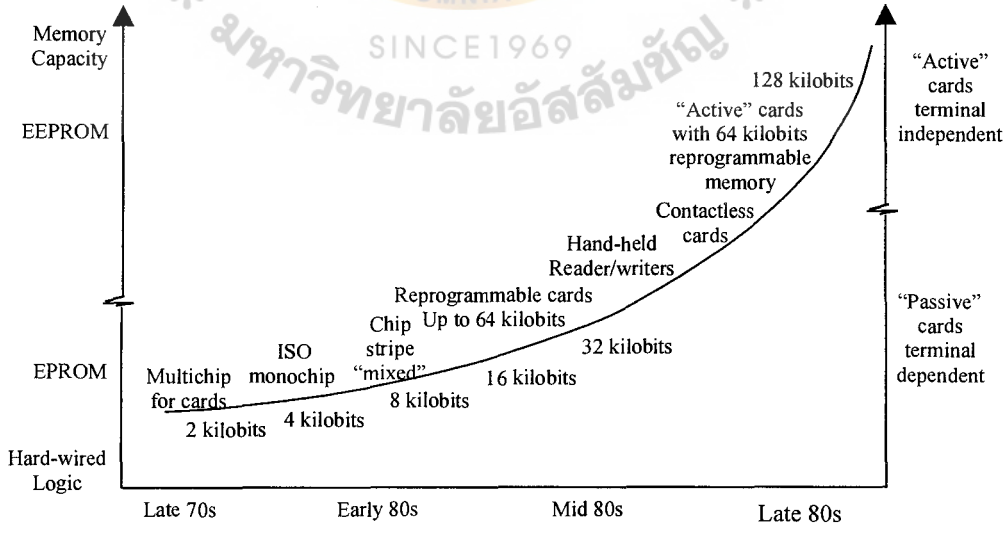


Figure 2.5. 1978-1988 Ten Years of Technical Evolution (Wolfgang and Wolfgang 1997).

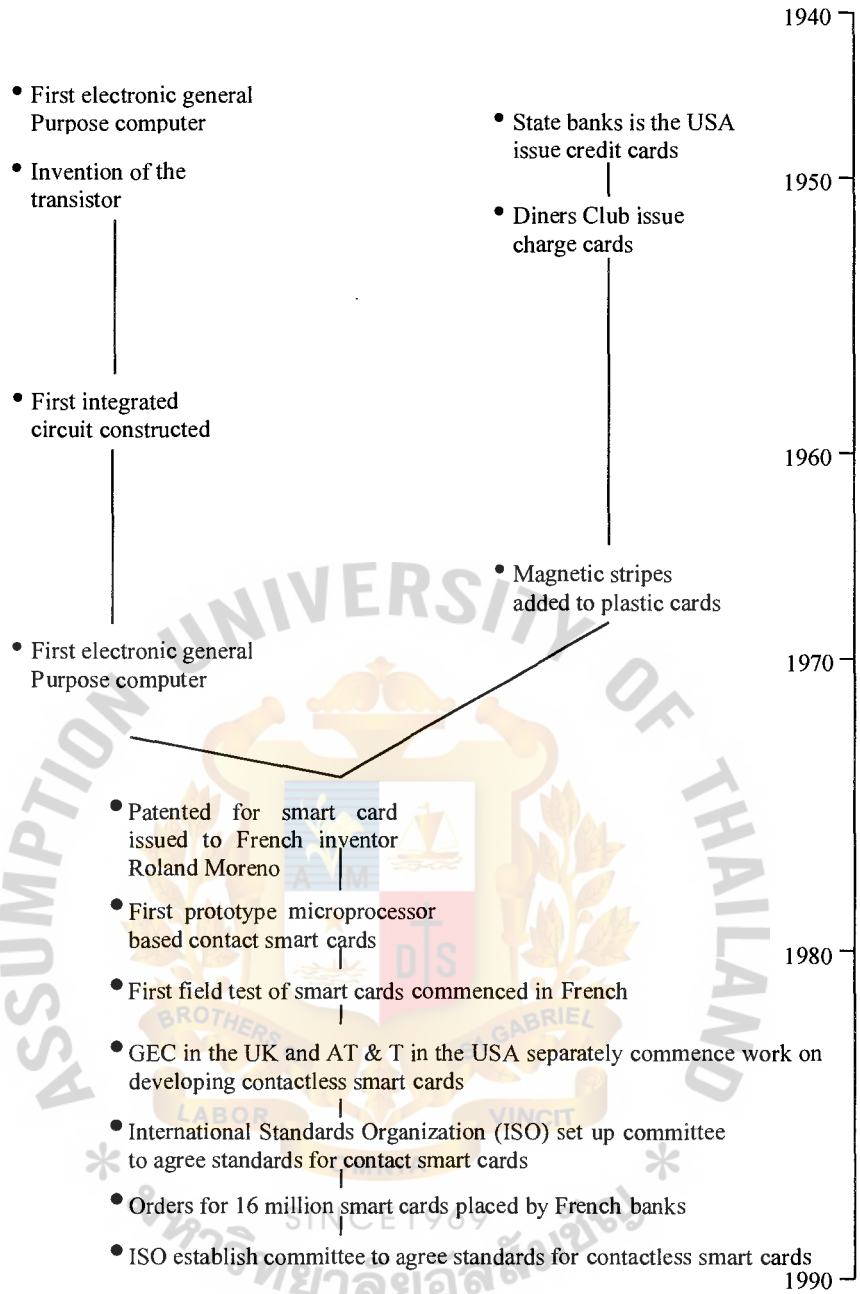


Figure 2.6. Historical Evolution of the Smart Card (Dreifus and Monk 1997).

2.5 Manufacturing, Personalization and Issuing of Smart Card

There are eight major stages involved in the manufacture, personalization and issue of smart cards. These stages are illustrated in Figure 2.7 and discussed as follows:

(1) Design. Designing the card to a written specification which meets market

requirements, such as cost, satisfies a multiplicity of different applications, will operate in a range of environments and survive under normal wear and tear conditions for a specified period of time. The design should accommodate the possibility of scaling up to very large volume manufacture. Unlike the operations that follow, design is not a process that is repeated except when a new generation of card is to be produced.

(2) Chip fabrication. Manufacture of the smart card chip or chips.

(3) Embedding software in permanent memory. Storage of fundamental instructions required for all applications, such as sending data to the reader, are stored in the card's permanent memory.

(4) Micromodule manufacture. Production of a circuit board (rigid or flexible) and the mounting of the chip or chips on the board prior to incorporation of the module in the card.

(5) Embedding the micromodule in a card. The use of traditional card lamination techniques or other techniques to produce a non-active card including the embedding of the micromodule in the card.

(6) Application program development. Writing of the application software to a specification.

(7) Activation. Incorporation of the application software in the card, together with security keys if they are required.

(8) Personalization and issue. Storage, in the card, of personal identification data relating to the ultimate cardholder and the issue of the card to the intended owner, such that no mismatch occurs with personal data stored in the card.

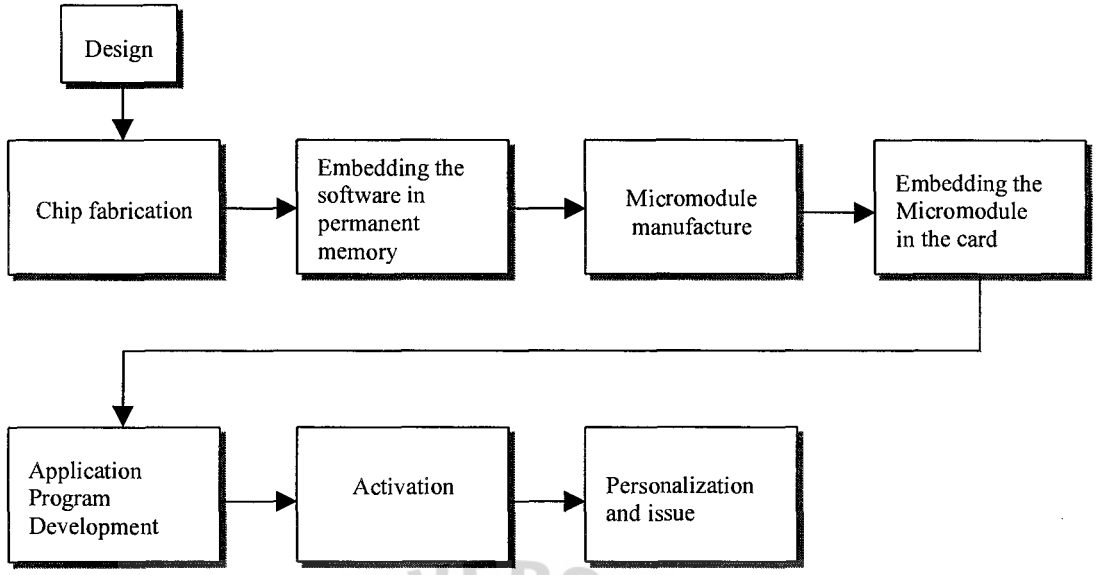


Figure 2.7. The Manufacturing of Smart Card (Bright 1988).

2.6 Structure of the Smart Card

Although there are a number of different types of smart cards, they all have in common the same three fundamental elements as any other computer: processing power (the smart part), data storage elements, and a means to input and output data.

The processing power is supplied by a microprocessor chip and the storage elements by a memory chip. Some cards have these combined on one chip (a microcomputer, also known as a microcontroller). The microprocessor incorporated in the card can differ from one card manufacturer to another, as can type of the memory. The means by which data is transferred in and out of the cards, and the units through which they communicate, can also be different. Although each element may differ in detail each performs the same basic tasks. Before the card can function it must have a source from which it can be powered.

(1) Microprocessor.

The microprocessor is the intelligent element of the smart card. It performs two basic functions: the manipulation and the interpretation of data. It carries out these functions by executing instructions stored in the card's memory.

(2) Memory structure.

Various ways of structuring the memory to provide a hierarchy of security zones, are employed by different card suppliers. There are, however, three fundamental zones: open, working and secret.

The open zone contains information which is not confidential, such as the cardholder's name and address. It can be read by the card reader but alterations cannot be made by an unauthorized person.

The working zone contains confidential information. Certain information must be given to the card before access is permitted. The most usual way of presenting this information to the card is by inserting the card into a reader, with the cardholder entering a personal identification number (PIN). For financial applications, the confidential information could be the amount of a purchase, the date and details of the merchant from whom the purchase was made. Also contained here would be the information that the card's microprocessor checks before authorizing a transaction, such as the available credit and the number of transactions that can be allowed in a defined period.

In the secret zone, the information is completely confidential. The contents are not accessible to the cardholder and need not be known in total by the issuer or the manufacturer. This zone holds data such as the PIN.

The card's microprocessor has access to this zone and can examine the PIN and compare it with the PIN entered by the cardholder via a keyboard. This ensures that the PIN never leaves the card, thereby maintaining a high level of security.

(3) Input/Output

For the smart card to be of any use, it must be able to interact with the "outside world." Therefore, it must have a means by which it can receive and send data. The method varies, depending upon the type of card. Some cards for instance, communicate through metallic contacts on the card's surface while others do so by the contactless transmission and reception of data. Others communicate via a keyboard and display incorporated in the card.

Read/Write units with which the cards communicate can be categorized into four basic types which are described in the following list. The choice of read/write unit is dependent upon the system or product into which it is to be incorporated.

(a) Intelligent stand-alone units

(b) Non-intelligent units (These read/write units do no more than provide the interface between the card and another device, such as a computer)

(c) Hand-held read/write units (These low-cost units are small, can be held in the hand, are battery powered and usually contain a keyboard and small display)

(d) Integral read/write unit (An integral read/write unit is usually a basic non-intelligent unit which has been embedded in a larger, more complex device, such as an automatic teller machine(ATM)

Figure 2.8 shows portable contact smart card for read/write unit. It is battery powered although it can also be powered from the mains.

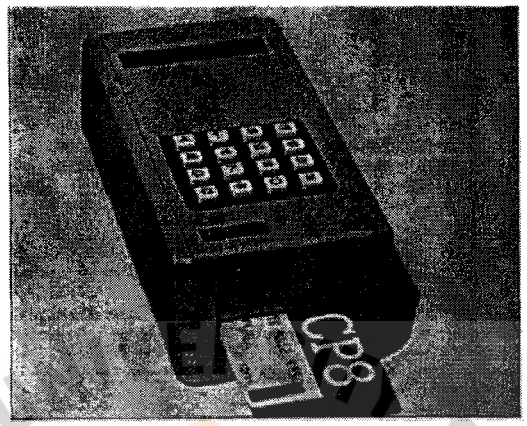


Figure 2.8. Portable Contact Smart Card Read/Write Unit (McCrindle 1990).

Further, there are three principal methods currently in use for powering a smart card as follows and the principal methods are shown in Figure 2.9.

(1) From an external power source feeding current through contacts on the card

(2) By transmitting power

(3) By a battery embedded in the card

Some thin card calculators use solar cells on the surface to provide sufficient power for the device to operate but this method for powering a smart card is currently not popular because of its limitations as follows:

(a) It requires good ambient light.

(b) Cells are vulnerable to breakage when the card is flexed.

(c) It is more costly than cards which obtain power through contacts or via contactless operation.

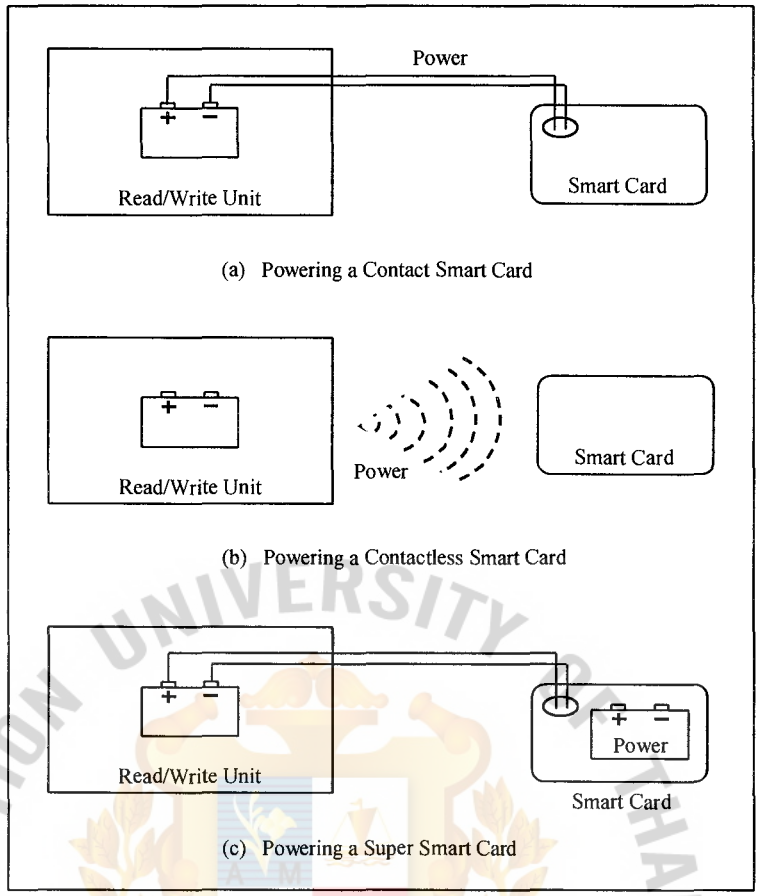


Figure 2.9. Different Methods of Powering a Smart Card (Dreifus and Monk 1997).

2.7 Types of the Smart Card

There are a variety of smart cards available from a number of different manufacturers. They can vary in terms of the microprocessor used, the type of memory and the way they communicate with the read/write unit. However, they can be broadly divided into the three different categories: contact smart cards, contactless smart cards, and super smart cards. The different types of smart cards are illustrated in Figure 2.10.

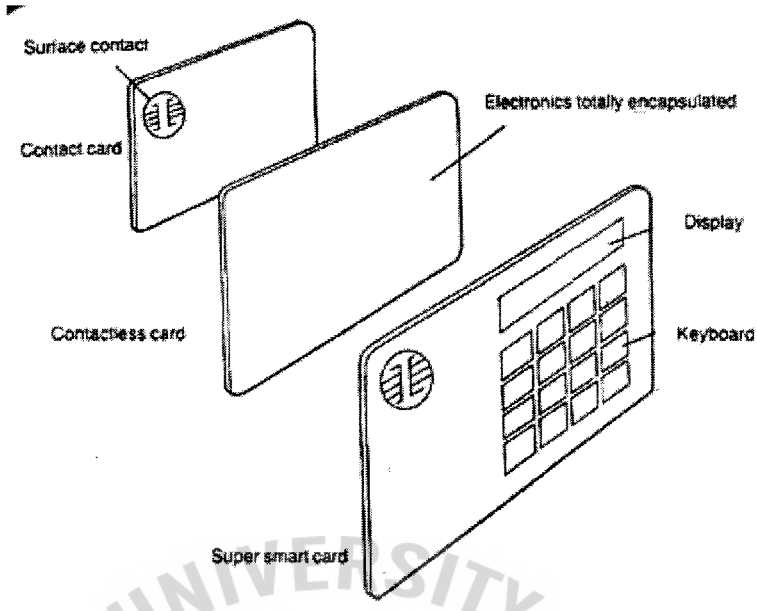


Figure 2.10. Three Types of Smart Cards (Wolfgang and Wolfgang 1997).

2.7.1 Contact Smart Cards

Contact smart cards have the microelectronics embedded in the card with connections to metallic contact pads on the surface of the card. The contacts are the link by which the read/write unit and the card's microcomputer communicate and the means by which power is fed to the microelectronics. There are eight contacts and the allocation of the function of each has been standardized. Two of the contact are reversed of supply voltage and ground (zero voltage reference), one for reset and one for the clock signal which provides timing information for the microprocessor to carry out its operational sequences. The remaining contacts provide for serial data input and output, and the supply of power necessary to program the memory while two are reversed for future allocation. The following figures show the contact smart card.

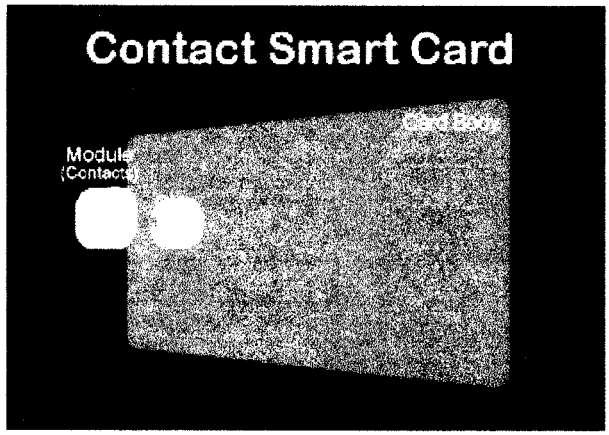


Figure 2.11. Contact Smart Card (www.gemplus.com).

Figure 2.12. Bull CP8 Contact Smart Card (McCrindle 1990).

2.7.2 Contactless Smart Cards

A contactless cards look just like plastic cards, except that they have an electronic microchip and a high frequency radio antenna or coils embedded inside which is activated when the card is passed near a transmitter. These components allow the card to communicate with an antenna/coupler unit without a physical contact. Contactless cards are most suitable for high speed or large volume applications as in mass-transit or toll collection activities. Contactless smart card is shown in Figures 2.13 and 2.14.

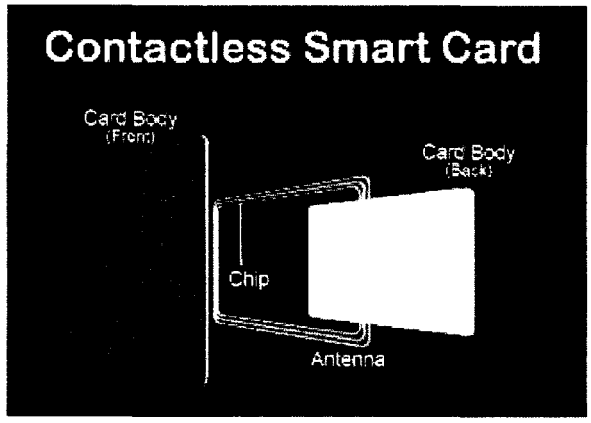


Figure 2.13. Contactless Smart Card (www.gemplus.com).

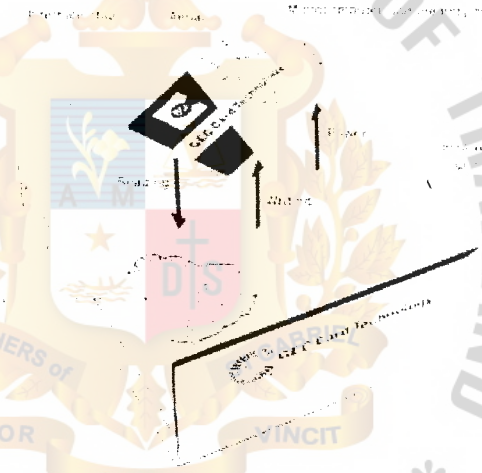


Figure 2.14. GEC Contactless Card and Read/Write Unit (McCrindle 1990).

2.7.3 Super Smart Cards

Super smart cards differ from the other smart cards quite radically insofar as it incorporates a keyboard and liquid crystal display (LCD). It can function more like a stand alone terminal without the need of a card read/write unit. Although it can work independently, there are occasions when it needs to go on line, for instance to a computer. To accommodate this function, these cards also, generally, have surface

contacts. To maintain downward compatibility with magnetic stripe readers, the card is able to emulate, electronically, a magnetic stripe being read. As with other cards, a logo and an embossed cardholder's name and number can be incorporated. In the case of the super smart card, on the side of the card, opposite the display and keyboard. The driving force for the development of the super smart card has come, very much, from Visa International (Figure 2.15). Working with the Toshiba Corporation of Japan, Visa brought the card into existence, although another company involved with this technology is Smart Card International of New York.

Figure 2.15. Visa Super Smart Card (McCrindle 1990).

Further, there are others types of smart card as follows:

(1) Optional memory cards (Drexler Laser card)

(2) Tags

(3) Intelligent tokens (NPL Token)

(4) Magnetic stripe card

The optical card is passive and does not contain a processor. The most striking feature of the LaserCard is its 2 Mbyte memory capacity-this is equivalent to about 800 pages of text or 60 pages of graphics.

Applications for the optical memory card are in areas where large amounts of memory are required. The card is particularly suitable for medical records as it has the capacity to hold graphical information as well as text.

The advantage of this card is to distribute easily and it can be used to download information on to the user's computer for further processing and updating. Record keeping is another application where the optical memory card's use is particularly appropriate.

A tag could be defined as a contactless memory card. Like the contactless smart card, it works without coming into contact with the reader. It also contains memory although much less than is found in memory cards. Unlike the smart card, it does not, generally, contain intelligence in the form of a microprocessor and the nature of the electronics within it prevents it from being made into an ISO card. As its name implies, the applications to which a tag is put are normally related to tracking and identification-for example, tracking of manufactured articles on a production line or allowing personnel access to a secure area. Coded tags come in a range of different packages to suit specific applications.

For intelligent tokens, the National Physical Laboratory (NPL) in Britain has been working for some time on the development of a token, called Talisman, which can provide far greater security than is possible through the use of a PIN alone.

The aim of this card is to enable the token to sign messages electronically using a unique secret key which is never revealed to the terminal. NPL token is shown in Figure 2.16.

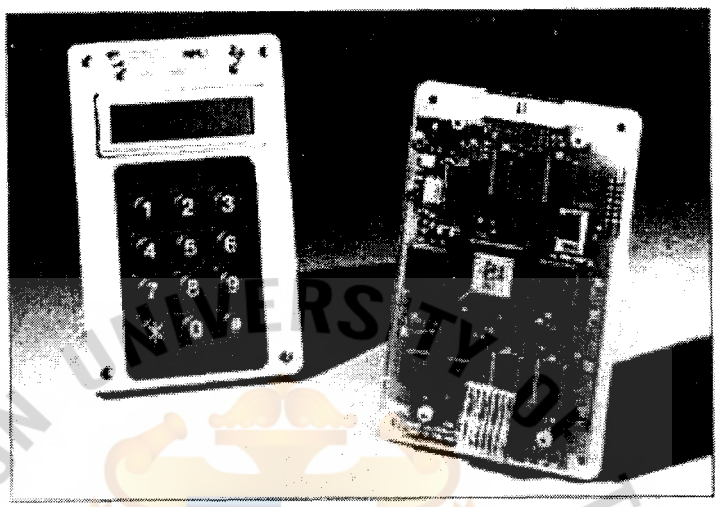


Figure 2.16. The Prototype NPL Talisman Token MK2 (McCrindle 1990).

The identification procedure begins with the token being presented to the terminal. The token then identifies itself to the terminal, which responds by sending out a challenge in the form of a random number. When the token receives the challenge, it asks the cardholder to enter his PIN via the token's keypad. The PIN is then compared to the number stored in memory. If the PIN is correct, the token generates a digital signature on the challenge and returns the signed challenge to the terminal.

Most people are familiar with magnetic stripe cards: automatic teller machine cards and credit cards are common examples. These cards usually contain between one and three magnetised tracks which contain details such as the primary account number and expiry date. Figure 2.17 shows some features of magnetic stripe card.

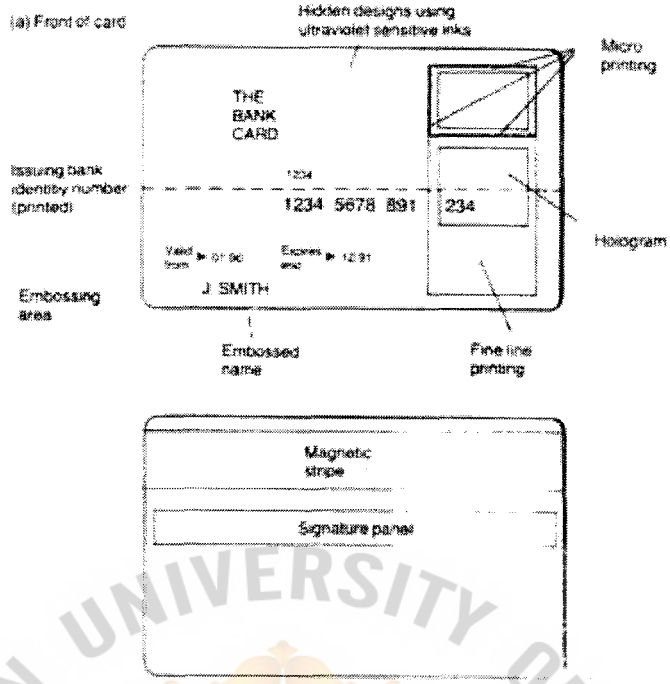


Figure 2.17. Some of the Features Incorporated on a Modern Magnetic Stripe Card (Wolfgang and Wolfgang 1997).

The main difference between a magnetic stripe card and a smart card is the site where the processing takes place. With a magnetic stripe card, this happens in a central data base; with a smart card, this happens in the card itself.

The use of card systems as an alternative to cash payments provides an example of the different way in which the two card types operate. In an EFTPOS (Electronic Funds Transfer at Point-of-Sale) transaction, the magnetic stripe card is swiped through a reader, with the retailer adding information about the total amount of the purchase. This information is relayed to the central data base which confirms that the card holder has sufficient funds in his or her account. The on-line connection between the card holder's bank account and the account of the payee (for example, a retail outlet or service station) allows funds to be transferred. The card is used simply to identify the account from which the money will be debited by the central data base. In contrast, with a stored value smart card, (or SVC), the card holder first transfers funds to the card

via a smart card reader. The transferred funds are stored electronically on the card. The card is then inserted into a special card reader at the retailer or merchant and the amount is debited from the electronic monetary value stored on the card. The funds are then transferred to the merchant after being temporarily stored in a holding account by the enterprise managing the whole payment system for the stored value card.

2.8 Advantages and Disadvantages of Smart Card

Smart card, as a new technology, provides a lot of advantages as suggested by McCrindle (1990), he said that benefits of using a smart card in general way are as follows:

(1) Smart card technology had been proved successful and had the potential to prevent fraud.

(2) The system is easy to use. The card holds all the information necessary for automatic configuration and log-on.

(3) Context-sensitive help facilities can be provided, where appropriate, in the knowledge that they will only be seen by authorised users.

(4) The card can be used as a portable and updatable personal data store.

(5) There are security features built into the cards EFTPOS units enabling them to verify each other's identity.

(6) There could be a smooth change-over from existing magnetic stripe cards as smart cards could work with existing readers.

(7) Communications between the card and the reader could be encrypted to increase security.

Further, he also stated that both retailers and cardholders benefit from using smart card system. For retailers, smart card provides several benefits as follows:

(1) Transactions are shorter and they can move people through till check-outs (EFTPOS units in this case) more quickly.

(2) They no longer need to spend time comparing the signature on the cheque with the signature on the card.

(3) The till itself checks the hot card file so that there is no need to look through lists of numbers on paper.

(4) The day's takings are more secure, held electronically in an EFTPOS unit or a smart card than they are in notes and coins.

For the cardholder, the benefits reflect those to the retailer. Such benefits are as follows:

(1) As transactions take less time at the till, shopping is quicker and easier.

(2) There are no cheques to write.

(3) The card is more secure than existing bank cards. The use of the PIN ensures that no one but the cardholder can use the card for transactions larger than £20. The hot card file helps to prevent a lost or stolen card from being used.

(4) It is easy to keep track of spending by viewing transactions at the MFile station.

(5) The cardholder does not necessarily have to go to the bank to load MCash.

Moreover, the bank also benefits from using smart card since there is a reduction in processing costs. The cost of processing a cheque can be as much as 60p. The increased security of the card makes fraud less likely and added services could encourage more customers to use the bank.

Michael Porter E. (1985) also suggested that smart card has advantages in many aspects. Advantages of smart card are discussed below:

(1) Off-line Security. It is the "intelligence" of the microprocessor which enables the smart card to function so effectively as an off-line device. Of all the plastic card technologies, only the smart card can be programmed to ensure the traditional responsibilities of a centrally controlled on-line system can be adequately maintained and protected when an off-line solution is substituted. Neither the magnetic stripe card nor the optical card has the ability to calculate balances and to check these against authorised monthly spending limits. Nor can they handle the computational requirements of a powerful security algorithm.

(2) Data storage. The chip selected for smart cards must optimise the chosen technology based on the parameters listed. Power consumption creates heat and is a function of processing speed, packing density and the type of technology. Similarly, not only is cost a function of complexity but is also directly related to "yield" that is, the percentage of chips which pass the final acceptance tests. Moreover, there are different degrees of difficulty in accommodating various forms of memory on the same chip. The developments have given rise to yet another acronym—HCMOS—which stands for "high-performance CMOS." The essential characteristics when compared to CMOS are very low power consumption, higher speed, greater packing density (100,000 transistors), and the ability to allow both EPROM and EEPROM to be combined with the microprocessor whereas CMOS only allows EPROM integration. This last item represents an important benefit in supporting a wide range of applications on a single chip card.

(3) Read/write terminals. Since the very earliest days of development, the design and features of the smart card and its integrated circuit chip have

dominated the publicity and even the more intellectual dissertation – often at the expense of the other essential elements including the read/write terminals. In an effort to redress the balance, and in view of their undoubted significance, this section examines some of the more important issues associated with the design and operation of read/write terminals. It will be clear by now that the choice of the read/write device is conditioned by the nature and source of the card selected and by the specific application needs. A growing range of card readers exist today which may be loosely categorised into four generic versions:

(a) Independent devices which not only provide access to the integrated chip but also support all relevant work-station functions by means of self-contained memory and processing resources along with keyboard and display facilities.

(b) Dependent devices which interconnect with a separate terminal, e.g. personal computer, utilized to provide the resources necessary to communicate with the card.

(c) Integrated devices which are accommodated within a more sophisticated terminal, e.g. point of sale unit, resulting in a saving of space and overall costs.

(d) Hand-held devices which were originally developed in France for the national EFTPOS service to suit retail outlets where low margins precluded the use of more sophisticated equipment. These low-cost devices are battery powered and comprise a pin-pad and one-line display with which to check card authenticity and verify the user's PIN.

Clearly, the selection criteria used to determine which read/write device option is appropriate will vary according to the system needs.

(4) Low-power operation. There is low power operation for using telephone chip card, only 2 mA for memory card and 5-15 mA for processing card.

(5) Robustness. The smart card has lifetime at least 10 years more in comparison with the magnetic stripe card or ordinary card only 3 years. In testing, it is found that contactless card is more reliable than the magnetic stripe card 17 times.

Besides, as suggested by Wolfgang Rankl & Wolfgang Effing (1997), the smart card offers a range of advantages compared with the magnetic stripe. The maximum storage capacity of a smart card is of a far greater order of magnitude than that of a magnetic one. Circuits with each over 20 kbytes of memory are already available and they are expected to multiply with each new chip generation. Only the optical memory cards have a greater capacity.

One of the most important advantages of smart cards consists in the fact that their stored data can be protected against unauthorized access and tampering. As access to data takes place only via a serial interface supervised by the operating system and by a security logic system, it is possible to write confidential data to the card which can never be read from outside. This secret data can then only ever be processed internally by the chip's arithmetic unit. In principle, the memory functions of writing, erasing and reading can be controlled both by hardware and by software, and be linked to specific conditions. This allows the construction of numerous security mechanisms, which can also be tailored to the special demands of the relevant application.

Together with the ability to computer cryptographic algorithms, the smart card makes it possible to implement a convenient security module which can be carried

about at all times.

Further advantages of the smart card are its high degree of reliability and long life compared with magnetic cards, whose circulation is generally limited to one or two years.

However, smart card also has disadvantages. McCrindle (1990) said that disadvantages of using smart card are as follows:

(1) The smart card is expensive unit cost.

(2) The investment of card readers is so expensive in comparison with ordinary card.

(3) The smart card is not a robustness material in comparison with a coin.

Michael Porter E. (1985) also suggested that the smart card is a fairly expensive item in comparison with an ordinary card. The cost is more than the magnetic stripe card about 2-3 times.

Other disadvantages of smart card are about the cardholder has to pay for fee of card using, the problem of static electric, magnetic field, temperature and ultraviolet ray. Further, it may lack of technical support, technological support, and privacy. It may not also be protected from theft and virus (Srisab 1999).

2.9 Smart Card Application

Smart card can be applied in various areas of business as follows:

(1) Financial Application

(2) Medical Application

(3) Health Care Application

(4) Telecommunication and Application

(5) University Application

(6) Miscellaneous Application

Applications representative of the different areas emphasizing how smart card facilities are used are presented in Figure 2.18.

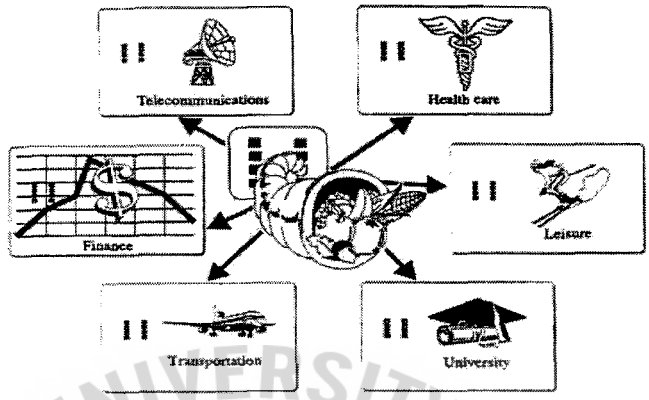


Figure 2.18. Main Areas Where Smart Cards Are Used (Bright 1988).

2.9.1 Financial Application

The world of finance-banking, insurance, wholesale and retail business and so on is one of the major application areas for smart cards and many areas of finance will be revolutionized by the introduction of smart cards in the future.

In financial application, the card can hold in its memory such things as:

(a) Cardholder's identification.

(b) Card issuer identification.

(c) Cardholder's PIN.

(d) Account balance.

(e) Transaction limit.

(f) Log of transactions.

There are five types of financial transactions using the smart card: electronic cheque, electronic travelers' cheques, electronic cash, electronic token, and corporate cash management services.

(1) Electronic Cheque

The smart card can be used during EFTPOS transactions (Electronic Fund Transfer at the Point-of-Sale). At a retailer's check-out the card is placed on or in the reader, where it automatically goes through authentication sequences. To authorize payment, the customer types in the PIN which the card then matches with the one held in its memory. If the number corresponds, the card will authorize the terminal to transfer funds from the cardholder's bank account to the retailer's bank account. This can be done instantaneously, or at a pre-set time, or the transaction can be stored in the point-of-sale terminal until the terminal is interrogated by the bank's computer. A record of the transaction will be stored in the card at the same time.

The card cannot give the cardholder information about the balance in his bank account, because of other transactions such as direct debits, but it will allow transactions up to a certain limit set by the bank, perhaps on a monthly basis. This use of the smart card will bring about a significant decrease in the number of cheques and vouchers handled by financial institutions and should, therefore, reduce the costs of paper processing. On-line communications costs will also be reduced as the card's built-in authorization means that referral to the bank's main computer is not required for every transaction. They can be batched up for transfer, for example, in the middle of the night. The ability of the smart card to contain a pre-set credit limit will reduce losses due to bad debt and will enable the financial institutions to issue cards to a greater number of people. This will, in turn, benefit the retailer as there will be more customers with credit.

(2) Electronic Travellers' Cheques

The smart card can be used as a more secure and convenient replacement for travellers' cheques. A pre-paid monetary value is stored in the card, possibly in a foreign currency. When payment is authorised, by the cardholder's PIN, the purchase value is deducted from the card. Reconciliation of the travellers' cheques held in the terminal will be carried out at a later date.

(3) Electronic Cash (Electronic Purse)

Funds can be loaded into a card for use as cash. This electronic cash can then be used for small purchases without necessarily requiring the authorization of a PIN. When the card is credited with the cash the cardholder's account is debited in the normal way, except that the amount debited is then held by the bank until reclaimed by a retailer. When the card is used to purchase goods or services the value of the transaction is deducted from the card and held securely at the retailer's terminal. The retailer then presents this information to the bank so that his account can be credited. In the intervening time the bank can invest the money.

(4) Electronic Token

The smart card has considerable potential as an electronic token, possibly in association with other uses. The principle here is that a prepaid area is set aside to store electronic units of time or electronic tickets, etc., for a specific service or item.

Magnetic stripe cards are currently being used extensively with public telephones, parking meters and vending machines for this type of application. At present these are discarded when empty. However, a smart

card can be used to combine several token areas and each of these could be recharged, depending on the type of memory in the card. This allows the cost to be distributed over a number of services and over a much longer issue life.

For example, the card could be used to pay for gas and electricity as a replacement for coin meters. Consumers could pay for units at a vending machine at the gas or electricity company shop, which would credit their cards. The cards would then be used to operate the meters.

The advantages of this system would be that collections would no longer have to be made and there would be no incentive for people to rob meters or collectors. There would also be benefits for the consumer as units could be bought and stored in the card in advance, in a similar way to buying telephone stamps, for instance. The card could, conceivably, be identified with one particular meter so that it would not operate another. It is possible that the card could also monitor patterns of use and give back information on peak consumption times so that the consumer could make savings.

(5) Corporate cash management services

Banks are now beginning to provide corporate cash management services to companies and major clients. In this area, smart cards can act as secure keys allowing major account holders access to the bank's mainframe computers to view their accounts and transfer money automatically between accounts.

2.9.2 Medical Application

As a general medical card, the smart card could contain information such as:

(1) Holder's address, date of birth and next of kin

(2) Name and address of doctor

(3) Recent medical history

(4) Serious complaints

(5) Allergies

(6) Drugs being taken

(7) Donor wishes

The card could be carried by the individual and in the event of an emergency, such as the holder collapsing in the street, it could provide immediate information to an ambulance crew or doctor. The speed with which vital information could be available may well save lives.

The smart card could hold information concerning the patient's recent medical history for the previous six months, which, in many cases, would be all the information a doctor would require. If the patient carried the card to his appointment, it would not be necessary for the doctor to have the patient's file in front of him. At the end of the consultation, the doctor's notes could be recorded on the card and a copy printed out for the file. At present, on occasions, a great amount of effort has to be put into locating a patient's records and getting them to the right place at the right time. If each patient was issued with a smart card the paper records could be kept for reference only and for use if a card is lost. A smart card system could prove to be cheaper than installing a computer network in a large hospital for location and retrieval of patients' records.

However, the smart card does not have enough memory capacity to store a patient's complete medical history, especially when it comes to store a digitized X-ray

picture, for example.

The following figure shows the record of a "page" of personal identification details and information useful to both the pharmacist and GP.

Name : Smith Mary Sex: F Blood group : AB+ Marital status : M
Address : 15 Station Road, Anytown, Glam CF9 401. Phone : (002) 12255445
NHS : VSYU3435578 NI : 215164651 Birthday 121516
EP1001 : 12154 TET : 123158 Smear : 054118615
Chronic : Asthma Bronchitis Diabetes Donor : Kidney eye
Allergies : Aspirin Penicilin

Next of kin: Doctor : Dr. Williams
Smith John Phone : (022) 15846136
77 Fisher Cottage
Winsor, Bershier PP097 G87
Phone : (86) 7878990 Comments : Insulin department diabetic

Figure 2.19. An Example of Record of Personal Identification (Dreifus and Monk 1997).

Table 2.2 is an example, which shows the record drug items prescribed to the patient and indicate, on the card, the number of times each has been repeated.

Table 2.2. An Example of Record Drug Items (Dreifus and Monk 1997).

Date	Drug	Fo	Str	Qty	Instr	Repeat	Disp
120386/	Aspirin	ta	300MG	30	1-2/8DD/GR		1
120458/	Aspirin	ta	300MG	30	1-2/8DD/GR	12547	8
120025/	Aspirin	ta	300MG	30	1-2/8DD/GR	89652	

2.9.3 Telecommunications Application

Actual smart cards are also employed in telecommunications, computers, and consumer electronics as shown in Figure 2.20. Some phone services use smart cards. Besides, GSM communications integrated services including phones and smart

cards have recently been commercialized. Cards can protect data communications and storage in mainframes and personal computers. Smart cards are also used in other telecommunication services, with the well-known example of pay TV being the most important.

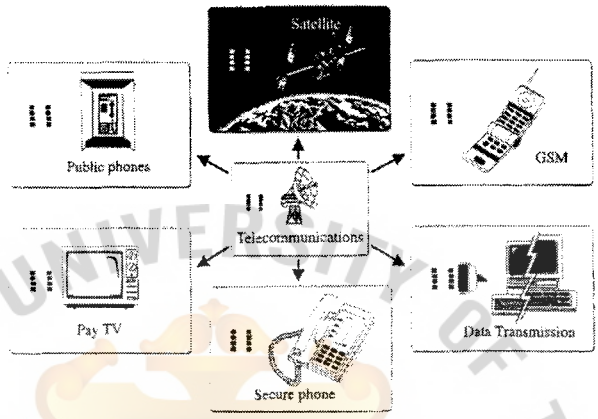


Figure 2.20. Smart Cards in Communications and Consumer Electronics (Bright 1988).

Telecommunication application can be discussed as follows:

(1) Pre-Paid Telephone Card

The smart card could be purchased with a number of pre-stored calling units, in the same way as existing telephone payment cards. Units would be deducted to pay for calls until the pre-charged value was used up. However, unlike present cards, an EEPROM-based smart card could be recharged.

(2) Credit Card Telephone Card

As a credit telephone card the smart card could be issued to enable authorized people to make expensive calls. This could be especially useful to business people who travel widely and make extensive use of public

telephones. Each card could have its own PIN for use in identifying the cardholder before the call was connected. The value of each call could be logged on the card until a predefined credit limit was reached. At that point, the card could, through the telephone system, either inform the telecommunications authority of the amount to be invoiced or authorize a transfer of money from the cardholder's bank account to the authority's account.

(3) Speed Dialing

The cardholder could easily store frequently used telephone numbers in the card where short, memorable codes would be allocated to them. When placed in a telephone incorporating a read/write unit a line connection would be made by, simply, keying in the appropriate code.

(4) Telephone Personalization

The smart card could also be used to personalize telephones to the cardholder's own number. By simply placing a card on a suitably modified telephone incoming calls on the cardholder's phone could be transferred to that number or outgoing calls could be charged to the holder's number. This could be particularly useful when used with a cellular phone installed in a taxi.

(5) Call Logger

People working at home, or away from their usual place of work, could use the smart card to log details of their telephone calls. These details could include number called, duration of call and cost, for use in subsequent expense claims. The card could be interrogated at regular intervals either for claim details or to check that it was only being used for legitimate

business purposes.

(6) Automatic Log-On to information service

The smart card offers a more secure means of granting access to telephone-based information services such as the UK Prestel service.

(7) Access to Telephone exchanges

The smart card could be issued to telephone maintenance engineers to enable them to gain access to an exchange or to act as a portable data pad for storing details of work undertaken and faults located.

2.9.4 Health Care Application

Health care is one of the major application areas of various types of cards. Intense activity on patient cards, either as a single subject or associated with computerization of health records, can be detected from statements made at several annual conferences, scientific congresses, and symposia around the world.

Browsing through the proceedings of these meetings, one can find contributions from many countries where implementations of card applications for health services are suggested as shown in Figure 2.21. Most applications are in the pilot project stage, and the national health services of many countries are using or testing different cards for their patients. It is therefore reasonable to expect a rapid increase of health care card applications in the near future.

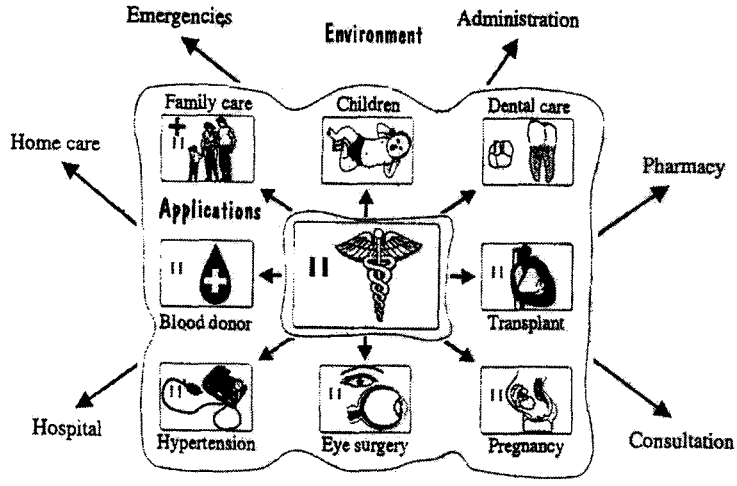


Figure 2.21. Health-care Areas Where Smart Cards Are Used. Inset: Examples of Current Applications (Bright 1988).

2.9.5 University Application

University research groups have been traditionally involved in smart card applications. It is not surprising, therefore, that smart card applications for university services are quite common as shown in Figure 2.22. It is not surprising either that university-related applications were initiated in the early days of smart cards.

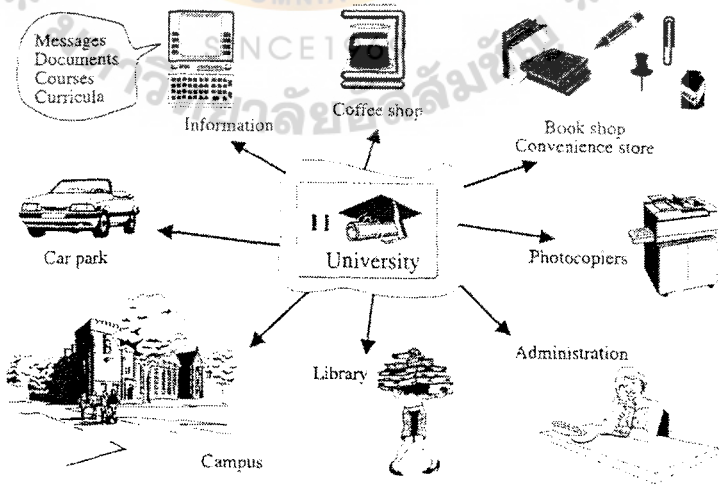


Figure 2.22. Current Applications of Smart Cards in Universities and Colleges (Bright 1988).

2.9.6 Miscellaneous Application

Smart cards have found a place in many other activities. Card applications can be spotted worldwide in amazingly variable areas. Prepaid cards are used for public transport in trams, buses, trains, and subways. There are sport cards for practicing golf, ski, or squash. Cards are being employed be hotels, gas stations, trade centers, cinemas, and theaters. Cards are carried in cars for highway tolls, in ships, and in oil-drilling platforms. Apple-shaped cards are the only dress for clients of several nudist beaches, where the cards have demonstrated their reliability in a hostile environment like sea water.

2.10 Economic Analysis Methodology

In the method of economic analysis, there are many approaches to be used as follows:

(a) Benefits-Costs Analysis

(b) Present-Worth and Capitalized-Cost Evaluation

Benefits-Costs Analysis

In analyzing the proposed system, only time measurement is not enough for making decision since the new system needs the investment. As a result, we have to be assured that benefits precede the total costs. Benefits and Costs can be thought of as either tangible or intangible. Both of them must be taken into account when systems are considered.

Tangible Benefits are advantages measurable in the currency that accrue to the organization through use of the information system. Example of tangible benefits are an increase in speed of processing, access to otherwise inaccessible information, access to information on a more timely basis than was possible before, the advantage of the computer's superior calculating power, and decreases in the amount of employee time

needed to complete specific tasks. Although measurement is not always easy, tangible benefits can actually be measured in terms of dollars, resources, or time saved.

Intangible Benefit accrued to the organization from use of the information system is difficult to measure but are important nonetheless. They may include improving the decision-making process, enhancing accuracy, becoming more competitive in customer service, maintaining a good business image, and increasing job satisfaction benefits are extremely important and can have far reaching implications for the business as it relates to people outside the organization as well as within it.

While intangible benefits of an information system are important factors in deciding whether to proceed with a system, a system built solely for its intangible benefits will not be successful. You must discuss both tangible and intangible benefits in your proposal. Since presenting both will allow decision-makers in the business to make a well-informed decision about the proposed system.

Apart from Benefits, Costs should always be taken in consideration in both senses of tangible and intangible costs. Tangible costs are those that can be accurately projected by the systems analyst and the business' accounting personnel, included the cost of equipment such as computers and terminals, costs of systems analysts' time, cost of programmers' time, and other employee's salaries. These costs are typically well established or can be found out quite easily and are the costs that will require a cash outlay of the business.

On the other hand, intangible costs are difficult to estimate and may not be known. They include losing a competitive edge, losing the reputation for being first with an innovation or the leader in a field, declining company image due to increased customer dissatisfaction, and ineffective decision making due to untimely or inaccessible information. As you can imagine, it is nest to impossible to accurately

project a dollar amount for intangible costs. In order to aid decision-makers that want to weigh the proposed system and all of its implications, you must include intangible costs, even though they are not quantifiable.

Present-Worth and Capitalized-Cost Evaluation

The idea of the present value method is to determine how much money it is worthwhile investing now in order to receive a given return in some years' time. The answer obviously depends on the interest rate used in the evaluation. To some extent the present value method works backwards.

Further, cash flows over some time period are the actual inflows and outflows of money are called cash flows. To perform the economic analysis, estimates may be needed on financing interest rates, life of assets, revenues, costs, tax effects, etc.

First, the project benefits are estimated for each year from today. Then, we compute the present value of these savings. If the project cost exceeds the present value, then it is not worthwhile. A future amount of money converted into its equivalent present value has a magnitude of the present-worth amount that is always less than that of the actual cash flow, because for any interest rate greater than zero, all P/F factors have a value less than 1.0. The terms frequently used in reference to present-worth calculations are present worth (PW), present value (PV), and net present value (NPV). Regardless of what they are called, present-worth calculations are routinely used to make economic-related decisions. Up to this point, present-worth computations have been made from cash flows associated with only a single project or alternative.

The present-worth (PW) method of alternative evaluation is very popular because future expenditures or receipts are transformed into equivalent dollars now. That is, all the future cash flows associated with an alternative are converted into present dollars. In this form, it is very easy, even for a person unfamiliar with economic analysis, to see the

economic advantage of one alternative over another. Other times, the cash flows will include both receipts and disbursements. Receipts, for example, could come from product sale, equipment salvage values, or realizable savings associated with a particular aspect of the alternative. Since a majority of the problems we will consider have both receipts and disbursements, we represent disbursements as negative cash flows and receipts as positive. Deviation from this sign convention occurs only when there could be no mistake in interpreting the final results.

Thus, whether alternatives involve disbursements only, or receipts and disbursements, the following guidelines are applied to select an alternative using the present worth measure of worth:

For one alternative, if PW >= 0, the requested rate of return is met or exceeded and the alternative is financially viable.

For two or more alternative, when only one can be selected (i.e., alternatives are mutually exclusive). Select the alternative with the PW value that is numerically larger, that is, less negative or more positive, indicating a lower PW of costs or larger PW of net cash flow of receipts and disbursements.

The alternatives must be compared over the same number of years. We use the symbols as:

PW = value or sum of money at a time denoted as the present; dollars, pesos, etc.

F = value or sum of money at some future time; dollars, pesos, etc.

A = a series of consecutive, equal, end-of-period amount of money; dollars per month, dollars per year, etc.

n = number of interest period; months, years, etc.

i = interest rate per interest period; percent per month, percent per year, etc.

Thus, the following expression in brackets is known as the single-payment present-worth factor (SPPWF). This expression will allow determination of the present worth P of a given future amount F after n years at interest rate i.

$$P = F[1/(1 + i)n]$$

or another form: $P = F(P/F, i\%, n)$

The following expression in brackets is called the uniform-series present-worth factor (USPWF). This equation will give the present worth P of an equivalent uniform annual series A which begins at the end of year 1 and extends for n years at an interest rate i.

$$P = A\left[\frac{(1 + i)n-1}{i(1 + i)n}\right]$$

Another form of this formula is as follows:

$$P = A(P/A, i\%, n)$$

There are four types of present-worth evaluation that are used in this project.

(a) Depreciation or Capital Recovery

(b) Straight-Line (SL) Depreciation

(c) Evaluating Feasibility Factors

(d) Payback Period

Depreciation is the reduction in value of an asset owned by the corporation. Depreciation models use government-approved rules, rates, and formulas to represent the current value on the company books. The depreciation amount D_t, usually computed annually, does not necessarily reflect the actual usage pattern of the asset during ownership. Annual depreciation charges are tax deductible and indicated in corporate accounts.

The straight-line model is a method of depreciation used as the standard of comparison for most other methods. It derives its name from the fact that the book value decreases linearly with time because the recovery or depreciation rate is the same each year at 1 over the recovery period. Therefore, d = 1/n. The annual depreciation is determined by multiplying the first cost minus the estimated salvage value by the depreciation rate d, which is the same as dividing by the recovery period n in the equation form below:

$$D_t = (B - SV)d$$

$$= \frac{B - SV}{n}$$

where t = year ($t = 1, 2, 3, \ldots, n$)

D_t = annual depreciation charge

B = first cost or unadjusted basis

SV = estimated salvage value

d = depreciation rate (same for all years)

n = recovery period or expected depreciable life

Economic feasibility addresses only one of the goals of systems development: the project-management goal of developing a system within the imposed budget constraints. However, a system that is economically feasible may be infeasible for other reasons: organizational, technical, or operational. Parallel to the cost-benefit analysis for economic feasibility is the project risk evaluation form for organizational, technical, and operational feasibility. Project risk is the likelihood that a proposed system will not satisfy the systems development goals: a high-quality system that is delivered on time, within budget, and with high user commitment and that helps the organization meet its

objectives. The ratings/responses for each risk factor are –1 (no; high risk), 0 (maybe; not a factor either way), or +1 (yes; little or no risk). A +1 (little or no risk) rating for each factor would yield a total score of 14; thus, the higher the total score achieved in the evaluation, the lower is the degree of project risk associated with the project. However, each factor also needs to be considered individually because a negative rating on a few key factors can increase risk substantially. The output of an enterprise analysis is a prioritized list of potential systems development projects. How does an organization decide which of these projects to pursue? To make this decision, the organization must evaluate the costs, benefits, and risks associated with each project. Few high-benefit projects are also low-risk projects. Overall, an organization should give highest priority to projects that promise significant benefits and a manageable level of risk.

Payback Period provides straightforward ways of yielding information to decision-makers about the worthiness of the proposed system. Payback is a simple way to assess whether a business should invest in a proposed information system based on how long it will take for the benefits of the system to pay back the costs of developing. Briefly, the payback method determines the number of years of operation that the information system needs to pay back the cost of investing in it. Payback can be determined in one of two ways-either by increasing revenues or increasing savings. Alternatively, a combination of the two methods can also be used. Since this is a popular way to assess alternative investment, businesses will typically have a set time period for payback assessments. If the proposed system has a projected payback of six years in a company that adheres to a three-year maximum payback on projects involving fast-changing technology, the system will be rejected. Payback that is made within the range used by the business but is still longer than typical may not be rejected outright but may be subject to scrutiny through other methods.

2.11 System Analysis and Design Approaches

System analysis and design used to analyze the existing and the proposed system are as follows:

(a) Data Flow Diagram (DFD)

(b) Time Measurement

(c) Gantt Chart

Data Flow Diagram concept is the diagrammatic picture explains the data flow of any system. In theory, Sata flow is usually the first component to be defined system inputs and outputs as determined from interviewing, observing users, and analyzing documents and other existing system. The information captured for each data flow may be summarized using a form containing the following information:

(1) ID, and optional identification number. Sometimes the ID is coded using a scheme to identify the system and the application within the system.

(2) A unique descriptive name for this data flow. This name is the text that should appear on the diagram and be referenced in all descriptions using the data flow.

(3) A general description of the data flow.

(4) The source of the data flow. This could be an external entity, a process, or a data flow coming from a data store.

(5) The destination of the data flow (same item lists under the source).

(6) An indication of whether the data flow is a record entering or leaving a file, used between processes, it is designed as internal.

(7) The name of the data structure describing the elements found on this data flow. For a simple data flow, this could be a one or several element.

(8) The volume per unit of time. This could be record per day or any other unit

of time.

(9) An area for furthers comments and notations about the data flow.

The details of each data flow is described using a data structure, which is a group of elements sometime called fields. Data structures are usually described using algebraic notation. This allows the analyst to produce a view of the elements that make up the data structure, along with information about those elements. For instance, the analyst will denote that there are many of the same elements within the data structure (a repeating group) or whether two elements may exist mutually exclusive of each other. When data structures are first defined, only the data elements that the user would see, such as a name, address, and balance due are included. This stage is the logical design, showing what data the business needs for day-to-day operation. Using the logical design as a basis, the analyst then designs the physical data structures. These include additional elements necessary for implementing the system. Indeed, Physical DFDs and Logical DFDs are interchangeable by converting them to be another one. There are many steps to convert physical DFDs to logical DFDs widely used started with remove all the processed that refer to physical activities only and do not transform information. The remaining processes are physical because they describe physical components. Then, take each physical process, find out what it does, and replace it by a leveled DFD of logical functions that represent the physical object's logical activities, or what the object does. All physical processes can be expanded in this way and their expansion combined into a lower-level logical DFD. This lower-level DFD is then examined. Any common or similar functions are combined, and these combined higher-level processes become the higher-level DFD. There are four kinds of symbols to represent system components in DFD are shown in Figure 2.23.

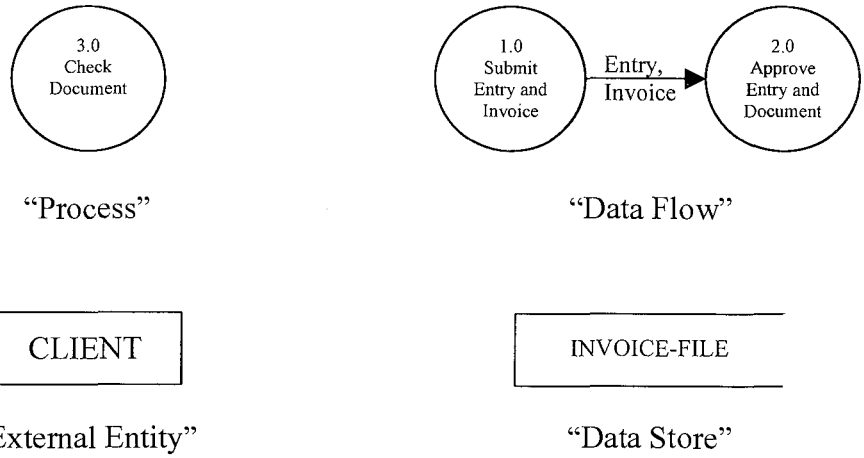


Figure 2.23. Data Flow Diagram Symbols (Hawryszkiewycz 1998).

Another theory used in this project in the part of feasibility analysis is Time measurement. As a matter of fact, there are a number of work measurement methods that can be used for work measurement depending on the application, time measurement is the best suit for our project because of these reasons:

(a) Data flow of proposed system can be compared by time taken.

(b) New design changes some tasks; this method helps to specify detail of the work elements.

(c) Standard time is not necessary since this job does not take large volume.

Time measurement is one of the simplest approaches of work measurement. A job is divided into a series of smaller work elements representing the accepted work methods for the job. Observation is needed to record the time needed per transaction. Then, the analyst sums up total time taken for one job. The less tome taken, the more efficient task emerged due to the more utilization on the time.

In implementing the new system, the operation scheduling is very important to keep step of working and easy for checking the result at each stage development. This project applies the Gantt Chart in project scheduling so as to monitoring the progress of

jobs. It is essentially a chart on which bars represent each task or activity. The length of each bar represents the relative length of the task. We use a two-dimensional Gantt Chart where time is indicated on the vertical dimension and a description of activities makes up the horizontal dimension. The Gantt Chart depicts the sequence of work and can also be used to monitor progress. Since the bar representing activities or tasks are drawn to scales; that is, the size of the bar indicates the relative length of time it will take to complete each task. In other word, if the preceding step is not finished on tome, the Gantt Chart may have to be monitored from the next step till the end of process so that all parties can upgrade their task according to the plan. The main advantage of the Gantt Chart is its simplicity. The system analyst will find not only that this technique is easy to use but also that it lends itself to worthwhile communication with end users.

III. THE EXISTING SYSTEM DEFINITION

3.1 Historical Background of the Thai Customs Department

Thailand's duty and tax collection dates back to the Sukhothai period, when Thailand first engaged in trading with foreign countries. The tax being collected in that period was called "Changkob" and was lived on goods either in terms of exchangeable items or money, and was based largely on the size of ship of other means of transport. Details of the agency that collected the Changkob, however, remains unknown.

In the early Ayudhaya period, the government started to authorize officials to collect a tax known as "Suay-Sa-Arkorn."

In the late Ayudhaya period, this was replaced by a new system known as the "Chao Pa Si" (Monopoly Tax Collector).

The new system allowed individuals, selected by means of tender, to collect tax at the point of entry on behalf of Royal Finance House.

Tax collection evolved and prospered in the Rattanakosin Period. In the reign of King Rama IV, a "Tax House" was founded to import goods on the basis of "Roi Chak Sam" (the rate of 3 percent).

Later, in the reign of King Rama V, the government recommended tax collection, bringing an end to the private sector role and the "Monopoly Tax Collector."

In July B.E. 2417 (1874 A.D.), the "Ratsada Korn Pipat Chamber" or "Hoe Ratsada Korn Pipat." was established to handle all kinds of tax collection. The task of collecting Customs duty was later transferred to the newly created "Customs House" which became the foundation of the present Thai Customs Department.

3.2 Roles and Responsibility

The main roles of the Customs Department are to collect revenue and facilitate business transactions both domestically and internationally. These tasks have been arranged as follows:

(1) Enforcement of tax laws and other related laws, including the tariff levied on various import/export items. The revenue collected the department consist of: Customs duty, value added tax (VAT) for the Revenue Department, excise tax for the Excise Department, municipal tax for the Ministry of Interior, surcharges under the Investment Promotion Act, charges and fees under Customs and related laws.

(2) Prevention, suppression and control of smuggling. This involves monitors, investigation, and cracking down on illegal activities. It is meant to protect honest entrepreneurs and to enhance the tax collecting capacity of the department. This is achieved by:

(a) establishing measure against tax and duty evasion as well as rebate fraud

(b) undertaking intensive surveillance and control over the smuggling of narcotics, weapons and protected flora and fauna: and

(c) exchanging information/intelligence with other Customs administrations and related agencies.

(3) Promotion of export through tax measures, including tax reimbursement for raw materials imported to be produced, mixed, assembled or packed for re-export. Also, tax exemption is granted on the raw materials which are imported for storage in bonded warehouses and when re-exported from the

Export Processing Zone (EPZ). Tariff reduction is also accorded to those with promotional privileges from the Board of Investment

We also promote export, by offering incentives to investors, such as:

(1) simplified Customs formalities,

(2) temporary goods depots for Customs inspection and packing of exported goods to be transported out of the port are by the containerized system. Apart form these three functions, the Customs Department is also responsible for.

(3) advising on policy-related matter for tariff structure reform and the use of tax measures beneficial to the national economy; and other operations defined by taw as responsibilities of the Department or those assigned by the Ministry of Finance or by the Cabinet.

3.3 Action Plan

Action plans for the five-year master plan of the Royal Thai Customs Department (1998-2002) are as follows:

(1) Customs Formalities Development

(2) International Standardization Development

(3) Export Promotion

(4) Development Plan for Administration

(5) Development Plan for Prevention and Suppression

3.3.1 Customs Formalities Development

In the first plan, the Customs Department introduces the paperless system. This system is to hold the computer training programs for operating officers. Training courses consists of basic computer for Customs officers including Microsoft Office,

e-mail, and other software packages; new techniques for computer, Internet and Customs-related Internet, EDI for Customs.

In addition, this system issues laws to support a paperless environment, studies and analyze the Department's responsibilities and requirements to see where the paperless system can be implemented, and drafts new laws to modify/amend the existing Customs laws.

Further, it also seeks approval from the committee "Kor Por Kor" before presenting proposed laws to the Department, and passes legal procedures of the National Assembly.

This plan also develops Customs Broker System which include selecting Customs Brokers and issuing licenses, Establishing an on-line computer system for Customs Brokers' inquiries, and Issuing laws to support and control Customs Brokers.

3.3.2 International Standardization Development

The second plan is to develop price system. Such system includes standardizing price data, developing price data file system, drafting new laws to support the introduction of GATT Valuation, and drafting operating regulations for GATT/WTO Valuation.

It also develops plan for tariff nomenclature and structure which includes modifying/amending the tariff nomenclature law by authorizing the Cabinet in the amendment. Besides, it amends the tariff rate structure for reviving and developing the country; coordinating with other countries to this end.

In the international standardization plan, it also includes adjusting the sub-headings of the tariff nomenclature to be in harmony with those of ASEAN and other countries for linking tariff data through EDI, Translating Explanatory Notes and WCO Tariff rulings, and Introducing pre-classification information.

Moreover, this plan is to develop plan to institute Kyoto convention and other conventions' regulations which includes amending laws and regulations to be in line with the Kyoto Convention, and stipulating procedures for acceding to the Kyoto Convention. Also, it is to develop plan to standardizing laboratories in line with the WCO. To develop efficient, modern laboratories by using new technology and equipment and then it is also goods analysis development.

3.3.3 Export Promotion

The third plan is to include amending the existing rules and regulations on beneficiaries, rights and formalities to facilitate export promotion, establishing Customs Free Zones, and amending relevant laws to promotion of establishment warehouses and bonded warehouses locally. In addition to develop the on-line computer system for export clearance and drawback which links computers at export entry counters, export checking posts and clearance points, and Reduce the rates of yield by compiling and standardizing them; encourage exporters to use the standardized rates of yield.

3.3.4 Development Plan for Administration

The fourth plan includes developing human resource, forming customary ways and launching a campaign for encouraging personnel to recognize needs. There are positive attitudes and values performing their jobs. Nevertheless, to establish criteria for movement of personnel is to prevent unfairness but also to establish development and training plans for officers, and to establish a plan for enhancing the work progress of specializing officers.

For the organizational development plan, it is considered to implement plan in line with measures for adjusting the public sector to counteract the economic crisis, and complete the Five-Year Manpower Plan (1999-2003).

The proactive public relations plan which supports to create an efficiency plan for public relations, enhance the image of Customs, enhance understanding of new policies, visions and our service approach, promote information technology service, and harmonize information in the central and regional offices.

3.3.5 Development Plan for Prevention and Suppression

The finally plan, the Customs Department needs to develop network for intelligence system. Moreover, development of risk assessment system and post clearance verification. They provide introduction of information technology and new technologies, including development of human resources in the field of suppression by enhancing attitudes of working for transparency and justice for taxpayers.

3.4 Customs Administrative Structure

Royal Thai Customs Administrative Structure is compounded with five main departments which work for the Administrations, Operations, Policy and Planning, Assessment and Audit, and Technique and Foreign Affair with the administrative structure as shown in Figure 3.1.

This project defines only the Operation Department and Technique and Foreign Affair Department, in particular of Bangkok Port Import Clearance Bureau and Bangkok Port Export Clearance Bureau. The important role of the Customs Department toward Import and Export is nearly the same task. The Customs Department is regarded as the country's import and export gate, being tasked with the examination of imported and exported goods to see if they comply with Customs regulations, for instance whether such goods are accompanied by a correct license from the concerned agency if they are so required. The examination is divided into 2 parts: examination of import and export documents and examination of imported and exported goods. The organization

chart is shown Customs Administrative Structure in Figure 3.2, concerning on the existing system analysis and the proposed system design.

At this point of view, the operation division can be divided into 3 main areas, which monitor the formality execution of Importation process. The other division is concerned with the technique and foreign affairs, which can be into 4 main areas and one of them control and monitor the formality execution of Exportation process. Figure 3.3 shows as the Customs House and 5 Regional Customs Bureaus Map, including 55 bureaus which point to the outstanding position of Thai import and export areas.

This chapter defines administrative process in issuing Customs card steps for operating with the execution of Customs formalities. The procedures of import and export, and clearance procedure are presented to flow chart diagram. The existing system is considered 3 parts; initially, the time is needed to get or delivery a receipt and Customs card done, and then the workload has been justified. Most of the information is done on human resource and stored in an administrative data files or folders. The data entry is duplicative and repetitive part of their jobs. There are filling out of paper forms that are the same paper work. The staffs and officers can't do the job efficiently and effectively because of the lack of resources. They always reenter all their redundant data on the same paper forms. Secondary, the system must develop and update data on the import and export of Customs bureau network. If the data cannot be updated, the accurate up-dated report will not be generated. The entrepreneurs or the Customs brokers must submit many documents for approval. Finally, there is no sufficient network to provide checking data because the entrepreneurs will have a chance to directly meet the officers not only during the verification of documents before releasing or clearance of goods but they will without delay because of Custom fraud and corruption.

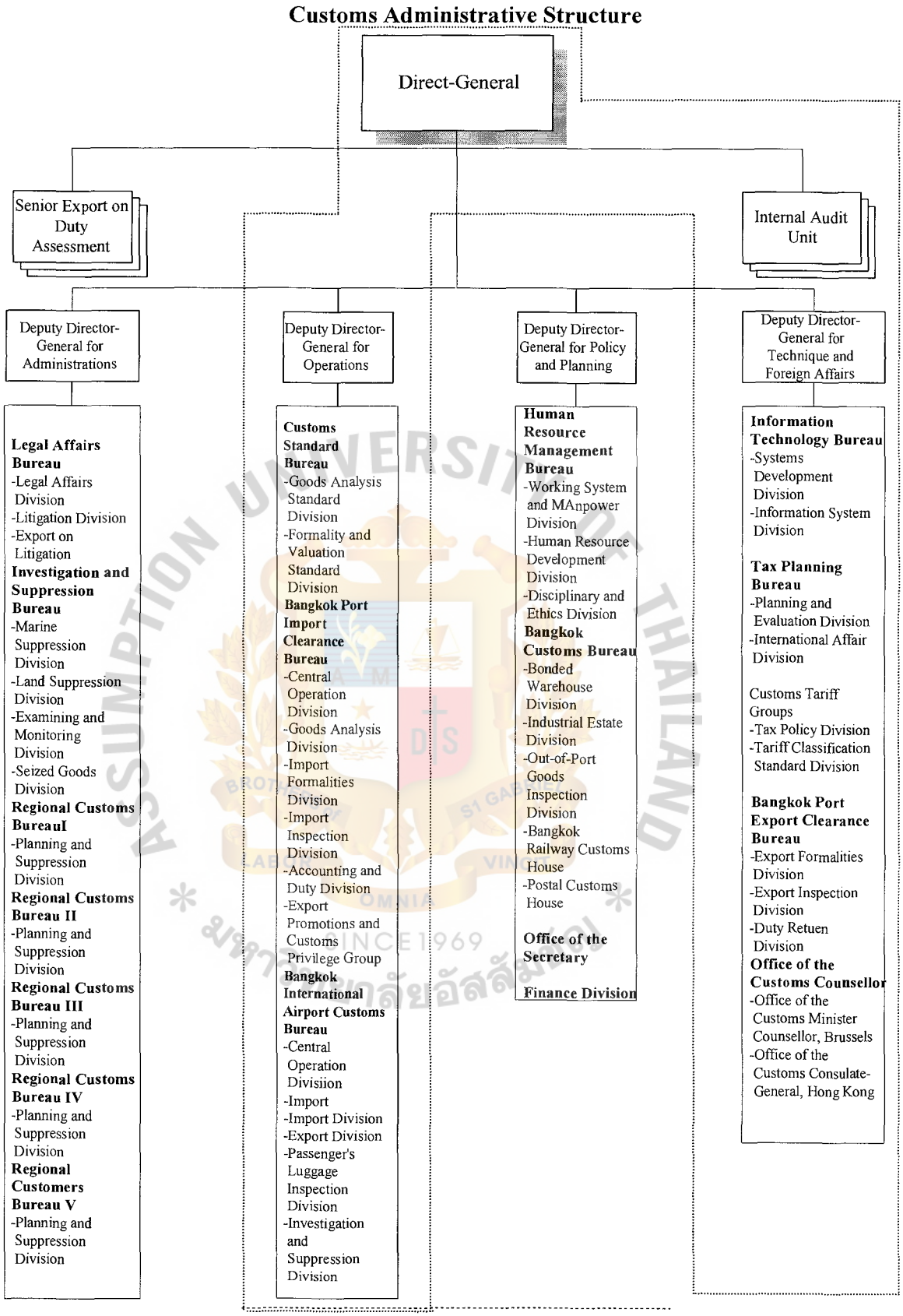


Figure 3.1. Customs Organization Chart (www.customs.go.th).

Administration Division and Technique and Foreign Affair Division

Figure 3.2. Administration Division and Technique and Foreign Affair Division.

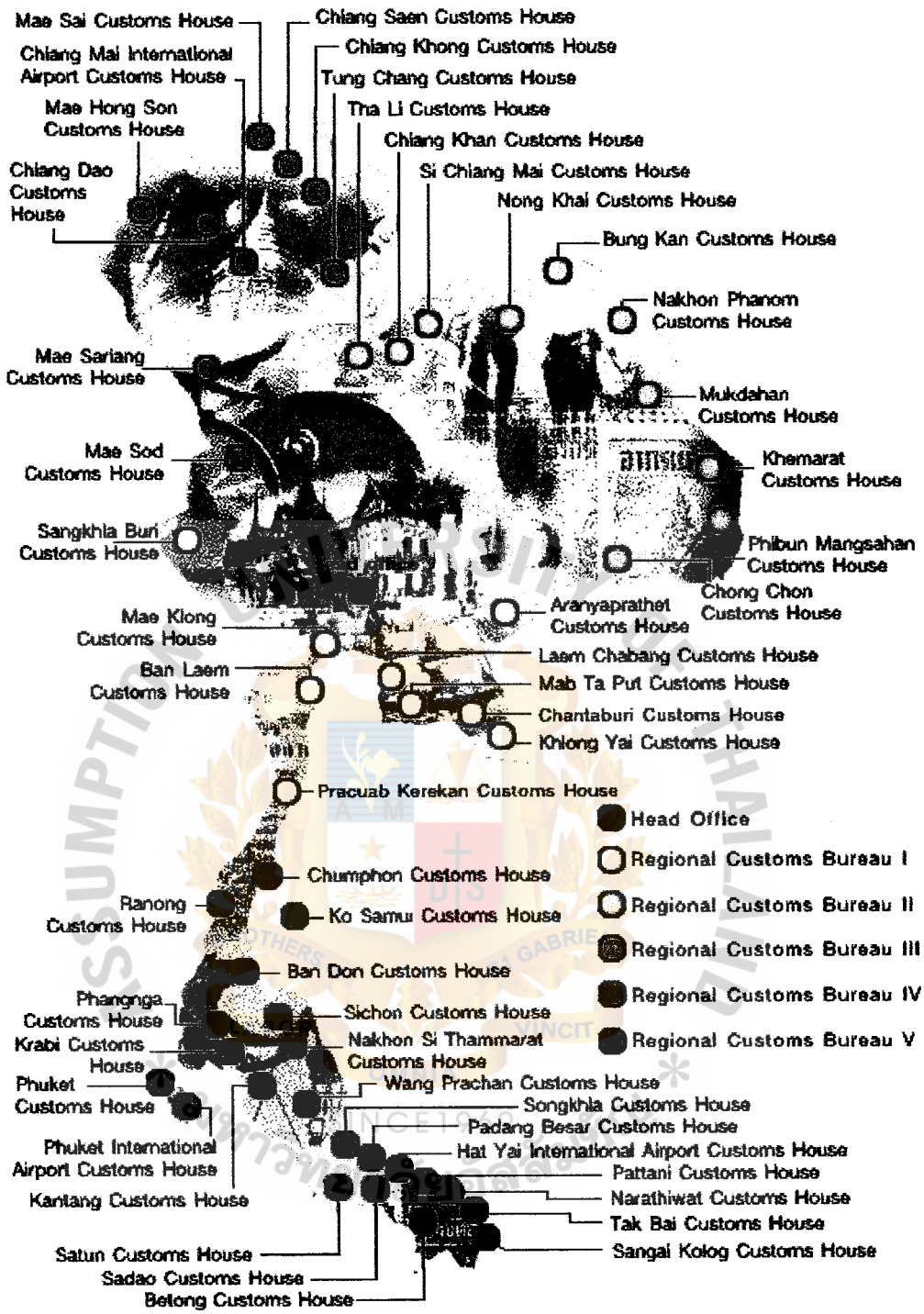


Figure 3.3. The Customs House and Regional Customs Bureaus Map.

To consider the Customs Card Request procedure, there are seven steps as shown in Figure 3.4. Therefore, The total time taken is about 1-2 hours to be complete all procedures.

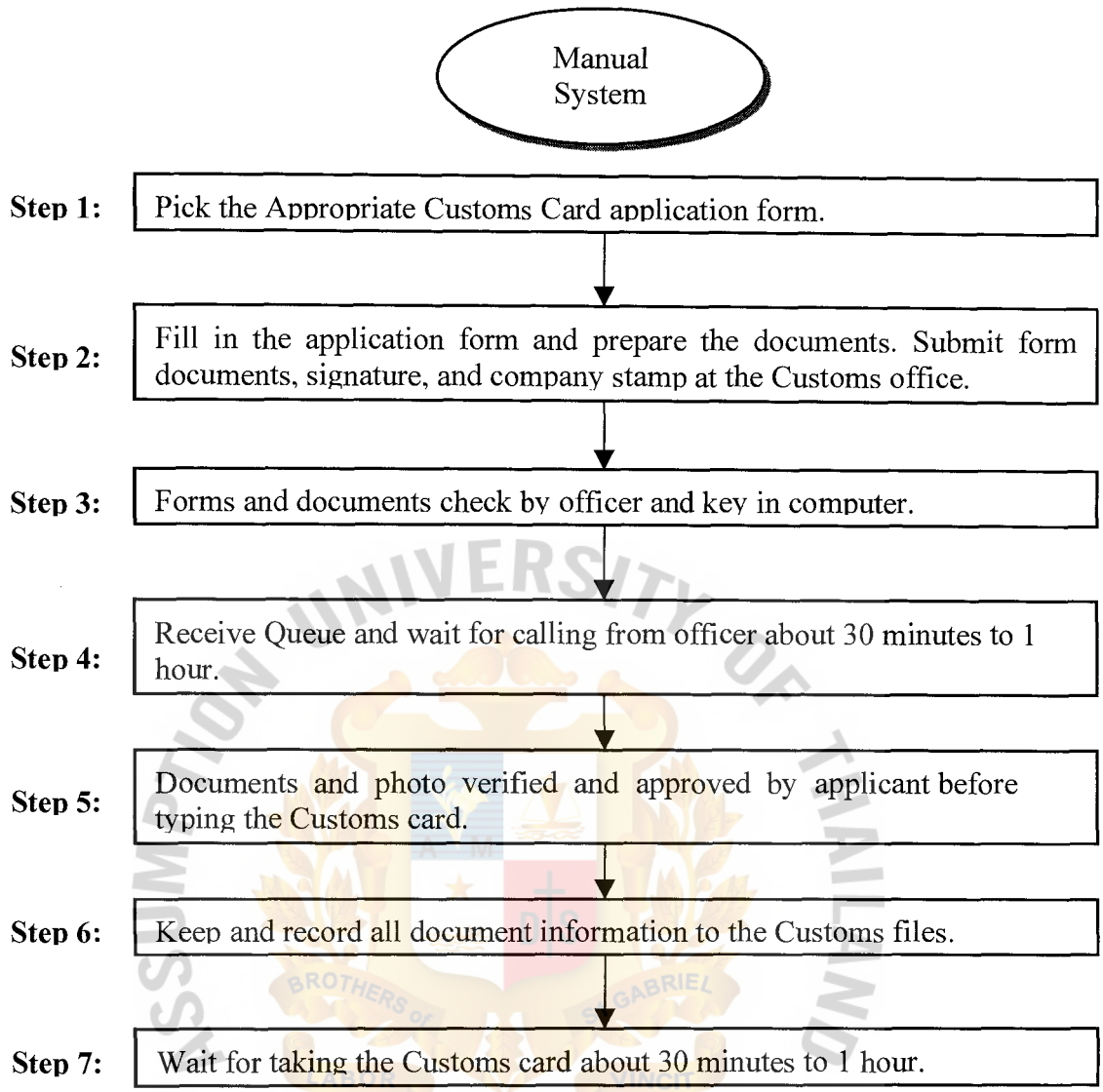


Figure 3.4. The Customs Card Request Procedure.

3.5 Import Procedure via the Existing System

These following documents are used for the execution of Customs import formality:

Examination of Import Documents

The importer's documents must be shown and submitted to the Customs Department in cases like:

(a) managers' or authorized persons' signature cards which are issued by the Customs Department; in case the importers authorized Customs brokers to

perform the work on their behalf, Attorney-In-Fact card, Customs brokers' or clearing identification cards must also be displayed to Customs officers;

(b) import entries which are the Customs forms to be filled in by the importers by giving the particulars concerning the description, Customs duty, value added tax (VAT) for the Revenue Department, exercise tax for the Exercise Department, and entry released. All copies must be original and 3 photo copies;

(c) bill of Lading:- 1 original bill;

(d) invoices:- 1 original invoice and 3 copies;

(e) packing lists:- 1 case;

(f) oversea business form (Thor Tor 2) for the value of goods in excess of 500,000 bahts;

(g) licenses or certificates in case the imported goods require import licenses or certificates.

The existing import procedure and clearance of goods system is manual system, which consists of 8 steps. Each process spent more time and the total time takes more than 30 minutes. Importation at the Bangkok Port requires two steps: Document procedure, and Clearance of goods. Figure 3.5 shows the step by step of import procedures. Examples of Import documents mentioned above are illustrated in Appendix C. Further, Export documents are mentioned in next topic.

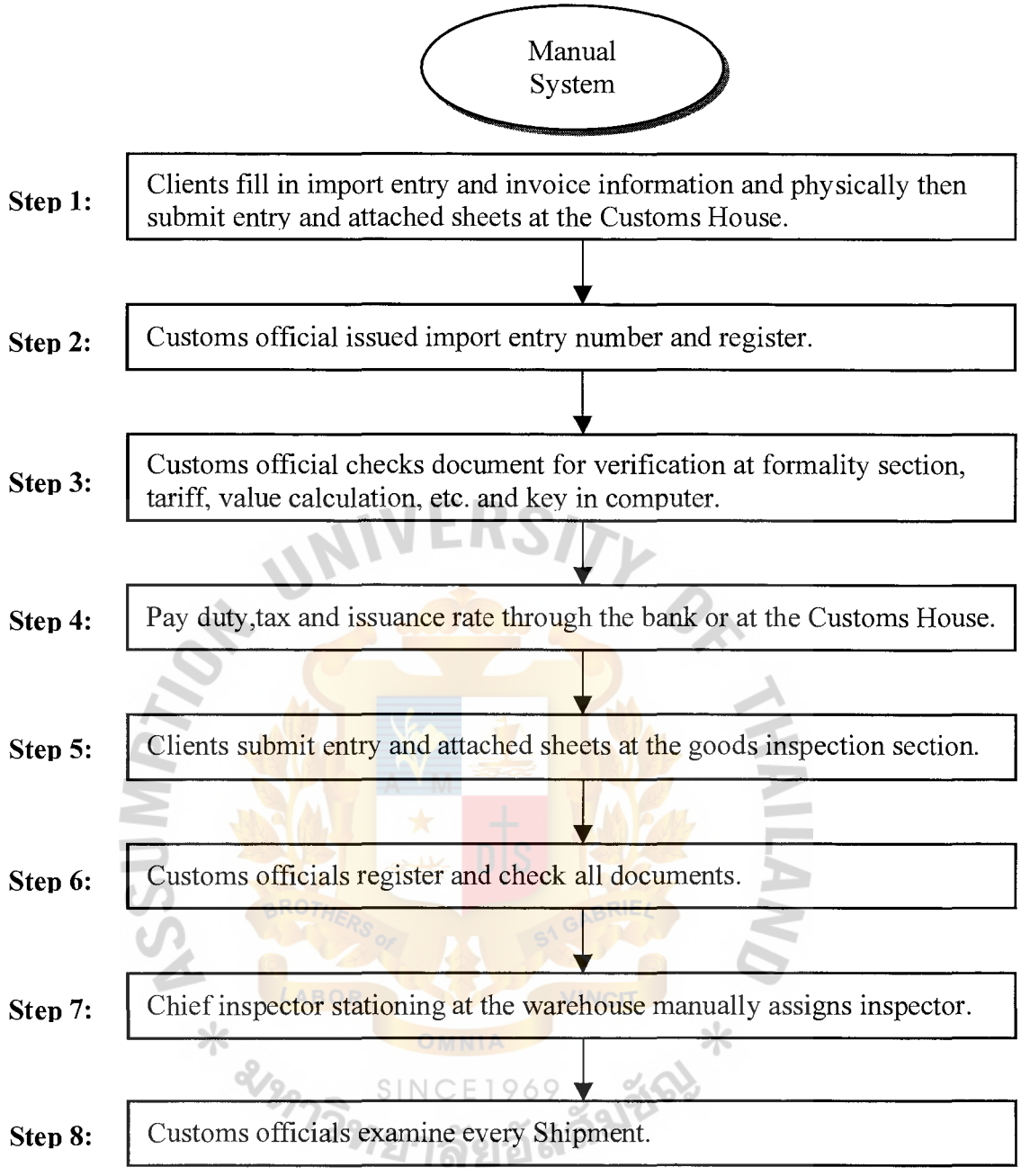


Figure 3.5. Customs Import Procedure.

3.6 Export Procedure via the Existing System

These following documents are used for the execution of export Customs formalities:

Examination of Export Documents

The documents exporters must be shown and submit to the Customs Department in general cases are:

(a) managers' or authorized persons' signature cards which are issued by the Customs Department; in case the exporters authorized Customs brokers to perform the work on their behalf, Attorney-In-Fact card, Customs brokers' or clearing identification cards must also be displayed to Customs officers;

(b) export entries which are the Customs forms to be filled in be the exporters by giving the particulars concerning the description, value, and quantity of goods as well as the port and country of destination. All copies must be original and 3 photo copies;

(c) invoices:- 1 original invoice and 3 copies;

(d) packing lists:- 1 case;

(e) oversea business form (Thor Tor 1) for the value of goods in excess of 500,000 bahts;

(f) licenses or certificates in case the exported goods require export licenses or certificates.

The existing export procedure and clearance of goods system is manual system, which consists of 13 steps. This process takes more than 45 minutes until packing cargo to shipment but the exportation is not so strict than the importation, which is related to import tax and exercise tax. Exportation at the Bangkok Port also requires two steps: Document procedure, and Clearance of goods (see Appendix C).

(1) Document procedure;

(a) completeness check of export entries / supported documents and inspection order (by assessment officials);

(b) issuance of entry number and duty exemption numbers (by formality officials).

These two steps will approximately be completed within 10-15 minutes.

(2) Clearance of goods; The entries processed through the manual system have clearance steps as follows:

Registration ⟶ Customs official assignment ⟶ Goods inspection

Working hours

The Export Formality Sub-Division, besides rendering services within office hours, also provides identical services during the overtime period from 4:30 p.m. to 8:30 a.m. on the following day. There is a 24-hour service on weekends with no overtime charges.

The Goods Inspection Sub-Division provides a 24-hour service with overtime charges.

The following Figure 3.6 is shown the step by step of export procedures.

3.7 Problem Definition

According to the mentioned existing flow chart, there are many deficiencies that generate problems for each administration process as follows:

(1) Issuance of Customs Card Procedure

(a) Manual work in repeated process i.e. issue new Customs card, inform the information, writing receipt, collecting data into files or folders, etc.

(b) Workload on one person i.e. Officer is responsible for categorizing document, run number of document, recheck document, tracing overdue case, key data, etc.

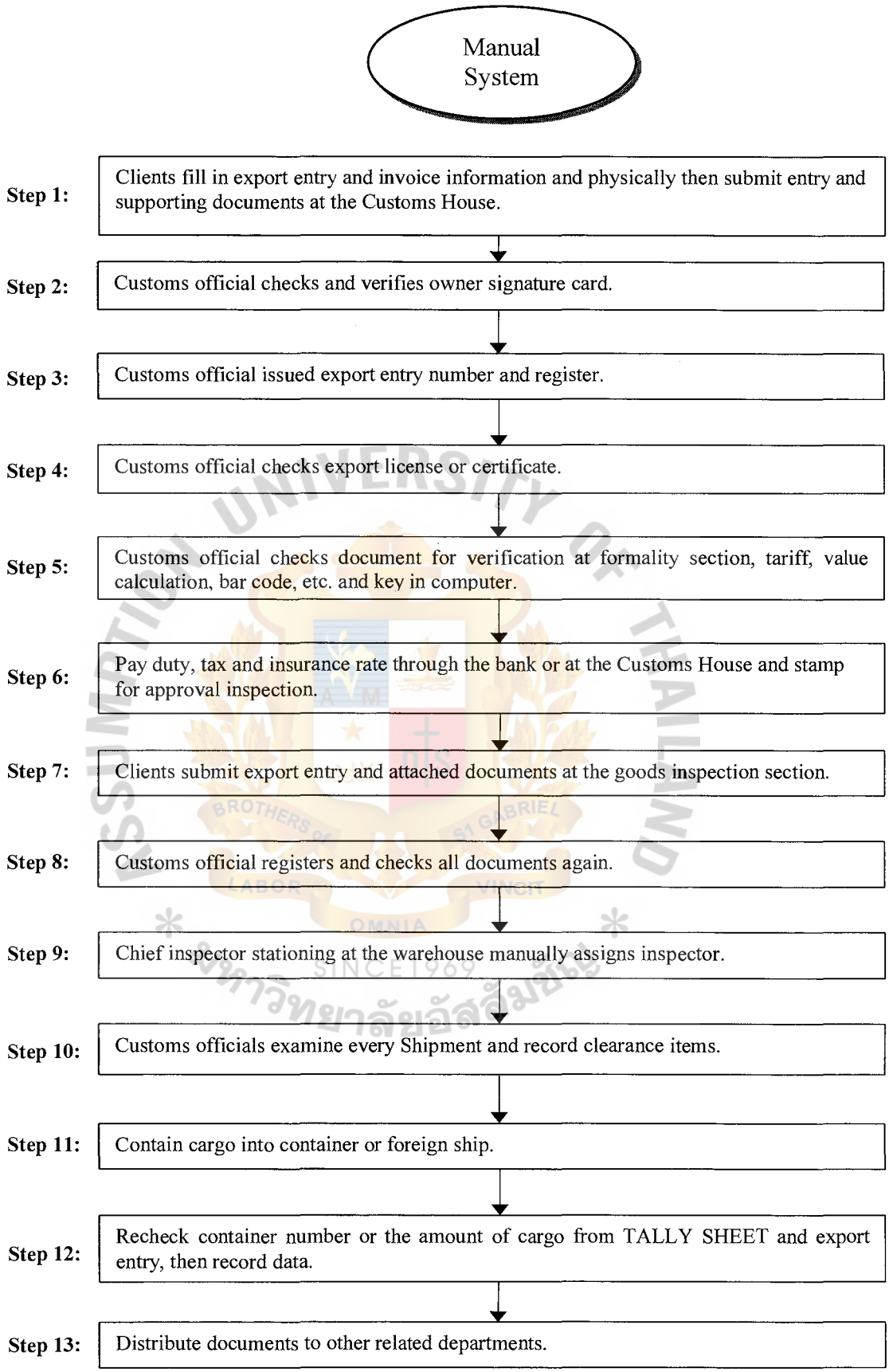


Figure 3.6. Customs Export Procedure.

(c) Time spent i.e. finding the document, checking and rechecking document, approving document, photograph, signature and company's stamp, queue in step by step, paying fees, etc.

(2) The execution of Customs formalities:- The import and export procedures

(a) Redundancy of document i.e. invoices, receipts, exercise tax, value-added tax, identification form, licenses or certificates, bills of lading, packing lists, oversea business form, etc.

(b) Idle time during approval process

(c) Insecurity in work process i.e. imitating of signed identification form, photograph, company's stamp, bribery, etc.

(d) Taking much time in each step before clearance of goods

(e) Number of steps i.e. informing the information, checking invoice, paying tax, revenue, and Customs duty rates, etc.

(3) The Customs clearance of goods procedure

(a) Mass-documents for inspection

(b) Used much time in each process before releasing goods (the last step)

(c) Bribery of officer and Customs broker easily

3.8 Users' Requirements Specifications

The Customs officers as users are investigated and interviewed partly to analyze flaws and deficiencies of the current system. The smart card system is set to provide the up-to-date information. The report can be generated at any time as much as needed. They can automate the most time-consuming and repetitive part of their jobs, all the tedious data entry. Not only it will save time but it will also reduce errors. In developing administration system, the data can always be updated through data entry screen and be transmitted to linked hardware. It also reduces the workload of officers. However, the

users requirements specifications which they want to help in working documents, including the development of the administrative system as follows:

(1) Data and accuracy list from other department to generate report and competition report;

(2) Standardize for all computation factors;

(3) Reduce time consuming and work redundancy;

(4) Need flexibility in generated any kind of report using difference data resources;

(5) Easy to update and using the up-to-date data from the related department from the database system;

(6) Provide a more user-friendly method to access and manipulate data so that clients can more easily fill requests for information;

(7) Provide on-line or network in operational processing applications;

(8) On-site information system.

All steps are paper work or manual working process thus there is no connection with the Customs database. They are separated to man to man in their duties. Thus, they must key and arrange data in computer again so that the data will be kept into the Customs files or folders, in another way, they must copy all documents and send to other divisions related for being evidences in operation. That means the officer must spend a lot of time to connect network and check information before container or shipment moved.

The existing system is summarized the process as shown in Figure 3.7 below:

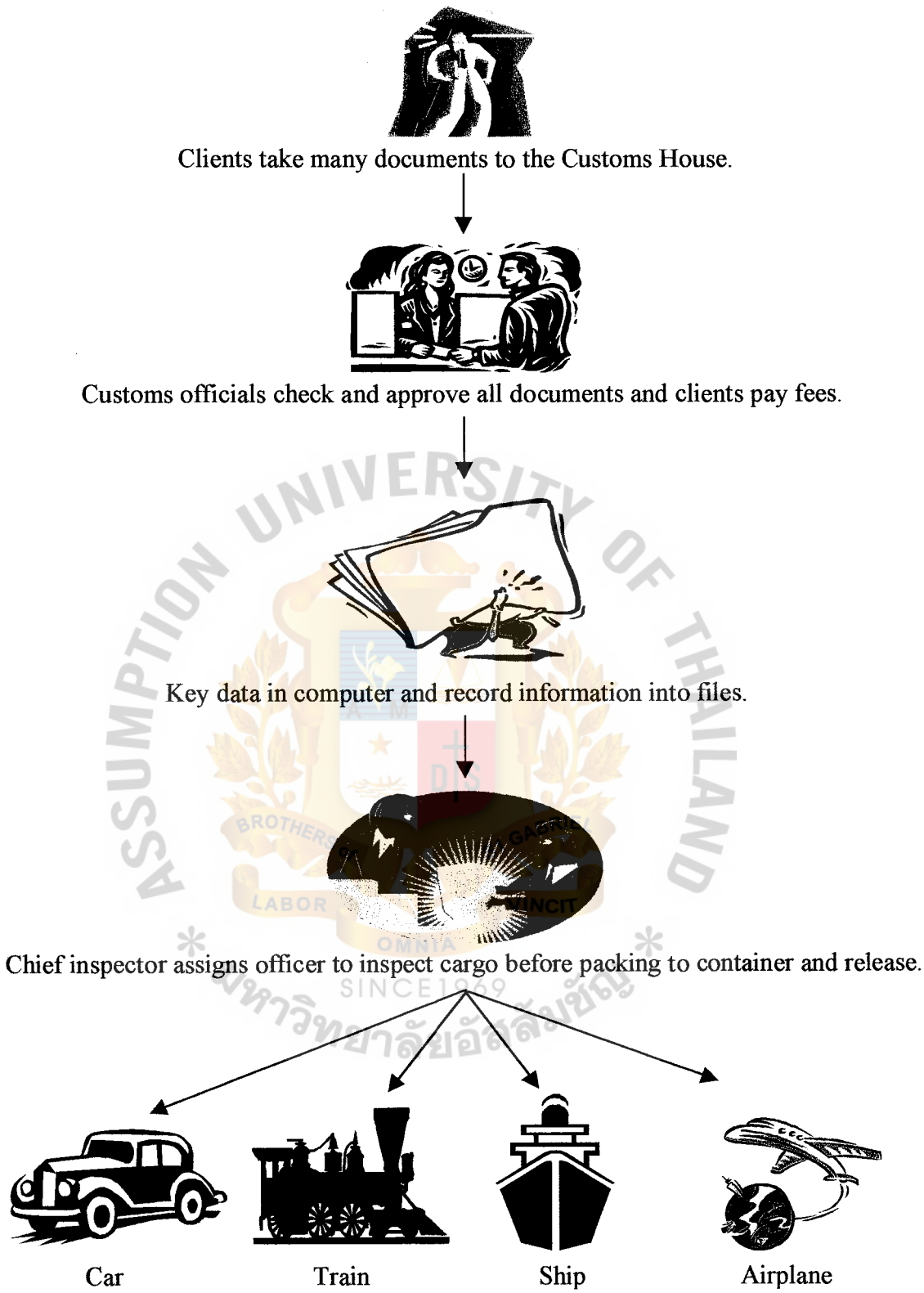


Figure 3.7. An Overview of Import-Export and Clearance of Goods Procedures.

IV. THE PROPOSED SYSTEM

4.1 Constituents and Configurations of the Proposed System

The customization is needed in system design in order to construct the most suitable system for specific area. The proposed system recommended is the most automatic process due to the major computer-based transactions. The problems in existing system such as the manual work in running number of document; record received document; categorizing information; creating client file and approved before input any data, would not happen in the proposed system. The software of proposed system is created by software house so it is more expensive than general licensed software. However, the specification of system is generated to satisfy user needs because they will connect to other departments conveniently per transaction. The value of investment will be represented later. The major constituents of the proposed system can be concluded as follows:

(1) Multiple database management system

(2) Object-oriented design for retrieving data

(3) Data transferable from server to import and export department

(4) Operation both on-line and off-line system

(5) Operations mainly exist on the screen

(6) Providing customized report

(7) Security of record data

To obtain these function, the new system needs to attain the following configuration:

(1) Software Module in connecting between server and other divisions

(2) 1 main server installed at the central position

(3) 55 linked Servers installed at the regional Customs and bureaus

(4) 4 printers: 1 laser printer, 1 color printer and 2 dot matrix printers

(5) 2 scanners at the central position

(6) 2 digital cameras at the central position

(7) 3 card writers installed at the central position

(8) 3 card readers installed at the Head office and 208 units at 55 Bureaus

(9) 14 workstation units installed at the administration department of the Head office and 208 units at 55 Bureaus

(10) At least 150,000 smart cards initially for importers and exporters (manager or owner card), including Attorney-In-Fact card, and Customs brokers' card or shipping card or clearing identification card

The proposed system will develop new procedures since the issuance of the smart card, import and export procedures clearance of goods procedure. First, the Customs card request procedure is process in changing client's old Customs card. Because of limited time schedule, the Customs must recall old card version to the organization before finishing the installation of the card reader. Thus, every step is elaborated working process and accurate data information. Time is utilized to save time consuming. There are many machines to help users' convenience. The card writer will save time to issue the new feature of Customs card and print out the trusted report or receipt. Programmers will design the smart card software, which is called "Personalization Smart Card Program", is to interface with other peripheral devices. Its size is small and portable like name cards or credit cards, etc. Instead of taking a lot of documents and manual work, clients can use only this card taking the card to everywhere that they want to go and their missions will not take more time. Because of its capacity, each card can contain text size around 8 Kbytes now. In other words, it can upgrade software to 16 Kbytes or 32 Kbytes, so that it can be available for other features in the future. Clients or software houses can do it by themselves under limited

rights from the Customs permission. The following Figure 4.1 shows steps of Customs Card Request Procedure.

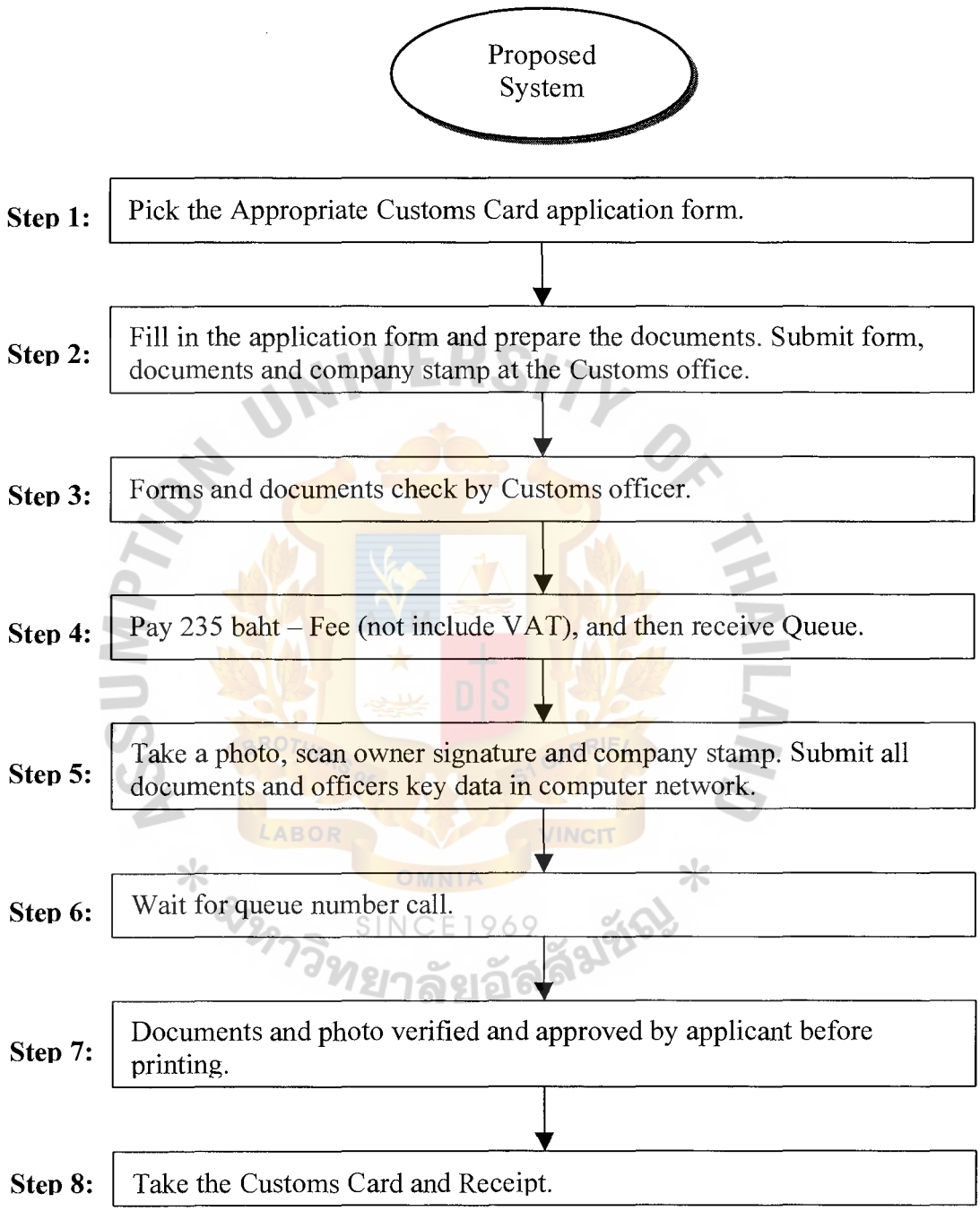


Figure 4.1. The Customs Card Request Procedure via the Proposed System.

Thus, these steps can be established as the suggested configuration in Figure 4.2, which defines the detail of hardware installation in the proposed system.

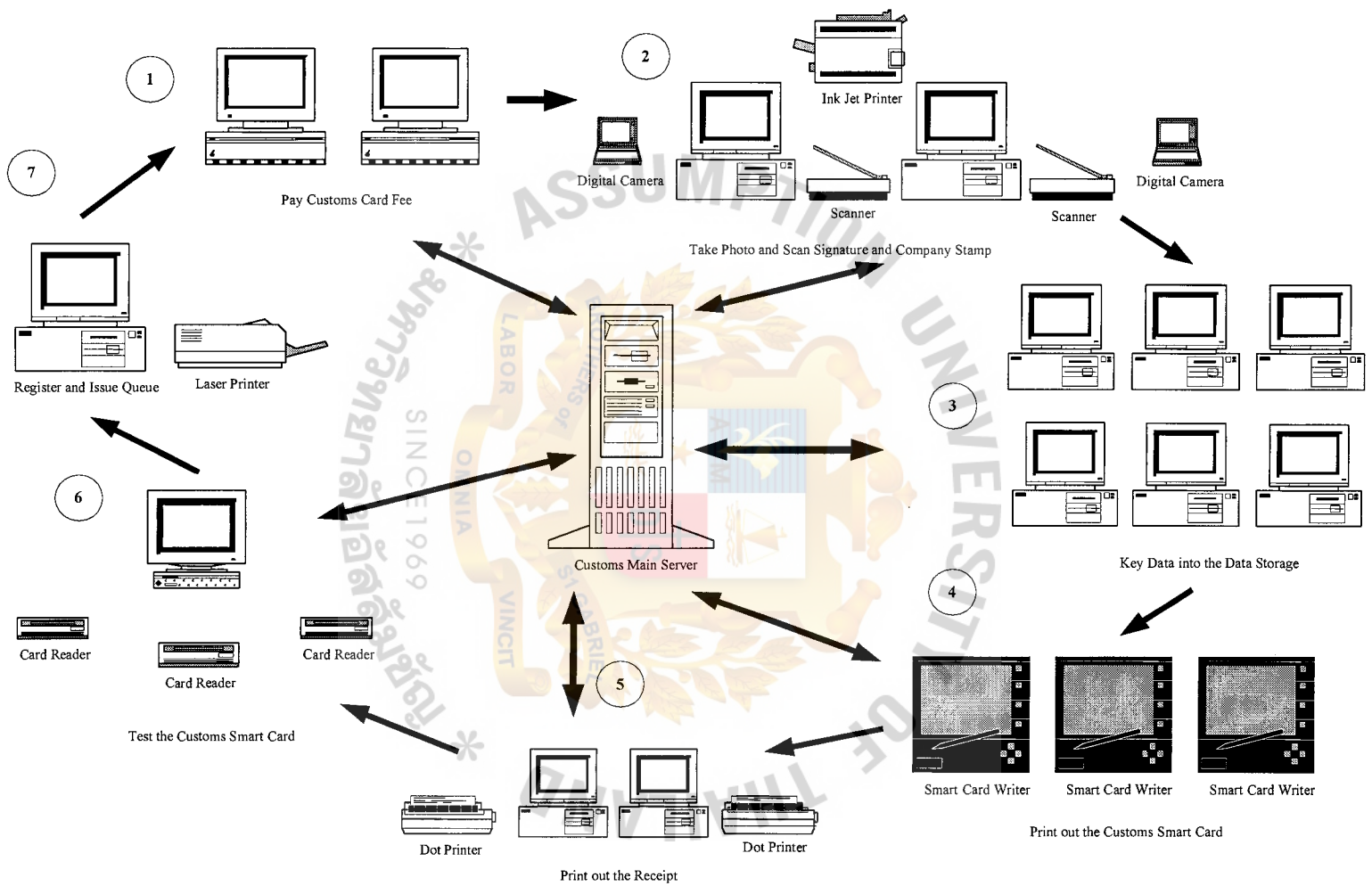


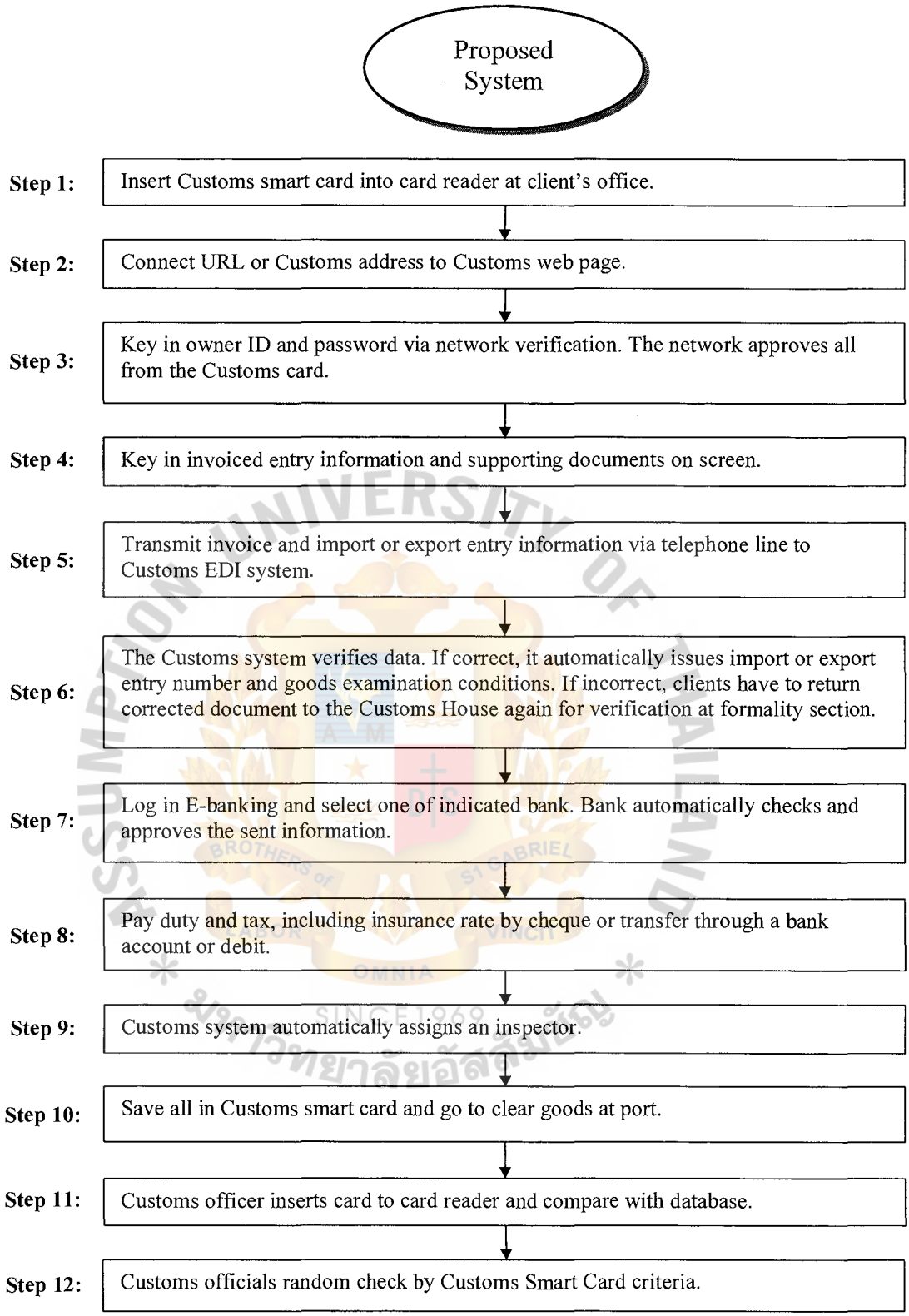
Figure 4.2. Customs Card Request Procedure Prototype via the Proposed System.

4.2 Import and Export Procedures via the Smart Card System

Second, the system describes briefly that involves importers and exporters or authorized agents transmit the information concerning their importation or exportation from their computers to the Department's computers. The Department's computers will then process the information received; if correct, entry number will be issued and the importers or exporters will be notified through computer network after that they can pay the revenue or Customs duty by passing through E-banking immediately; if incorrect, correction orders will be transmitted. Then importers or exporters or authorized agents will prepare the entries by using the computer data and submit them to certain officials, depending on the types of entries. The entry that requires no checking must be lodged at the warehouse designated as the port of import or export. In this case, a warehouse official will record the number of bill in card and computer, and the computer will automatically specify the name of the official for the clearance of goods. A Customs chief inspector stationed at the warehouse will review the over all information as shown in Customs card and endorse them prior to the release of goods.

There is no need to take many forms and documents to the Customs office in the smart card system; especially clients can do every activity at their offices by passing through this system. So import procedure is almost the same as export procedure because every data is already recorded in Customs card and Customs database. The process is shown in Figure 4.3 the execution of Customs import and export procedures, including clearing of goods process.

The system is supported with Electronic Data Interchange (EDI), which the exchange of structure messages from one company system to another through electronic mean. The clients who need to use the system must have their own programs for the transmission of data, e.g. entry, invoice, bill of lading, packing list and manifest.



Note: Gold Card members are exempted from goods inspection except for random checking.

Figure 4.3. Customs Import and Export Procedures via the Proposed System.

The clients themselves can develop their own programs or have the programs done by a software house in limitation and regulation of the Customs House. As regards to the formality execution process and the clearance of goods undertake the proposed system, importers or exporters must load the information on invoices and entries into the computer linked with the Customs Department's computer system for verification. If the information is correct, computer will number the entries and notify the importers or exporters through the system that will automatically assign an inspector or a chief inspector. The importers or exporters can thereafter submit the entries for examination and for recording the clearance data at any formality section before the process is completed. Gold Card members are exempted from goods inspection except for random checking. This process is much faster than the old process. In addition to the problem regarding corruption, smuggling and Customs fraud will especially be reduced. Since the system is called "Private Virtual Network or PVN", so the data flow in the system is realized to care for security and personalize data in each transaction. The proposed system is summarized in the Figure 4.4.

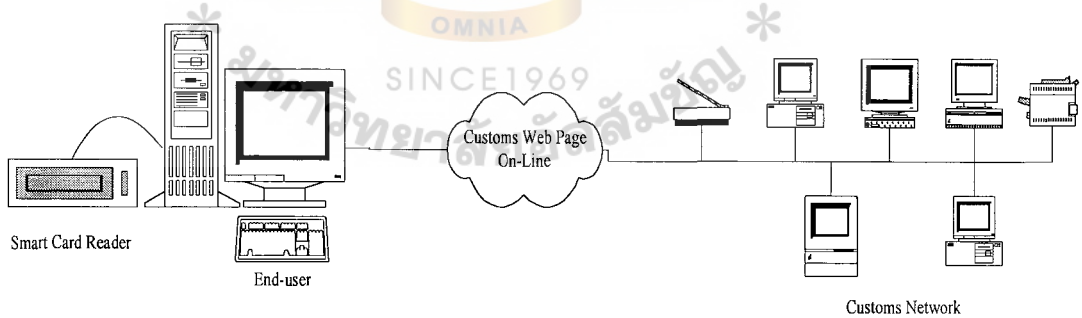


Figure 4.4. An Overview of the Customs Smart Card System.

4.3 Features of the Proposed System

Features of suggested Customs server specification, which is applied in the Customs Department network for future work, shows as follows:

(1) Performances:

(a) Processor: Intel Pentium III 667MHz processor with 133MHz front side bus

(b) Cache: 256KB on-chip L2 cache

(c) ECC Memory: 64MB registered ECC SDRAM standard Up to 768MB maximum memory capacity

(d) I/O Expansion Slots: Four PCI slots (two available in the SCSI version, three in the IDE version) and one ISA slot

(e) Controllers: Embedded, dual-channel U/66 IDE controller Additional SCSI controller card

(f) Mass Storage Shelves: Seven shelves:

(1) One preinstalled 3.5-inch flexible disk drive

(2) One preinstalled CD-ROM drive

(3) One available for optional tape drive

(4) One bundled HDD

(5) Three open 1- 3.5-inch shelves

(g) Maximum Internal Storage: Up to 72GB SCSI or 45GB IDE

(h) Video: Integrated 1024768, 256-color, non-interlaced 4MB SDRAM video memory

(i) CD-ROM Drive: 40X-max-speed IDE CD-ROM drive

(j) Flexible Disk Drive: 3.5-inch, 1.44MB flexible disk drive

(k) Built-in I/O Ports: Two 9-pin RS-232 serial ports; One 25-pin parallel port; One external SCSI port; One PS/2 mouse; One PS/2 keyboard; One AGP port

(l) Keyboard and Mouse: Bundled keyboard and mouse

(2) Expandability:

Design Features: All major assemblies easy to remove for upgrades or repair Physically compatible with standard 19-inch racks

(3) Flexibility:

Supported Operating Systems: Microsoft Windows NT 4.0 Server, Windows NT 4.0 Small Business Server, Windows 2000 Advanced Server, Novell NetWare 5.1, Novell Small Business Suite 5, and Red HatLinux 6.1

These above components will be requested to establish for the proposed system both at the head office and the regional and Customs bureaus. In real task, the components will be adapted appropriately to the objective and the position. The specification depends on the Customs ability that a main server should have more abilities and specifications in storing main database and connecting with other bureau servers around the country. The system should have more security and constancy or stability in transferring all information via the line connection. Also, it should be low risk and fast transferring request between main server and others in each transaction.

An overall of the proposed system shows a prototype of the Customs smart card, a chart of the Customs hardware installation at the head center and other bureaus, including a map of Internet connectivity in Thailand, for more details see in Appendix D, Appendix E, and Appendix F correspondingly.

However, there is suggestion of the Customs workstation specifications in the further work. They can apply in many tasks related to record data files. The ability

should be sufficient for working process and the cost should be appropriate to the users' requirements. Therefore, Figure 4.5 will suggest the proposed workstation specifications, which will describe necessary components in use. Each part can change or upgrade to become effective and efficient part for the system network.

In applying these above mentioned in the smart card system, the features of new system can be briefly explained as follows:

(1) Input data without pre-generating reference since object-oriented language allows nullity of object in the database.

(2) Automatic coding reference number for each transaction.

(3) Searching existing document file and spontaneous create new file for firsthand input.

(4) Provide report by extracting data input from central database.

(5) Directly link with server on sending details of import and export document.

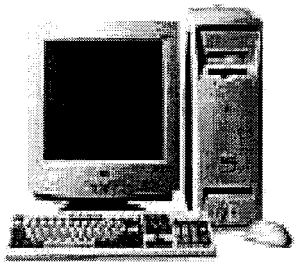
(6) Pay value added tax (VAT), revenue and exercise tax by passing through electronics banking.

(7) Finance and Accounting department has permission on directly retrieving data from database to audit each transaction.

(8) Distributing related documents of import and export procedures by connecting network to Regional Customs Bureau I-V.

(9) Approving authorized clients without imitation because of much more security of smart card system.

Specification for workstations



1. Dimension™ L566cx, Intel™ Celeron™ Processor at 566 MHz
2. Memory: 64MB SDRAM
3. Keyboard: QuietKey® Keyboard
4. Monitor: 15" (13.8" viewable)
5. Video Card: Intel 3D AGP Graphics
6. Hard Drive: 7.5GB Ultra ATA Hard Drive (4400 RPM)
7. Floppy Drive: 1.44MB Floppy Drive
8. Operating System: Microsoft® Windows® 98 Second Edition
9. Mouse: Logitech First Mouse+ Wheel (PS/2v)
10. Broadband Ready/Ethernet Network Card: Integrated Intel® 10/100 Ethernet Controller
11. Modem: No Modem Requested
12. CD/DVD ROM Drive: 48X Max Variable CD-ROM Drive
13. Sound Card: SoundBlaster 64V Integrated
14. Speakers: No Speaker option
15. Bundled Software: NEW Microsoft® Works Suite 2000 with Money 2000 Standard
16. Norton Antivirus® at no additional charge: Norton Antivirus® 2000
17. Hardware Support Services: 1 Year Next Business Day On-Site
18. Resolution Assistant: Resolution Assistant

Figure 4.5. The Proposed Specification for Workstations.

These features serve the users' requirements by reducing documents provided and many steps to succeed the import and export procedures. Obviously, the smart card is quite good enough to keep the data. Therefore the input needed more are those tasks in

smart card reader and writer process. However, these features will test by prototype of the system to the Bangkok Port Customs Import and Export Bureau first. After verification, they will provide the on-line or network system to every bureau in the country. Moreover, they may progress from local network to global network in the real world organizations if every company, organization, infrastructure and user accepts the worthwhile and joins with the system, then a chance will occur.

To assess the proposed system, the elaborated feasibility study will also be provided in the next section so as to be noticeable in its net present worth (NPW) or net present value (NPV), and costs and benefits analysis both qualitative and quantitative.

4.4 System Improvements

According to the implementation plan of the proposed system, the system will be improved and developed in 3 categorized targets: entrepreneurs or Customs brokers or shipping; the Customs officials; and the environmental nature as follows:

(1) Entrepreneurs or Customs brokers or shipping. The system will help them:

(a) reduce amount of documents with only 1 card

(b) save time consuming and cost for each transaction

(c) do not directly go to the Customs House

(d) do not face the traffic jam on their ways

(e) be sure in security transaction

(f) reduce redundancy documents

(g) update data sharing any time

(h) take utilization card to everywhere comfortable

(i) protect the penetration to confidential data

(j) reduce manual working process such as typing or filling in the request form, entries, invoices, packing lists, etc.

(2) The Customs Officials. The system, which will also give them the worthwhile, will be essential to help the working process:

(a) reduce work redundancy

(b) reduce amount of employees

(c) save time consuming of total processes

(d) security level increased

(e) user-friendly program implementation

(f) easy to update data sharing for related process

(g) save cost of paper document

(h) reduce manual routine work such as typing document, card

(i) create the trust worthy reports

(j) utilizing the existing resources

(k) increase of the centralize data sharing for every relevant department

(l) save time in recording each transaction from number file

(m) customized reports are provided

(n) easy to look for existing information

(o) data flows through the network system

(p) provide space area for other activities

(q) save cost of renting storage area to keep many files

(r) reduce corruption, smuggling and Customs fraud

(s) utilize time remained for creating the Customs development plan

(3) The environmental nature. Not only the above mentioned benefited in the proposed system but also there is indirect effect in the environment system:

(a) it conserves the environmental system by solving problems of pollution, especially air pollution because entrepreneur will not travel to the Head office.

(b) it solves the problem of destroying the forest in producing paper

(c) paper used can be recycled for other uses

V. FEASIBILITY ANALYSIS

5.1 Qualitative Analysis

The smart card system can be analyzed in its benefits in the qualitative basis as follows:

(1) Eliminate tedious tasks such as recording and running number of received document, categorizing documents, looking for manufacturers' exist document from data files and folders, etc.

(2) Shorten time consuming for total processes

(3) Generate user's happiness in working environment

(4) Better service for clients as reducing time waiting

(5) Reduce redundancy of keeping many database

(6) User-friendly system provided

(7) Accurate and trustable report provided

(8) Distribute manufacturer data to Regional Customs Bureau

(9) Eliminate reworking process

(10) Enhance know-how of officers

(11) Introduce the important stage for further system development

(12) Reduce costs of documents storage and transfer each transaction

(13) Save operational entrepreneurs time to directly contact with the Customs Department

(14) Pay many Customs fees via electronics banking at entrepreneurs' offices

(15) Get immediate news from the Customs web page to help in company administration

(16) Decrease the Customs corruption, smuggling and fraud

(17) Increase security in import and export procedures and clearing procedure

(18) Generate new features of the Customs smart card in many applications development

5.2 Economic Feasibility: Costs and Benefits

Since the current system is traditional process so there is no installation network before. That means the Customs House must decide to invest all, such as workstation at head office and bureaus, main server, LAN, UPS or security system, printer, scanner, digital camera, so on. The decision-maker has to consider and recognize about the possibility on investment before approving the system.

The software development and consultant fee needs to be considered for the first installation of the system. Maintenance cost and IS Support will be increased from the current system due to new requirement of server.

Thus, costs and benefits for this project can be roughly estimated according to the above suggestion. The more details are also shown in the net cash flow of NPV or NPW (net present value or net present worth) as following calculation in Figure 5.4.

5.2.1 Present-Worth and Capitalized-Cost Evaluation

The costs and benefits are used to determine whether a project is economically feasible. There are two ways to do this: the payback method and the present value method. Even the payback method is quite simple but it is not always the best way to determine economic feasibility. It does not seem to make much sense to put the value into a project investment. Hence, the present value or present worth is chosen for computation.

According to the cost analysis, the proposed system is considered in hardware, software, maintenance, salary, utility and depreciation of machines. All factors are described below:

Assumed that the proposed system has 15 years life span (the worst case), at a saving deposit interest rate of 3 percent per year compounded annually.

(1) Hardware consists of smart card reader, smart card writer, computer desktop and workstation, UPS, server, printer (2 dot matrixes, 1 laser printer and 1 color printer), scanner, digital camera, hub and LAN card.

(a) PCs are installed about 208 machines at Regional Customs Bureaus and 14 machines at Customs Head office. The amount cost of investment is equal to 28,000 bahts per unit.

(b) Terminals or smart card reader and writer units are installed about 3 machines at the head office and 208 machines at Bureaus. The amount investment cost is equal to 1,500 bahts per unit.

(c) Smart card writer units are installed 3 machines at only the head office. The amount investment cost is 200,000 bahts per unit.

(d) Only 1 main server is installed at only head office. The amount investment cost is 120,000 bahts.

(e) 55 linked servers are established at the Regional Customs and Bureaus. The price is 45,000 bahts per unit.

(f) 4 printers are installed at the head office and the average investment cost is 14,000 bahts per unit.

(g) 2 scanners are installed at only head office and the amount investment cost is 4,500 bahts per unit.

(h) 2 digital cameras are used at only head office and the amount investment cost is 12,000 bahts per unit.

Therefore, all details of hardware mentioned above describes the following calculation:

(a)	PCs	=	222 * 28,000
		=	6,216,000 bahts
(b)	Terminal	=	211 * 1,500
		=	316,500 bahts
(c)	Smart card writer	=	3 * 200,000
		=	600,000 bahts
(d)	Main Server	=	1 * 70,000
		=	120,000 bahts
(e)	Linked Server	=	55 * 45,000
		=	2,475,000 bahts
(f)	Printer	=	4 * 14,000
		=	56,000 bahts
(g)	Scanner	=	2 * 4,500
		=	9,000 bahts
(h)	Digital camera	=	2 * 12,000
		=	24,000 bahts
Hence the sum of all machines		=	6,216,000 + 316,500 + 600,000 + 120,000 + 2,475,000 + 56,000 + 9,000 + 24,000
		=	7,291,500 bahts at the beginning investment

And then the straight-line depreciation of all machines is calculated in 15 years of lifetime, the formula is total cost / number of years that means:

Depreciation of hardware is equal to:

9,816,500 / 15 = 654,433.33 bahts per year

(2) Software consists of smart cart reader and writer driver, personalization smart card program, and upgrade software. The system provides only ten persons for creating and generating program in the first year investment. The salary is 15,000 bahts per month of each person, and it starts at year zero or at the beginning investment. After that they establish the software, they will quit from the responsibility and there is no need to be in the calculation. Thus, Software expense

= 10 persons * 15,000 bahts per month * 12 months

= 1,800,000 bahts or 1.8 Million bahts per year

(3) Maintenance cost, only two technicians are mainly employed to control and monitor the whole system. The salary is 15,000 bahts per month of each person and it starts at year one.

Thus, maintenance cost

= 2 persons * 15,000 bahts per month * 12 months

= 360,000 bahts or 0.36 Million baht per year

(4) Salary is another important factor for operating and collecting data. There are 40 employees to response the system. Each employee has a salary about 10,000 bahts per month that starts at year one.

Thus, total salary

= 40 employees * 10,000 bahts per month * 12 months

= 4,800,000 bahts or 4.8 Million bahts per year

(5) Utility consists of water bill, electricity bill, telephone bill, and so on. It is estimated and approximately about 25,000 baths per month that starts at year one.

Thus, total utility cost

= 25,000 bahts per month * 12 months

= 300,000 bahts or 0.3 Million bahts per year

(6) Card expense consists of all materials, such as plastic, microchip, magnetic stripe, and so on. Cost of a card is about 120 bahts and the Customs House estimates the importers and exporter about 100,000 persons. However, smart card will expire every three years at the date it was issued.

Thus, total card expense

= 120 bahts per piece * 100,000 clients

= 12,000,000 bahts or 12 Million bahts per 3 years

(7) Card sales, importer and exporter will pay 235 bahts (not include VAT) per each until the date expires (every three years), which starts at year zero.

Thus, total card sales

= 235 bahts per piece * 100,000 clients

= 23,500,000 bahts or 23.5 Million bahts per 3 years

(8) The benefit, which will come from the difference between buying and selling smart card reader to clients, is derived by:

Cost of card reader = 1,500 bahts per unit

and selling to clients = 2,500 bahts per unit

Thus, the benefit = 2,500 – 1,500

= 1,000 bahts per unit

According to above mention, the cash flow of investment is generated in Figure 5.1 to Figure 5.4 to support the net present value method. It can formulate the calculation as the following:

Assumed that the proposed system has 15 year life span (the worst case), at a saving deposit interest rate of 3 percent per year compounded annually, then we get:

$$\begin{aligned}
\text{NPW}(3\%) = {} & (100 + 23.5 - 9.82 - 1.8 - 3 - 12) - (0.36 + 4.8 + 0.3 + 0.65) \\
& * (P/A, 3\%, 2) + (23.5 - 0.36 - 4.8 - 0.3 - 0.65 - 3 - 12) \\
& * (P/F, 3\%, 3) - (0.36 + 4.8 + 0.3 + 0.65) * (P/A, 3\%, 2) \\
& * (P/F, 3\%, 3) + (23.5 - 0.36 - 4.8 - 0.3 - 0.65 - 3 - 12) \\
& * (P/F, 3\%, 6) - (0.36 + 4.8 + 0.3 + 0.65) * (P/A, 3\%, 2) \\
& * (P/F, 3\%, 6) + (23.5 - 0.36 - 4.8 - 0.3 - 0.65 - 3 - 12) \\
& * (P/A, 3\%, 9) - (0.36 + 4.8 + 0.3 + 0.65) * (P/A, 3\%, 2) \\
& * (P/F, 3\%, 9) + (23.5 - 0.36 - 4.8 - 0.3 - 0.65 - 3 - 12) \\
& * (P/A, 3\%, 12) - (0.36 + 4.8 + 0.3 + 0.65) * (P/A, 3\%, 2) \\
& * (P/F, 3\%, 12) + (23.5 - 0.36 - 4.8 - 0.3 - 0.65 - 3 - 12) \\
& * (P/F, 3\%, 15)
\end{aligned}$$

$$\begin{aligned}
\text{NPW}(3\%) = {} & 96.88 - 6.11(P/A, 3\%, 2) + 2.39(P/F, 3\%, 3) \\
& - 6.11(P/A, 3\%, 2)(P/F, 3\%, 3) + 2.39(P/F, 3\%, 6) \\
& - 6.11(P/A, 3\%, 2)(P/F, 3\%, 6) + 2.39(P/F, 3\%, 9) \\
& - 6.11(P/A, 3\%, 2)(P/F, 3\%, 9) + 2.39(P/F, 3\%\ 12) \\
& - 6.11(P/A, 3\%, 2)(P/F, 3\%, 12) + 2.39(P/F, 3\%, 15)
\end{aligned}$$

$$\begin{aligned}
\text{NPW}(3\%) = {} & 96.88 - (6.11 * 1.9135) + (2.39 * 0.9151) \\
& - (6.11 * 1.9135 * 0.9151) + (2.39 * 0.8375) \\
& - (6.11 * 1.9135 * 0.8375) + (2.39 * 0.7664) \\
& - (6.11 * 1.9135 * 0.7664) + (2.39 * 0.7014) \\
& - (6.11 * 1.9135 * 0.7014) + (2.39 * 0.6419) \\
= {} & 56.768 \text{ Mbahts}
\end{aligned}$$

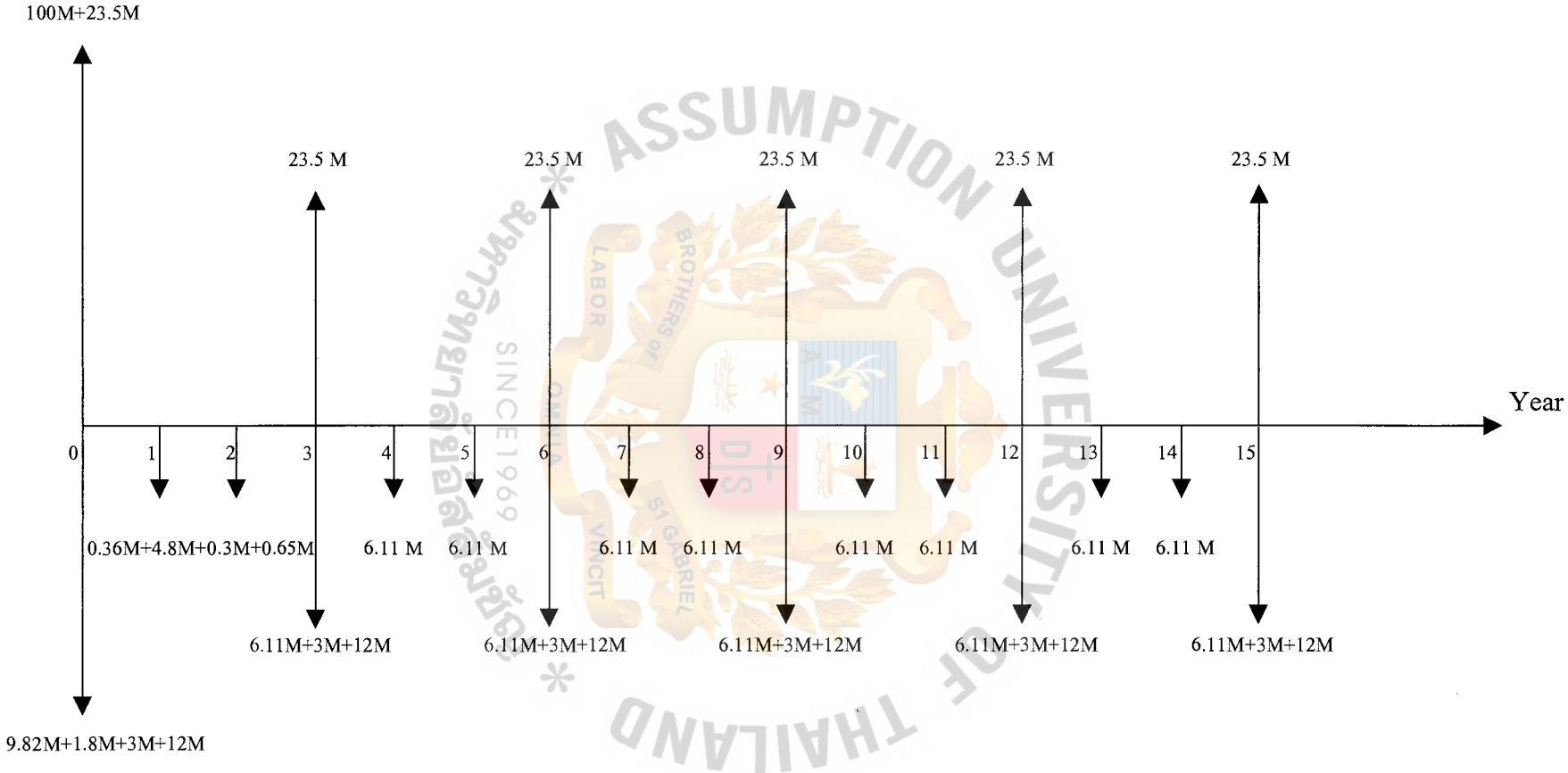


Figure 5.1. Cash Flow of the Smart Card Investment - Step 1.

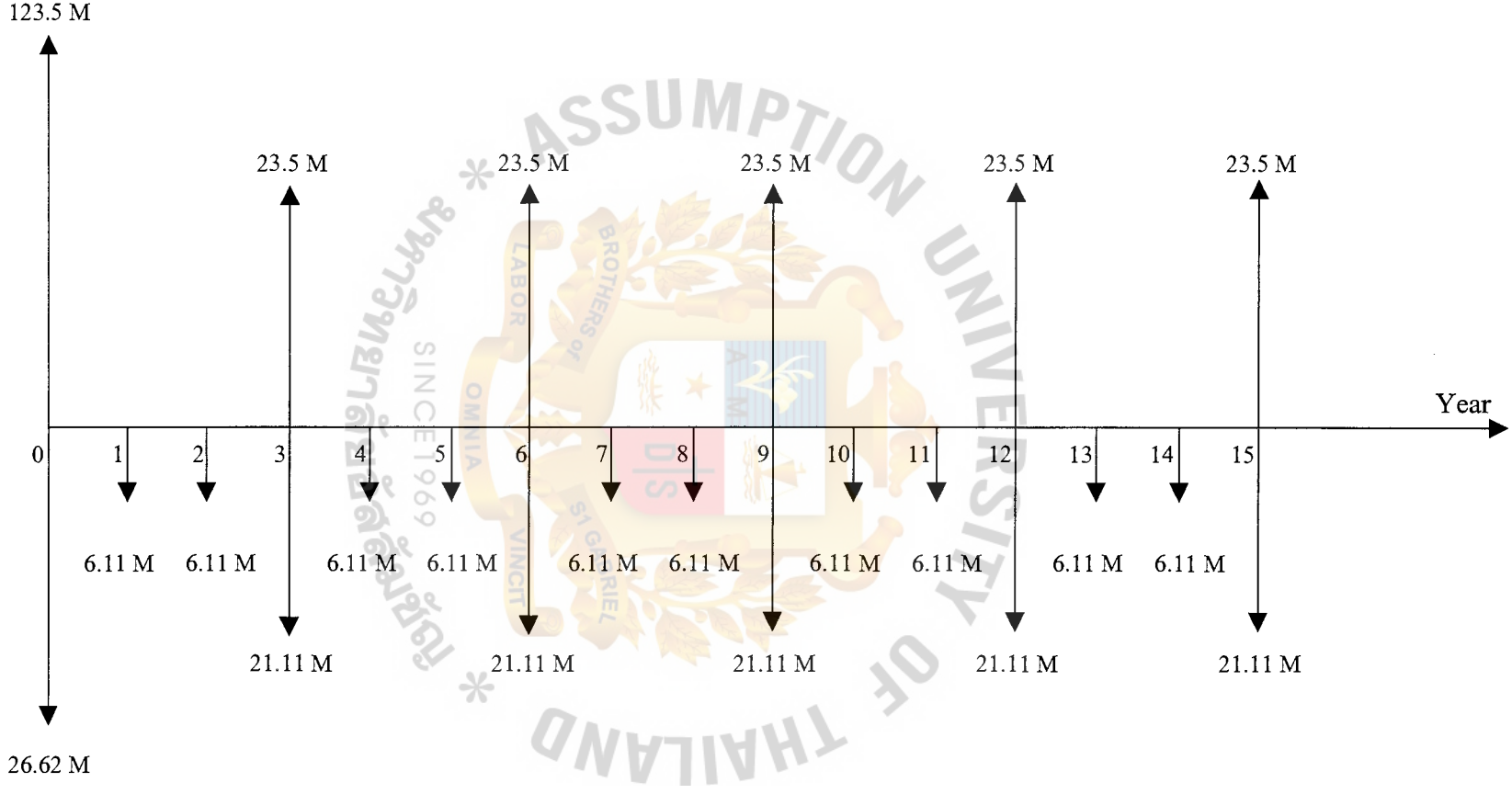


Figure 5.2. Cash Flow of the Smart Card Investment - Step 2.

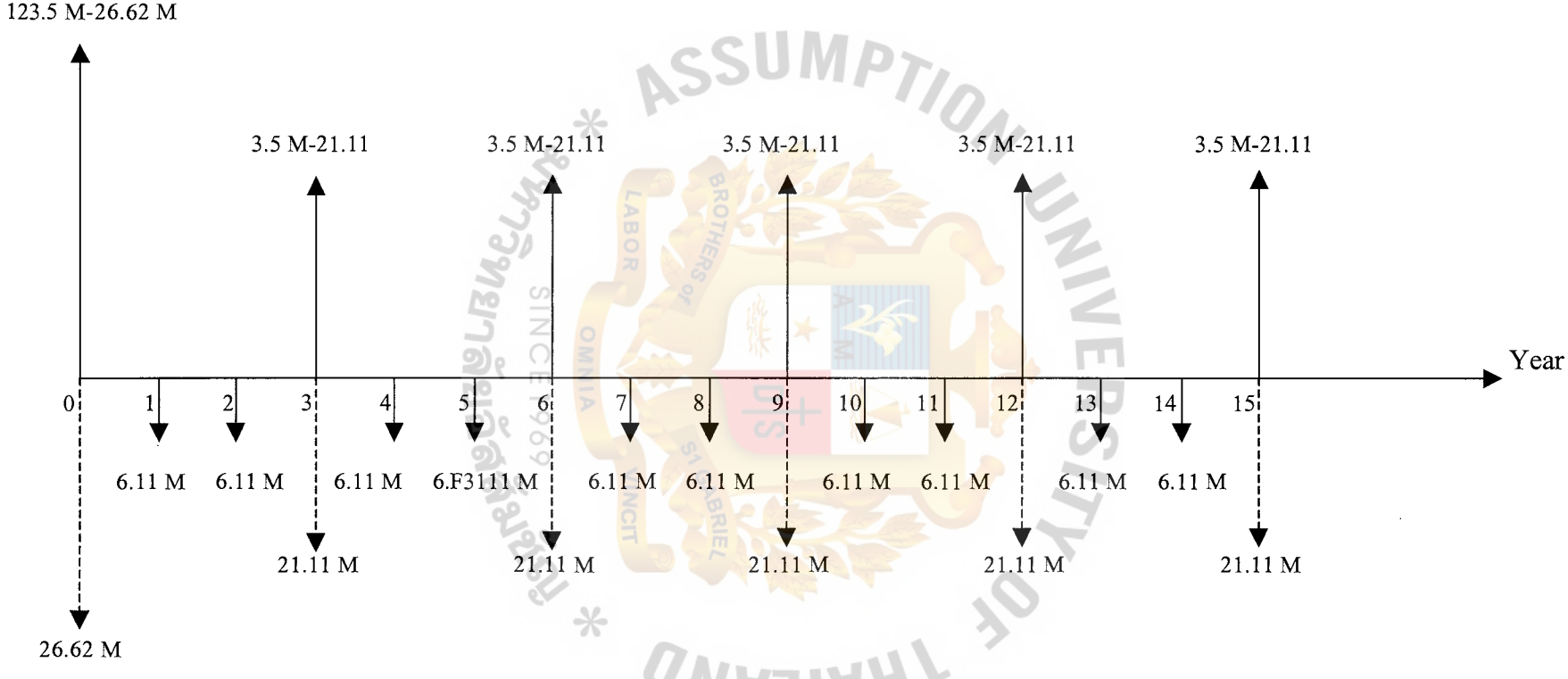


Figure 5.3. Cash Flow of the Smart Card Investment - Step 3.

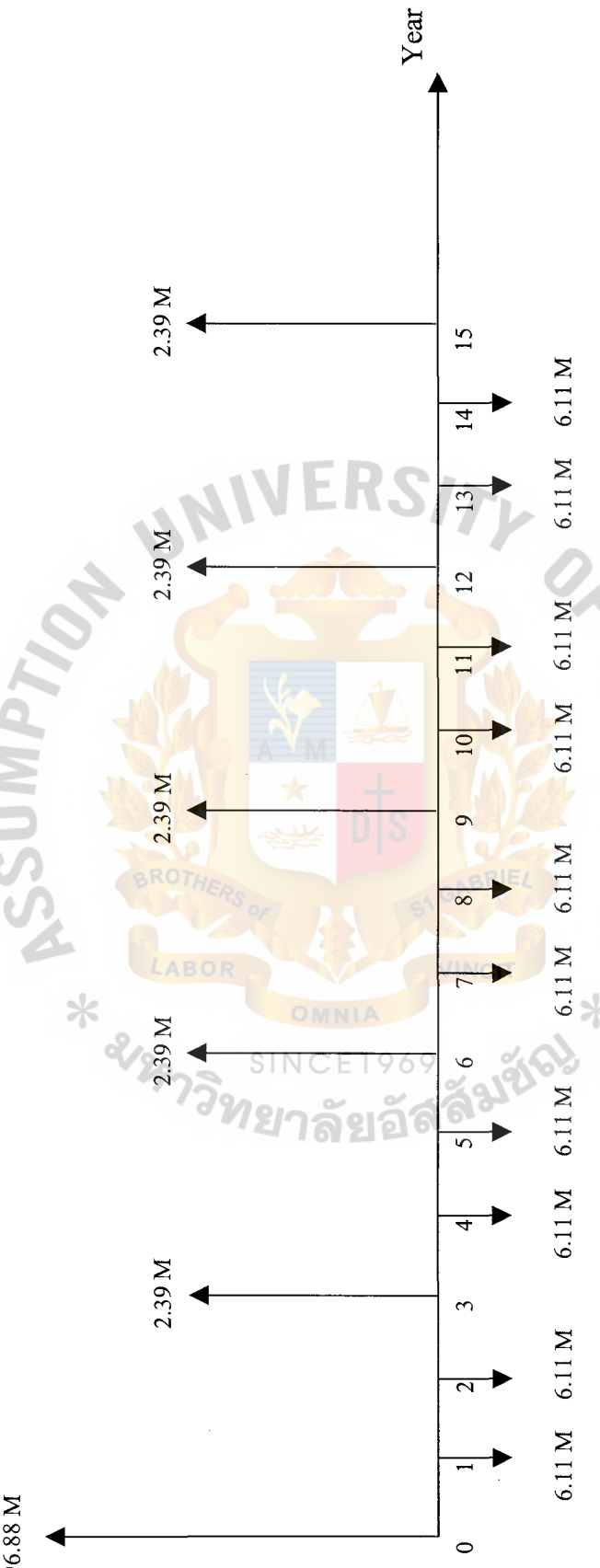


Figure 5.4. Cash Flow of the Smart Card Investment - Step 4.

Noticeably, we can get the estimated value from table P given A or (P/A, i%, n) and P given F or (P/F, i%, n) in Engineering Economy Book. Therefore, the result, which is the worthwhile in investment, is equal to 56.768 million bahts or positive way that means the new system should be decided to invest instead the old system.

From the cash flow of calculation, the step-by-step procedures are shown in Figure 5.1 to Figure 5.4, it can summarize and conclude that the smart card project should be invested on the Customs Department because the net present worth is positive value. Nowadays, it means that it is a better way to invest when it is compared with a saving deposit interest rate of 3 percent per year.

However, the estimated cost is expected to cover all costs of developing the system, including hardware, software, data conversion, training and consulting fees. Thus, the system should be operational be December of this year (2000).

5.2.2 Project Risk / Feasibility Analysis

In addition to defining the current problems and objectives, constraints, and scope of the project, notice that the author provides supporting comments for each aspect of the project risk evaluation form as summarized in Table 5.1. That is, the project will be completed under the imposed constraints and whether the proposed system will serve the Customs House business goals. The project risk evaluation is defined key factors that affect the feasibility concerns. The total point or score for achieving the project is 10 and it is shown that this project is in the range of low risk. It is feasible to develop the system. Let's consider other factors or feasibility analysis to composing with the decision making.

Moreover, the benefits which the Customs House will get from the new system can be found both in tangible and intangible benefits. The tangible benefits that officers can readily quantify to distribute report and database, the economic benefit in

unnecessary cost of hiring new employees or part-time employment. Another one is intangible benefit that is not readily quantified to spread the quicker report, current tracking status, up-to-date information, easier in calculating tax and others, comparison of the cost and actual expense, effective ness and efficiency, etc.

5.3 Technical Feasibility

The designed system must be easier to use for Customs officials in the organization. The report can be obtained right away upon their needs. The data entry screen always updates the information without redundancy. Moreover, the network must be also installed to connect other Regional Customs Bureaus. The proposed technology can support the objectives and goals of the Customs House. The new system will be installed as the global network. Softwares and programs will also be written and designed to link and interface all components such as computer network (workstation to workstation, workstation to server, printer, smart card reader and writer, other terminals, etc.). New hardware such as new computers, printers i.e. dot matrix printer, laser printer and color printer, server, hub, LAN card, smart card readers and writers are considered to be network system and investment. The entrepreneurs must buy card reader and writer from the Customs House so that they can manipulate by themselves at their offices. The clients themselves can install and develop their own program or software or have the programs done by a software house. However, there is limitation on their development so that it is protection of the information flow that will be penetrated from unauthorized users. In addition, the smart card system is required to manage the database and owner identification, which is a confidential file in operation. Either it can control the flow or database for security.

Table 5.1. Project Risk / Feasibility Analysis.

Project Risk Evaluation		
Project: Customs Administrative Smart Card Processing	**Completed by:** System Analyst	**Date:** November 2000

Factors affecting project risk	Rating*	Comments
1. Characteristics of the organization		
a. Has stable, well defined objectives?	1	Director General of Customs has articulated plans for expansion and improved streamingline of working process.
b. Is guided by an information systems plan?	0	No existing information system, still traditional process so less important.
c. Proposed system fits plan and addresses organizational objectives?	1	System will help The Customs House meet its objectives and goal. It also leads to international import-export business.
2. Characteristics of the information system		
a. Model available/clear requirements?	1	Smart card system has ever been developed IS on other business organizations.
b. Automates routine, structured procedures?	1	Issuance smart card processing is routine, clearly defined process.
c. Affects only one business area? (No cross-functional or interorganizational links?)	-1	System will encompass and on-line administrative processing, finance & accounting, importation and exportation, and so on.
d. Can be completed in less than one year?	1	Estimated schedule time is about 3-4 months because of 55 Customs Bureaus for installing completed machines.
e. Use stable, proven technology?	1	Lots of IT options. All have been used extensively in other business segments.
3. Characteristics of the developers		
a. Are experienced in chosen development methodology?	0	Only study the methodology on number of successful projects and propose to use the system.
b. Are skilled at determining functional requirements?	1	Consultants will help for suggestion since they have taken course work and participate in numerous projects.
c. Are familiar with technology and information architecture?	1	Spending much more time to study the system and try to develop similar system before.
4. Characteristics of the users		
a. Have business are experience?	1	Customs officials have average of many years' experience on their jobs.
b. Have development experience?	1	EDI is changing performance of Customs officials at the Bangkok international Airport Customs Bureau.
c. Are committed to the project?	1	Preliminary investigations and interviews suggest that all users are enthusiastic about modernize project.
Total points	10	**Low risk.**

*+1 = yes; 0 = maybe; -1 = no

5.4 Operational Feasibility

The administrative Customs House are really interested in implementation of management information system (MIS), in particular on the import and export procedures, and the clearance of goods process.

The Director General Customs is very supportive for the smart card system but it has to be considered more on costs and benefits feasibility analysis. Since this project is just the preliminary investigation, more adjustment and fully implementation of completed system needs to be considered from the consultant.

Noticing from interviewing with Customs officials and clients, they are fully support and eager to use the new system since it will help them to reduce their time and step in Customs operation. They can get the information and document in the way that they require such as owner identification, invoice, entry, packing list, etc. Nevertheless, Customs officials can have the record in the previous importation and exportation, then they can also approve them easily and prevent corruption. Furthermore, there is training for officers so that they will have more skills on their jobs and the administrative team can get the assessment or evaluation report showing the new trend to improve and develop the organization.

5.5 Organizational Feasibility

According to the analysis on the "Project Risk Evaluation Form" in the first question, this organization is already defined the duty and responsibility for each officer. The clear-cut objective of the organization is to design the project. Once the client accepts the smart card system, the network is created and implemented until the project is complete. However, the Customs House is stable enough to implement the proposed system. The organization is not a small business so the information system

and information technology can support the Customs plan and policy. The real implementation is expected in the near future.

The smart card system will help to manage all of the data and keep records in the database. This will use the concept of DBMS (database management system) and MIS (management information system) to implement the whole project. If the completed system is agreed to use by the clients, the DBMS will provide Customs officials more convenient and including the clients.

In summary, this preliminary analysis suggests that the proposed system is very likely to contribute to organization efficiency, competitiveness and to provide the desired benefits in the organization.

5.6 Time Measurement

From restructuring the Customs Card Request Procedure, Import Procedure, Export Procedure and Clearance Procedure, time measurement is used as a tool for supporting decision making.

Starting from the existing system as shown in Table 5.2 to Table 5.5, the proposed system like Table 5.6 to Table 5.9 will help reducing total time taken by eliminating the transactions of filling repetitive request form, arranging and running a number file, recording information to files, key data in computer again, and categorizing documents. By the result of implementing Personalization Smart Card Program, it is only written software for Customs tasks. However, the proposed system is recommended further to develop the system and it provides the average result of three to four times of time taken in the existing system. The summary of development in time taken is shown in Table 5.10 that is estimated time in comparison of system evaluation. Also, Figure 5.5 shows the graph of comparison between the existing and the proposed time taken per transaction clearly.

Table 5.2. Time Measurement for the Customs Card Request Procedure in the Existing System.

No.	Activities	Time Taken (in seconds)
1	Arrange and run number of document	35
2	Check request form, signature, company stamp and attached documents	600
3	Key in the computer	300
4	Wait for customer call following a queue	1800
5	Verify photo and documents again before approval	300
6	Type the Customs card	180
7	Record all document information to the Customs files	240
8	Recheck record with report print out	180
9	Wait for taking the Customs card	2700
	Total Time Taken per Transaction	**6335**

Table 5.3. Time Measurement for the Import Procedure per Transaction in the Existing System.

No.	Activities	Time Taken (in seconds)
1	Type import entry and invoice information and physically	900
2	Generate entry number and check owner signature	300
3	Check all documents for verification at formality section	600
4	Calculate duty, tariff, tax value, barcode and revenue	300
5	Write the receipt	180
6	Wait for calling to pay tax, and revenue	300
7	Check all documents, card signature and assign inspector	210
8	Inspect goods before clearance of goods process	1200
	Total Time Taken per Transaction	**3990**

Table 5.4. Time Measurement for the Export Procedure per Transaction in the Existing System.

No.	Activities	Time Taken (in seconds)
1	Type export entry and invoice information and physically	900
2	Generate entry number and check owner signature	300
3	Check all documents for verification at formality section	600
4	Calculate duty, tariff, tax value, barcode and revenue	300
5	Assess duty and approve by chief inspector stamp	240
6	Wait for calling to pay tax, and revenue	300
7	Write the receipt	180
	Total Time Taken per Transaction	**2820**

Table 5.5. Time Measurement for the Clearance Procedure per Transaction in the Existing System.

No.	Activities	Time Taken (in seconds)
1	Submit approved documents and recheck again by inspector	240
2	Inspect cargo or goods and stamp for approval	1200
3	Record information	360
4	Pack cargo or goods into container or shipment	1500
5	Copy and Distribute recorded data file to other related departments	1200
6	Keep original data in files or folders	180
	Total Time Taken per Transaction	**4680**

Table 5.6. Time Measurement for the Customs Card Request Procedure in the Proposed System.

No.	Activities	Time Taken (in seconds)
1	Get a queue	5
2	Check request form and attached documents	120
3	Pay card fee at the counter	45
4	Take a photo and scan signature and company stamp	80
5	Key data in computer database system	600
6	Recheck or confirm record with prototype print out and claim	180
7	Print out receipt	35
8	Print out the Customs card	120
	Total Time Taken per Transaction	**1185**

Table 5.7. Time Measurement for the Import Procedure per Transaction in the Proposed System.

No.	Activities	Time Taken (in seconds)
1	Connect URL to the Customs web page	15
2	Verify user ID and password	20
3	Key in import entry and invoice information and physically via computer on-line	600
4	Verify information and automatically send import entry number back	180
5	Pay duty, tax and insurance rate via electronic banking	150
6	Assign automatically inspector (by Customs system)	10
7	Record data and results in the smart card	10
	Total Time Taken per Transaction	**985**

Table 5.8. Time Measurement for the Export Procedure per Transaction in the Proposed System.

No.	Activities	Time Taken (in seconds)
1	Connect URL to the Customs web page	15
2	Verify user ID and password	20
3	Key in import entry and invoice information and physically via computer on-line	600
4	Verify information and automatically send import entry number back	180
5	Pay duty, tax and insurance rate via electronic banking	150
6	Assign automatically inspector (by Customs system)	10
7	Record data and results in the smart card	10
	Total Time Taken per Transaction	**985**

Table 5.9. Time Measurement for the Clearance Procedure per Transaction in the Proposed System.

No.	Activities	Time Taken (in seconds)
1	Submit approved Customs card and compare with database again by inspector	180
2	Confirm all data	45
3	Print out the report	30
	Total Time Taken per Transaction	**255**

Table 5.10. Summary of Total Time Taken for Each System of Customs Procedures.

Execution of Customs Procedures	System	Total Time Taken (in seconds)
The Customs Card Request Procedure	Existing	6335
The Import Procedure	Existing	3990
The Export Procedure	Existing	2620
The Clearance of Goods Procedure	Existing	4680
The Customs Card Request Procedure	Proposed	1185
The Import Procedure	Proposed	985
The Export Procedure	Proposed	985
The Clearance of Goods Procedure	Proposed	255

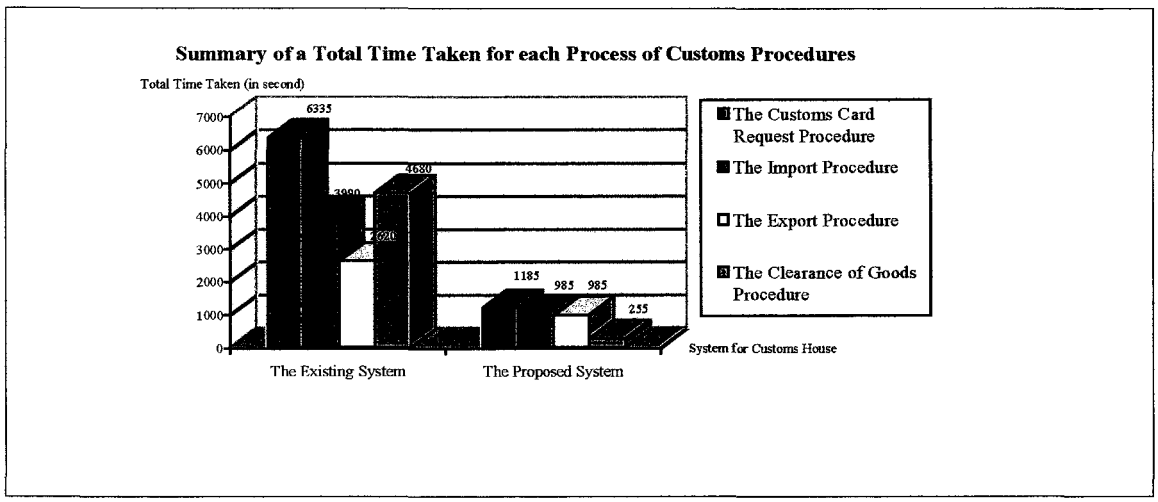


Figure 5.5. A Summary of a Total Time Taken for the Existing System and the Proposed System of Customs Card Request Procedure, Import-Export Procedures and Clearance of Goods Procedure.

Identically, the result of time measurement for the activities of the Customs card request procedure, import-export procedures and clearance procedure are reduced by system development because some work processes are eliminated. Table 5.2 to Table 5.5 illustrate a time measurement for the activities from the existing system and the proposed system. Finally, Table 5.10 and Figure 5.2 summarize the development total time taken in each system.

5.7 New Trend towards the Customs Smart Card Applications in the Future

Due to an outstanding benefits and attributes of smart card, the Royal Thai Customs Department has realized such importance and has planned to apply smart card system to its Import and Export Department in order to improve an existing working system. Also, the Customs Department tends to expand the smart card system to be used as one card for better Customs Clearing services to both consumers and business. For Customs Clearing, the card tends to be used for EDI honored companies and brokers.

According to daily services for consumers, a card will be used as hyper E-Purse or E-Money (Electronic Purse or Electronic Money) to comfort the cardholders for general

payment. It also helps the Customs Department to work faster and the company and entrepreneur can control the expenses. It can also be used as an ATM card for withdrawal and telebanking, hyper PhoneCard for both public or private and both wire or wireless phone. The Customs Department also aims to improve smart card system to be used as hyper Vending Card (for vending machine), hyper Copy Card, hyper Taxi Card (for the cardholder who uses taxi service without paying cash), and Mass Communication card (such as bus, skytrain, tollway, etc. when permitted by such department).

Further, other uses for daily services for consumers at Customs Department include many areas such as time attendant (clock in and out for office workers), access control, food court and car park. In addition to these services, the Customs Department has been planning to apply the smart card system to contact the government sector easier and more convenient. Such system will be applied to identification card, medical card, driving license, airline ticket reservation, etc. For these applications, the Customs Department has emphasized on the security of smart card system in order to ensure the cardholders that such system is workable. The security feature will be in many forms such as password (authorized persons must input the confidential number and the output appears after codes are decrypted), fingerprint, eye-dentification, and voice recognition, etc. An overview of smart card application in the future of the Customs Department is illustrated in Figure 5.6. Also, Table 5.11 shows the trend towards import and export transaction that is likely to be increasing in the future.

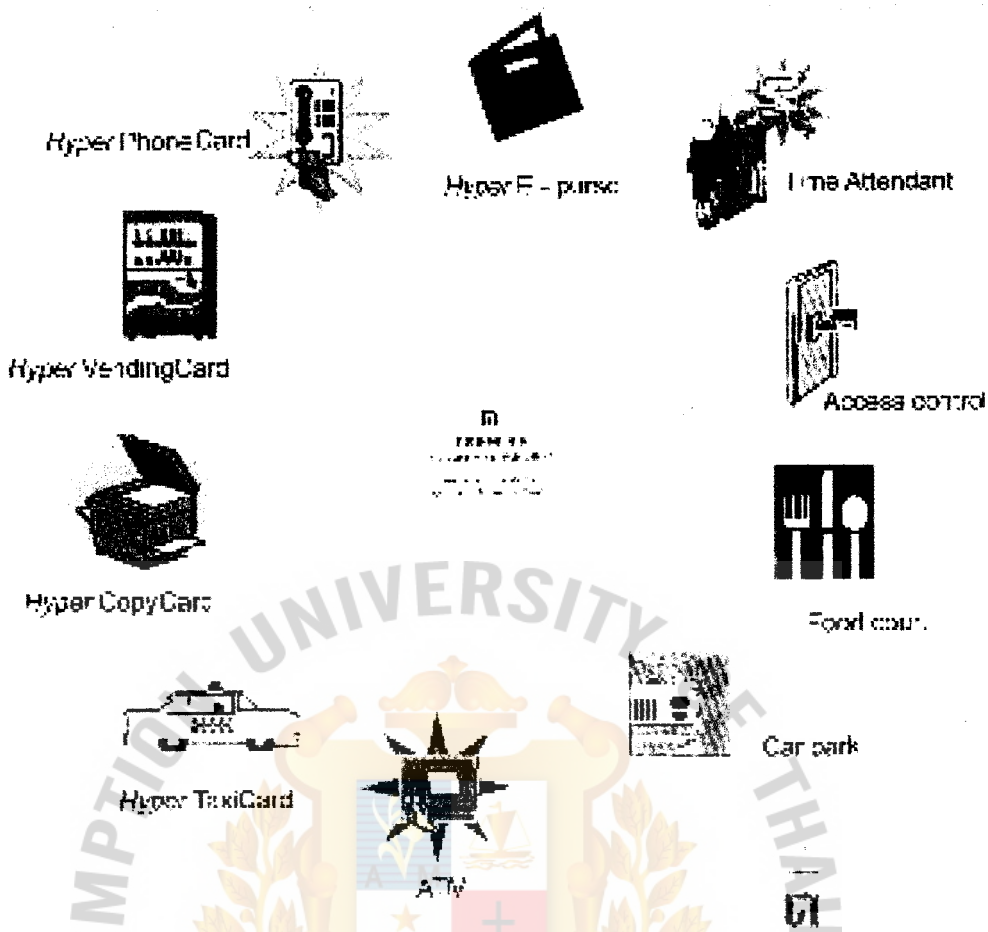


Figure 5.6. An Overview of Future Applications on Smart Card System (Customs Department 1999).

Table 5.11. 5 Fiscal Years of Import / Export and Trade Balance (Customs Department 1999).

VALUE : MILLION BAHT

YEAR	IMPORT	EXPORT	BALANCE
1994	1,307,664.50	1,079,329.21	-228,335.29
1995	1,659,029.30	1,344,172.85	-314,856.45
1996	1,885,729.50	1,420,494.37	-465,235.13
1997	1,839,823.20	1,562,981.61	-276,841.59
* 1998	1,900,593.00	2,333,275.00	432,682.00

Note * Preliminary Information

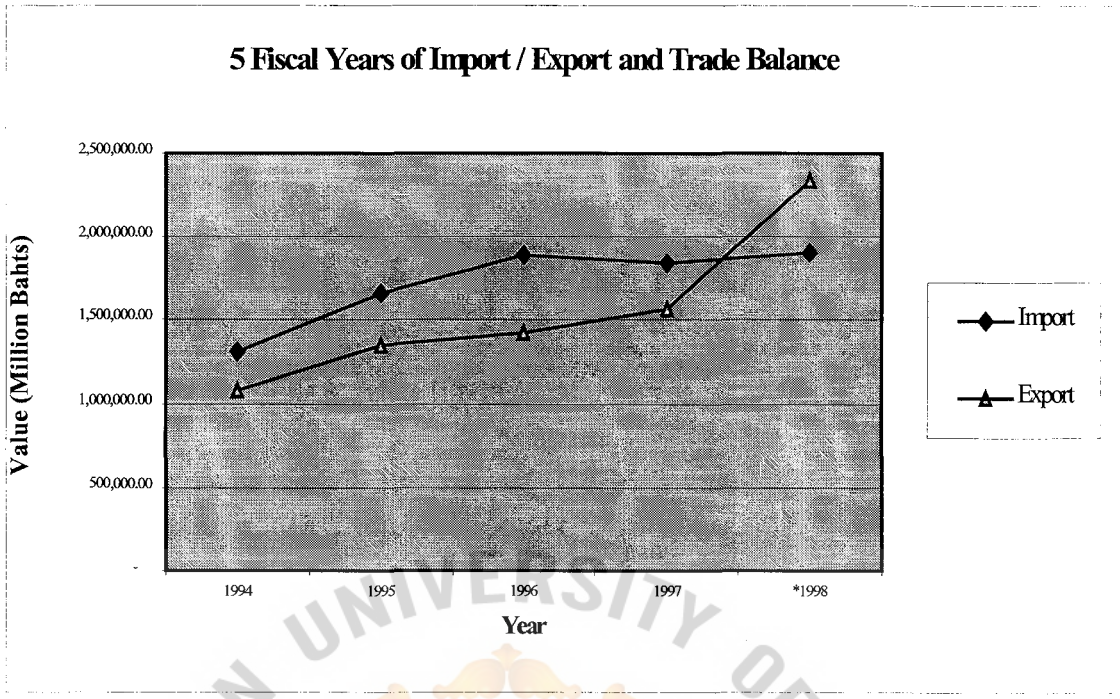


Figure 5.7. Trend towards Importation and Exportation within 5 Fiscal Years (Customs Department 1999).

From the table and figure above, it reveals that an Import and Export transaction in Thailand tends to be highly increasing. This trend can be seen from an increasing number of importers and exporters in each year. Thus, it means the number of smart card holders contacting the Customs Department is increasing as well. Especially, when importation is compared with exportation, it shows that if an increasing rate of exportation is high, the domestic economy is being gradually recovered and increasingly expanding. Therefore, it can be said that an application of smart card system will result in the expansion of such system to the international importation and exportation in the future.

Moreover, the trend towards using smart cards is likely to increase. With this statement, it is supported that Gemplus company had set the market team to survey market situation and smart card industries in the future.

The result of this survey is concluded that in 1989, there was one smart card holder per 100 population and smart card tends to be increasingly used as one card per 10 population in 1996. Also, it is expected that in 2000 all population around the world will use smart cards in the average of one person per one card, either male or female, youngster or adults.

For phone card market in Asia, it has been growing for a long period of time towards the growth of using cellular digital mobile phone (GSM) in many countries and it is estimated that mobile phones (GSM) market is likely to grow by 10 times of the current amount of card.

From an estimated number, the use of smart card in market sectors is apparently increasing comparing with the use of smart card in the past. An estimated number is shown in Table 5.12.

Table 5.12. An Estimated Number of Smart Card Using (Computer.Today 1999).

Market Sector	1997 (M Unit)	2002 (M Unit)	Annual Average Ratio (%)
Phone Card	684	3270	30
Mobile Phone (GSM)	69	760	49
Bank	49	690	55
Loyalty	22	320	56
Health Care Card	16	210	54
Pay-TV	12	150	52
Bus Ticket	8	240	77
Game	2	70	78
ID Card	12	310	143
IT	1	120	142
Others	24	170	38

For the number of smart card being used in the world market, it is found that the phonecard market becomes the number one followed by digital mobile phone and

banking business sector especially the bank that has an increasing number of smart card users.

Due to the number estimated of Gemplus market surveyor, smart cards is likely to increase by 55% per year since a lot of large companies and financial institutions in the world have issued smart cards (such as Visa and Master Card, etc.) in order to increase their customers' spending.

From such information, it can be obviously seen that smart card is becoming a powerful tool to revolutionize an information technology of the world (พันธ์ศักดิ์ 2542).

VI. IMPLEMENTATION DEFINITION

There are three processes in implementation of system development as follows:

(1) The Existing System Analysis

(2) The Proposed System

(3) The Implementation System

6.1 Process 1: The Existing System Analysis

Starting with analyzing the existing system by collecting data to solve the problem occurring, observing the workflow and specifying the users' requirements. According to the current system is facing a workload circumstance, the way of interview is necessary to support system analysis. Identify which part of the system should be developed in order to design the proposed system. The design of the form, report and input-output screen will be generated. All data and documents are contained and moved like a computer-card portable.

6.2 Process 2: The Proposed System Design

This section should be firstly considered, but gradually implemented. After concluding problem analysis, it needs time to arrange and prepare work-group to achieve the proposed system. In other words, the author has to find out the best suit-customized system by interviewing what users need and find out how to achieve them, then design the system to solve such needs. Recruiting the programmers and specialists are recommended to generate the specific software or program since developing this complicated system requires the experienced persons. Moreover, the new system elaborates working process so person who initiates the foundation of system must also have more skills and expertise. This process may take time and money because it is not a small organization. However, it finally provides the long-term benefits.

6.3 Process 3: The Implementation System

After hardware and software are installed completely, the Customs office provides system testing of prototype to verify a complete system or adapt system. Prototyping is used when a totally novel system is proposed. No early experience exists with a similar system, and so a model is needed to gain experience with the kind of problems that can be expected when developing the full-blown system. All processes must start from the bottom stage that is developing human resource. The organization will be fully developed wherever all staffs and officers attend the same goal and objectives. Hence, they should start exchange of the traditional culture to modern workflow that both direct and relevant Customs officers tend to keep all tasks smoothly but overlooked the effective way of solving problems. They should be exposed to new ideas and a good know-how on technology integration that will be beneficial in the long-term plan of progression. They should have training basis of computer knowledge to that it is related to the new system. Consequently, there is card-recall of old Customs card from clients during the implementation processing time of issuing the new Customs card. It gradually decreases within 3 months. Fortunately, training program will be also provided to end-users. They should know and study computer-based system from beginner program till advance program that depends on the user requirements. However, Thai Customs should improve and develop the proposed system to be an innovative feature trend in the future.

Implementation Schedule for Customs Administration Development

Processes	Activities	Year 2000-2001																	
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Process 1	**Existing System Analysis**																		
1.1	Collect data and problems																		
1.2	Interview and determine users's specifications and requirements																		
1.3	Analyze the current system																		
1.4	Conclude the problems																		
Process2	**Proposed system Design**																		
2.1	Prepare work-group																		
2.2	Design proposed system																		
2.3	Write interface program																		
Process 3	**Implementaiton**																		
3.1	Install hardware																		
3.2	Install software																		
3.3	Test system with prototype																		
3.4	Train computer knowledge to officials																		
3.5	Take old card back																		
3.6	Issue smart Card																		
3.7	Develop new feature system																		
3.8	Train computer knowledge to users																		

Figure 6.1. Customs Administration Gantt Chart.

VII. CONCLUSIONS

Smart Card is a plastic card in which a specialized microprocessor chip is embedded for data storage, supervision and security. Its practical applications are divided into three categorized: data carrier, identification, and financial. For data carrier, the card is used as a convenient, portable and secures means of storing information. For identification, the card provides a secure means of identifying the holder to allow access. While the financial application, card can be used for financial transactions.

One of the most important features of the smart card is security that is used to prevent attacks from unauthorized persons. This feature can be grouped under the three headings: physical and manufacturing security, personal identification security, and communications security. For physical and manufacturing security, smart cards are designed to reduce difficulty without the right facilities and expertise. In addition, the manufacture of the chips requires very complex and expensive equipment. Also, Customs chips for smart cards are not publicly available and would not be easy to obtain. The personal identification security, is a security threat from someone stealing a card from the owner and presenting it at the system for personal gain. The used method of identifying the owner of a card is the password or PIN which does not reveal its identity number to the system. Since the keyed PIN can be encrypted, if the line tapping is succeeded, the PIN can not be read.

With the personal identification, biometrics is the alternatives which involve the measurement of a unique personal characteristic of the cardholder, followed by digitization of the measured characteristic and the recording of it in the card. Some of its characteristics are dynamic signature revification, fingerprint, voice patterns, hand geometry, and retinal eye pattern (Eyedentification).

For communications security, smart cards may be able to test (or "challenge") the eligibility of the external device being used for data reading, thus unauthorized access is avoided. Also, as the card provides data security itself, off-line operations and transactions can be safely carried out.

The history of smart cards began with the replacement of conventional paper by plastic cards. At first, the cards' functions were simple and security printing and the signature field provided protection against forgery. Later, the first improvement is a magnetic stripe card which allows further digitized data to be stored but it has to be connected on-line to the system's host computer. However, this generates costs due to the need for data transmission. In order to keep costs down, the card transaction should be executed off-line but without putting the system's security at risk.

Thus, the development of smart card is a new possibility for solving this problem. Due to the huge progress in microelectronics, it can integrate data storage and arithmetic logic.

In addition to a high degree of reliability and security against tampering, smart card technology promised the greatest flexibility in future applications.

Smart card has been pervasively applied increase in many aspects in European countries and Japan. Also, a lot of organizations have applied smart card to improve business transaction and provide better services to customers in Thailand. For example, TFB smart card, from Thai Farmer Bank incorporated with many organizations, EGV theaters card, Shell smart bonus, Synergy (PTT gasoline), Caltex smart card, SOGO smart card (corporate with SOGO Department Store and Standard Charter Nakorn-Thon), etc.

Other organizations, such as CP Seven-Eleven, which has been surveying and implementing issue plan in future, incorporated with large banks provided services

about e-money or e-purse and it tends to improve the card to be used as a phone card, bus card, taxi card, driving license, identification card, and so on in the future.

The evolution of smart cards began with microcomputer chip. Later, the magnetic stripe card was introduced since the use of credit card was increasing and becoming important to extract information from the card quickly. However, the merging of these two types of smart card was developed which eventually became a smart card.

There are eight stages involved in the manufacture, personalization and issue of smart cards. These stages include designing card, fabricating chip, embedding software in permanent memory, manufacturing micromodule, embedding the micromodule in a card, developing application program, activating application software in the card, and personalizing and issuing card.

The structure of smart card consists of the three fundamental elements: processing power, data storage, and input/output data, which perform two basic functions that is the manipulation and the interpretation of data.

Ways of structuring memory to provide a hierarchy of security zones or can be divided into three zones: open, working, and secret zones.

Open zone contains information which is not confidential. Information can be read but not alternated by unauthorized person.

The working zone contains confidential information which can be accessed by entering a PIN or password. In the secret zone, the information is completely confidential which contents are not accessible to the cardholder except the card's microprocessor.

For input/output, the smart card must be able to interact with the outside world by means which it can receive and send data.

Types of smart card can be divided into three categories: contact, contactless, and super smart card. Contact smart cards have the microelectronics embedded in the card with connections to metallic contact pads on the surface of the card.

A contactless smart card has an electronic microchip and a high frequency radio antenna or coils embedded inside which is activated when the card is passed near a transmitter without a physical contact.

Super smart card differs from other smart card in which it can function like a stand-alone terminal without the need of a card read/write unit.

Further, there are others types of smart card such as optical memory cards, tags, intelligent tokens, and magnetic stripe card.

Smart card provides a lot of advantages since it is proved and has the potential to prevent fraud, protect against unauthorized access and tampering. The system is easy to use, and the card can be used as a portable and updateable personal data store, etc. Smart cards also provide benefits to both retailer and cardholder.

However, smart cards can also provide disadvantage since it is very expensive in unit cost and investment, it is not also robust material if compared with a coin, etc.

Smart cards can be applied in many areas of business: such as financial, medical, health care, telecommunication, and other applications.

For financial application, there are five transactions using the smart card: electronic cheque, electronic traveler's cheques, electronic cash, electronic token, and corporate cash management services.

According to the historical background, the Royal Thai Customs Department originated in the Sukhothai period, called "Changkob," for collecting tax and exchanging items or money. In the next period, it still performed the same tasks but its name had been changed from one period to the other. In addition, the task of collecting

Customs duty was transferred to the newly created "Customs House" which became the foundation of the present Thai Customs Department.

The main roles and responsibilities of the Customs Department are to collect revenue and facilitating business transactions both domestically and internationally. These tasks include enforcement of tax laws and other related laws; monitoring, investigating, and cracking down on illegal activities; and promoting export through tax measures.

An existing working system is carried out manually and routinely which causes a lot of paper document, no security (cause of bribery and fraud). It is also difficult to keep and find data, and difficult to update and back up data (because data is not linked to the database, so each department cannot know and update data immediately). Further, it also takes time in each process.

Therefore, the Customs Department has attempted to improve its working system in order to make better working system, reduce unnecessary procedures, and provide better services to customers.

It also realizes the importance of smart card system which can help to solve such existing problems. Since it can contain a lot of data and it is portable, it can reduce paper document. It also increases security, thus unauthorized persons are unable to copy, penetrate or alter data. Further, data is easy to be updated and backed up and this system can also work both on-line and off-line and can be used with other sectors as well.

Thus, the Customs Department begins to apply smart card system to an existing system in Import and Export Department which starts analyzing existing system about Customs card request procedures, import and export procedures and clearing of goods procedure. Importers or exporters or Customs brokers file the data concerning import

and export entries via smart card on-line computer network of the Customs Department, which will receive the data for verification before notifying results to the importers or exporters or Customs brokers, who will input relevant data on import entries or export entries for submission at any Customs office together with other documents in a card. The goods not subject to tariff and value verification can pass through next step whereas the goods subject to tariff and value verification must proceed through next step for verification at the Import or Export Procedure Sub-Division and for duty payment (if any). Customs officers will thereafter check the completeness of documents against the data in the computer at the Goods Inspection Sub-Division, and the computer will automatically assign Customs inspectors to undertake the clearance of goods.

The Customs Department will reduce cost, time and human resource in the process. It is easy to control and monitor the Customs officer's behavior. Since every step must verify by network that is data transaction passing through the private virtual network and the system can also encrypt and decrypt codes from smart card so there is more security and trustiness in each operation.

Later, feasibility analysis of smart card is conducted to analyze the costs and benefits to find tangible and intangible benefits: the qualitative basis including economic feasibility, technical feasibility, operational feasibility, and organizational feasibility. According to the time measurement analysis, it can be seen that the total time taken for the current system compared with the recommended system and the result has declined about three to four times of importation and exportation procedure. Nevertheless, the recommended system helping time taken per transaction will create redundancy of database as being Personalization Smart Card Program and all servers. In addition, the present value or present worth will support the idea of returned value that is more worthwhile for each year after establishing the system.

The proposed system will be implemented in an effort to develop Thai's import and export system to meet the international standard. It is expected to substantially reduce the management and administrative costs of the trading community and to simultaneously expedite the Customs clearance process. The implementation of the system will stem from rapid and consistent changes in the international trade environment. Information technology has become a main factor in gaining a competitive edge in the business environment. The Customs Department has long realized the importance of the system and has currently implemented the system to improve management, service quality and operational effectiveness. The system is planned to be installed to provide all import and export facilities.

The proposed system will be subject to modification on the import and export procedure, including the clearance of goods, to facilitate importers and exporters. The clients who need to use the system must have their own programs for the transmission of the data, e.g. entry, invoice, bill of lading, packing list, and manifest. Both Customs officers and clients must be provided and supported the training program of smart card and computer-based knowledge. If the implementation plan is successful as the above suggestion mentioned, the Customs Department will perform its role actively in high spirit with an aim to initiate and urgently put to work its efficient system in servicing the needs of the country's international trading community in many areas. Moreover, the Customs Department is presently recognized by both local and foreign business communities for its various measures to effect the fast-track systems in its handling of various tasks in the future.

Finally, due to the deficiencies of the Existing Administration Import and Export System such as manual working process; insecurity policy; non-customized report provided, the proposed program is created to support these flaws. It will help reduce

manual routine tasks. The system evaluation describes the system improvement in many areas. It will affect either direct or indirect human behavior because they are always related to the environment. The transportation will decrease, and then the pollution in the environment will also decreased. To reduce the usage of paper, it will help preserve nature more so that the life cycle of humans and nature growth will be expanding to have been better life and been progressive in the changes. When we concentrate the opportunity of the new trend towards the Customs smart card applications in the future will be very useful and value to international importation and exportation business areas, including other infrastructures and other aspects. Not only the smart card system is innovative and modern information technology to the Thai government but its trend will also have influence to other applications in the business areas worldwide.

VIII. RECOMMENDATIONS

This project towards a system analysis and design method is likely to be useful for any organization that needs to improve and develop the workers' satisfaction and performance toward work or to solve manual working processes such as data collection, information transferred, etc. that are tedious and inefficient. However it can also be applied in other sections such as Business department, Administration department, Foreign department, etc. that perform the same or similar working system. Since, the application of only one section of the company is not enough to generate full capacity for total operations. Therefore, developing overall areas of the company will bring up the efficient working processes to achieve higher effectiveness in the large scale of the company.

The result of the study towards the smart card system application at the Customs Department indicates that the smart card is powerful and useful to the working process system and the result of that automatic function leads to the systematical processes and effectiveness to achieve department goals. The systems provides either local area network or LAN and wide area network or WAN which users can transfer any data around the world. Nowadays, the government still uses the connection via saving private bus transfer with high speed per transaction within the country. However, there is some interconnection between other countries, so the line connection should be less complicated, high security and low price of airtime in each transaction. For more details, the map of Internet connectivities in Thailand is shown in Appendix F. Thus, any organization should apply and adjust the smart card system for the suitability and appropriateness of each job and requirements.

Smart card system is the novel evolution of plastic card that substitutes cash. It can record and process the data. In order to access information within the card, the

cardholders must have specified code and it must match with the card acceptor device so that they can read or edit the data on card. Therefore, it is difficult to forge the card or data on the card. Also, this card differs from magnetic stripe card that has the same worldwide standard. It is easily accessible to the information within the card via prevalent card acceptor devices. Moreover, the smart card helps to protect the corruption that has more value in the present.

Further, smart card system will be developed, especially in terms of security, for better use in the future. Such development includes eye-dentification, finger verification, and voice recognition, etc. These features can ensure that the personal data of the cardholders cannot be accesses by unauthorized persons. However, the investment of this technology seems to be relatively high and not worth for short term application since it is difficult to gain profits or the investor can lose the capital. If the smart card system is used for long-term period, both users and the service providers can gain benefits all together. However, it seems to be better if all sectors – government and private – incorporate to provide services toward smart card system, since such cooperation can offer better things to all people, not only for some groups of people or organizations.

According to the limitation of time frame, an implementation of this project is not completely conducted to obtain the result of method application. Therefore, for a better result, users should look for more details from other sources.

APPENDIX A

DATA FLOW DIAGRAM OF THE EXISTING SYSTEM

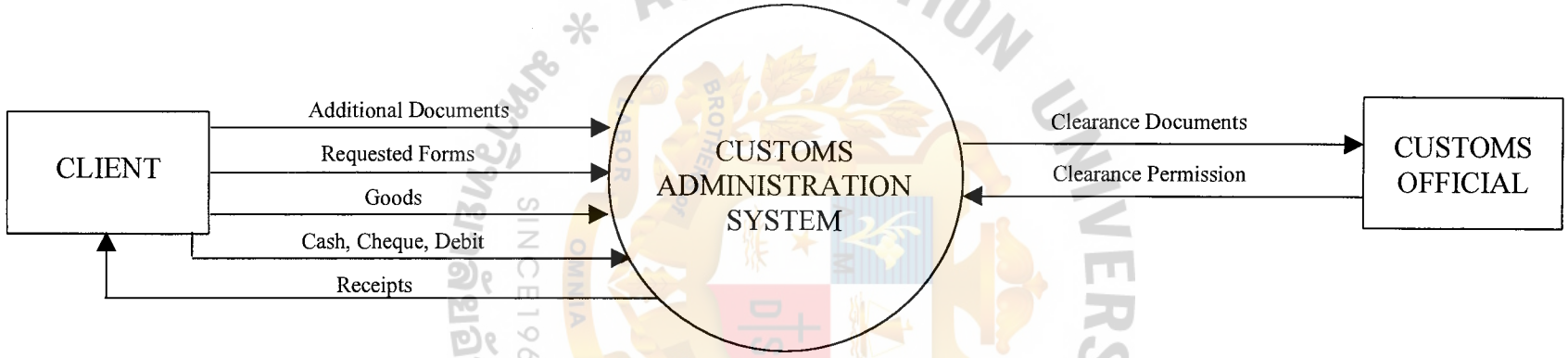


Figure A.1. Context Diagram of Customs Administration System.

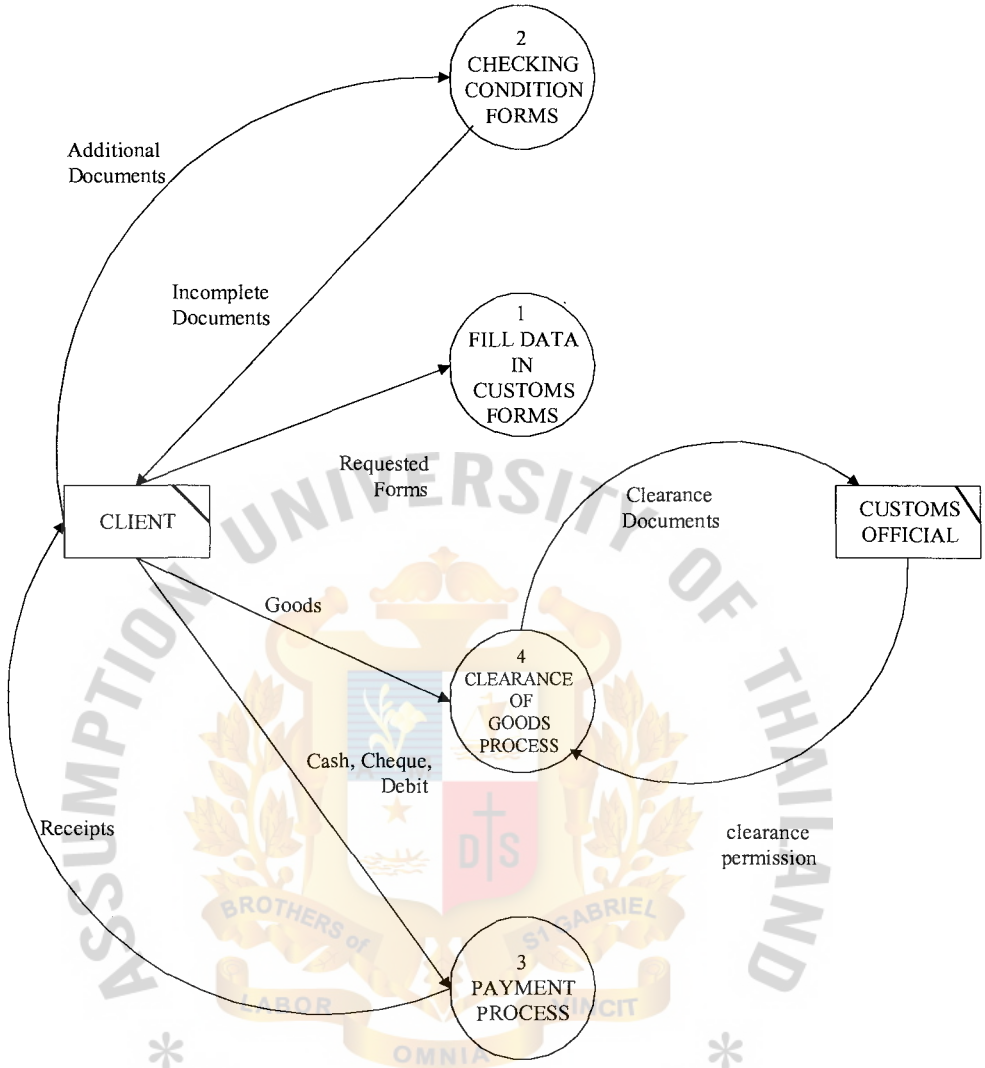


Figure A.2. DFD Level 0 of Customs Import Procedure.

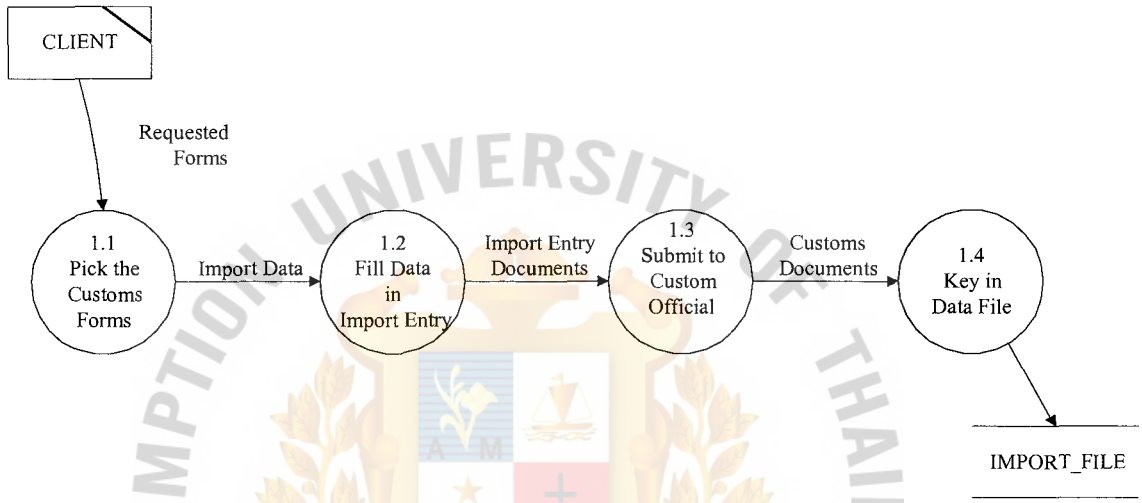


Figure A.3. DFD Level 1 of Filling Data in Customs Form.

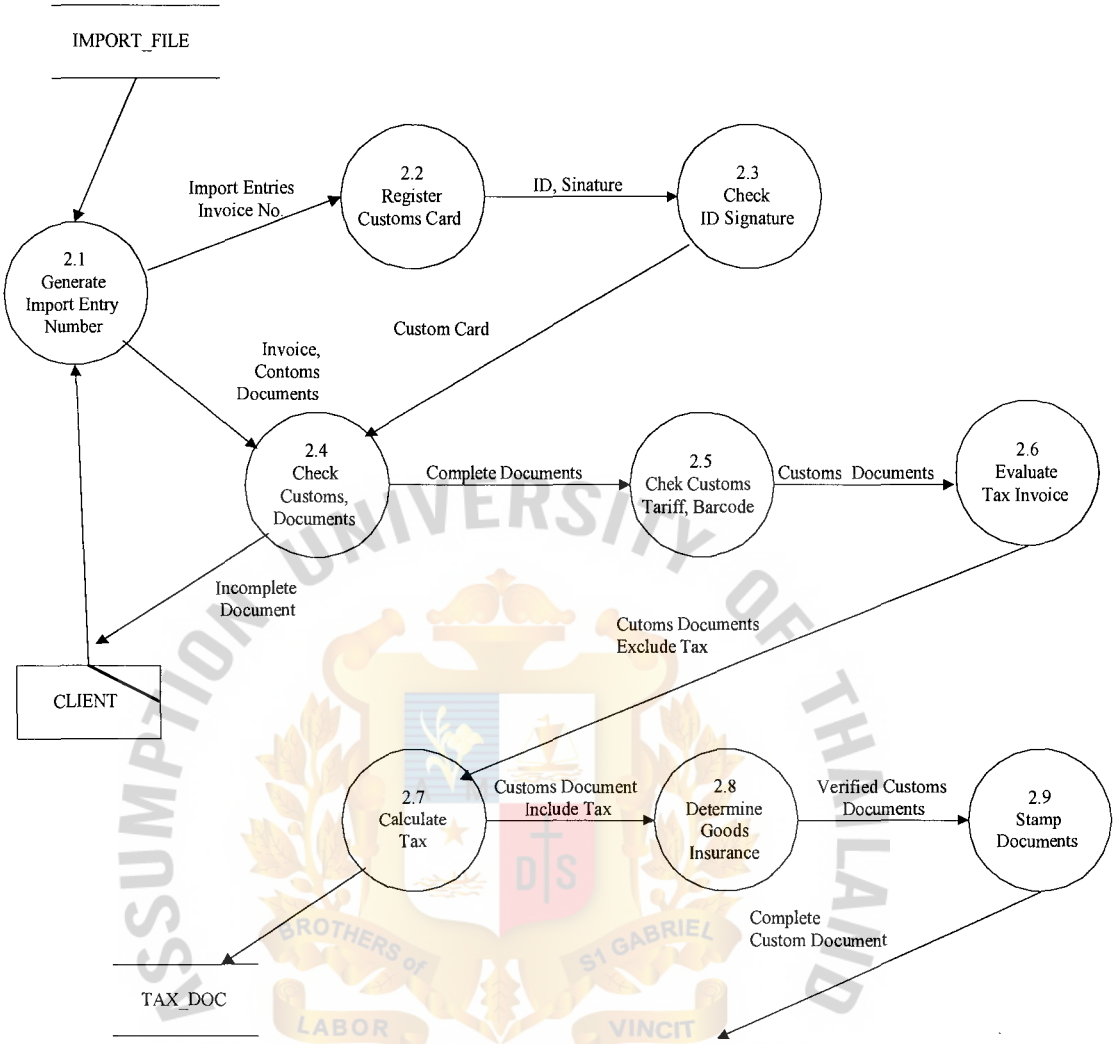


Figure A.4. DFD Level 1 of Checking Conditions and Documents.

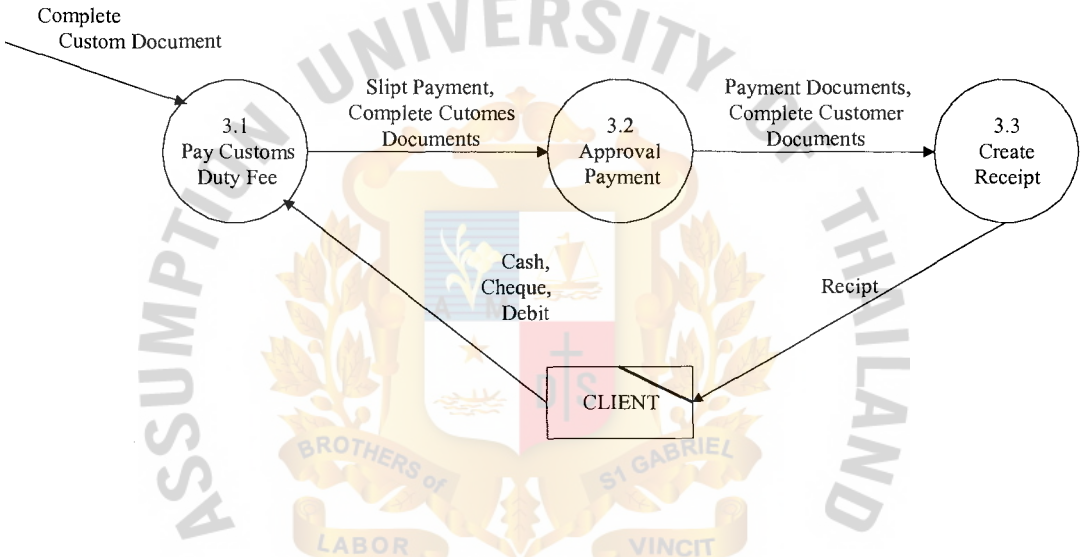


Figure A.5. DFD Level 1of Import Payment Process.

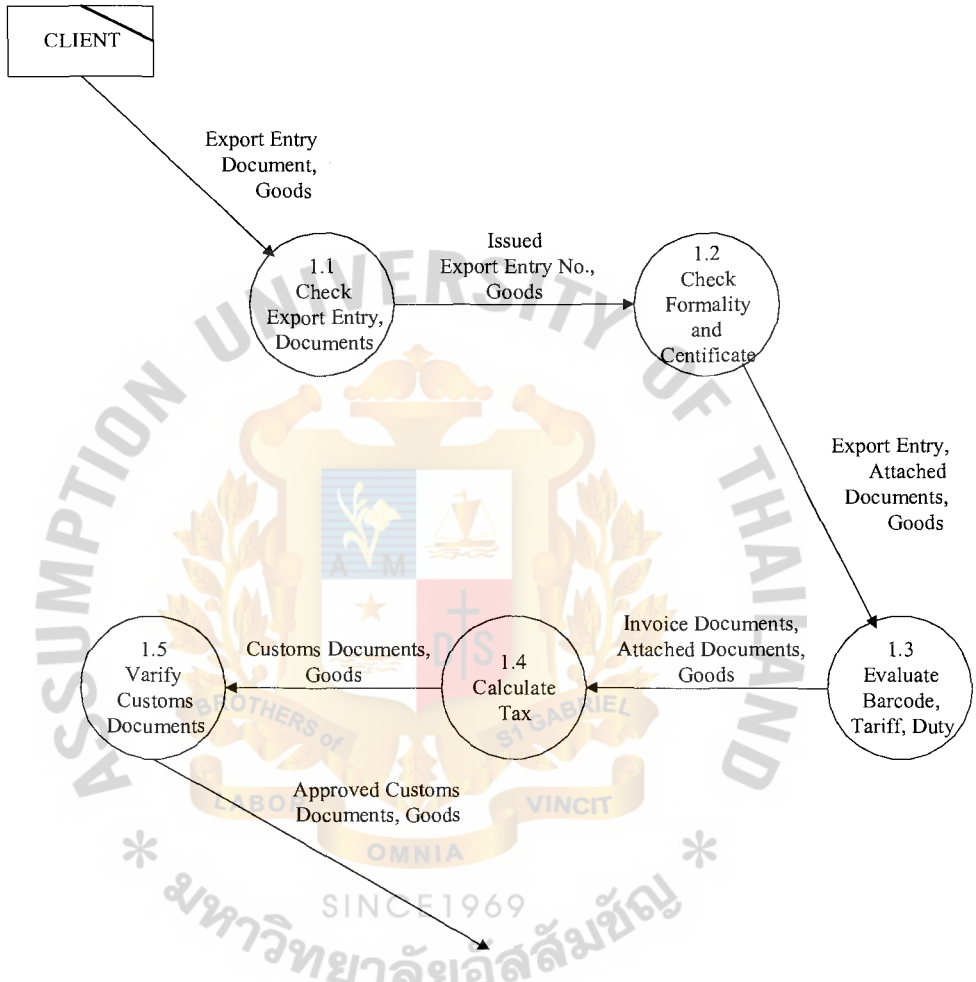


Figure A.6. DFD Level 1 of Customs Clearance Process.

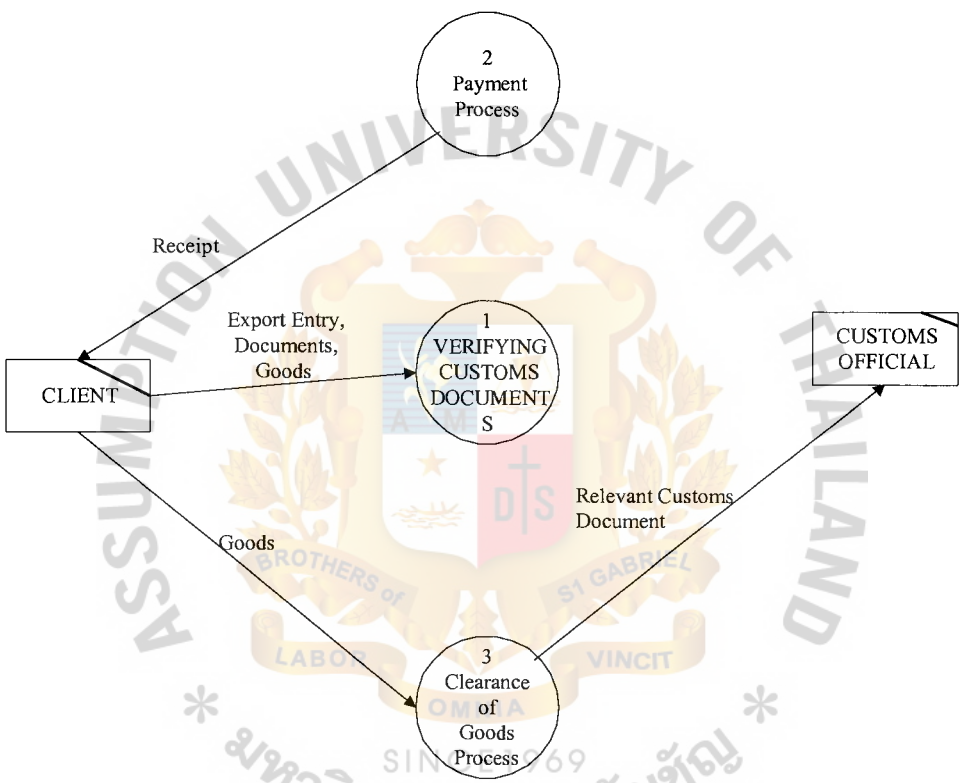


Figure A.7. DFD Level 0 of Customs Export Procedure.

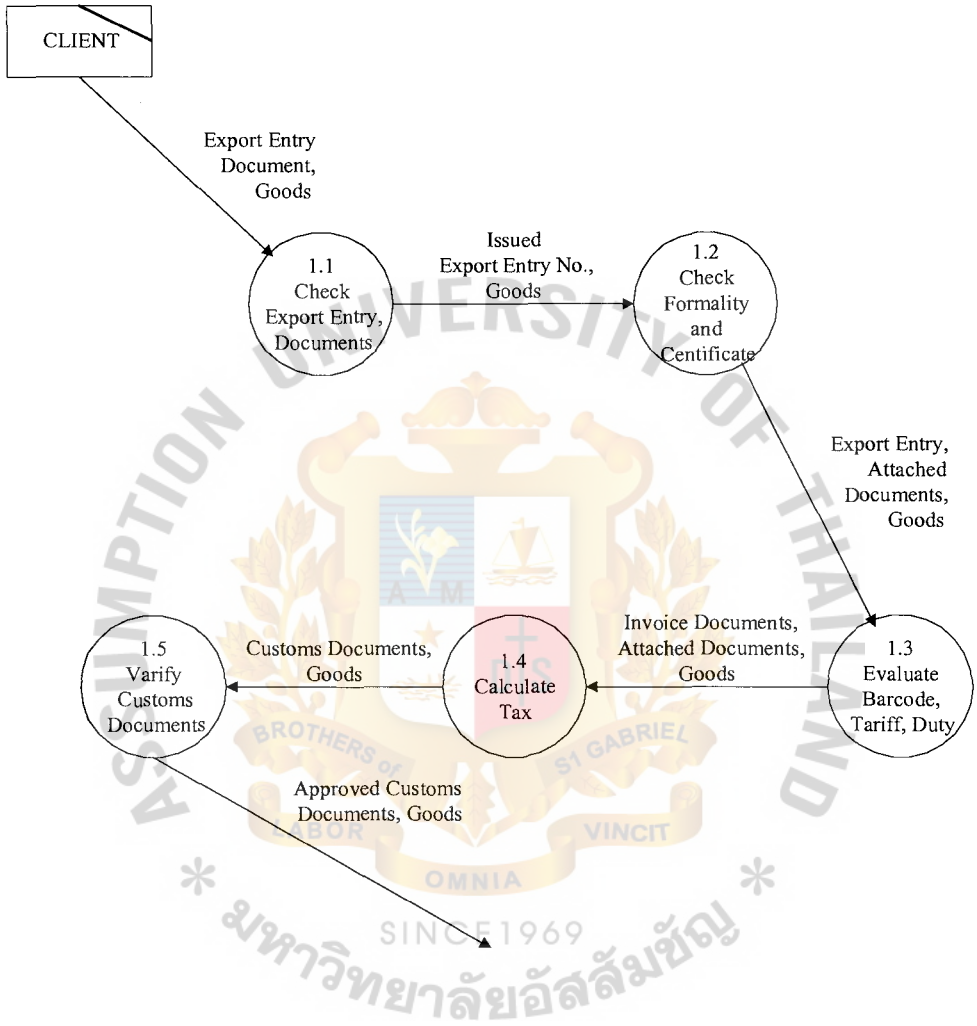


Figure A.8. DFD Level 1 of Customs Verifying Document.

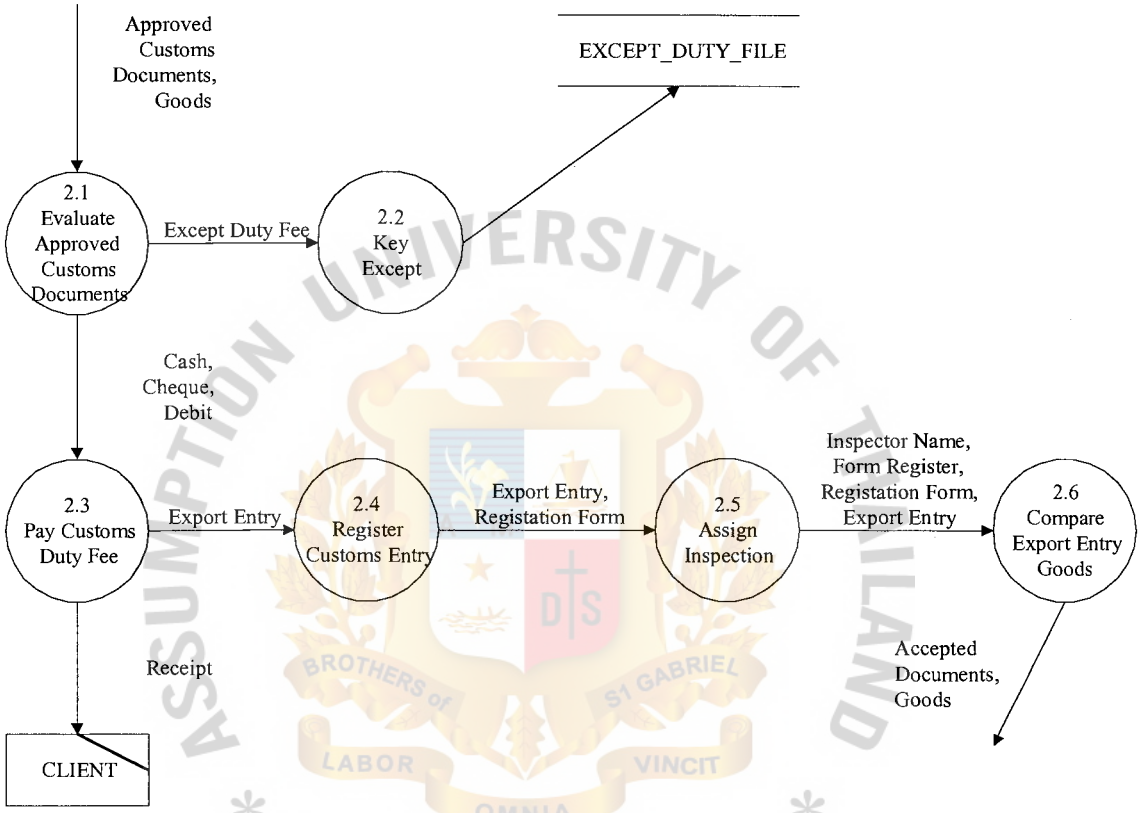


Figure A.9. DFD Level 1 of Export Payment Process.

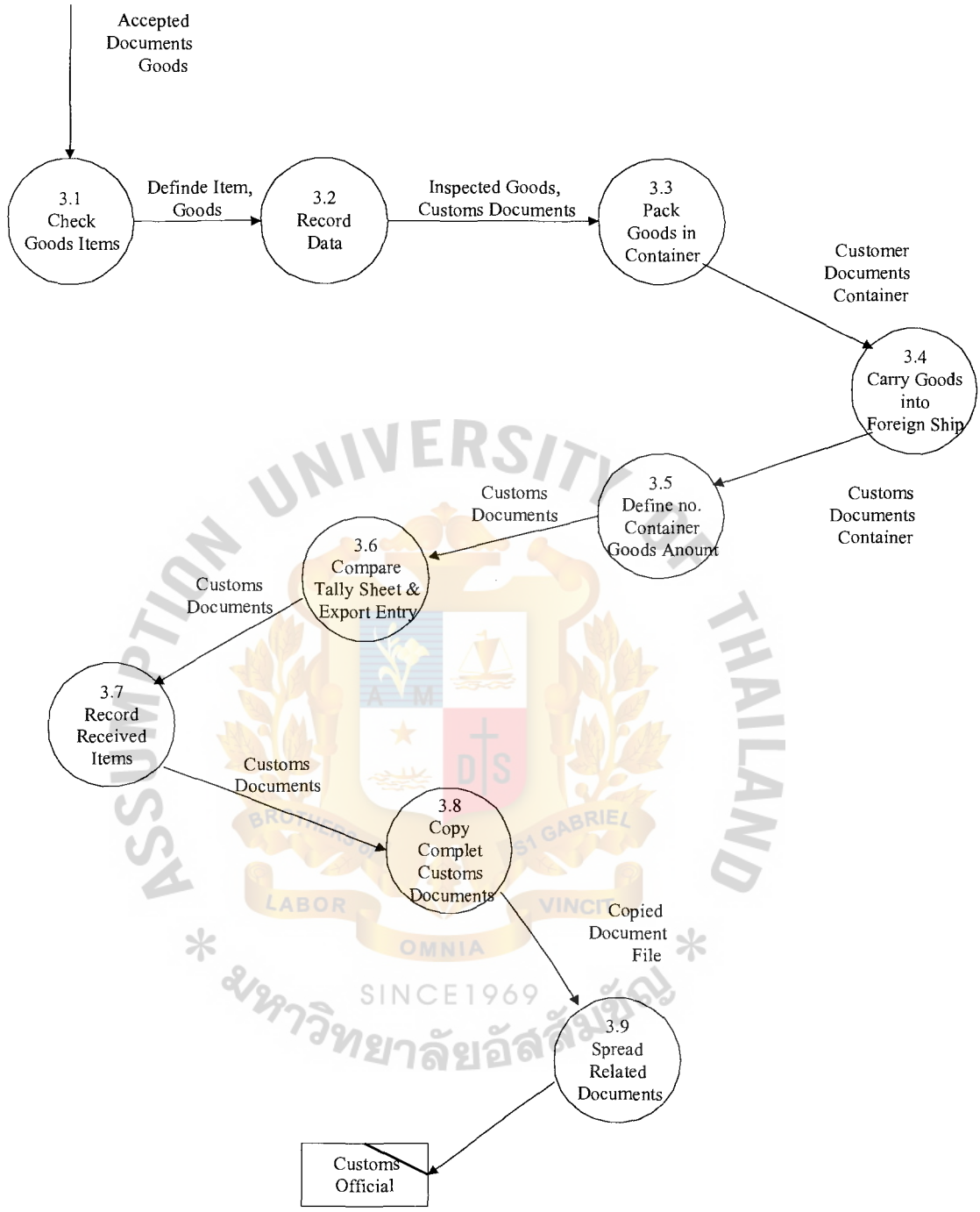


Figure A.10. DFD Level 1 of Customs Clearance Process.

APPENDIX B

DATA FLOW DIAGRAM OF THE PROPOSED SYSTEM

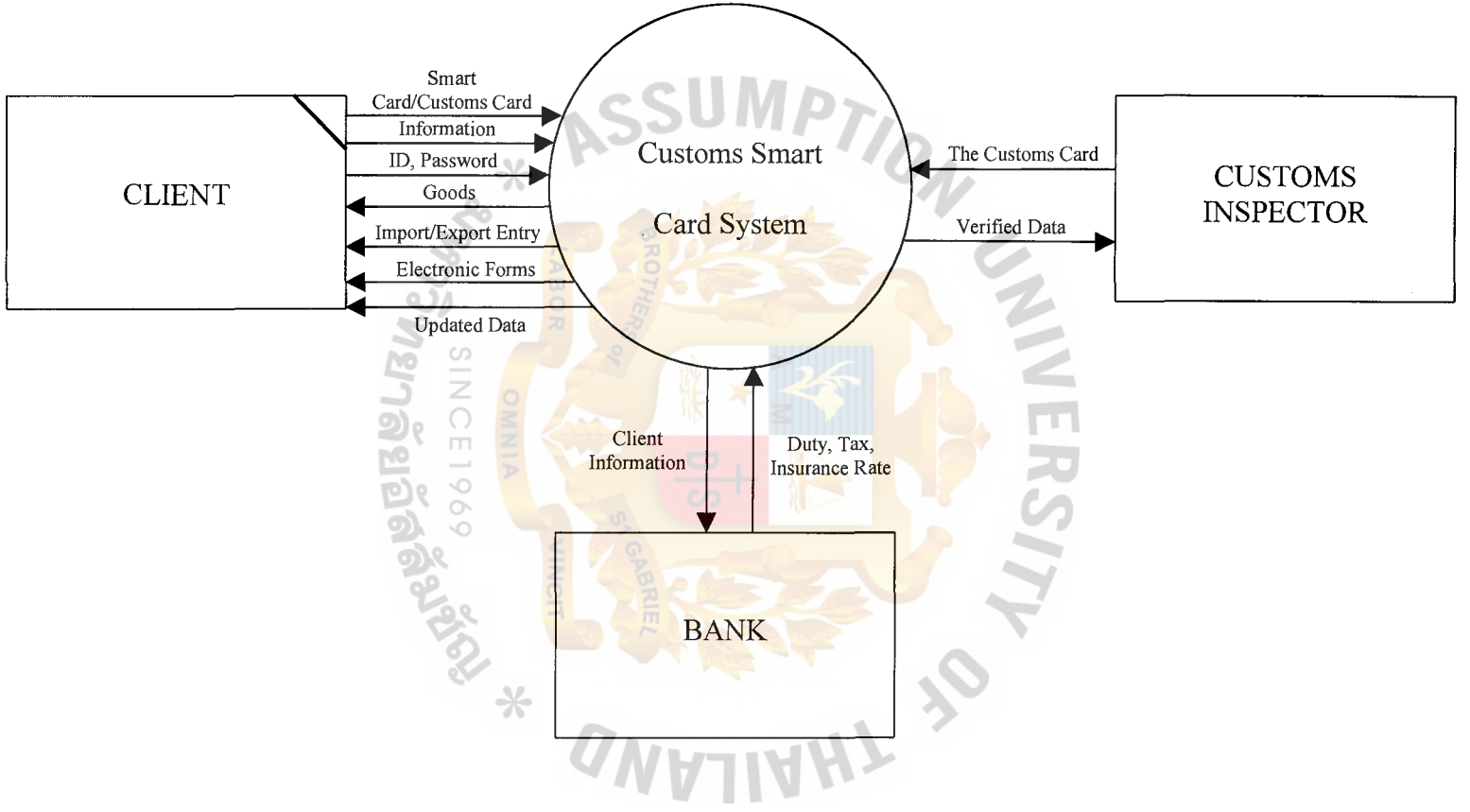


Figure B.1. Customs Smart Card System Context Diagram.

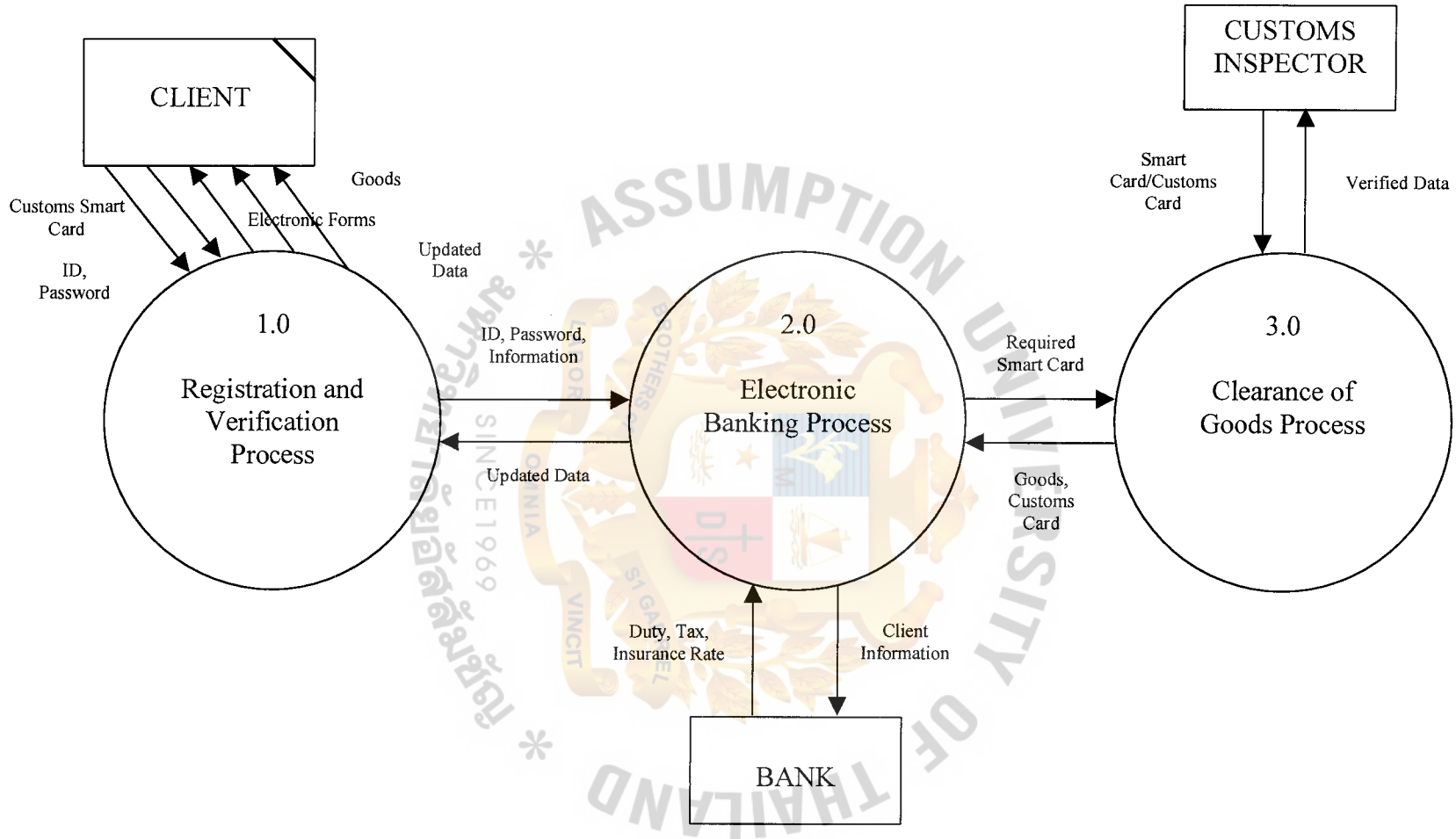


Figure B.2. Level 0 Data Flow Diagram of Customs Smart Card Request Process.

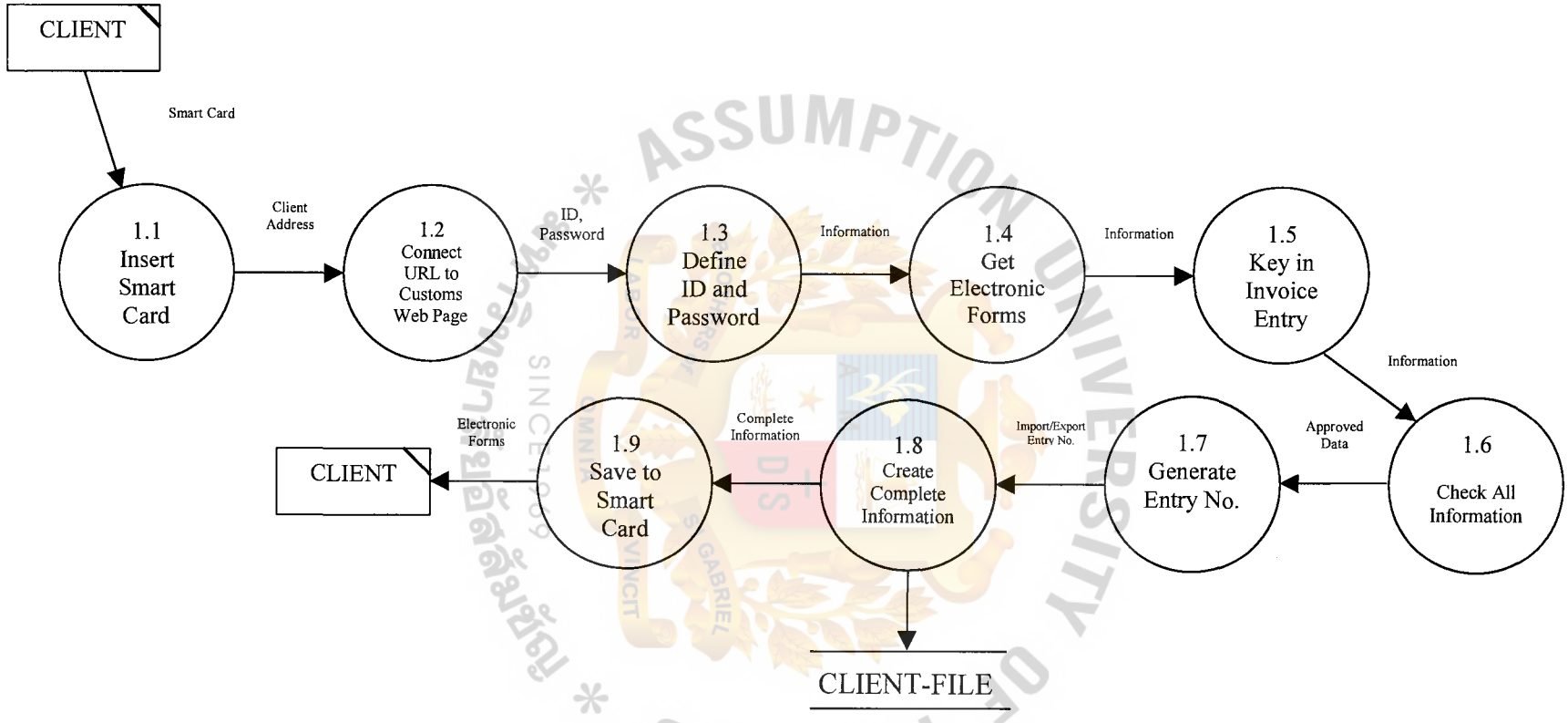


Figure B.3. Level 1 Data Flow Diagram of Registration and Verification Process.

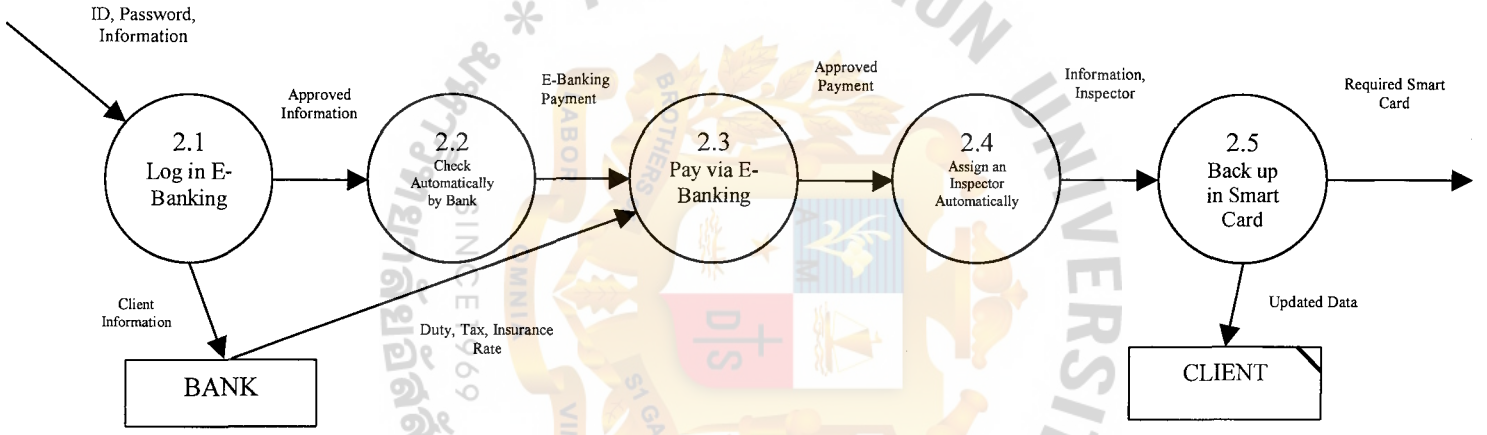


Figure B.4. Level 1 Data Flow Diagram of Electronic Banking Process.

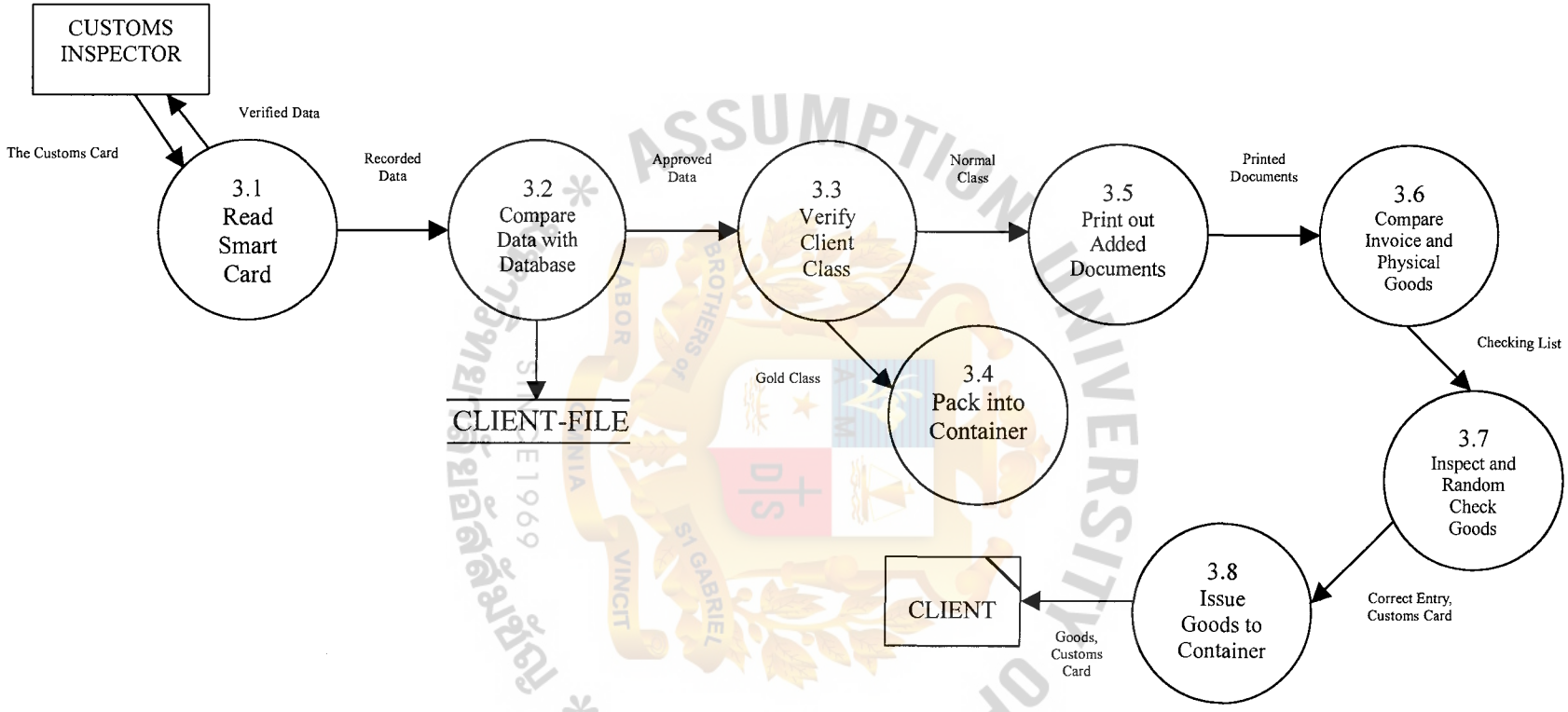


Figure B.5. Level 1 Data Flow Diagram of Clearance of Goods Process.

APPENDIX C

THE CUSTOMS IMPORT AND EXPORT DOCUMENTS
OF THE EXISTING SYSTEM

Figure C.1. Owner or Manager Signature Card.

กรมศุลกากร

บัตรตัวอย่างลายมือชื่อผู้รับมอบอำนาจ

ชื่อ นายอำนาจ นธีเมธาโชค

ผู้รับมอบอำนาจ

น.ส.นวลจันทร์ ลำภัต

ตั้งอยู่ที่ 55 หมู่ 7 ถ.เพชรเกษม ต.คลองจินห

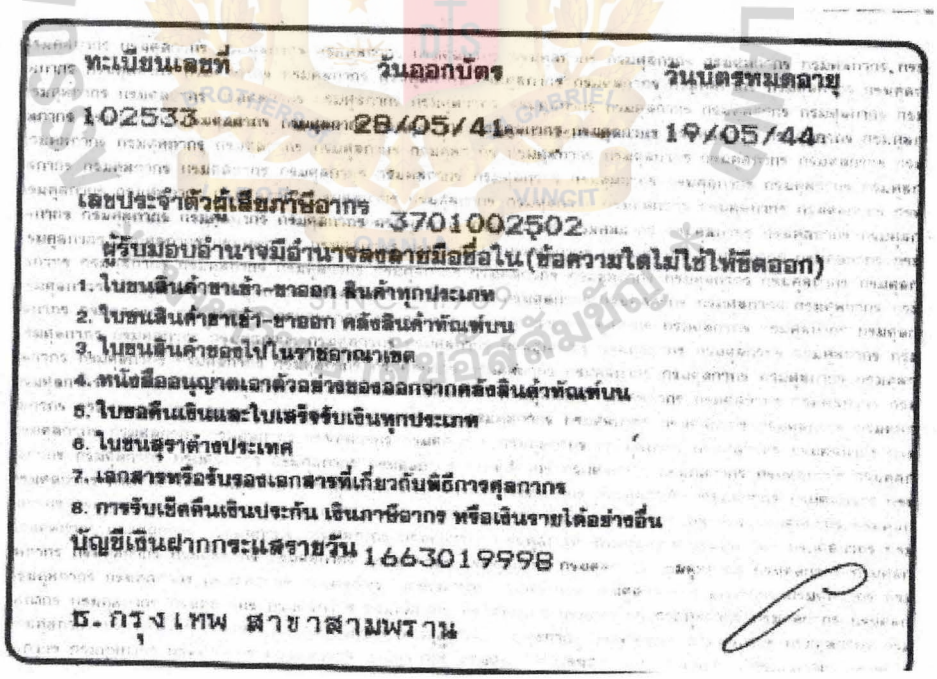
อ.สามพราน จ.นครปฐม

นายธนา สุทธิภัญโญกุล

เจ้าหน้าที่บริหารงานทั่วไป ๖

นายทะเบียน

ลายมือชื่อผู้รับมอบอำนาจ



ทะเบียนเลขที่ 102533

วันออกบัตร 28/05/41

วันบัตรหมดอายุ 19/05/44

เลขประจำตัวผู้เสียภาษีอากร 3701002502

ผู้รับมอบอำนาจมีอำนาจลงลายมือชื่อใน (ข้อความใดไม่ใช้ให้ขีดออก)

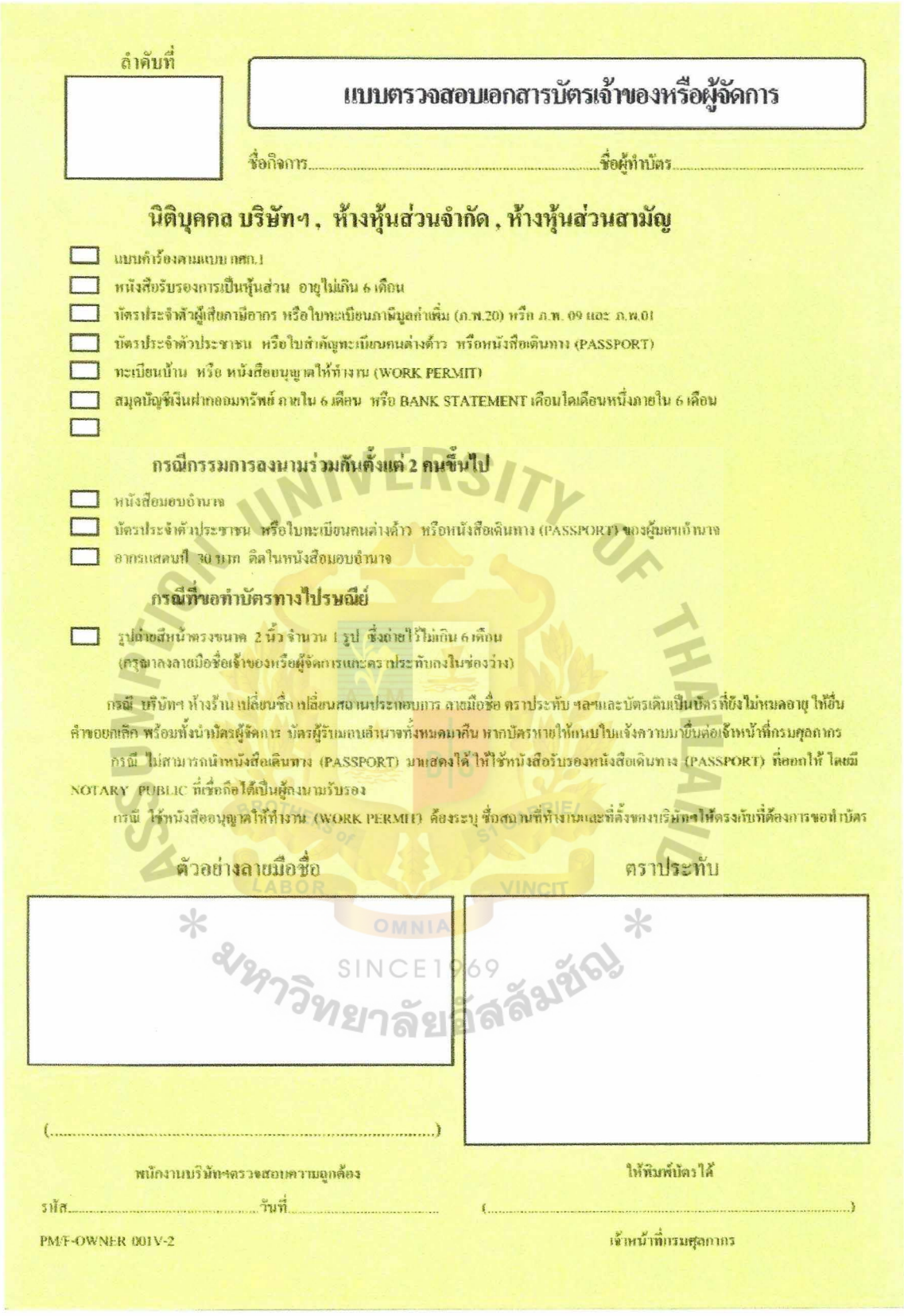
1. ใบขนสินค้าขาเข้า-ขาออก สินค้าทุกประเภท
2. ใบขนสินค้าขาเข้า-ขาออก คลังสินค้าทัณฑ์บน
3. ใบขนสินค้าขอไปในราชอาณาเขต
4. หนังสืออนุญาตเอาตัวอย่างของออกจากคลังสินค้าทัณฑ์บน
5. ใบขอคืนเงินและใบเสร็จรับเงินทุกประเภท
6. ใบขนสุราต่างประเทศ
7. เอกสารหรือรับรองเอกสารที่เกี่ยวกับพิธีการศุลกากร
8. การรับเช็คคืนเงินประกัน เงินภาษีอากร หรือเงินรายได้อย่างอื่น

บัญชีเงินฝากกระแสรายวัน 1663019998

ธ.กรุงเทพ สาขาสามพราน

Figure C.2. Attorney-In-Fact Card.

Figure C.3. Customs Clearance Card or Customs Brokers' Identification Card.



ลำดับที่

แบบตรวจสอบเอกสารบัตรเจ้าของหรือผู้จัดการ

ชื่อกิจการ.....ชื่อผู้ทำบัตร.....

นิติบุคคล บริษัทฯ , ห้างหุ้นส่วนจำกัด , ห้างหุ้นส่วนสามัญ

- ☐ แบบคำร้องตามแบบ กสก.1
- ☐ หนังสือรับรองการเป็นหุ้นส่วน อายุไม่เกิน 6 เดือน
- ☐ บัตรประจำตัวผู้เสียภาษีอากร หรือใบทะเบียนภาษีมูลค่าเพิ่ม (ภ.พ.20) หรือ ภ.พ. 09 และ ภ.พ.01
- ☐ บัตรประจำตัวประชาชน หรือใบสำคัญทะเบียนคนต่างด้าว หรือหนังสือเดินทาง (PASSPORT)
- ☐ ทะเบียนบ้าน หรือ หนังสืออนุญาตให้ทำงาน (WORK PERMIT)
- ☐ สมุดบัญชีเงินฝากออมทรัพย์ ภายใน 6 เดือน หรือ BANK STATEMENT เดือนใดเดือนหนึ่งภายใน 6 เดือน
- ☐

กรณีกรรมการลงนามร่วมกันตั้งแต่ 2 คนขึ้นไป

- ☐ หนังสือมอบอำนาจ
- ☐ บัตรประจำตัวประชาชน หรือใบทะเบียนคนต่างด้าว หรือหนังสือเดินทาง (PASSPORT) ของผู้มอบอำนาจ
- ☐ อากรแสตมป์ 30 บาท ติดในหนังสือมอบอำนาจ

กรณีที่ขอทำบัตรทางไปรษณีย์

- ☐ รูปถ่ายสีหน้าตรงขนาด 2 นิ้ว จำนวน 1 รูป ซึ่งถ่ายไว้ไม่เกิน 6 เดือน
  (กรุณาลงลายมือชื่อเจ้าของหรือผู้จัดการและตราประทับลงในช่องว่าง)

กรณี บริษัทฯ ห้างร้าน เปลี่ยนชื่อ เปลี่ยนสถานประกอบการ ลายมือชื่อ ตราประทับ ฯลฯ และบัตรเดิมเป็นบัตรที่ยังไม่หมดอายุ ให้ยื่นคำขอยกเลิก พร้อมทั้งนำบัตรผู้จัดการ บัตรผู้รับมอบอำนาจทั้งหมดมาคืน หากบัตรหายให้แนบใบแจ้งความมายื่นต่อเจ้าหน้าที่กรมสุขภาพ

กรณี ไม่สามารถนำหนังสือเดินทาง (PASSPORT) มาแสดงได้ ให้ใช้หนังสือรับรองหนังสือเดินทาง (PASSPORT) ที่ออกให้ โดยมี NOTARY PUBLIC ที่เชื่อถือได้เป็นผู้ลงนามรับรอง

กรณี ใช้หนังสืออนุญาตให้ทำงาน (WORK PERMIT) ต้องระบุ ชื่อสถานที่ทำงานและที่ตั้งของบริษัทฯให้ตรงกับที่ต้องการขอทำบัตร

ตัวอย่างลายมือชื่อ

ตราประทับ

(.....)

พนักงานบริษัทฯตรวจสอบความถูกต้อง

รหัส.....วันที่.....

ให้พิมพ์บัตรได้

(.....)

เจ้าหน้าที่กรมสุขภาพ

PM/F-OWNER 001V-2

Figure C.4. Owner or Manager Document Inspection Form.

ลำดับที่

แบบตรวจสอบเอกสาร บัตรผ่านพิธีการ

ชื่อกิจการ.....ชื่อผู้ทำบัตร.....

- ☐ แบบคำร้องตามแบบ กพก.3
- ☐ บัตรประจำตัวประชาชน หรือใบสำคัญทะเบียนคนต่างด้าว หรือหนังสือเดินทาง (PASSPORT) หรือบัตรอื่นๆซึ่งทางราชการออกให้
- ☐ ทะเบียนบ้าน หรือ หนังสืออนุญาตให้ทำงาน (WORK PERMIT)
- ☐ บัตรผ่านพิธีการเดิม
- ☐ บัตรประจำตัวผู้เสียภาษีอากร

หนังสือแสดงวุฒิการศึกษา

- ☐ ปริญญาตรีหรือเทียบเท่า
- ☐ ประกาศนียบัตรผ่านการอบรมจากสำนักบริหารและพัฒนาบุคคล
- ☐ ประกาศนียบัตรผ่านการอบรมจากสมาคมชิปปิ้งแห่งประเทศไทย หรือจากสถาบันการศึกษาที่เปิดสอนวิชาตัวแทนออกของที่กรมศุลกากรรับรอง

กรณีที่มีหนังสือแสดงวุฒิการศึกษา จะต้องผ่านการทดสอบตัวแทนออกของรับอนุญาต จากสำนักบริหารและพัฒนาบุคคลก่อนในเดือนมกราคม เมษายน กรกฎาคม ของทุกปี ซึ่งผู้ผ่านการทดสอบสามารถขอรับใบรับรองผลการสอบได้ภายใน 15 วัน นับตั้งแต่วันสิ้นสุดการสอบ เว้นแต่ผู้ที่กรมศุลกากรได้รับแจ้งรายชื่อพร้อมหลักฐานครบถ้วนจากสมาคมชิปปิ้งแห่งประเทศไทย หรือ สถาบันการศึกษาที่เปิดสอนวิชาตัวแทนออกของที่กรมศุลกากรรับรอง ก่อนวันที่ 17 ตุลาคม พ.ศ. 2540 ไม่ต้องขอทำการสอบ

ตัวอย่างลายมือชื่อ	ตราประทับ
(.....)	
พนักงานบริษัทฯตรวจสอบความถูกต้อง	ให้พิมพ์บัตรได้
รหัส.....วันที่.....	(.....)
PM/F-CLEAR 001V-2	เจ้าหน้าที่กรมศุลกากร

Figure C.5. The Formality Execution Document Inspection Form.

ลำดับที่

แบบตรวจสอบเอกสาร บัตรผู้รับมอบอำนาจ

ชื่อกิจการ.....ชื่อผู้ทำบัตร.....

- ☐ แบบคำร้องตามแบบ กศก.2
- ☐ หนังสือมอบอำนาจจากเจ้าของหรือผู้จัดการ ตามแบบ กศก.4
- ☐ อากรแสตมป์ 30 บาท ติดในหนังสือมอบอำนาจ
- ☐ บัตรเจ้าของหรือผู้จัดการ ซึ่งเป็นผู้มอบอำนาจ
- ☐ บัตรประจำตัวผู้เสียภาษีอากรของผู้รับมอบอำนาจ
- ☐ บัตรประจำตัวประชาชน หรือใบสำคัญทะเบียนคนต่างด้าว หรือหนังสือเดินทาง (PASSPORT)
- ☐ ทะเบียนบ้าน หรือหนังสืออนุญาตให้ทำงาน (WORK PERMIT) เฉพาะบุคคลต่างประเทศ

กรณีการมอบอำนาจให้รับเช็คคืนเงินประกัน เงินภาษีอากร หรือเงินรายได้อย่างอื่น ให้ระบุเลขที่บัญชีเงินฝากและชื่อธนาคารของบริษัท , ห้าง , ร้าน ที่เป็นผู้มอบอำนาจลงในหนังสือมอบอำนาจด้วย

ตัวอย่างลายมือชื่อ	ตราประทับ
(.....)	
พนักงานบริษัทฯตรวจสอบความถูกต้อง	ให้พิมพ์บัตรได้
รหัส.....วันที่.....	(.....)
PM/F-ATT 001V-2	เจ้าหน้าที่กรมศุลกากร

Figure C.6. Attorney-In-Fact Document Inspection Form.

กศก. 120

กรมศุลกากร

เลขที่ B 0828926

ใบเสร็จรับเงิน

เลขประจำตัวผู้เสียภาษีอากร 3011829905

ชื่อผู้นำของเข้า/ส่งของออก บ.เอทีอี เซอร์วิส (ประเทศไทย) จำกัด

ชื่อยานพาหนะ JL 707. วันนำเข้า/ส่งออก 05-09-41

เลขที่ใบขนฯ 1103-0091061T-2 เลขที่ชำระอากร/วันเดือนปี 072053/09-09-41

ได้รับเงินตามรายการข้างล่างนี้ไว้แล้ว	ที่ชำระตามสำแดง (บาท)	ที่วางประกัน (บาท)
01	6,365.00	
05	13,367.00	
รวมเงินทั้งสิ้น (บาท)	19,732.00	

จำนวนเงินตัวอักษร หนึ่งหมื่นเก้าพันเจ็ดร้อยสามสิบสองบาทถ้วน

ลงชื่อผู้รับเงิน ..... วันที่ 09-09-41

( )

ตำแหน่ง ..... กอง/ด่านศุลกากร .....

หมายเหตุ จำนวนเงินภาษีมูลค่าเพิ่มที่ชำระตามสำแดงเท่านั้น ที่จะนำไปเครดิต

01 ค่าอากรขาเข้า 02 ค่าอากรขาออก 03 ค่าธรรมเนียมพิเศษ 04 ค่าภาษีสรรพสามิต 05 ค่าภาษีมูลค่าเพิ่ม 06 เงินเพิ่มภาษีมูลค่าเพิ่ม 07 เบี้ยปรับภาษีมูลค่าเพิ่ม
08 ค่าภาษีและค่าธรรมเนียมอื่น 09 ค่าธรรมเนียมศุลกากร 10 ค่าปรับศุลกากร 11 ค่าธรรมเนียมอื่นๆ 12 ค่าแห่งชาติ 13 รายได้เบ็ดเสร็จ 14 อื่นๆ

Figure C.7. Customs Receipt / Tax Invoice.

...CORPORATION LTD.
Southern Industrial Estate
9/8 Moo. 4 , Chalung , Hadyai , Songkhla . 90110 (S) Thailand
Tel: 66-074-472234-38 Fax: 66-074-472243

INVOICE

Date MAY , 8 , 2000
Invoice No. EX. TLKC / 00096

INVOICE Of GASKET
SHIPPED. UNIVERSAL BRIGHT V. 0037N From BANGKOK , THAILAND To MOJI JAPAN
For account and risk of Messrs NIPPON LEAKLESS CORPORATION LTD.
MUSHOZU , ONGA-MACHI , ONGA-GUN , FUKUOKA , JAPAN TEL: 093-293-1222
Your Order No ..... Payment Term 90 DAYS AFTER B/L DATE
Delivery Date ETD. 11 / 5 / 2000 ETA. 23 / 5 / 2000 Bank's Certificate No.....

Items No.	Description	Quantity	Unit price	Amount
	GASKET	PCS	YEN	YEN
28	17228-ZM7-0000	800	1.50	1,200.00
29	18291-ZV5-0101	800	1.50	1,200.00
30	18333-ZV7-0001	1,000	1.50	1,500.00
31	19242-ZV5-0001	1,500	9.90	14,850.00
32	19351-ZV1-8502	800	1.50	1,200.00
33	19351-ZV5-0004	2,000	1.50	3,000.00
34	21115-VD6-9003	500	19.00	9,500.00
35	21215-VD6-8511	800	20.20	16,160.00
36	25312-VD6-9002	800	1.50	1,200.00
37	25712-VD6-9022	1,800	1.50	2,700.00
38	41281-ZV0-8502	1,800	1.50	2,700.00
39	50168-ZW1-0001	1,000	22.50	22,500.00
40	16221-883-8001	50,000	1.50	75,000.00
41	21811-P6H-0002	8,850	190.00	1,681,500.00
42	21812-PCJ-0002	8,850	1.50	13,275.00
43	21811-PFL-0002	2,000	140.23	280,460.00
44	21812-PFL-0002	2,000	1.50	3,000.00
		278,300.00 PCS		5,136,175.00
	TOTAL F.O.B. BANKGOK	278,300.00 PCS		5,136,175.00

SHIPPING MARKS & NOS.
- NIPPON LEAKLESS CORPORATION LTD.
- PALLETS NO. 1 - 3
- MADE IN THAILAND

(MR. KIYOYUKI SAITO)
FACTORY MANAGER

Figure C.8. An Example of Company Invoice via Bangkok Port.

INVOICE

TOYO DENSO CO., LTD.
88-24 SHINGOU HIGASHIMATUYAMA SHI
SAITAMA KEN 355-0071 JAPAN

PHONE: 0493-22-6971
FAX: 0493-22-9650

SOLD BY ORDER AND FOR ACCOUNT AND RISK OF MESSERS
THAI TOYO DENSO CO.,LTD
109.10th Floor,Sitthivorakit Building
5Soi Pipat,Silom Road
Bangkok 10500 Thailand
ATTN: Mr AOKI
TEL: 662-266-8350
FAX: 662-266-8351

INVOICE NO. MA029
DATE TOKYO NOV. 27,1998
ISSUED BY PAYMENT BY REMITTANCE
ORDER NO.
MARKS
TOYO DENSO CO., LTD.
Bangkok 10500 Thailand
C/NO 1-11
MADE IN JAPAN

SHIPPED FROM	TO
TOKYO	BANGKOK,THAILAND
PER	ON OR ABOUT
AIRCRAFT	NOV 30, 1998

PARTS FOR A AUTOMOBILE

FOB TOKYO IN YEN

NO.	PARTS NO.	DESCRIPTION	Q'TY	U.PRICE	AMOUNT	WEIGHT
1	7F24373-02	BASE COMP	3,922	71.09	278,814.98	18,629.50
2	7F21816-01	LIT UNIT	90	572.55	51,529.50	14,400.00
3	7Z11108	GOMUSEN	6,000	3.36	20,160.00	360.00
4	7Z07001	CLIP B	1,000	9.14	9,140.00	3,000.00
5	7G00967	O-RING	50,000	3.18	159,000.00	5,000.00
6	7M08232B02	KNOB	2,840	6.62	18,800.80	5,680.00
7	7P05861	TERMINAL	7,000	0.84	5,880.00	2,730.00
		TOTAL	70852. PCS		¥543,325	49.80KGS

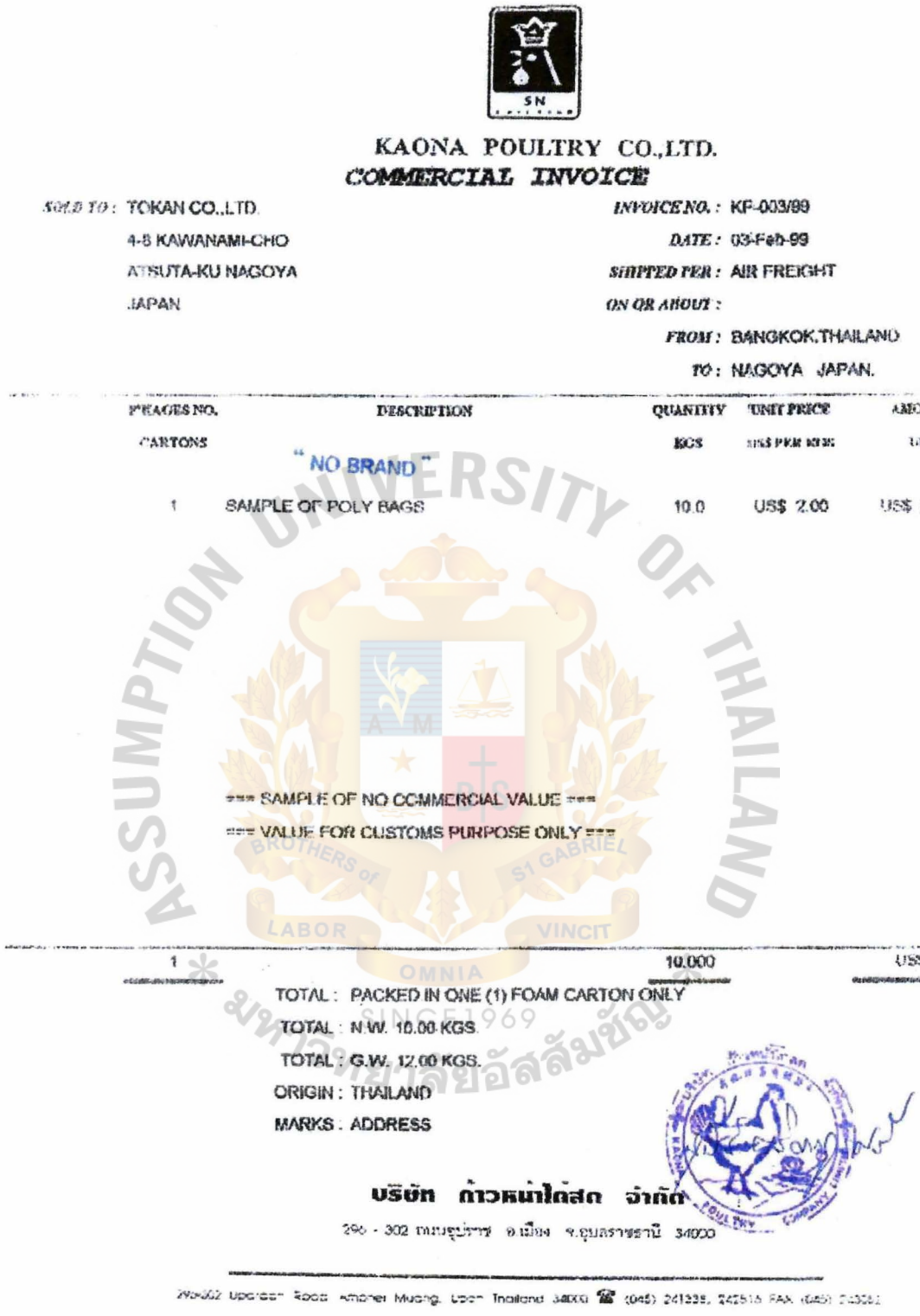
TOTAL: 11 CARTONS.
CONTORY OF ORIGIN:JAPAN

F CARTON	325X275X100	5	NO1-NO5
A CARTON	555X555X205	2	NO6-NO7
E CARTON	325X275X205	1	NO8
CARTON	390X280X300	1	NO9
CARTON	480X420X240	2	NO10-NO11

G/W 58.99KGS

TOYO DENSO CO., LTD.
Manager

Figure C.9. An Example of Company Invoice via Aircraft Carrier (1).



KAONA POULTRY CO.,LTD.

COMMERCIAL INVOICE

SOLD TO : TOKAN CO.,LTD.
4-8 KAWANAMI-CHO
ATSUTA-KU NAGOYA
JAPAN

INVOICE NO. : KP-003/99
DATE : 03-Feb-99
SHIPPED PER : AIR FREIGHT
ON OR ABOUT :
FROM : BANGKOK,THAILAND
TO : NAGOYA JAPAN.

PKAGES NO. CARTONS	DESCRIPTION	QUANTITY KGS	UNIT PRICE US$ PER KGS	AMOUNT US$
	" NO BRAND "			
1	SAMPLE OF POLY BAGS	10.0	US$ 2.00	US$ 20.00

*** SAMPLE OF NO COMMERCIAL VALUE ***
*** VALUE FOR CUSTOMS PURPOSE ONLY ***

1		10.000	US$ 20.00

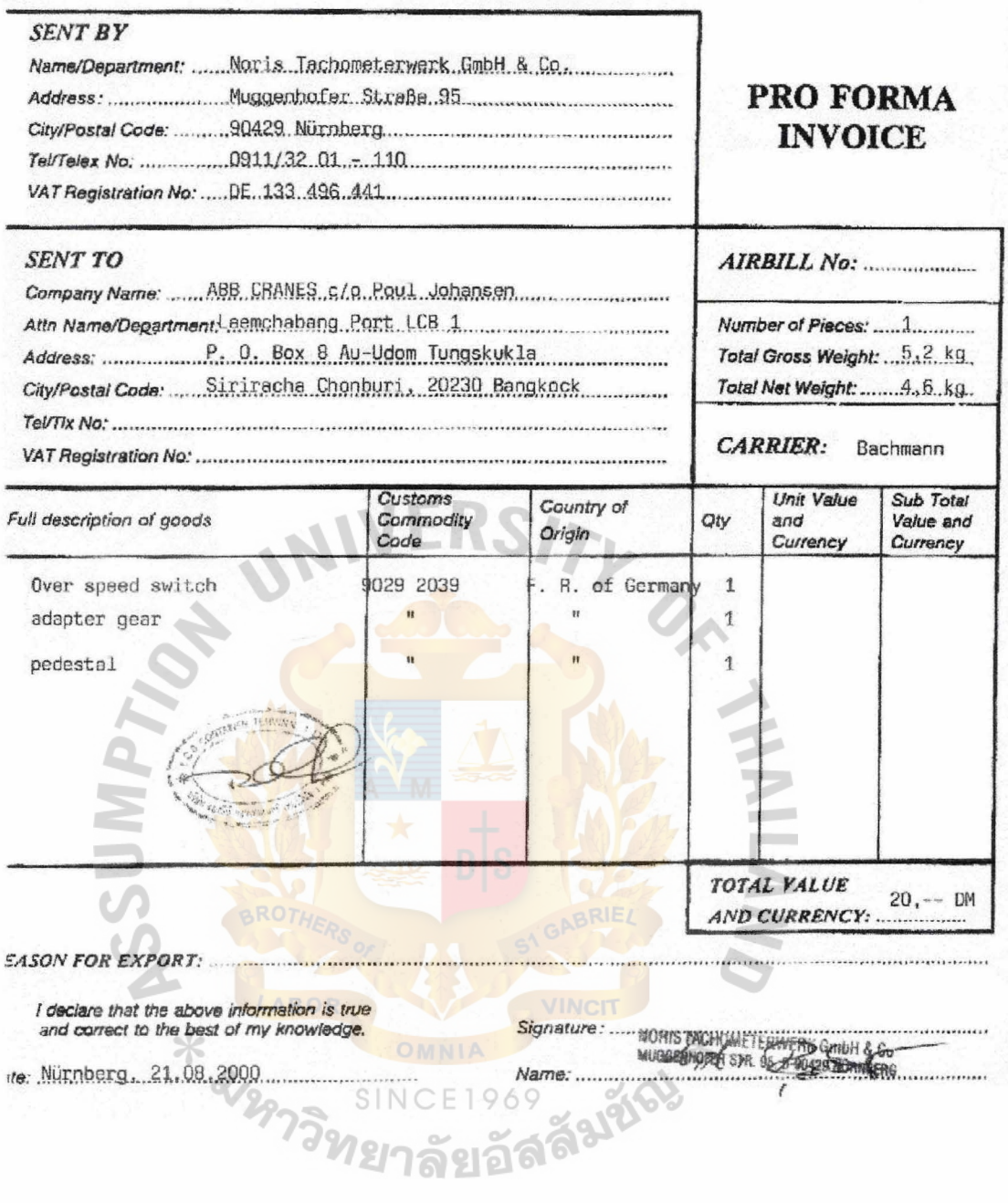
TOTAL : PACKED IN ONE (1) FOAM CARTON ONLY
TOTAL : N.W. 10.00 KGS.
TOTAL : G.W. 12.00 KGS.
ORIGIN : THAILAND
MARKS : ADDRESS

บริษัท ก้าวหน้าไก่สด จำกัด

290 - 302 ถนนอุบลทาน อ.เมือง จ.อุบลราชธานี 34000

290-302 Uparatn Road Amphur Muang Ubon Thailand 34000 (045) 241335, 242518 FAX (045) 243091

Figure C.10. An Example of Company Invoice via Aircraft Carrier (2).



SENT BY

Name/Department: Noris Tachometerwerk GmbH & Co.
Address: Muggenhofer Straße 95
City/Postal Code: 90429 Nürnberg
Tel/Telex No: 0911/32 01 - 110
VAT Registration No: DE 133 496 441

PRO FORMA INVOICE

SENT TO

Company Name: ABB CRANES c/o Poul Johansen
Attn Name/Department: Laemchabang Port LCB 1
Address: P. O. Box 8 Au-Udom Tungskukla
City/Postal Code: Siriracha Chonburi, 20230 Bangkock
Tel/Tlx No:
VAT Registration No:

AIRBILL No:

Number of Pieces: 1
Total Gross Weight: 5,2 kg
Total Net Weight: 4,6 kg

CARRIER: Bachmann

Full description of goods	Customs Commodity Code	Country of Origin	Qty	Unit Value and Currency	Sub Total Value and Currency
Over speed switch	9029 2039	F. R. of Germany	1		
adapter gear	"	"	1		
pedestal	"	"	1		

TOTAL VALUE AND CURRENCY: 20,-- DM

REASON FOR EXPORT:

I declare that the above information is true and correct to the best of my knowledge.

Signature:

Date: Nürnberg, 21.08.2000

Name:

Figure C.11. Pro Forma Invoice.

THAI LEAKLESS CORPORATION LTD.

Southern Industrial Estate

9/8 Moo. 4 , Chalung . Hadyai , Songkhla . 90110 (S) Thailand

Tel: 66-074-472234-38 Fax: 66-074-472243

PACKING LIST

Date MAY , 8 , 2000

Invoice No. EX. TLKC / 00096

INVOICE Of GASKET

SHIPPED UNIVERSAL BRIGHT V. 0037N From BANGKOK , THAILAND To MOJI JAPAN

For account and risk of Messrs NIPPON LEAKLESS CORPORATION LTD.

MUSHOZU , ONGA-MACHI , ONGA-GUN , FUKUOKA , JAPAN TEL: 093-293-1222

Your Order No ..... Payment Term 90 DAYS AFTER B/L DATE

Delivery Date ETD. 11 / 5 / 2000 ETA. 23 / 5 / 2000 Bank's Certificate No.....

PAL & CAR	Description	Quantity	Net. W.	Gross. W.
	GASKET	PCS	KGS	KGS
	17151-ZV5-0002	100		
	17151-ZV7-0001	100		
	17228-ZG3-8002	50		
	17228-ZM7-0000	50		
	18291-ZV5-0101	50		
	18333-ZV7-0001	100		
	19242-ZV5-0001	100		
	19351-ZV1-8502	50		
	19351-ZV5-0004	50		
	21115-VD6-9003	100		
	21215-VD6-8511	100		
	25312-VD6-9002	100		
	25712-VD6-9022	100		
	41281-ZV0-8502	50		
	50168-ZW1-0001	50		
	16221-883-8001	50		
	21811-P6H-0002	50		
	21812-PCJ-0002	50		
	21811-PFL-0002	50		
	21812-PFL-0002	50		
C 65 - 68	21811-P6H-0002	2,400		
	21812-PCJ-0002	2,400		
TOTAL		278,300.00 PCS	648.23 KGS	755.23 KGS

SHIPPING MARKS & NOS

- NIPPON LEAKLESS CORPORATION LTD.
- PALLETS NO. 1-3
- MADE IN THAILAND

(วิทยา มลิลาทิพย์)
พยานรู้เห็นการลงลายมือชื่อ 5 (104038)

(MR. KIYOYUKI SAITO)
FACTORY MANAGER

Figure C.12. An Example of Packing List.

Customs Brokers
IATA Agents
International & Domestic
Freight Forwarders

NIPPON EXPRESS (U.K.) LTD

PACKING LIST OF PERSONAL EFFECTS

Sheet No. 1 of

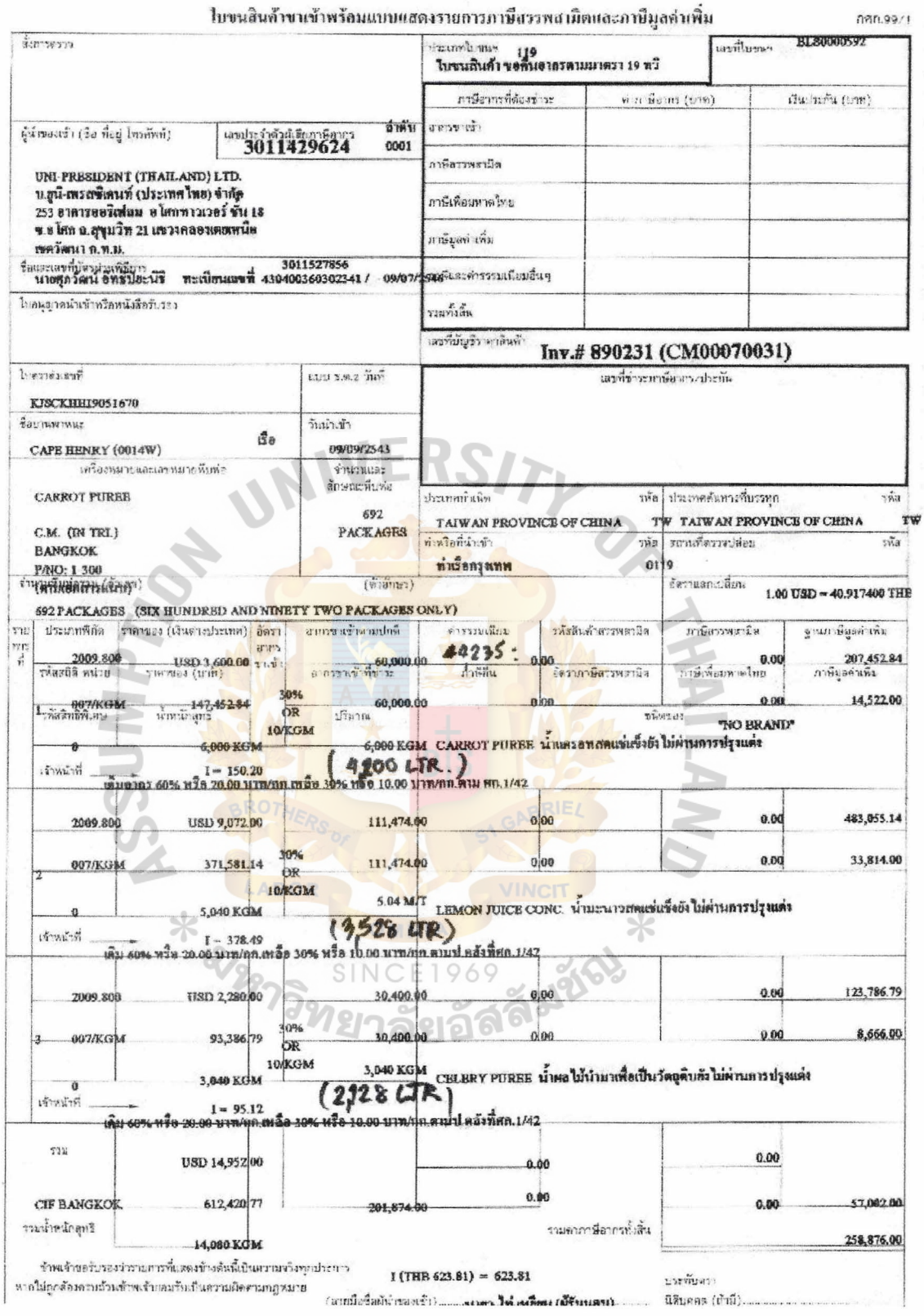
Package No.	Description of Goods	Quantity	Insured Value Y or STG £	Remark
	Post cards		£7	
	Tea boxes	9	£20	
	Biscuit	1	£2	
	Calendars	23	£32	
	coat	1	£25	
	clothes		£40	
	Kitchen tools	2	£10	
	shoes	3	£35	
	Jigsaws	2	£6	
	Books		£35	
	Cosmetics		£95	
	Hand bag	1	£5	
	Torch	1	£3	
	Umbrella	1	£3	
	Battery charger	1	£5	
	Walkman	1	£30	
	Car for kids	1	£5	
	Body lotion	2	£4	
	Sub Total		£345	
	Grand Total		£346	

No Commercial Value
Value for Customs and
Insurance purposes only

I declare that all particulars given above are fully and truly stated according to the best of my knowledge.

Figure C.13. An Example of Packing List of Personal Effects.

Figure C.14. Customs Import Entry with Exercise Tax and VAT.



ใบขนสินค้าขาเข้าพร้อมแบบแสดงรายการภาษีอากรฯ และภาษีมูลค่าเพิ่ม

ประเภทใบขน 119
ใบขนสินค้า ของที่เอาธรตามมาตรา 19 ทวิ

เลขที่ใบขน BL80000592

ภาษีอากรที่ต้องชำระ	ฐานภาษี (บาท)	เงินประกัน (บาท)
อากรขาเข้า		
ภาษีสรรพสามิต		
ภาษีเพื่อมหาดไทย		
ภาษีมูลค่าเพิ่ม		
อื่นๆ และค่าธรรมเนียมอื่นๆ		
รวมทั้งสิ้น		

ผู้นำของเข้า (ชื่อ ที่อยู่ โทรศัพท์) เลขประจำตัวผู้เสียภาษีอากร 3011429624 สาขาที่ 0001

UNI-PRESIDENT (THAILAND) LTD.
บ.ยูนิ-เพรสซิเดนท์ (ประเทศไทย) จำกัด
253 อาคารยูเอฟเอ็ม ชั้น โลทาเวเวอร์ ชั้น 18
ซ.ช โลท ถ.สุขุมวิท 21 แขวงคลองเตยเหนือ
เขตวัฒนา ก.ท.ม.

ชื่อและเลขที่บัตรผู้นำของเข้า นายสุภวัฒน์ อิทธิปัญญานิธิ 3011527856 ทะเบียนเลขที่ 430400360302341 / 09/07/2548

ใบอนุญาตนำเข้าหรือหนังสือรับรอง

เลขที่ใบขนสินค้า Inv.# 890231 (CM00070031)

ใบตราส่งเลขที่ KJSCKHHI9051670

ชื่อยานพาหนะ เรือ CAPE HENRY (0014W)

วันที่ 09/09/2543

เครื่องหมายและเลขหมายหีบห่อ
CARROT PUREE
C.M. (IN TRI.)
BANGKOK
P/NO: 1-300

จำนวนและลักษณะหีบห่อ 692 PACKAGES

ประเทศที่ส่งออก TAIWAN PROVINCE OF CHINA รหัส TW

ประเทศต้นทาง TAIWAN PROVINCE OF CHINA รหัส TW

ท่าเรือที่นำเข้า ท่าเรือกรุงเทพ รหัส 0119

สถานที่ตรวจปล่อย รหัส

จำนวนหีบห่อ (ตัวเลข) 692 PACKAGES (SIX HUNDRED AND NINETY TWO PACKAGES ONLY)

อัตราแลกเปลี่ยน 1.00 USD = 40.917400 THB

รายการที่	ประเภทพิกัด	ราคาของ (เงินตราต่างประเทศ)	อัตราอากร	อากรขาเข้าตามปกติ	ค่าธรรมเนียม	หลักฐานประกอบการพิจารณาอื่นๆ	ภาษีสรรพสามิต	ฐานภาษีมูลค่าเพิ่ม
	2009.800	USD 3,600.00		60,000.00	44235 : 0.00		0.00	207,452.84
	รหัสหน่วยปริมาณ	ราคาของ (บาท)		อากรขาเข้าที่ชำระ	ภาษีอื่นๆ	อัตราภาษีสรรพสามิต	ภาษีเพื่อมหาดไทย	ภาษีมูลค่าเพิ่ม
1	007/KGM	147,452.84	30% OR 10/KGM	60,000.00	0.00		0.00	14,522.00
	รหัสลักษณะพิเศษ	น้ำหนักสุทธิ		ปริมาณ			ชนิดของ	
	0	6,000 KGM		6,000 KGM	CARROT PUREE น้ำแครอทสดแช่แข็งยังไม่ผ่านการปรุงแต่ง		"NO BRAND"	
	เจ้าหน้าที่	I = 150.20		(4300 LTR.)				
	เติม 60% หรือ 20.00 บาท/กก.เหลือ 30% หรือ 10.00 บาท/กก.ตาม พก.1/42							
	2009.800	USD 9,072.00		111,474.00	0.00		0.00	483,055.14
2	007/KGM	371,581.14	30% OR 10/KGM	111,474.00	0.00		0.00	33,814.00
	0	5,040 KGM		5.04 M/T	LEMON JUICE CONC. น้ำมะนาวสดแช่แข็งยังไม่ผ่านการปรุงแต่ง			
	เจ้าหน้าที่	I = 378.49		(9528 LTR)				
	เติม 60% หรือ 20.00 บาท/กก.เหลือ 30% หรือ 10.00 บาท/กก.ตามบ.หลังที่ศก.1/42							
	2009.800	USD 2,280.00		30,400.00	0.00		0.00	123,786.79
3	007/KGM	93,386.79	30% OR 10/KGM	30,400.00	0.00		0.00	8,666.00
	0	3,040 KGM		3,040 KGM	CELERY PUREE น้ำผลไม้นำมาเพื่อเป็นวัตถุดิบยังไม่ผ่านการปรุงแต่ง			
	เจ้าหน้าที่	I = 95.12		(2128 LTR)				
	เติม 60% หรือ 20.00 บาท/กก.เหลือ 30% หรือ 10.00 บาท/กก.ตามบ.หลังที่ศก.1/42							
	รวม	USD 14,952.00			0.00		0.00	
	CIF BANGKOK	612,420.77		201,874.00	0.00		0.00	57,082.00
	รวมน้ำหนักสุทธิ	14,080 KGM					รวมอากรทั้งสิ้น	258,876.00

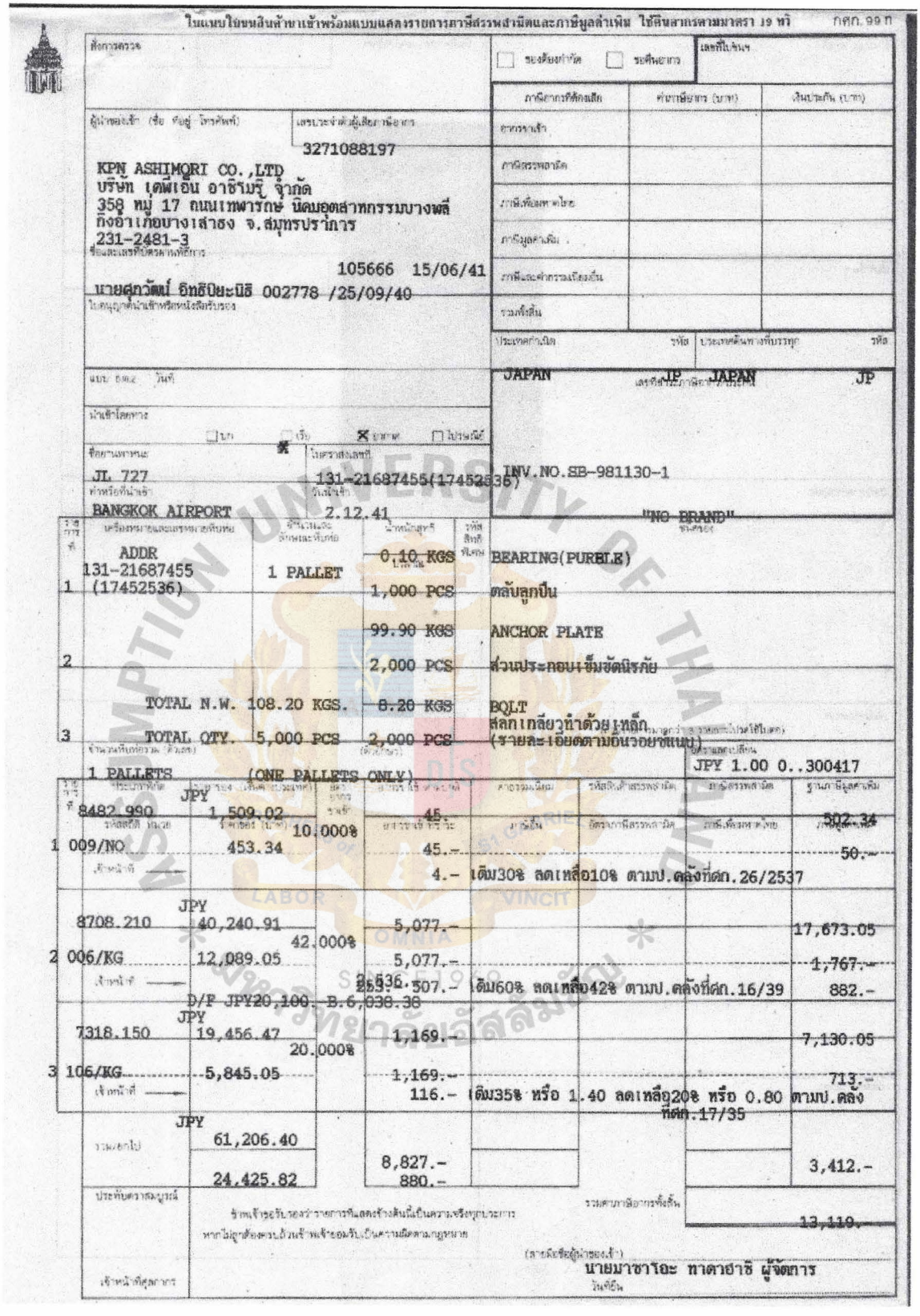
ข้าพเจ้าขอรับรองว่ารายการที่แสดงข้างต้นนี้เป็นความจริงทุกประการ หากไม่ถูกต้องตามนี้ข้าพเจ้ายอมรับเป็นความผิดตามกฎหมาย

I (THB 623.81) = 623.81

(ลายมือชื่อผู้นำของเข้า) ..... ไม่เกี่ยว (ผู้รับมอบ) .....

ประทับตรา นิติบุคคล (ถ้ามี) .....

Figure C.15. Customs Import Entry Form with Details.



ใบแนบใบขนสินค้าเข้าพร้อมแบบแสดงรายการภาษีสรรพสามิตและภาษีมูลค่าเพิ่ม ใช้หีนสากรตามมาตรา 19 ทวิ กศก. 99 ท

KPN ASHIMORI CO.,LTD
บริษัท เคพีเอ็น อาชิมอริ จำกัด
358 หมู่ 17 ถนนเทพารักษ์ นิคมอุตสาหกรรมบางพลี
กิ่งอำเภอบางเสาธง จ.สมุทรปราการ
231-2481-3
3271088197
105666 15/06/41
นายศุภวัฒน์ อิทธิปิยะนิธิ 002778 /25/09/40
JAPAN JP JAPAN
JL 727
131-21687455(17452536)
INV.NO.SB-981130-1
BANGKOK AIRPORT
2.12.41
"NO BRAND"
ADDR
131-21687455
(17452536)
1 PALLET
0.10 KGS
BEARING(PURBLE)
1,000 PCS
ตลับลูกปืน
99.90 KGS
ANCHOR PLATE
2,000 PCS
ส่วนประกอบเข็มขัดนิรภัย
TOTAL N.W. 108.20 KGS.
8.20 KGS
BOLT
TOTAL QTY. 5,000 PCS
2,000 PCS
สลักเกลียวทำด้วยเหล็ก
(รายละเอียดตามอินวอยซ์แนบ)
1 PALLETS (ONE PALLETS ONLY)
JPY 1.00 0..300417
8482.990
JPY 1,509.02
10.000%
45.-
502.34
1 009/NO
453.34
45.-
50.-
4.- เดิม30% ลดเหลือ10% ตามป.คลังที่ศก.26/2537
8708.210
JPY 40,240.91
42.000%
5,077.-
17,673.05
2 006/KG
12,089.05
5,077.-
1,767.-
2,536.507.- เดิม60% ลดเหลือ42% ตามป.คลังที่ศก.16/39
882.-
D/P JPY20,100. B.6,038.38
7318.150
JPY 19,456.47
20.000%
1,169.-
7,130.05
3 106/KG
5,845.05
1,169.-
713.-
116.- เดิม35% หรือ 1.40 ลดเหลือ20% หรือ 0.80 ตามป.คลังที่ศก.17/35
JPY 61,206.40
24,425.82
8,827.-
880.-
3,412.-
13,119.-
นายมาซาโอะ ทาตายาชิ ผู้จัดการ

Figure C.16. Enclosed Customs Import Entry Form Used for Drawback under Section 19 Bis.

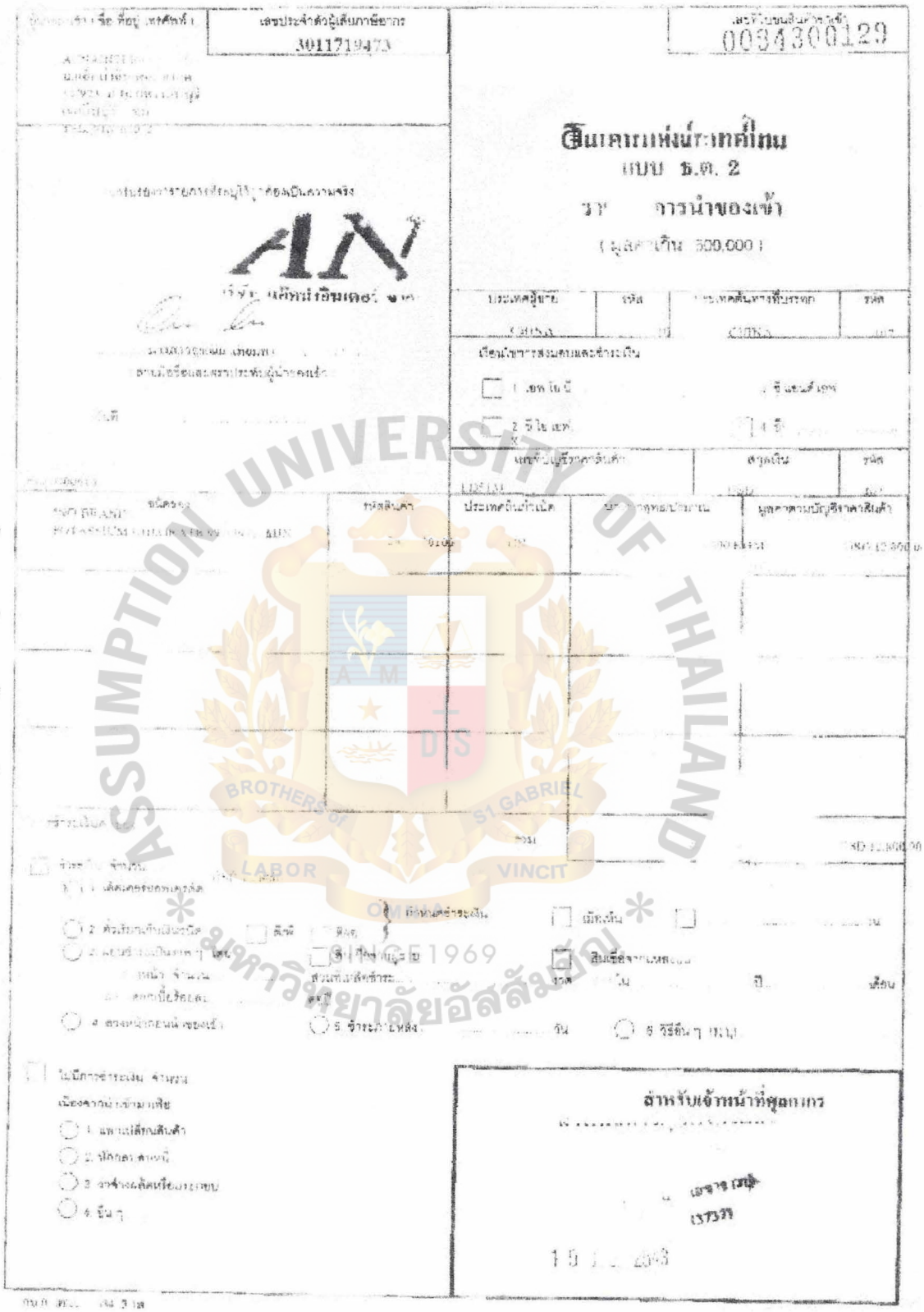


Figure C.17. Oversea Business Form (Thor Tor 2) for the Value of Goods in Excess of 500,000 Bahts.

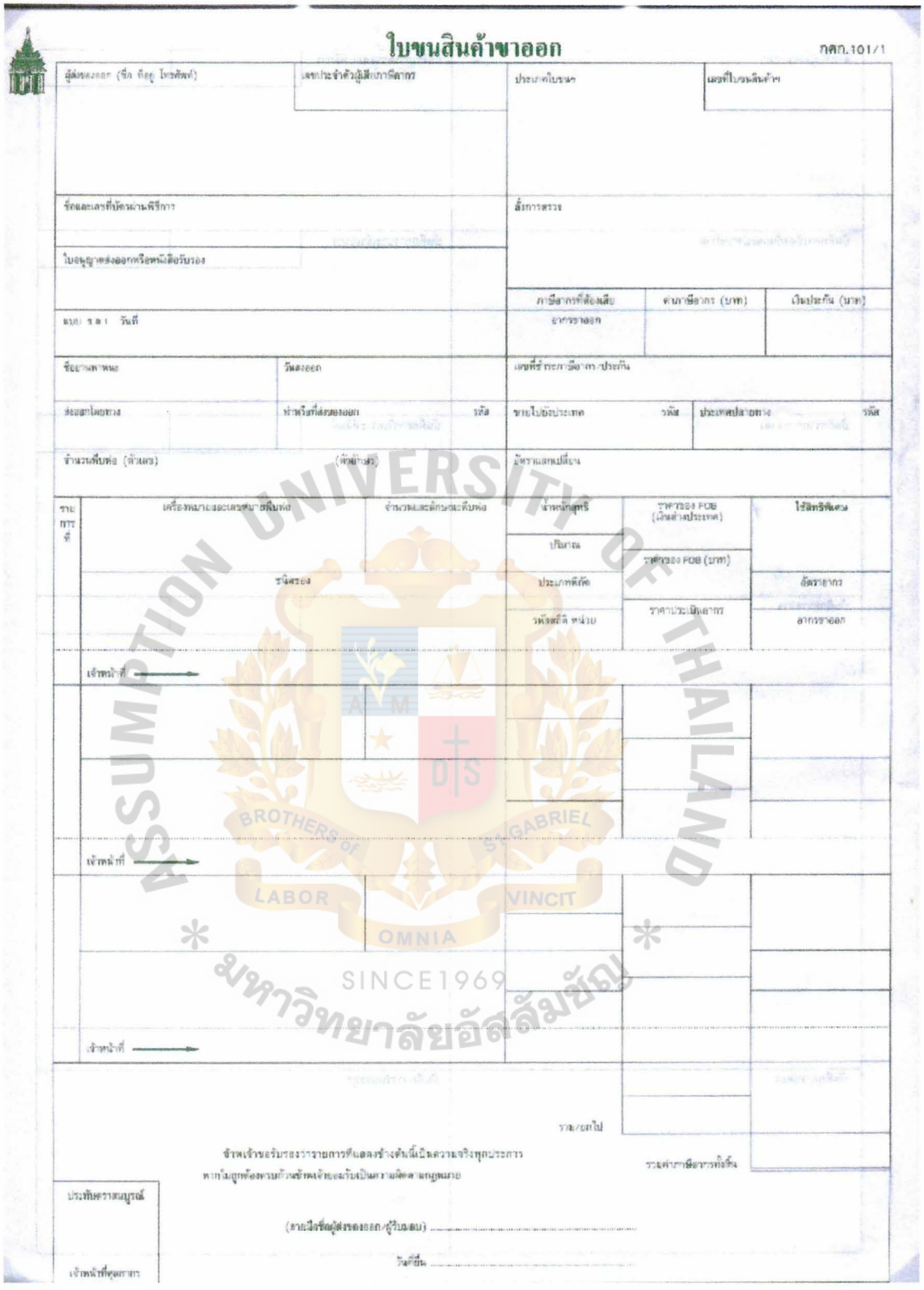
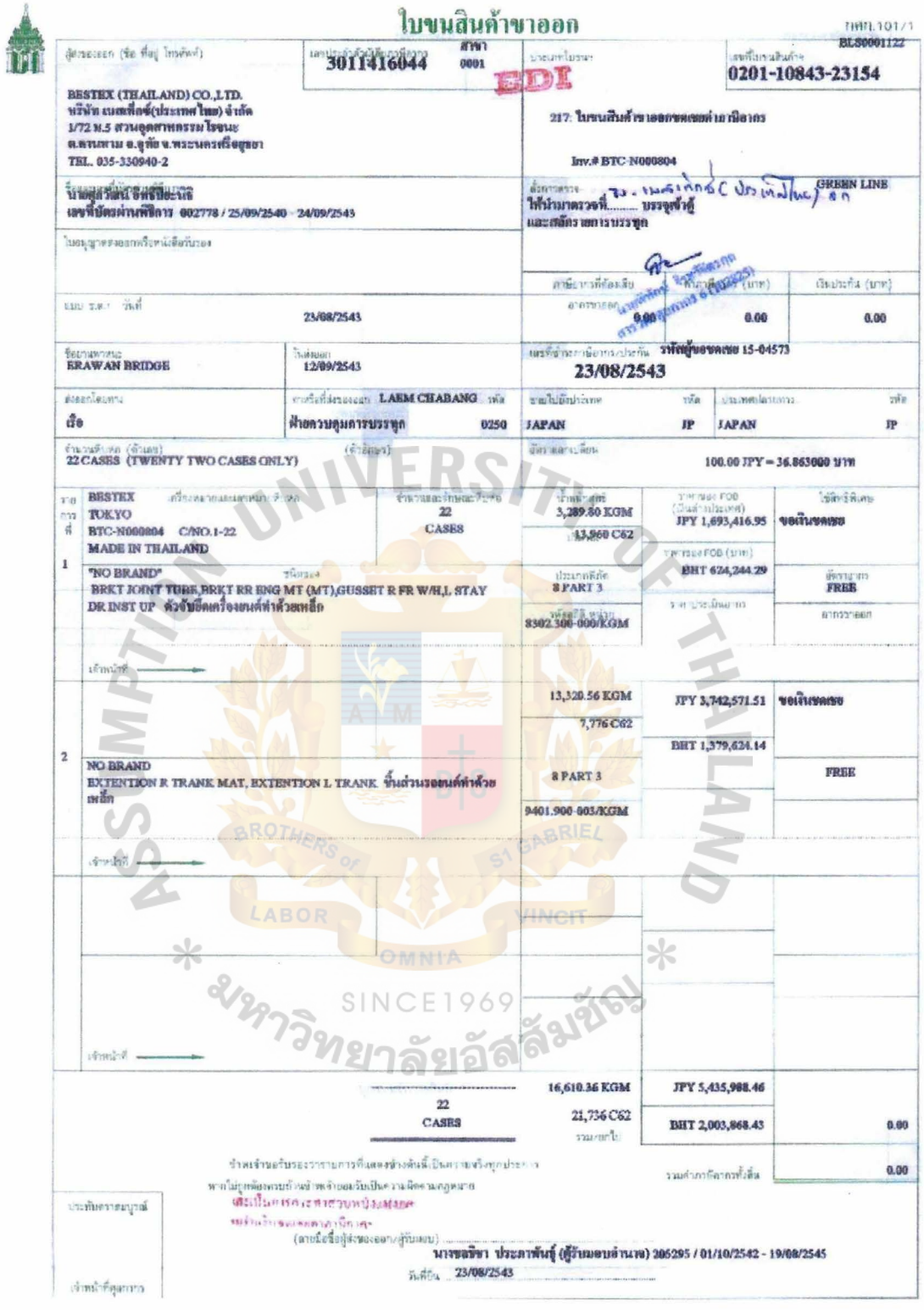


Figure C.18. Customs Export Entry Form with Exercise Tax and VAT.



ใบขนสินค้าขาออก

BESTEX (THAILAND) CO.,LTD.
บริษัท เบสเท็กซ์(ประเทศไทย) จำกัด
1/72 ม.5 สวนอุตสาหกรรมโรจนะ
อ.ผักไห่ จ.พระนครศรีอยุธยา
TEL. 035-330940-2

3011416044 สาขา 0001

EDI

BLS0001122

0201-10843-23154

217: ใบขนสินค้าขาออกของเขตปลอดอากร

Inv.# BTC-N000804

GREEN LINE

นายสุสวัสดิ์ อิศรีประดิษ
เลขที่บัตรผ่านพิธีการ 002778 / 25/09/2540 - 24/09/2543

23/08/2543

0.00 | 0.00 | 0.00

ERAWAN BRIDGE | 12/09/2543 | 23/08/2543

เรือ | ฝ่ายควบคุมการบรรทุก 0250 | JAPAN JP | JAPAN JP

22 CASES (TWENTY TWO CASES ONLY)

100.00 JPY = 36.863000 บาท

1	BESTEX TOKYO BTC-N000804 C/NO.1-22 MADE IN THAILAND	22 CASES	3,289.80 KGM	JPY 1,693,416.95	ขอเงินคืนเซส
			13,960 C62		
				BHT 624,244.29	
	"NO BRAND" BRKT JOINT TUBE,BRKT RR ENG MT (MT),GUSSET R FR W/H,L STAY DR INST UP ตัวยึดเครื่องยนต์ทำด้วยเหล็ก		8 PART 3		FREE
			8302.300-000/KGM		
2	NO BRAND EXTENTION R TRANK MAT, EXTENTION L TRANK ชิ้นส่วนรองยนต์ทำด้วยเหล็ก		13,320.56 KGM	JPY 3,742,571.51	ขอเงินคืนเซส
			7,776 C62		
				BHT 1,379,624.14	
			8 PART 3		FREE
			9401.900-003/KGM		
		22 CASES	16,610.36 KGM	JPY 5,435,988.46	
			21,736 C62	BHT 2,003,868.43	0.00
					0.00

ข้าพเจ้าขอรับรองว่ารายการที่แสดงข้างต้นนี้เป็นความจริงทุกประการ
หากไม่ถูกต้องครบถ้วนข้าพเจ้ายอมรับเป็นความผิดตามกฎหมาย

(ลายมือชื่อผู้ส่งของออก/ผู้รับมอบ) .....
นางชลธิชา ประภาพันธุ์ (ผู้รับมอบอำนาจ) 205295 / 01/10/2542 - 19/08/2545
วันที่ 23/08/2543

ประทับตราสมบูรณ์

เจ้าหน้าที่ศุลกากร

Figure C.19. Customs Export Entry Form with Details.

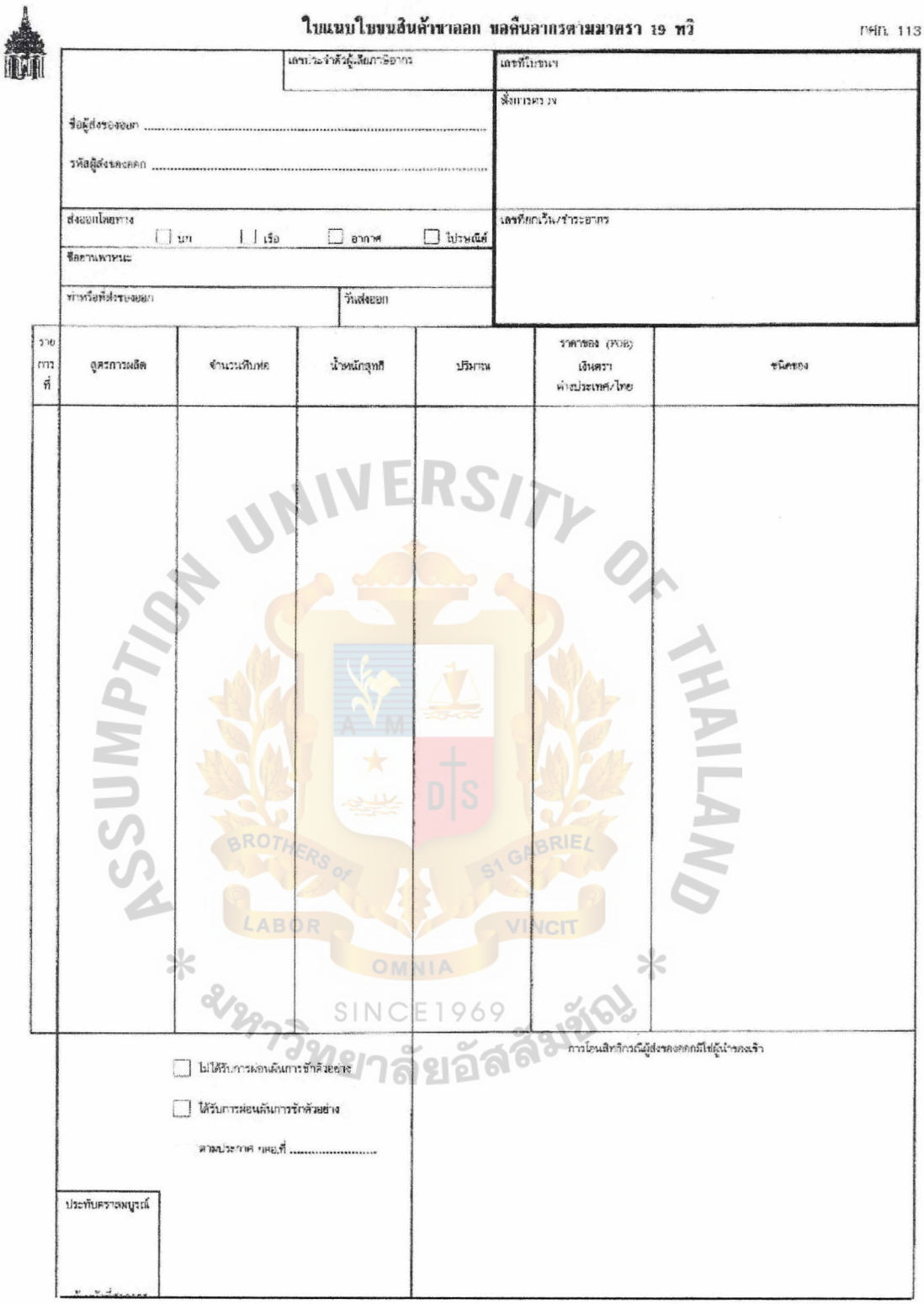
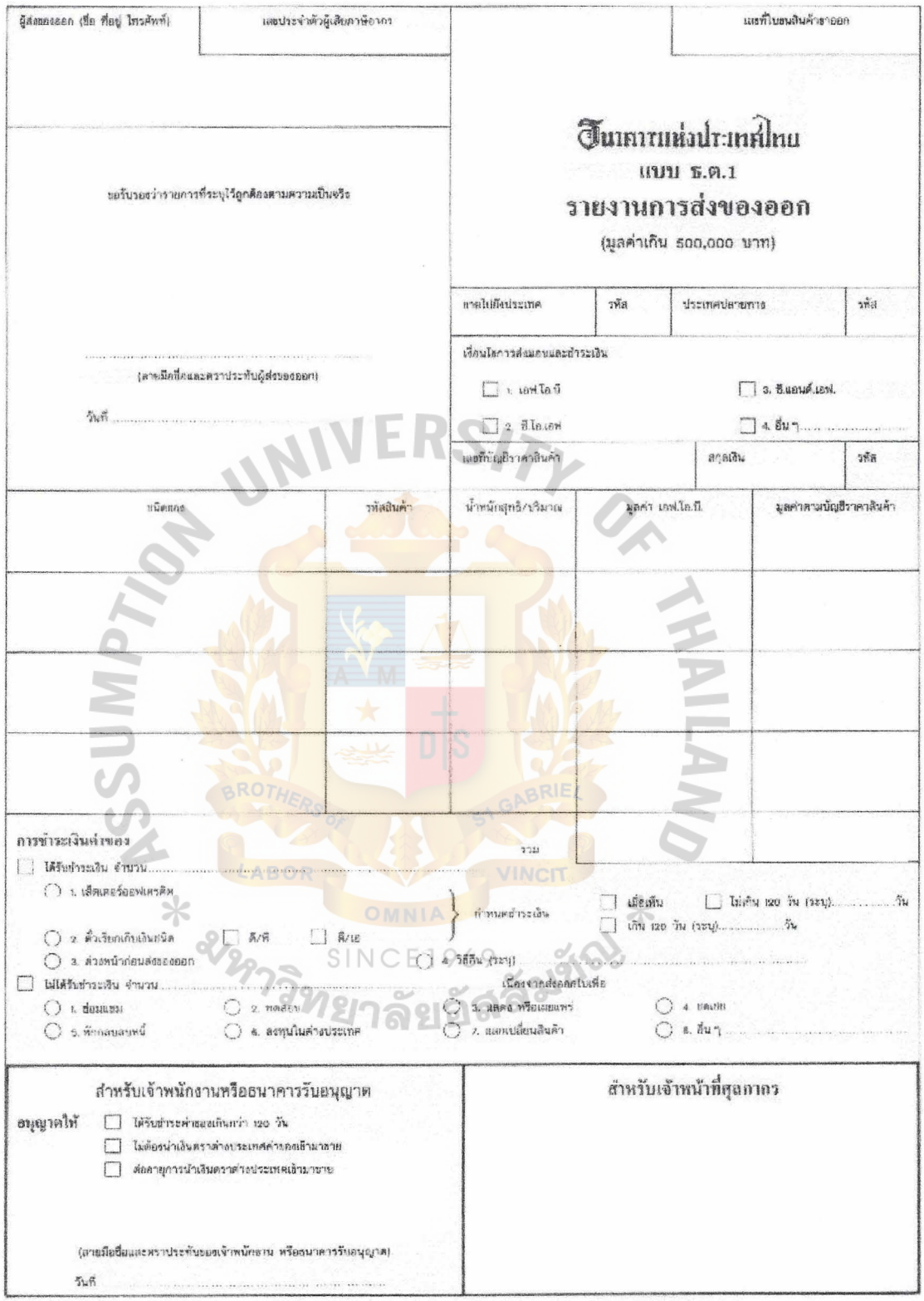


Figure C.20. Enclosed Customs Export Entry Form Used for Drawback under Section 19 Bis.



ผู้ส่งของออก (ชื่อ ที่อยู่ โทรศัพท์) | เลขประจำตัวผู้เสียภาษีอากร | แรกที่ใบขนสินค้าขาออก

ยอรับรองว่ารายการที่ระบุไว้ถูกต้องตามความเป็นจริง

(ลายมือชื่อและตราประทับผู้ส่งของออก)

วันที่

อินาคารแห่งประเทศไทย
แบบ ธ.ต.1
รายงานการส่งของออก
(มูลค่าเกิน 500,000 บาท)

ท่าปลายทางในต่างประเทศ | รหัส | ประเทศปลายทาง | รหัส

เงื่อนไขการส่งมอบและชำระเงิน
☐ 1. เอฟ.โอ.บี ☐ 3. ซี.แอนด์.เอฟ.
☐ 2. ซี.โอ.เอฟ ☐ 4. อื่น ๆ .....

แรกที่มูลค่าสินค้า | สกุลเงิน | รหัส

	ชนิดสินค้า	รหัสสินค้า	น้ำหนักสุทธิ/ปริมาณ	มูลค่า เอฟ.โอ.บี.	มูลค่าตามบัญชีราคาสินค้า
1					
2					
3					
4					
				รวม	

การชำระเงินค่าของ
☐ ได้รับชำระเงิน จำนวน ..... สกุล .....
○ 1. เสิดเตอร์ออฟเครดิต
○ 2. ตั๋วเรียกเก็บเงินสด ☐ ดี/พี ☐ ดี/เอ
○ 3. ล่วงหน้าก่อนส่งของออก
○ 4. วิธีอื่น (ระบุ) .....
กำหนดชำระเงิน: ☐ เมื่อเห็น ☐ ไม่เกิน 120 วัน (ระบุ)..... วัน ☐ เกิน 120 วัน (ระบุ)..... วัน
☐ ไม่ได้รับชำระเงิน จำนวน .....
เนื่องจากส่งออกโปรดเพื่อ
○ 1. ซ่อมแซม ○ 2. ทดสอบ ○ 3. สัตว์ หรือเมล็ดพืช ○ 4. ตัวอย่าง
○ 5. ทิ้งกลบลงหนี้ ○ 6. ลงทุนในต่างประเทศ ○ 7. แลกเปลี่ยนสินค้า ○ 8. อื่น ๆ .....

สำหรับเจ้าพนักงานหรือธนาคารรับอนุญาต

อนุญาตให้ ☐ ได้รับชำระค่าของเกินกว่า 120 วัน
☐ ไม่ต้องนำเงินตราต่างประเทศค่าของเข้ามาขาย
☐ ต่อลายการนำเงินตราต่างประเทศเข้ามาขาย

(ลายมือชื่อและตราประทับของเจ้าพนักงาน หรือธนาคารรับอนุญาต)

วันที่

สำหรับเจ้าหน้าที่ศุลกากร

กพ.ก. (ต) 301/2541.4.1.200 ล. กรณีที่ส่งออกได้รับชำระเงิน จะต้องนำเงินตราต่างประเทศค่าของที่ส่งออกเข้ามาขายใน 120 วัน นับแต่วันที่ส่งของออก

Figure C.21. Oversea Business Form (Thor Tor 1) for the Value of Goods in Excess of 500,000 Bahts.

BLS0001122

ผู้ส่งของออก (ชื่อ ที่อยู่ โทรศัพท์)

BESTEX (THAILAND) CO.,LTD
บริษัท เบสเท็กซ์(ประเทศไทย) จำกัด
1/72 ม.5 สวนอุตสาหกรรม โรจนะ
ต.คานหาม อ.อุทัย จ.พระนครศรีอยุธยา
TEL. 035-330940-2

เลขประจำตัวผู้เสียภาษีอากร 3011416044 สาขา 0001

EDI

เลขที่ใบขนสินค้าขาออก 0201-10843-23154

ธนาคารแห่งประเทศไทย

แบบ ธ.ต. 1

รายงานการส่งของออก

(มูลค่าเกิน 500,000)

ขอรับรองว่ารายการที่ระบุไว้ถูกต้องตามความเป็นจริง

.........นางพณิชา ประดาพันธุ์ (ผู้รับมอบอำนาจ)
(ลายมือชื่อและตราประทับผู้ส่งของออก)

วันที่ ....
23/08/2543

ขายไปยังประเทศ	รหัส	ประเทศปลายทาง	รหัส
JAPAN	115	JAPAN	115

เงื่อนไขการส่งมอบและชำระเงิน

- [ ] 1. เอฟ.โอ.บี
- [x] 2. ซี.ไอ.เอฟ
- [ ] 3. ซี แอนด์ เอฟ
- [ ] 4. อื่น ๆ ....

เลขที่บัญชีราคาสินค้า	สกุลเงิน	รหัส
BTC-N00884	JPY	

ชนิดของ	รหัสสินค้า	น้ำหนักสุทธิ/ปริมาณ	มูลค่า เอฟ.โอ.บี.	มูลค่าตามบัญชีราคาสินค้า
"NO BRAND" BRKT JOINT TUBE,BRKT RR BNG MT (MT),GUSSET R FR W/H,L STAY DR INST UP	8 PART 3 8302300-000/KGM	3,289.80 KGM 13,960 C62	JPY 1,693,416.95	JPY 1,780,000.00
NO BRAND		13,320.56 KGM	JPY 3,742,571.51	JPY 3,790,800.00
EXTENTION R TRANK MAT, EXTENTION L TRANK	8 PART 3 9401900-003/KGM	7,776 C62		
		รวม	JPY 5,435,988.46	JPY 5,570,800.00

การชำระเงินค่าของ

- [x] ได้รับชำระเงิน จำนวน JPY 5,570,800.00
  - ( ) 1. เล็ตเตอร์ออฟเครดิต
  - ( ) 2. ตั๋วเรียกเก็บเงินชนิด [ ] ดีพี [ ] ดีเอ } กำหนดชำระเงิน [ ] เมื่อเห็น [ ] ไม่เกิน 180 วัน (ระบุ) .... วัน [ ] เกิน 180 วัน (ระบุ) .... วัน
  - ( ) 3. ล่วงหน้าก่อนส่งของออก
  - ( ) 4. วิธีอื่น ๆ (ระบุ) ....
- [ ] ไม่ได้รับชำระเงิน จำนวน .... เนื่องจากส่งออกไปเพื่อ
  - ( ) 1. ซ่อมแซม ( ) 2. ทดลอง ( ) 3. แสดง หรือเผยแพร่ ( ) 4. ชดเชย
  - ( ) 5. หักกลบลบหนี้ ( ) 6. ลงทุนในต่างประเทศ ( ) 7. แลกเปลี่ยนสินค้า ( ) 8. อื่น ๆ ....

สำหรับเจ้าพนักงานหรือธนาคารรับอนุญาต

อนุญาตให้ [ ] ได้รับชำระค่าของเกินกว่า 180 วัน
[ ] ไม่ต้องนำเงินตราต่างประเทศค่าของเข้ามาขาย
[ ] ต่ออายุการนำเงินตราต่างประเทศเข้ามาขาย

....
(ลายมือชื่อและตราประทับของเจ้าพนักงาน หรือธนาคารรับอนุญาต)

วันที่ ....

สำหรับเจ้าหน้าที่ศุลกากร

ผ่านพิธีการศุลกากรแล้ว

กง.ต. (ต) 301/2534.1.1 ส. กรณีที่ส่งออกได้รับชำระเงิน จะต้องนำเงินตราต่างประเทศค่าของที่ส่งออกเข้ามาภายใน 180 วัน นับแต่วันที่ส่งของออก

Figure C.22. An Example of Thor Tor 1 with Export Details.

CERTIFICATE OF ORIGIN
****

This is to certify that the undermentioned commodity is pure product of Taiwan,R.O.C.

Commodity : (AS FOLLOW)

Quantity : 6922P'KGS

Name & Address of Shipper : CHIA MEEI FOOD INDUSTRIAL CORP.
58, TA-WEI ROAD TA-LI CITY TAICHUNG HSIEN,
412 TAIWAN R.O.C.

Name & Address of Manufacturer : CHIA MEEI FOOD INDUSTRIAL CORP.
58, TA-WEI ROAD TA-LI CITY TAICHUNG
HSIEN, 412 TAIWAN R.O.C.

Name & Address of Consignee (Importer) : UNI-PRESIDENT (THAILAND) LTD.
253 ORIFLAME ASOKE TOWER 18 TH
FLOOR SOI ASOKE SUKHUMVIT 21 RD.,
NORTH KLONGTOEY KHET WATTANA

Shipment by : FROM TAICHUNG TAIWAN TO BANGKOK, THAILAND BANGKOK 10110 THAILAND
SHIPPED PER S.S. CAPE HENRY V.0014V
SAILING ON OR ABOUT SEP 0 2 2000

MARKS AND NOS. CARROT PUREE
C.M. (IN TRI.)
BANGKOK -
P/NO: 1-300
NET WT.: 20KGS
PRODUCT OF CHIA MEEI FOOD
INDUSTRIAL CORP
MADE IN TAIWAN R.O.C.
PRODUCTION DATE: 000806
- DO -
LEMON JUICE CONC.
T/NO.1-240
NET WT.:21KGS
PRODUCTION DATE:000828

- DO -
CELERY PUREE
T/NO.:1-152
NET WT.:20KGS
PRODUCTION DATE: 000120

CHIA MEEI FOOD INDUSTRIAL CORP.

Figure C.23. An Example of License or Certificate.

CHIA MEEI FOOD INDUSTRIAL CORP

#56,Ta Wei Road, Ta-Li City Taichung Haien, Taiwan R.O.C.

PRODUCT ANALYSIS CERTIFICATE

Product :LEMON JUICE CONC. Batch No: 000828

Description: Production date: 00828

Country of origin:TAIWAN Buyer Order Number: 2000RM108

• Quality specification analysis:

Parameter	Unit	Specification	Analysis data
Brix	DEGREE	60↑	61.00
Acidity	w/w %	30-35	35.17
PH			2.44
Sensory comparison Again standard		Typical lemon Flavor	Normal
Color control against standard		Dark Yellow	Normal

•Biological hazard analysis

Parameter	Unit	Specification	Analysis data
Total Plate count	cfu/ml	1000↓	10↓
Coliform	cfu/ml	Negative	ND
E.Coli	cfu/ml	Negative	ND
Yeast & Mold	cfu/ml	500↓	10↓

•Chemical hazard analysis:

Parameter	Unit	Specification	Analysis data
Pesticides	ppm	Not specified	ND
Preservative	ppm	Negative	ND
Heavy metal	ppm	Not specified	ND
Cleaning chemical residue	ppm	Not specified	ND

•Physical hazard analysis:

We hereby certifies that the product supplied against this certificate has been examined and subjected to laboratory analysis. Also, we enclosed the specification for your reference. Rest assure that all materials used our process are strictly controlled for quality and health.

Prepared By : Chan,Hsiu –Hui Released By :Lin ,Ching-Hsiu

Title: Senior staff of Q.C., Dept. Title:Manager of Q.C.Dept.

Date: 2000.08.28 Date: 2000.08.28

Figure C.24. An Example of Product Analysis Certificate.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper
LEHMANN & VOSS & CO.
ALSTERUFER 19
20354 HAMBURG
GERMANY

Air Waybill No. 020-7833 2752
Page 2 of 2 Pages
Shipper's Reference Number 063949 (optional)

Consignee
HEINRICH SCHMID ASIA CO LTD.
25/61VIPAVILLE MANSION
SUKHUMVIT RD., T. PHAKNAM
A.MUANG SAMUTPRAKARN
10270 BANGKOK THAILAND

IATA

Two completed and signed copies of this Declaration must be handed to the operator.

WARNING

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for: *(delete non-applicable)*
XXXXXXXXXXX CARGO AIRCRAFT ONLY XXXXXXXXXXX

Airport of Departure: HAMBURG

Airport of Destination: BANGKOK

Shipment type: *(delete non-applicable)*
NON-RADIOACTIVE ~~RADIOACTIVE~~

NATURE AND QUANTITY OF DANGEROUS GOODS

Dangerous Goods Identification					Quantity and type of packing	Packing Inst.	Authorization
Proper Shipping Name	Class or Division	UN or ID No.	Packing Group	Subsidiary Risk			
TOXIC LIQUID, ORGANIC, N.O.S. (CONTAINS TRICHLOROETHYLENE AND DICHLOROMETHANE)	6.1.	UN 2810	III		TWELVE STEEL DRUMS X 25.85 L	618	

Additional Handling Information

EMERGENCY CONTACT: 011/49/40/44197-450
PREPARED IN ACCORDANCE WITH ICAO/IATA

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Name/Title of Signatory
MRS.M.WREDE, EXPORT CLERK

Place and Date
HAMBURG, 25.11.1998

Signature (see warning above) Lehmann & Voss & Co. i.A.

Druck und Vertrieb:
Dössel & Rademacher, Formularverlag, Brandenwiete 42, 20457 Hamburg, Telefon 329230-0, Telefax 329230-30 11.97 Bestell-Nr. 845

Figure C.25. The Form of Shipper's Declaration for Dangerous Goods.

APPENDIX D

CUSTOMS CARD, INPUT AND OUTPUT SCREEN REPORT
OF THE PROPOSED SYSTEM

Figure D.1. Types of the Customs Smart Card.

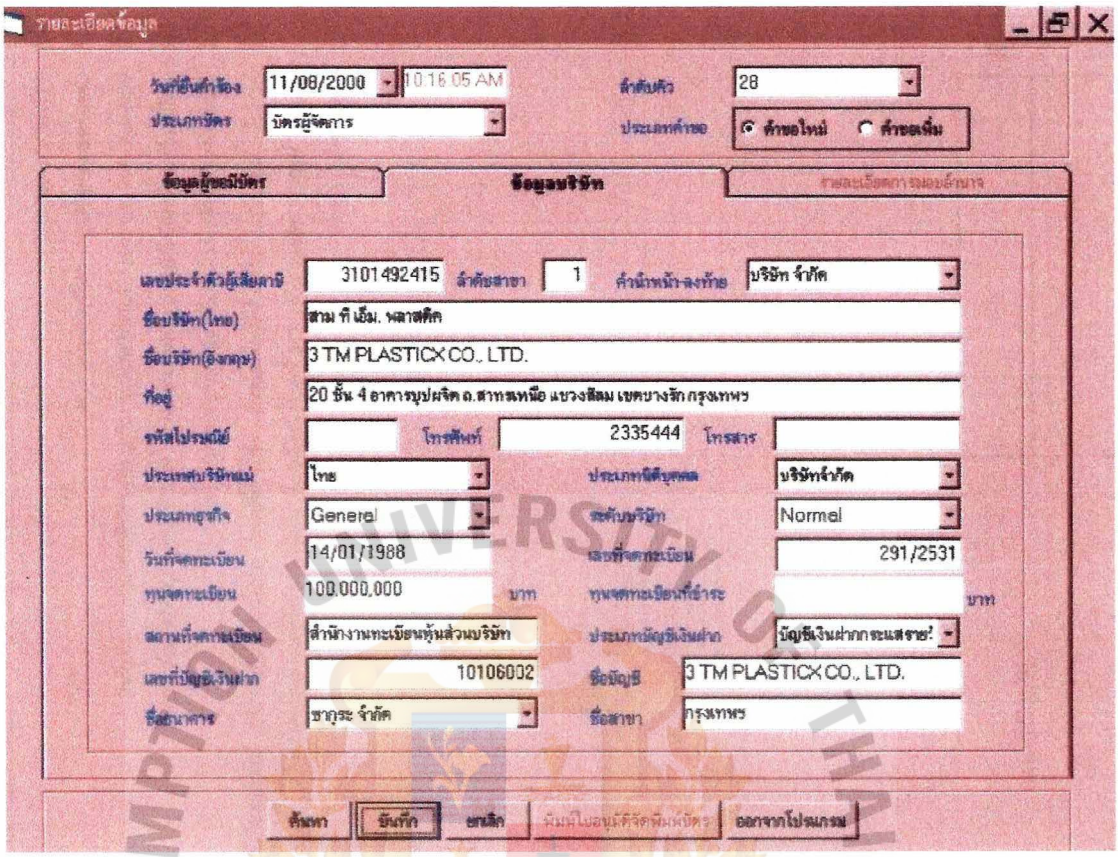


Figure D.2. Input Screen of the Clients' Description.

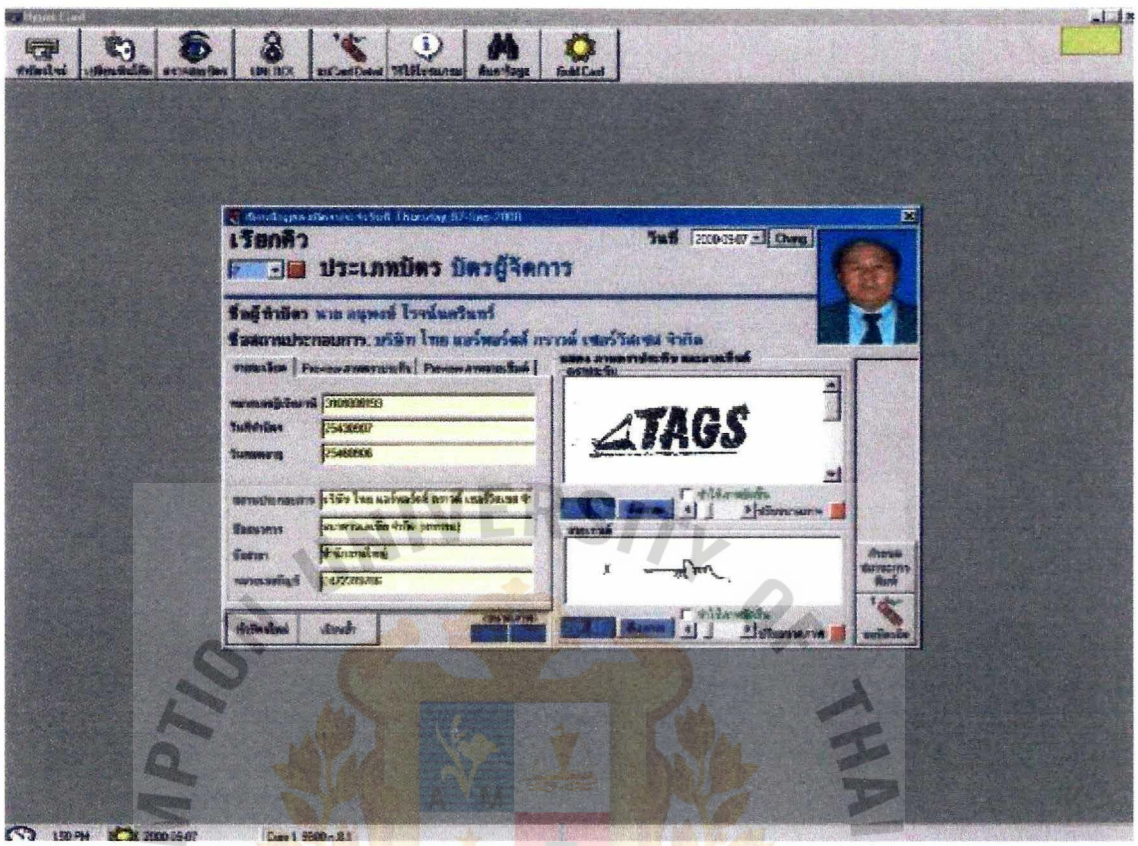


Figure D.3. Input Screen of the Customs Card Request.

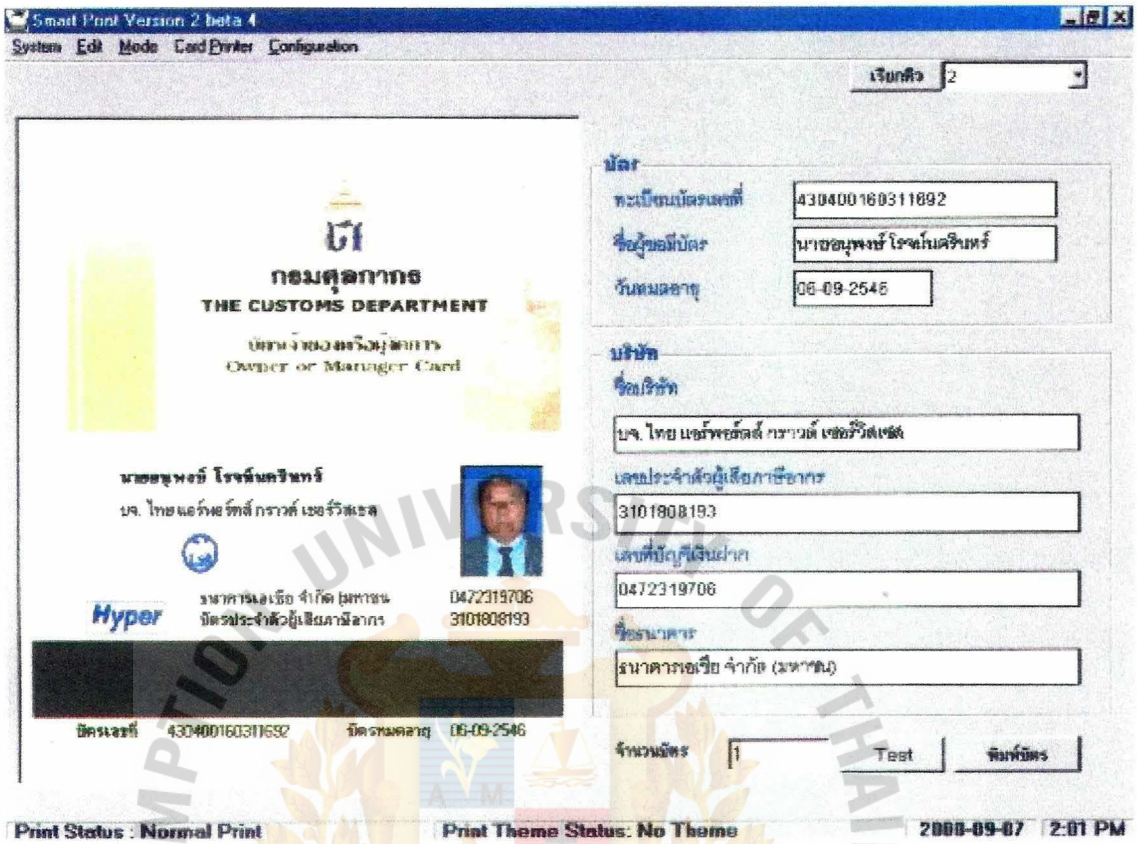


Figure D.4. Input Screen of the Customs Smart Card Information.

ประเภทบัตร	บัตรผู้รับมอบอำนาจ
รหัสประจำตัวผู้ขอมีบัตร	4316018907
ชื่อสถานประกอบการ	บริษัท เชฟโรเลต เซลส์ (ประเทศไทย) จำกัด
เลขประจำตัวผู้เสียภาษี	3021036799
สำดับสาขา	สำนักงานใหญ่
ที่ตั้งสถานประกอบการ	555 อาคารรสา ชั้น 23 ห้อง 2304 ถนนพหลโยธิน แขวงลาดยาว เขตจตุจักร กทม.
วันออกบัตร	25430908
วันหมดอายุ	25460907
ชื่อผู้รับมอบอำนาจ	นางสาว กมลรัตน์ สฤษฏ์มุทากุล
เลขภาษีผู้รับมอบ	1049408260
เลขที่บัตรประชาชน	3179900128447
ที่อยู่ผู้ถือบัตร	53/25 ซ.ประดิพัทธ์ 15 ถ.ประดิพัทธ์ แขวงสามเสนใน เขตพญาไท กรุงเทพฯ
หมายเลขโทรศัพท์	9370180
หมายเลขโทรสาร	
รหัสประจำตัวผู้มอบอำนาจ	4316018906
อำนาจที่ได้รับมอบ	11011111
ชื่อธนาคาร	ธนาคารซิตี้แบงค์
ชื่อสาขาธนาคาร	กรุงเทพฯ
หมายเลขบัญชี	5124588016
รหัสบัตร	430400260305779

ภาพตราประทับ

ภาพลายเซ็นต์

รายละเอียดอำนาจที่ได้รับมอบ

- ใบขนสินค้าขาเข้าและใบขนสินค้าขาออกสำหรับสินค้าทุกประเภท
- ใบขนสินค้าขาเข้าและใบขนสินค้าขาออก สำหรับของเข้าคลังสินค้าทัณฑ์บน
- หนังสืออนุญาตเอาตัวอย่างของออกจากคลังสินค้าทัณฑ์บน
- ใบขอคืนเงินและใบเสร็จรับเงินทุกประเภท
- ใบขนสุราต่างประเทศ
- เอกสารหรือบัตรรับรองเอกสารที่เกี่ยวกับพิธีการศุลกากร
- รับเช็คคืนเงินประกัน เงินภาษีอากร หรือเงินรายได้อย่างอื่น บัญชีเงินฝากกระแสรายวัน

Figure D.5. Report of Client's Information Card.

APPENDIX E

THE CUSTOMS DEPARTMENT PROCESSES

การใช้งานเครื่องอ่านบัตร Smart Card

รหัสบัตร: 1234

การตรวจสอบบัตร

1. สอดบัตรเข้าที่เครื่องอ่านบัตร โดยหันด้านที่มี Chip ขึ้นด้านบน
2. ที่หน้าจอ คลิกปุ่ม "ตรวจสอบบัตร"
3. เมื่อหน้าจอแสดงช่องให้ใส่ป้อนรหัสผ่าน ให้เจ้าของบัตรกดรหัสผ่าน
4. เมื่อรหัสถูกต้อง หน้าจอจะแสดงข้อมูลในบัตร
5. เมื่อต้องการพิมพ์ข้อมูลที่แสดงบนหน้าจอ ให้คลิกปุ่ม "พิมพ์ข้อมูล"
6. เมื่อต้องการกลับสู่การเริ่มต้น ให้คลิกปุ่ม "กลับสู่เมนูหลัก"

ในกรณีที่ป้อนรหัสไม่ถูกต้อง เครื่องจะให้ป้อนรหัสผ่านใหม่ และการป้อนรหัสผิดจะทำได้ไม่เกิน 6 ครั้ง หากป้อนรหัสผิดมากกว่า 6 ครั้ง บัตรจะไม่สามารถอ่านข้อมูลได้อีก

การเปลี่ยนรหัสผ่าน

1. สอดบัตรเข้าที่เครื่องอ่านบัตร โดยหันด้านที่มี Chip ขึ้นด้านบน
2. ที่หน้าจอ คลิกปุ่ม "เปลี่ยนรหัสผ่าน"
3. ป้อนรหัสผ่านเดิม
4. ป้อนรหัสผ่านใหม่
5. ยืนยันรหัสใหม่ อีกครั้ง

ในกรณีที่ป้อนรหัสไม่ถูกต้อง เครื่องจะให้ป้อนรหัสผ่านใหม่ และการป้อนรหัสผิดจะทำได้ไม่เกิน 6 ครั้ง หากป้อนรหัสผิดมากกว่า 6 ครั้ง บัตรจะไม่สามารถอ่านข้อมูลได้อีก

Figure E.1. Smart Card Instruction.

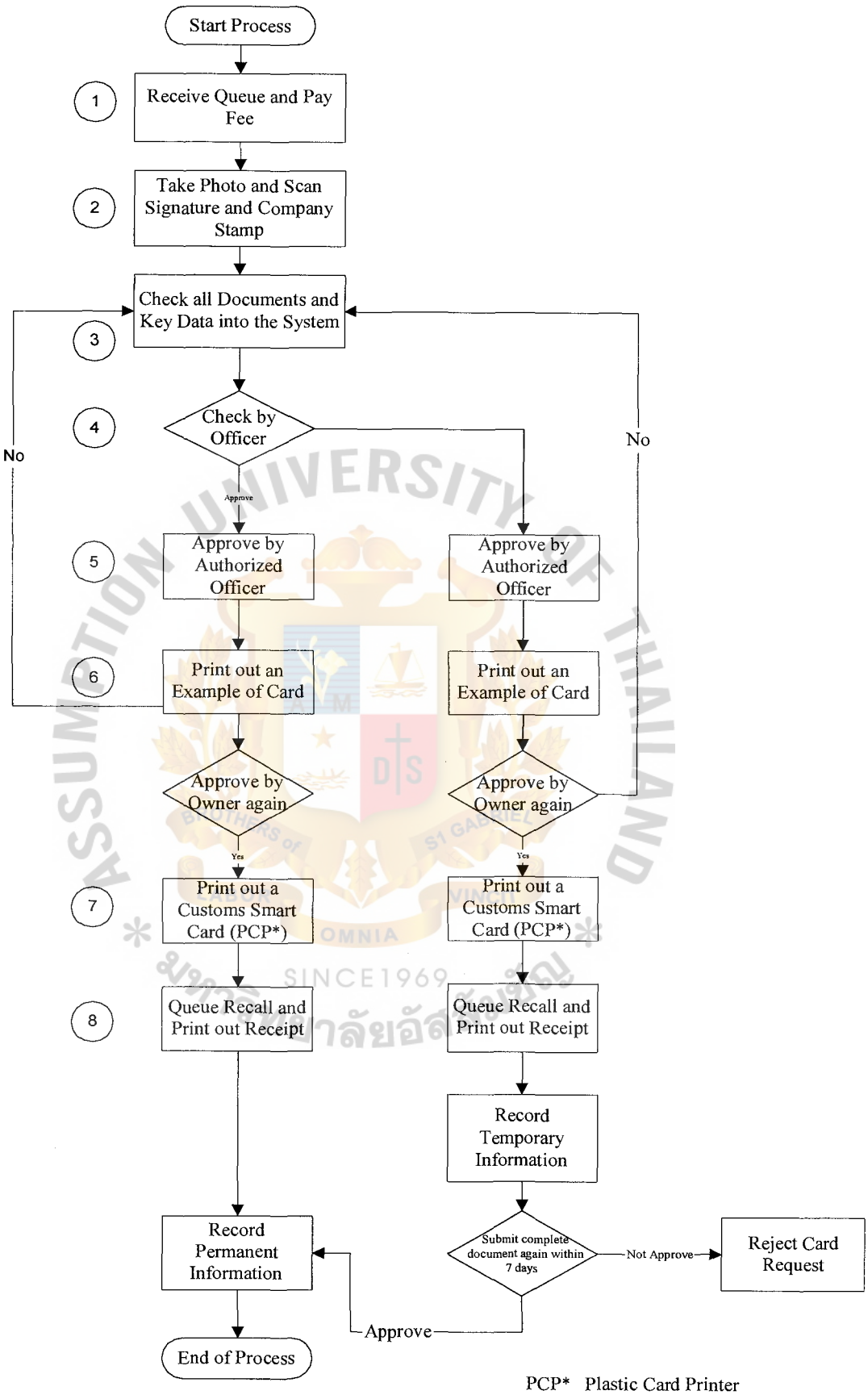


Figure E.2. Customs Card Request Procedure Flow Chart.

The Formality Execution Of Export Procedure

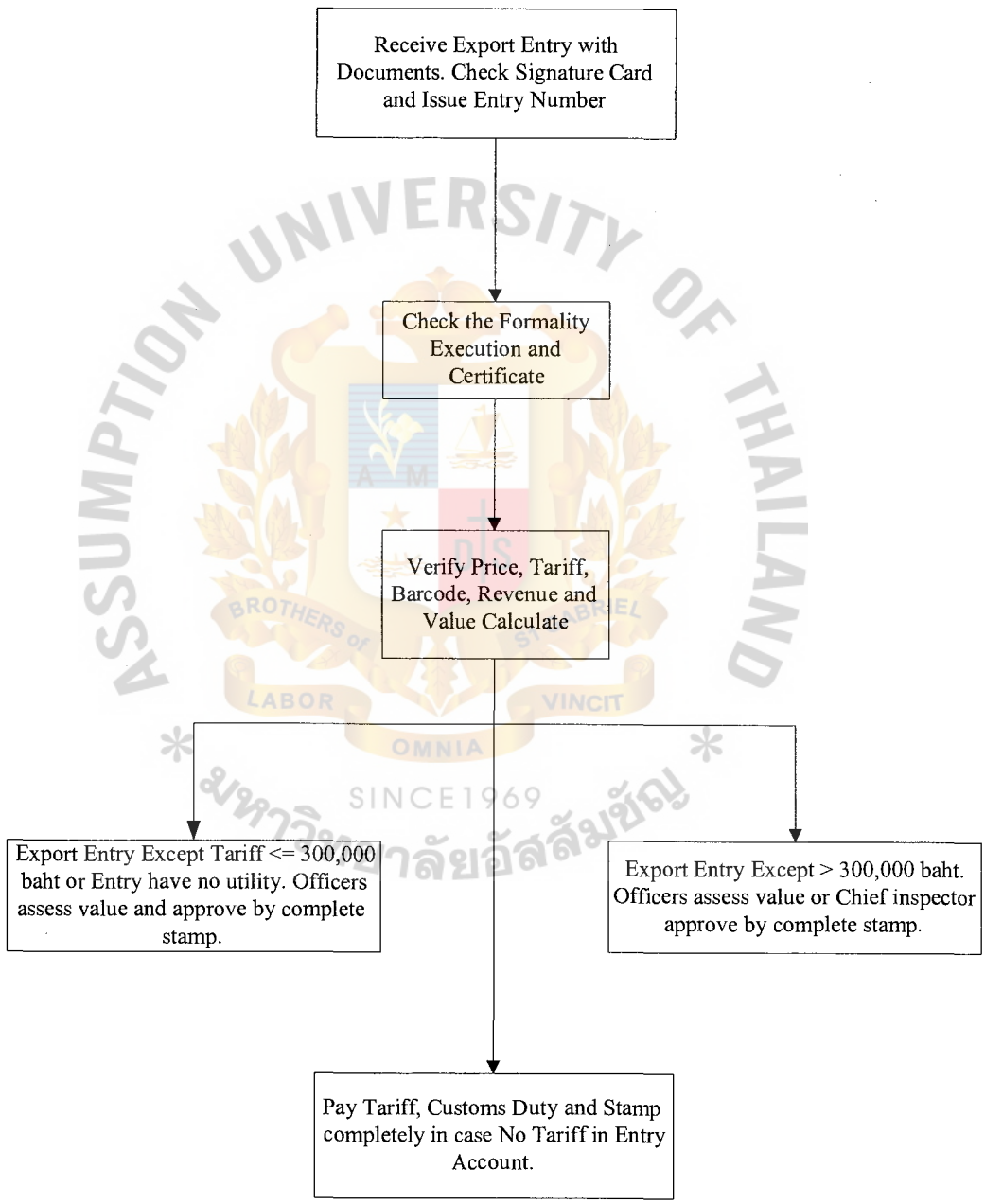


Figure E.3. The Formality Execution of Export Procedure.

Export Clearing of Goods Procedure

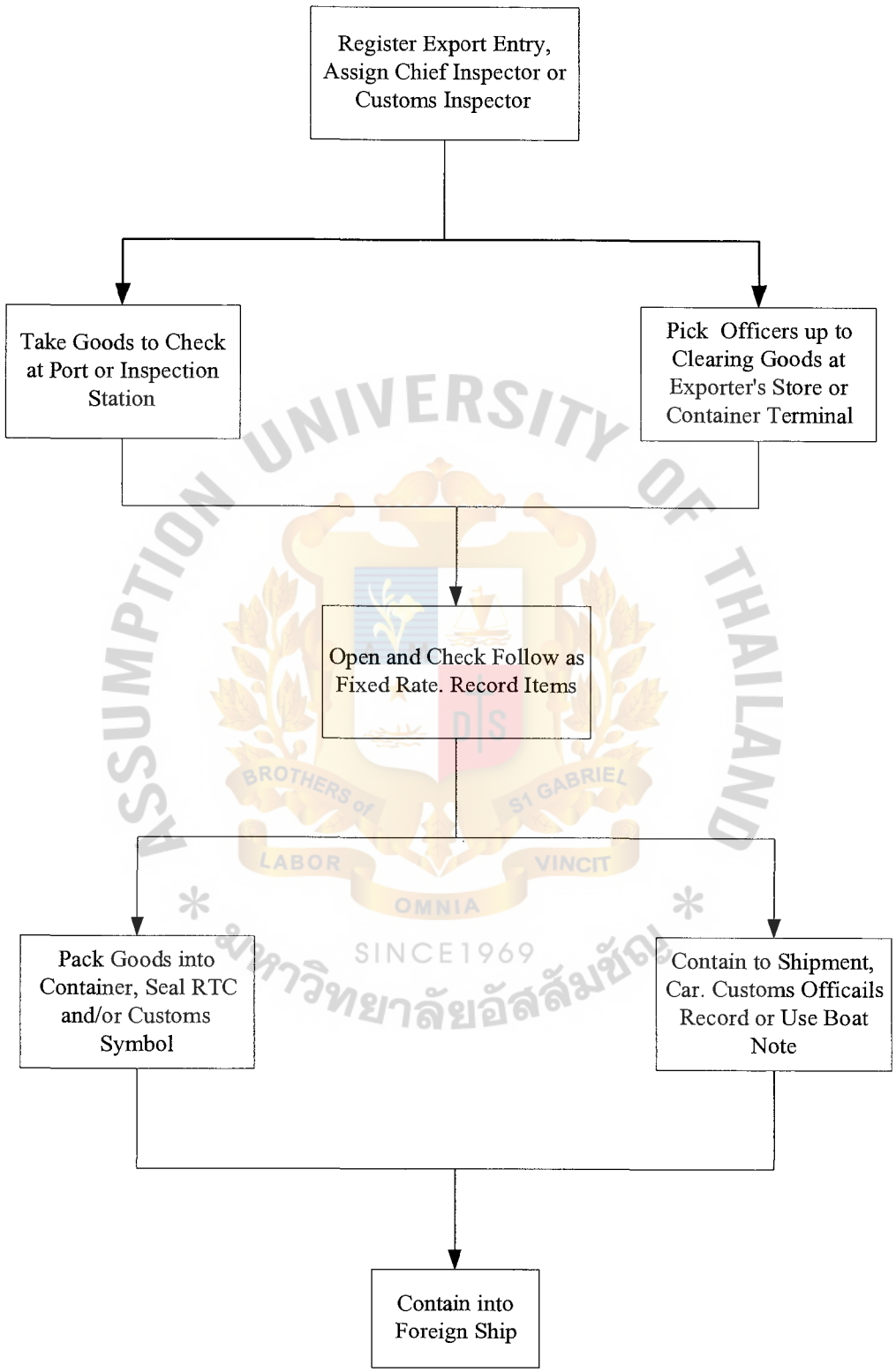


Figure E.4. Export Clearing of Goods Procedure.

Goods Container Procedure

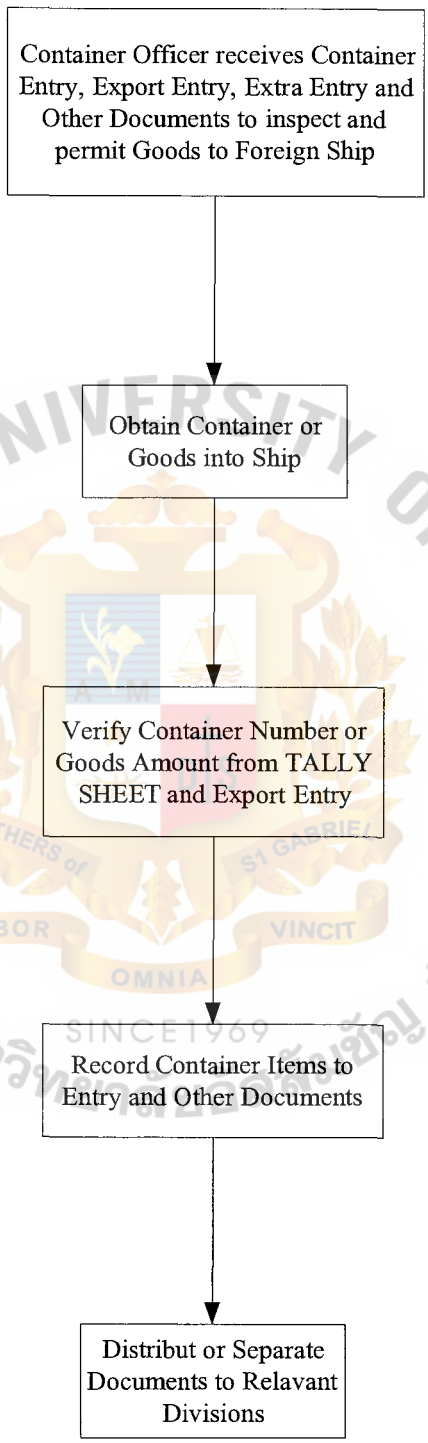


Figure E.5. Goods Container Procedure.

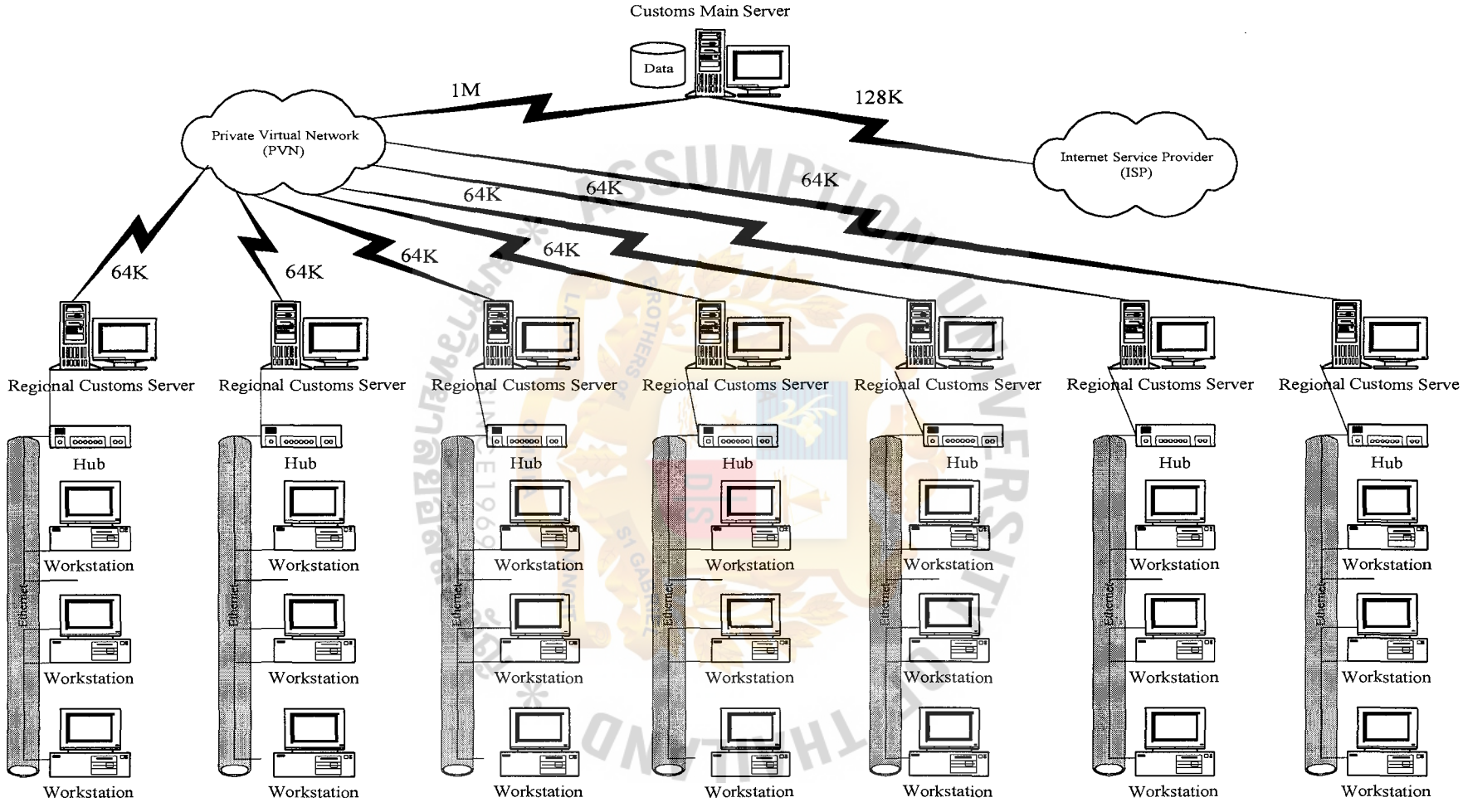


Figure E.6. A Prototype of the Customs Network Installation.

APPENDIX F

MAP OF INTERNET CONNECTIVITIES IN THAILAND

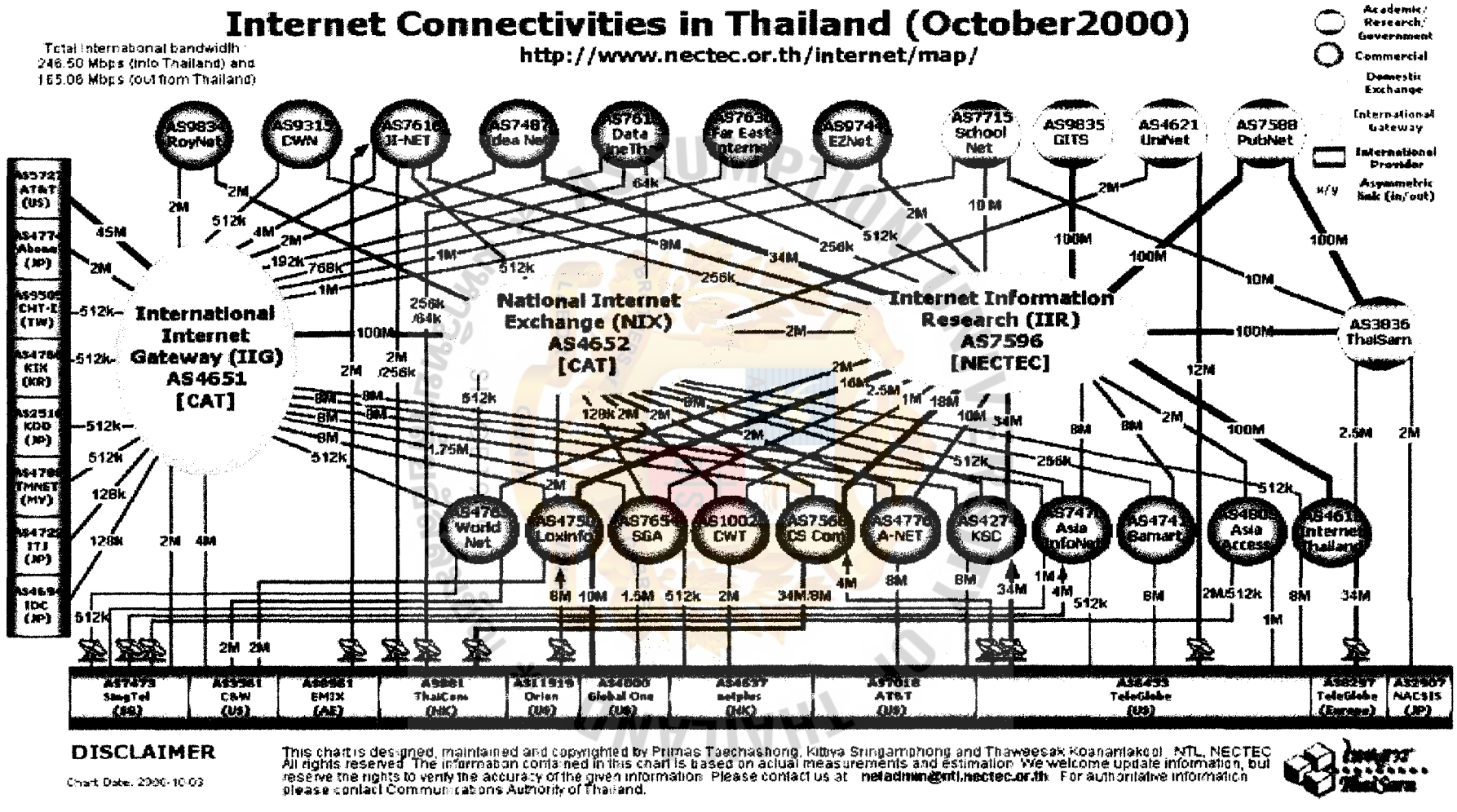


Figure F.1. Map of Internet Connectivities in Thailand.

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2. @ เอ็นเอ็น. "7/11 จับมือ 3 แบงก์ยักษ์ รุก "อี-มันนี่" แก้ปัญหาเงินสดท่วมร้าน," ไทยรัฐ, ปีที่ 51, ฉบับที่ 15545 (10 กันยายน 2543): 8.

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