



A Survey of Computer Competency of the Police  
in Pranakorn Sri Ayutthaya Province

by

Ms. Kwanchanok Warakulwit

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  
in Computer and Engineering Management  
Assumption University

November 2004



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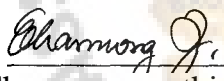

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Academic Year	November 2004

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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

The aim of the research was aimed to study the police's competency in computer usage on the aspects of knowledge about computer hardware, computer software, computer network, and computer technology. The samples used in this research were collected at random from 28 police stations in Pranakorn Sri Ayutthaya Province.

The result of the research shows the level of the police's competency of computer usage on all aspects is medium. Most of the police have the computer hardware knowledge that CD writer is used to record information on CD. Concerning with knowledge about computer software, they have the knowledge that Microsoft excel is suitable for computation work. They also have the knowledge that computer network is to connect more than 2 computers together with a network tool. And concerning with the knowledge about computer technology they know that nowadays we have camera, computer and cellphone all in one device. It was found out that there were relationships and differences between age, rank, position, field of work, computer usage frequency and competency in computer usage of significance at .05. On the contrary, there was only one factor that has no relationship with competency in computer usage of significance at .05. That factor was "Gender".

It is recommended that there should be an improved computer system to work efficiently and have enough computers installed for operation. Besides, the development of operation system is needed to make every field of work co-operate with each other more conveniently and speedily both within the station and others. In addition, personnel must be trained continuously for competency in computer usage so that they can apply it in their operation efficiently.

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# I. INTRODUCTION

## 1.1 Background

Nowadays, technology has been advancing rapidly and it has been making a lot of changes in such aspects as hardware technology, software technology, and network technology.

Computer hardware, software, and network technology can develop organizational performance. Computer hardware, software, and network selection should be based on organizational and business needs.

A range of hardware, software, and network technologies are available to organizations. There are many computer processing options to choose from, including mainframes, workstations, PCs, servers, and network computers, and many ways to configuring hardware components to create the computer systems of organization and the selection of operation systems and application software tools as well. Each organization would select the technology suitable for their work.

Contemporary computers can be categorized as mainframes, midrange computers, PCs workstations, and supercomputers. We need to understand the capabilities of each of these types of computers, and why some types are more appropriate for certain processing work than others.

### Classifying Computers

A mainframe is the largest computer, a powerhouse with massive memory and extremely rapid processing power. It is used for very large business, scientific, or military applications where a computer must handle massive amounts of data or many complicated processes. A **midrange** computer is less powerful, less expensive, and smaller than a mainframe but capable of supporting the computing need of smaller

organizations or of managing networks of other computers. Midrange computers can be **minicomputers**, which are used in systems for universities, factories, or research laboratories, or they can be servers, which are used for managing internal company networks or Web site. Server computers are specifically optimized to support a computer network, enabling users to share files, software, peripheral devices (such as printers), or other network resources. Servers have large memory and disk storage capacity, high-speed communications capabilities, and powerful CPUs.

Servers have become important components of firms' IT infrastructures, because they provide the hardware platform for electronic commerce. By adding special software, they can be customized to deliver Web pages, process purchase and sale transactions, or exchange data with systems inside the company. Organizations with heavy electronic commerce requirements and massive Web sites are running their Web and electronic commerce applications on multiple servers in **server farms** in computing centers run by commercial vendors such as IBM.

A **personal computer (PC)**, which is sometimes referred to as a *microcomputer*, is one that can be placed on a desktop or carried from room to room. Smaller laptop PCs are often used as portable desktops on the road. PCs are used as personal machines as well as in business. A **workstation** also fits on a desktop but has more powerful mathematical and graphic processing capabilities than a PC and can perform more complicated tasks than a PC in the same amount of time. Workstations are used for scientific, engineering, and design work that requires powerful graphics or computational capabilities.

A supercomputer is a highly sophisticated and powerful computer that is used for tasks requiring extremely rapid and complex calculations with hundreds of thousands of variable factors. Supercomputers use parallel processors and

traditionally have been used in scientific and military work, such as classified weapons research and weather forecasting, which use complex mathematical models. They are now starting to be used in business for the manipulation of vast quantities of data.

### Computer Networks

Today, stand-alone computers have been replaced by computers in networks for most processing tasks. The use of multiple computers linked by a communications network for processing is called **distributed processing**. In contrast, with **centralized processing**, in which all processing is accomplished by one large central computer, distributed processing distributes the processing work among PCs, midrange computers, and mainframes linked together.

One widely used form of distributed processing is **client/server computing**. Client/server computing splits processing between "clients" and "servers." Both are on the network, but each machine is assigned functions it is best suited to perform. The **client** is the user point-of-entry for the required function and is normally a desktop computer, workstation, or laptop computer. The user generally interacts directly only with the client portion of the application, often to input data or retrieve data for further analysis. The *server* provides the client with services. The server could be a mainframe or another desktop computer, but specialized server computers are often used in this role. Servers store and process shared data and also perform back-end functions not visible to users, such as managing network activities.

In some firms client/server networks with PCs have actually replaced mainframes and minicomputers. The process of transferring applications from large computers to smaller ones is called **downsizing**. Downsizing can potentially reduce computing costs, because memory and processing power on a PC cost a fraction of

their equivalent on a mainframe. The decision to downsize involves many factors in addition to the cost of computer hardware, including the need for new software, training, and perhaps new organizational procedures.

### Network Computers

In one form of client/server computing, client processing and storage capabilities are so minimal that the bulk of computer processing occurs on the server. The term *thin client* is sometimes used to refer to the client in this arrangement. Thin clients with minimal memory, storage and processor power and which are designed to work on networks are called **network computer (NCs)**. NC users download whatever software or data they need from a central computer over the Internet or an organization's internal network. The central computer also saves information for the user and makes it available for later retrieval, effectively eliminates the need for secondary storage devices such as hard disks, floppy disks, CD-ROMs, and their drives.

NCs are less expensive to purchase than PCs with local processing and storage, and can be administered and updated from a central network server. Software programs and applications would not have to be purchased, installed, and upgraded for each user because software would be delivered and maintained from one central point. Network computers and centralized software distribution thus could increase management control over the organization's computing function.

However, PC prices have fallen so the units can be purchased for almost the same cost as NCs. If a network failure occurs, hundreds or thousands of employees would not be able to use their computers, whereas people could keep working if they had full-function PCs. Companies should closely examine how network computers might fit into their information technology infrastructure.



## Type of Software

A software **program** is a series of statement or instructions to the computer. The process of writing or coding programs is termed *programming*, and individuals who specialize in this task are called *programmers*.

There are two major types of software: system and application software. Each kind performs a different function. **System software** is a set of generalized programs that manage the computer's resources, such as the central processor, communications links, and peripheral devices. Programmers who write system software are called *system programmers*.

**Application software** describes the programs that are written for or by users to apply the computer to a specific task. Software for processing an order or generating a mailing list is application software. Programmers who write application software are called *application programmers*.

In this project, the samples are the policemen from Pranakorn Sri Ayutthaya province. As mentioned above, computer system has been developing from the previous time but the police computer system can not be used efficiently as it should be. Therefore, the Interior Ministry of Thailand has a draft for the master plan of Information System Technology for improvement and development of modern computer system of police stations.

In this study, the draft of the master plan of Information System Technology studied the objectives, needs, and other elements to build readiness for the operation level to avoid operation problems and unnecessary expenses which are caused from the lack of knowledge and readiness of the policemen. Besides, the findings of this study can be used for improvement of the first draft of the master plan of Information System Technology or as data for the next master plan.

## 1.2 Objectives

Information Technology influences the daily life of people all over the world. It is accepted that it is worth the time and budget to introduce it into any work operation. So the objectives of the study are:

- (1) To assess the knowledge on computer usage skills of the police in Pranakorn Sri Ayutthaya Province.
- (2) To improve the police computer system in Pranakorn Sri Ayutthaya province which agrees with the first draft of the master plan of Information System Technology and to be the data for development of the draft for the next stage, which is the master plan.

## 1.3 Scope

This project focuses on personnel information, knowledge and acknowledgement of the computer skills. It also included the usage of the computer. The information on the usage of the computer of the police in Pranakorn Sri Ayutthaya Province was gathered by means of questionnaire answered by 2,123 police respondents.

## II. LITERATURE REVIEW

### Concepts, Theory and Reference Research

The research aims to study the police personnel's competency of computer usage in Pranakom Sri Ayutthaya. It focuses on computer usage of the computer system of the police station and computer usage knowledge of the police, and examines whether the police are able to use the computer competently.

The research was conducted based on the following concepts and theories.

- (1) Master Plan of Information Technology System.
- (2) The information technology concept.
- (3) The innovation of computer and the Internet.
- (4) System analysis and design concepts.
- (5) The theory of management of information system.

### 2.1 Master Plan of Information Technology System.

Nowadays, information technology system has rapidly changed and the change effects every dimension of the country development including justice management dealing with several government sectors such as the Office of National Police. It is necessary for the justice management to introduce information technology system to carry out the justice procedure. The master plan of the information technology system which every sector dealing with the justice procedure must be developed or improved to make it efficient.

The Office of National Police is one part of crime prevention and elimination sector, so it must be improved or developed information technology system both its system and personnel.

The master plan is composed of six strategies which are as follows.

Strategy I: The development and integration of information system in justice procedure.

Plan 1.1 The development of standard information data standard of justice procedure.

The operation standard on information technology system of justice procedure.

Plan 1.2 To reach the strategy for the electronic system without paper work.

Objectives:

- (1) To record management documentation into the electronic system in every sector.
- (2) To introduce the advanced technology to search for data electrically and efficiently.
- (3) To prepare data integration of justice procedure.

Strategy II: The development of information technology of justice procedure.

Plan 2.1 Preparing a plan for information technology system of the sectors in justice procedure.

Objectives:

- (1) To have enough computer facilities for its mission and police personnel.
- (2) The make data resource of the justice procedure ready for integration.

Strategy III: The development of information technology network of justice procedure.

Plan 3.1 The plan of Information technology network of justice procedure.

Objective:

To make the network of every sector related to justice data rapid, steady and safe for just in time service and within the reach.

Strategy IV: The development of stable and safety system of justice procedure.

Plan 4.1 The plan of the establishment of standard of information technology usage and investigation system of the justice procedure.

Strategy V: The management of human resource development of justice procedure for the integrated operation with information technology and mass communication. (National Justice Procedure, Issue No. I, 2005-2008)

Plan 5.1 Personnel training on information technology and the knowledge of the strategy for the master plan.

Objectives:

- (1) To have personnel qualification suitable for their duty and responsibility.
- (2) To provide a systematic and continuous operation training on information technology.
- (3) Study tours to other outside organizations on information technology.



## **2.2 The Information Technology Concepts.**

The Internet is the computer network connected to the computers in the world, different computer brand name and software work through the Internet. The software license is controlled by a law, or a patent etc. Because of the proprietary right high compensation motivates to create a new software version. When using the Internet it is necessary to choose the legal software. Shareware application can be downloaded. It is illegal to use and develop the software. But for procomm it is a shareware but some part of it is under the law of license control.

Quinn defined the characteristic of technology: The Copy Right. Actually most technology has a proprietary right that is high compensation to motivate to create new software versions (Quinn 1986).

Both two types of technology are rapidly changing and even continue to develop and unable to forecast the character of it, for example, the Internet began as a private network connected through specific department of defense network to link scientists and university professors around the world. But today the Internet is the largest implementation of internetworking, linking individual network all over the world. Adeboye said the success of transferring technology will start beginning when the starter can develop and adapt the technology. (Adeboye 1977).

The capability of the system to store data and transfer passing around internetworking is on the whole absolutely the largest network data center that benefits people who want to have their own or hackers or companies which come to join the network for their benefit.

Information Technology has a step to develop which indicated the changing the result of society change. The word of information is the knowledge based on

foundation realistic as (Toffler 1992). Pre-conversation order. Before 5000 A.D. is a tool development era developed for conversation.

- (1) Conversation order. From A.D. 5000 to 3000, human communicated with other or groups to exchange information, coordinate, and create information and it is a foundation for developing news.
- (2) Literacy order is a mass communication management era. Body language and ability to read changed the producing methods from hunting to make buying and selling. The knowledge is foundation for communication management.
- (3) Mass media order. From 1870 — 1970, the communication network was the data center. Most activities were aimed to develop and control social behavior. It is a one way communication.
- (4) New communication order. During the period, from 1970 — 2020, two way communication came to member participation. The member is the owner of data and share the data with others. It is called information society. Human transformed homo economy to homo information. News and information were created to supply such as products, and transfer them via various communication channels.

The knowledge and understanding of telecommunication system based on the same system is applied. (Toffler 1992).

A revolution of agriculture is family production. Product production is controlled by the head of a family.

A revolution of high technology forced the old system to change and it is necessary to gain a profit. The new technology is a tool to help organizations meet the organization objectives.

Information Highway is the third wave of technology. Multimedia is the infrastructure of information network. To develop the capability of technology, telephone line is used for network connection and global network connection passing via under water cable or FLAB (Fiber optic Link Around the Globe) such as Internet system.

### 2.3 The Innovation of Computer

Computers are important in people's personal life or at workplace. Being a computer illiterate will be a handicap in performing his or her job. People who use computers also know how and where they can be used, the kinds of tasks they perform, how they affect his society and economy and how to use them benefit his own life and career (McLeod 1994).

The concepts of Hardware and software

The most widely used computer terms probably are hardware and software. Nobody knows who coined these terms, but they have been around since the beginning of the computer era.

Hardware is all of the equipment that comprises a computer system.

What is software? Most people use the term software to mean the programs that cause the computer to perform particular jobs.

A computer is simply a tool for people to use; it is a machine that can solve problems by accepting data, performing certain operations on that data, and presenting the results of those operations. Today's computers are easy to use because of the software, such as word processing, spreadsheet, data management, communications, and graphics packages, that are geared to specific applications. These special programs allow users, with very little experience, to use a computer. Users can create term papers with a word-processing package, manage personal

finances with a spreadsheet package, keep records of addresses, birthdays and other vital statistics of family and friends with a data management package, communicate with other users on an electronic bulletin board, and perhaps design unique greeting cards with a graphics package.

## Computer Systems

### (1) Hardware

- (a) Computer
- (b) Primary storage
- (c) Secondary storage
- (d) Input devices
- (e) Output devices

### (2) Software

- (a) User

The hardware includes the computer, where the processing occurs; memory, which includes primary and secondary storage; input devices, such as the keyboard and the mouse; and output devices, such as printers and monitors. The software, or instructions, tells the computer. Finally, a person, or user, is required to activate the system.

The size of computers and configuration of a system depend on the processing requirements, necessary functions, and budget constraints. Large computers are grouped into three categories: supercomputers; mainframes; and minicomputers.

Supercomputers are the most expensive and most powerful computers.

Mainframe computers are smaller, cheaper, and not as powerful as supercomputers.

Minicomputers are the next step down, being smaller and less expensive, and containing somewhat less memory and processing capabilities.

These categorical distinctions in size, memory, and speed of operation are becoming blurred because of innovations in memory and storage capacities. New technology and faster processing speeds allow greater amounts of data to be stored in smaller areas; therefore, many of the new smaller machines have characteristics and capabilities of the larger ones.

Computers that are cheaper, smaller, and contain less memory than minicomputers are called microcomputers. Unlike the larger computers, a single microcomputer is generally used by only one person at a time.

Computers cannot decide how to be programmed, provide input, interpret data, implement decisions, or "think." Computer literacy means having a general knowledge about computers, knowing who uses them, what functions they perform, how they are used, where they are, how they affect society, and learning to use them yourself (Luce 1989)

#### Computer Network

- (1) The connected entities of a network are called computers or other devices
- (2) The link through which communication takes place is called a network medium; and
- (3) The rules that govern the manner in which data are exchanged between devices are achieved through a common network protocol.

A computer network is a collection of computers and other devices (nodes) that use a common network protocol to share resources with each other over a network medium.



## Type of Computer Networks

There are many different types of computer networks. The differences among them are usually based on perspective classified by the geographical area they encompass (e.g., local area networks and wide area networks), their topologies (e.g., point-to-point or broadcast), or the type of communications path they use and the manner in which data are transmitted across the path (e.g., circuit-switched and packet-switched).

### Classifying Networks by the Area They Encompass

A local area network (LAN) generally interconnects computing resources within a moderately sized geographical area. This can include a room, several rooms within a building, or several buildings of a campus. The Institute of Electrical and Electronics Engineers (IEEE), quantifies LAN length as 10 km or less in radius.

In contrast to a LAN, a wide area network (WAN) interconnects computing resources that are widely separated geographically (usually over 100 km). This includes towns, cities, states, and countries. Following the quantification of a LAN's range, a WAN would span an area greater than 5 miles (8 km). A WAN can be thought of as consisting of a collection of LANs. Some people make further distinctions between LANs and WANs. One such distinction is metropolitan area network (MAN), which interconnects computing resources that span a metropolitan area. Another classification is personal area network (PAN), which refers to the small computer networks that are found in private homes. The relatively low cost of computers and the resulting growing number of multi computer homes are driving the need for PAN as home computer users begin to realize the

convenience of interconnecting their computer. Still another classification is global area network (GAN), which refers to a collection of WAN that span the globe. Finally, there is storage network (SAN), which is a network dedicated exclusively for storing data. Given the continuous growth in the number of homepages, e-mails, and network users, the demand for storage capacity has become a real concern. One way of addressing an organization's storage needs is through a SAN in which dedicated storage servers provide unlimited access via a secure via a secure network infrastructure.

### Classifying Networks by Their Topology

**Point-to-Point Networks:** A point-to-point network consists of nodes that can only communicate with adjacent nodes. It is like looking into a telescope and seeing only one planet out of the eyepiece. Adjacent nodes are nodes that are next to each other. Adjacency is typically expressed by stating the number of hops required for data to travel from the source node to the destination node. A hop is a connection to or from an intermediate node on the path from the source to the destination. Adjacent nodes are always one hop away from each other. Thus, one hop implies two directly connected nodes. In a more complex form a point-to-point network might consist of thousands of nodes connected to adjacent nodes, with these adjacent nodes connected to other adjacent nodes and so on. If a node needs to communicate with a nonadjacent node, it does so indirectly via other adjacent nodes. The source node first transmits a message to its adjacent node. This message is then passed serially through each intermediate node until it finally reaches the destination node. Passing data through an adjacent node to another node is typically called bridging or routing depending on the passing technique used

to transfer the information. Several network topologies are based on the point-to-point design. Three very common point-to-point topologies are star, loop, and tree. (Skees 1981)

## **2.4 The Management Information System and Management of Information Technology.**

The leaders of organization have to introduce staff the concepts of technology facilities, Internet Facilities, and the importance of information technology to the organization's plan. Leaders have to describe the features of the organizations that are information technology and information systems. After that they have to set the subject area of technology and computerize them in the courses. The technology has been advancing dramatically. In the future, they will have to depend on the technology even more. Knowing the potential of Information systems and having ability to put this knowledge in all level of training courses can result in success. Organization can reach their goals and have higher quality man power.

Computers and technology will be forever changing the society, businesses, education and our lives. They have to understand how to manage the computer system and technology to meet the goal.

.Information systems are more than computers. Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. All information systems can be described as organizational and management solutions to environmental challenges.

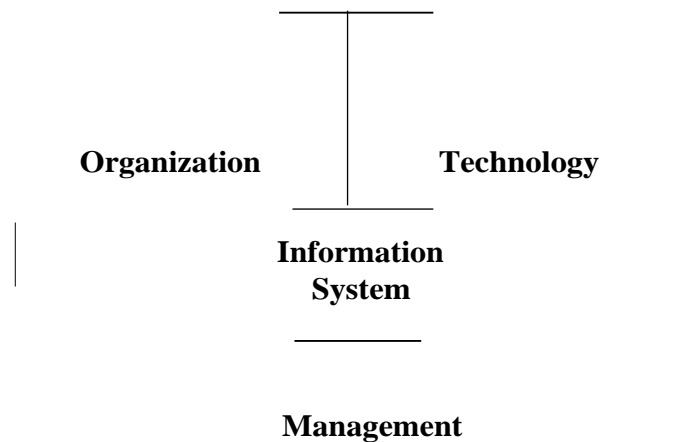


Figure 2.1. Info Nation Systems Environment.

Information systems are part of organizations. The key elements of an organization are its people, structure and operating procedures, politics, and culture. These are the components of organizations. Formal organizations are composed of different levels and specialties. Their structures reveal a clear-cut division of labor. Experts are employed and trained for different functions, including sales and marketing, manufacturing, finance, accounting, and human resource.

An organization coordinates work through a structured hierarchy and formal standard operating procedures. The hierarchy arranges people in a pyramidal structure of rising authority and responsibility. The upper levels of the hierarchy consist of managerial, professional, and technical employees, whereas the lower level consist of operational personnel.

Management perceived business challenges in the environment, they set the organization strategy for responding and they allocate the human and financial resources to achieve the strategy and coordinate the work.

But less understood is the fact that managers must do more than manage what already exists. They must also create new products and services and even re-create the organization from time to time. A substantial part of management is creative work driven by new knowledge and information. Information technology can play a powerful role in redirecting and redesigning the organization (Laudon and Laudon, 2004.)

## **2.5 System Analysis and Design**

Information as an organizational resource; organizations have long recognized the importance of managing key resources such as labor and raw materials. Information has now moved to its rightful place as a key resource. Decision makers now understand that information is not just a byproduct of conducting business; rather, it fuels business and can be the critical factor in determining the success or failure of a business.

Managing Information as a resource; to maximize the usefulness of information, a business must manage it correctly, just as it manages other resources. Managers need to understand that costs are associated with the production, distribution, security, storage and retrieval of all information. Although information is all around us, it is not free, and its strategic use for positioning a business competitively should not be taken for granted.

Managing Computer-Generated Information; the availability of networked computers, along with access to the Internet and the World Wide Web, has created an information explosion throughout society in general and business in particular. Managing computer-generated information differs in significant ways from handling manually produced data. Usually there is a greater quantity of computer information to administer. Costs of organization and maintaining it can increase at alarming rates,



and users often treat it less skeptically than information obtained in different ways. The varied roles of systems analysts, and the phases in the systems development life cycle; it also introduces Computer-Aided Software Engineering (CASE) tools.

### 2.5.1 System Analysis and Design Concepts

Information systems are developed for different purposes, depending on the needs of the business. Transaction processing systems (TPS) function at the operational level of the organization; office automation systems (OAS) and knowledge work systems (KWS) support work at the knowledge level. Higher-level systems include management information systems (MIS) and decision support systems (DSS). Expert systems apply the expertise of decision makers to solve specific, structured problems. On the strategic level of management we find executive support systems (ESS). Group decision support systems (GDSS) and the more generally described computer supported collaborative work (CSCW) systems aid group-level decision making semi-structured or unstructured variety (Kendall 1999).

#### (1) Transaction Process System (TPS)

Transaction process systems are computerized information systems that were developed to process large amounts of data for routine business transactions such as payroll and inventory. A TPS eliminates the tedium of necessary operational transactions and reduces the time once required to perform them manually, although people must still input data to computerized systems.

Transaction processing systems are boundary-spanning systems that permit the organization to interact with external environments. Because managers look to the data generated by the

TPS for up-to-the minute information about what is happening in their companies, it is essential to the day-to-day operations of business that these systems function smoothly without interruption.

(2) Office Automation Systems and Knowledge Work Systems (OAS)

At the knowledge level of the organization there are two classes of systems. Office automation systems (OAS) support data workers, who do not usually create new knowledge but rather analyze information in order to transform data manipulate it in some way before sharing it with, or formally disseminating it throughout the organization and, sometimes beyond the organization. Familiar aspects of OAS include word processing spreadsheets, desktop publishing, electronic scheduling, and communication through voice mail, e-mail (electronic mail), and video conferencing)

(3) Knowledge work systems (KWS) support professional workers such as scientists, engineers, and doctors by aiding them in their efforts to create new knowledge and by allowing them to contribute it to their organization or to society at large.

(4) Management Information System (MIS)

Management information system (MIS) do not replace transaction processing systems. MIS include transaction processing. MIS are computerized information systems that work because of the purposeful interaction between people and computers. Management information systems support a broader spectrum of organizational

tasks than transaction processing systems, including decision analysis and decision making.

(5) Decision Support Systems (DSS)

A higher-level class of computerized information systems is the decision support system (DSS). The DSS is similar to the traditional management information system because they both depend on a database as a source of data. A decision support system departs from the traditional management information system because it emphasizes the support of decision making in all of its phases, although the actual decision is still the exclusive province of the decision maker. Decision support systems are more closely tailored to the person or group using a traditional management information system.

(6) Expert Systems and Artificial Intelligence (AI)

Artificial intelligence (AI) can be considered the over arching field for expert systems. The general thrust of AI has been developing the machines that behave intelligently. Two avenues of research of AI are understanding a natural language and analyzing the ability to reason through a problem to its logical conclusion. Expert systems use the approaches of AI reasoning to solve the problems caused to them by other businesses (and other) users.

An expert systems is a very special class of information system that has been made practicable for use by business as a result of widespread availability of hardware and software such as microcomputers and expert system shells. An expert system (also

called a knowledge-based system) effectively captures and uses the knowledge of an expert for solving a particular problem experienced in an organization. Notice that unlike the DSS, which leaves the ultimate judgment to the decision maker, an expert system selects the best solution to a problem or a specific class of problems.

The basic components of an expert system are the knowledge base, an inference engine connection the user with the system by processing queries via languages such as SQL (structured query language), and the user interface. People called knowledge engineers capture the expertise of experts, build a computer system which includes this expert knowledge, and then implement it. It is entirely possible that building and implementing expert systems will be the future work of system analysts.

The variety of information systems that analysts may develop are shown in figure 1.2. Notice that the figure presents these systems from the bottom up, indicating that the operation, or lowest level of the organization, is supported by TPS, and the highest, or strategic level of semi-structured and unstructured decisions, is supported by ESS at the top.

(7) Group Decision Support Systems and Computer-Supported Collaborative Work Systems.

When groups need to work together to make semi-structured or unstructured decisions, a group decision support system may afford a solution. Group decision support systems (GDSS), which are used in special rooms equipped in a number of different configurations,

permit group members to interact with electronic support—often in the form of specialized software and special group facilitators. Group decision support systems are intended to bring a group together to solve a problem with the help of various support such as polling, questionnaires, brainstorming, and scenario creation. GDSS software can be designed to minimize typical negative group behaviors such as lack of participation due to fear of reprisal for expressing an unpopular or contested viewpoint, dominating by vocal group members, and "group think" decision making. Sometimes GDSS are discussed under the more general term computer supported collaborative work (CSCW), which might include software support called "groupware" for team collaboration via networked computers.

#### (8) Executive Support Systems

When executives turn to the computer, they are often looking for ways to help them make decisions on the strategic level. An executive support system (ESS) helps executives to organize their interactions with the external environment by providing graphics and communications support in accessible places such as boardrooms or personal corporate offices.

Although ESS relies on the information generated by TPS and MIS, executive support systems help their users address unstructured decision problems, which are not application specific, by creating an environment that is conducive to thinking about strategic problems in an informal way. ESS extends and supports the capabilities of executives, permitting them to make sense of their environments.

(9) Need for Systems Analysis and Design

Systems analysis and design, as performed by systems analysts, seeks to systematically analyze data input or data flow, processing or transforming data, data storage, and information output within the context of a particular business. Furthermore, systems analysis and design is used to analyze, design, and implement improvements in the functioning of businesses that can be accomplished through the use of computerized information systems.

Installing a system without a proper planning leads to great dissatisfaction and frequently causes the system to fall into disuse. Systems analysis and design lends structure to the analysis and design of information systems, a costly endeavor that might otherwise have been done in a haphazard way. It can be thought of as a series of processes systematically undertaken to improve a business through the use of computerized information systems. A large part of system analysis and design involves working with current and eventual users of information systems.

(10) End users

Anyone who interacts with an information system in the context of his or her work in organization can be called an end user. Over the years the distinctions among users have become blurred. Furthermore, any categories of users employed should not be thought of as exclusive.

However end users are classified. One fact about them remains pertinent to the systems analyst: Some kind of user involvement

throughout the systems project is critical to the successful development of computerized information systems analysts, whose roles in the organization are discussed next, are the other essential component in developing useful information systems.

### 2.5.2 The systems Development Life Cycle (SDLC)

The systems development life cycle is a phased approach to analysis and design. The systems are well developed through the use of a specific cycle of analyst and user activities.

Analysts disagree on exactly how many phases should be in the systems development life cycle, but they generally laud is organized approach. Here we have divided the cycle into seven phases, as shown in Figure 1.3. Although each phase is presented discreetly, it is never accomplished as a separate step. Instead, several activities can occur simultaneously, and some activities may reoccur. That is why it is more sensible to think of the SDLC as an accomplished phase (with activities in full swing overlapping others, and then tapering off) and not is separate steps (Kendall 1999.)

- (1) Identifying problems, opportunities, and objectives.
- (2) Determining information requirements.
- (3) Analyzing system needs.
- (4) Designing the recommended system.
- (5) Developing and documenting software.
- (6) Testing and maintaining the system.
- (7) The importance of maintenance.



### III. RESEARCH METHODOLOGY

#### 3.1 Research Overview

This survey research aims to study the competency or skill of computer usage of the police. The tool used in this research is the questionnaire and research strategy. They are documentary research and field research.

Documentary Research. In this study, the theories and concept of fluency of computer usage from text book, articles, journal, research finding and other materials were used as the background.

Field Research. To get accurate and reliable data, it is collected by using questionnaire were sent out to the police in Pranakorn Sri Ayutthaya Province.

#### 3.2 Research Population and Sample Size

The population involved in this research is 2,123 policemen from Pranakorn Sri Ayutthaya Province.

Simple Random Sampling is used to find the sample size from the population of policemen in Pranakorn Sri Ayutthaya Province by using this formula:

e = Error of sample which is .05 in percentage

N = Population

n = Sample Size

n = \_\_\_\_\_

$$1 + Ne^2$$

n =  $\frac{2,123}{1 + 2,123 (.05)^2}$

$$1 + 2,123 (.05)^2$$

n = 337

So the sample size of this research is 337 persons.

### 3.3 Method Sampling

There are 28 police stations in Pranakorn Sri Ayutthaya Province. The stratified Random Sampling is used to calculate the sample size.

$$n_h = \frac{N_h}{N} * n_o$$

$n_h$  = Sample size in each major subject  
 $N_h$  = Population in each subject  
 $N$  = Population of every major subject  
 $n_o$  = Sample size of the subject

Table 3.1. Sample Size of the Police.

No.	Police Station List	Population	Sample Size
1.	Ayutthaya Provincial Police Station	104	17
2.	Special Operation Section	34	5
3.	Ayutthaya Police Station	302	48
4.	Bangpain Police Station	143	23
5.	Prainracha Police Station	73	12
6.	Bangsai Police Station	87	14
7.	Changyai Police Station	51	8
8.	Ladbualaung Police Station	78	12
9.	Sena Police Station	150	24
10.	Marnwichai Police Station	26	4
11.	Pakhai Police Station	63	10
12.	Jakkarach Police Station	31	5

Table 3.1. Sample Size of the Policemen. (Continued)

No.	Police Station List	Population	Sample Size
13.	Uthai Police Station	103	16
14.	Wangnoi Police Station	120	19
15.	Pachee Police Station	62	10
16.	Rasom Police Station	12	2
17.	Tharuea Police Station	92	15
18.	Paktha Police Station	21	3
19.	Bangpahun Police Station	104	17
20.	Bankalor Police Station	26	4
21.	Maharach Police Station	72	11
22.	Rongchang Police Station	44	7
23.	Bangban Police Station	79	13
24.	Prakaow Police Station	35	6
25.	Nakornluang Police Station	85	13
26.	Thachang Police Station	34	5
27.	Banprak Police Station	39	6
28.	Bangsai Police Station	53	8
<b>Total</b>		<b>2,123</b>	<b>337</b>

### 3.4 Research Tool

The tool used in this research is the questionnaire that is designed in conjunction with concepts, theories and related research findings concerning with

competency in computer usage. The questionnaire is constructed in one set which could be divided into two parts as follows:

Part I is The policemen profile. It is concerned about the background of the policemen from Pranakorn Sri Ayutthaya Province.

Part II is concerned about the policemen competency in computer usage. It is divided into 4 aspects: Knowledge about computer hardware, knowledge about computer software, knowledge about computer network, and knowledge about computer technology. Each consists of questions to be responded. One mark is given if the response is right and no mark is given for wrong response or unanswered.

The range of mark is classified into three levels (fluency) according to the marks the police scored. It can be seen below.

<u>Fluency Level</u>	<u>Mark Range</u>
1. High	8-10 (marks)
2. Medium	5-7 (marks)
3. Low	0-4 (marks)

### 3.5 Development of the Questionnaire

The researcher set a questionnaire referring to a number of textbooks, references, documents, and related research concerning with police competency in computer usage as a guideline for the development of the questionnaire

- (1) Questionnaire is submitted to the advisor for inspection and approval.
- (2) Questionnaire must be checked to ensure validity and reliability.  
Suggestions are made by the advisor to remedy the errors.
- (3) The researcher amends the questionnaire accordingly and then once more presents it to the advisor so that the researcher will have a better and more effective research tool.

(4) The completed questionnaire is sent out to the sample group.

### 3.6 Testing Method

The questionnaires are tried out for validity and reliability.

- (1) Content validity: questionnaires are checked to have clarity, concreteness, conciseness and correctness by the thesis committee advisor. Suggestions are made for improvement.
- (2) Reliability. The questionnaires are answered by Angthong Province police. The population of the respondents is 30. It is then analyzed by SPSS from Windows Version 10, and the alpha is .8009.

### 3.7 Data Collection

Questionnaires were sent out to the sample group of different police stations.

The returned questionnaires are shown in the following table.

Table 3.2. Data Collection.

No.	Police Station List	Sample size	Number/ Percentage of Returned Questionnaires Collected
1.	Ayutthaya Provincial Police Station	17	17 (100%)
2.	Special Operation Section	5	5 (100%)
3.	Ayutthaya Police Station	48	48 (100%)

Table 3.2. Data Collection. (Continued)

No.	Police Station List	Sample size	Number/ Percentage of Returned Questionnaires Collected
4.	Bangpain Police Station	23	23 (100%)
5.	Prainracha Police Station	12	12 (100%)
6.	Bangsai Police Station	14	14 (100%)
7.	Changyai Police Station	8	8 (100%)
8.	Ladbualaung Police Station	12	12 (100%)
9.	Sena Police Station	24	24 (100%)
10.	Marnwichai Police Station	4	4 (100%)
11.	Pakhai Police Station	10	10 (100%)
12.	Jakkarach Police Station	5	5 (100%)
13.	Uthai Police Station	16	16 (100%)
14.	Wangnoi Police Station	19	19 (100%)
15.	Pachee Police Station	10	10 (100%)
16.	Rasom Police Station	2	2 (100%)
17.	Tharuea Police Station	15	15 (100%)
18.	Paktha Police Station	3	3 (100%)
19.	Bangpahun Police Station	17	17 (100%)
20.	Bankalor Police Station	4	4 (100%)

Table 3.2. Data Collection. (Continued)

No.	Police Station List	Sample size	Number/ Percentage of Returned Questionnaires Collected
21.	Maharach Police Station	11	11 (100%)
22.	Rongchang Police Station	7	7 (100%)
23.	Bangban Police Station	13	13 (100%)
24.	Prakaow Police Station	6	6 (100%)
25.	Nakornluang Police Station	13	13 (100%)
26.	Thachang Police Station	5	5 (100%)
27.	Banprak Police Station	6	6 (100%)
28.	Bangsai Police Station	8	8 (100%)
Total		337	337 (100%)

### 3.8 Data Analysis

When the questionnaires are returned, data analysis is conducted. The following factors are used in the analysis process.

- (1) Editing: The researcher will check the completeness of the questionnaires and sort out incomplete questionnaires separately.
- (2) Coding: All complete questionnaires will be coded according to the predetermined set of criteria.



- (3) **Compiling:** The questionnaires that are already coded will be complied by SPSS Windows Version10 program as a tool in the enumeration of frequency and the calculation of percentage.
- (4) **Analyzing:** In the analysis, the following types of statistics are used.
  - (a) **Percentage:** to analyze the outcome which indicates the level of policemen competency of each aspect.
  - (b) **Chi-square:** to find the relationship between independent and dependent variables which are gender, rank, position, and field of work.
  - (c) **ANOVA (Analysis Of Variance):** to analyze and compare whether the average between dependent and independent variables, which are age and computer usage frequency, to be different.

### **3.9 Research Variables:**

Independent variables are:

- (1) Gender: Male, Female
- (2) Age
- (3) Rank: Pol.L/C., Pol.Cpl., Pol.Sgt., Pol.Sgt.Maj., Pol.Sen.Sgt.Maj., Pol.Sub.Lt., Pol.Lt., Pol.Capt., Pol.Maj., Pol.Lt.Col., Pol.Col., and Pol.Maj.Gen.
- (4) Position: Squad Leader, Sub-Inspector, Inspector, Deputy Superintendent, Superintendent, Deputy Commander and Commander.
- (5) Field of work: Administration, Interrogation, Investigation, Protection / Prevention, Traffic control and Attestation.
- (6) Computer usage frequency: 1-2 times / week, 3-4 times / week, 5-6 times / week, and more than 6 times / week.

Some independent variables are grouped according to their age, rank and the fields of work which are related to each other to get high frequency.

(1) Age:

- (a) 20-31 years old
- (b) 31-40 years old
- (c) 41-60 years old

(2) Rank:

- (a) A non commissioned officer (Pol.L/C., Pol.Cp1., Pol.Sgt., Pol.Sgt.Maj., Pol.Sen.Sgt.Maj.)
- (b) A commissioned officer (Pol.Sub.Lt.)
- (c) A commissioned officer (Pol.Lt., Pol.Capt., Pol.Maj., Pol.Lt.Col., Pol.Col., and Pol.Maj.Gen.)

(3) Position:

- (a) Squad Leader
- (b) Sub-Inspector and Inspector
- (c) Deputy Superintendent, Superintendent, Deputy Commander and Commander.

(4) Field of work:

- (a) Administration
- (b) Interrogation, Investigation, Protection / Prevention, and Attestation
- (c) Traffic control

(5) Computer usage frequency:

- (a) Low (1-2 time(s) / week)
- (b) Medium (3-4 times / week)
- (c) High (5 and more than 6 times / week)

Dependent variables: Competency in computer usage is divided into 4 aspects as follows:

- (1) Computer hardware knowledge
- (2) Computer software knowledge
- (3) Computer network knowledge
- (4) Computer technology knowledge

3.10 Hypotheses

- (1) Gender has relationship with the competency in computer usage.
- (2) The difference of age has the difference of competency in computer usage.
- (3) Rank has relationship with the competency in computer usage.
- (4) Position has relationship with the competency in computer usage.
- (5) Field of work has relationship with the competency in computer usage.
- (6) The difference of computer usage frequency has the difference of competency in computer usage.

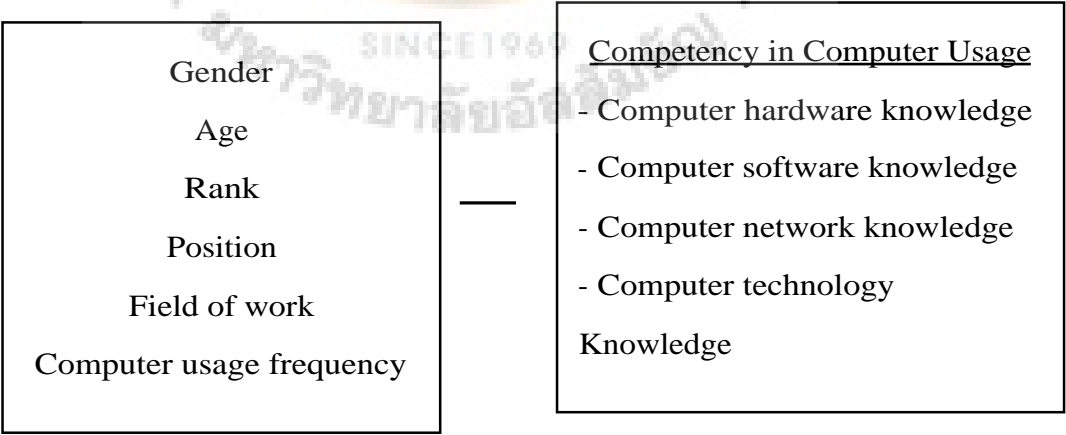


Figure 3.1. Research Conceptual Framework.

### 3.11 Statistical Methodology of Relationship and Difference Analysis

Chi-Squares ( $\chi^2$ ) is used to find the relationship of variables. The significance (sig.) is determined at .05. If the value of probability is lower than the determined significance, the hypotheses are accepted, so it shows that the independent and dependent variables have relationship. On the opposite side, if the value of probability is higher than the determined significance, the hypotheses are rejected, so it shows that the independent and dependent variables have no relationship. The value of Chi-Square shows the relationship between independent and dependent variables. If the values of Chi-Square are higher, it is more related. If the values of Chi-Square are lower, it is less related.

ANOVA (Analysis Of Variance) is used to find the difference of variables. The significance (sig.) is determined at .05. If the value of probability is lower than the determined significance, the hypotheses are accepted, so there is difference between independent and dependent variables. On the opposite side, if the value of probability is higher than the determined significance, the hypotheses are rejected, so there is no difference between the independent and dependent variables.

#### IV. DATA ANALYSIS AND DISCUSSION

The analysis is an important part of the project. It intends to summarize the data, give indications about the association between variables, as well as to test the differences of outcomes variables of the sample. There are many ways to conduct data analysis depending on the questions asked and the data summary. After the data was gathered through the questionnaire, it was returned and analyzed with the Statistic Package for the Social Sciences Program (SPSS).

##### 4.1 General Information

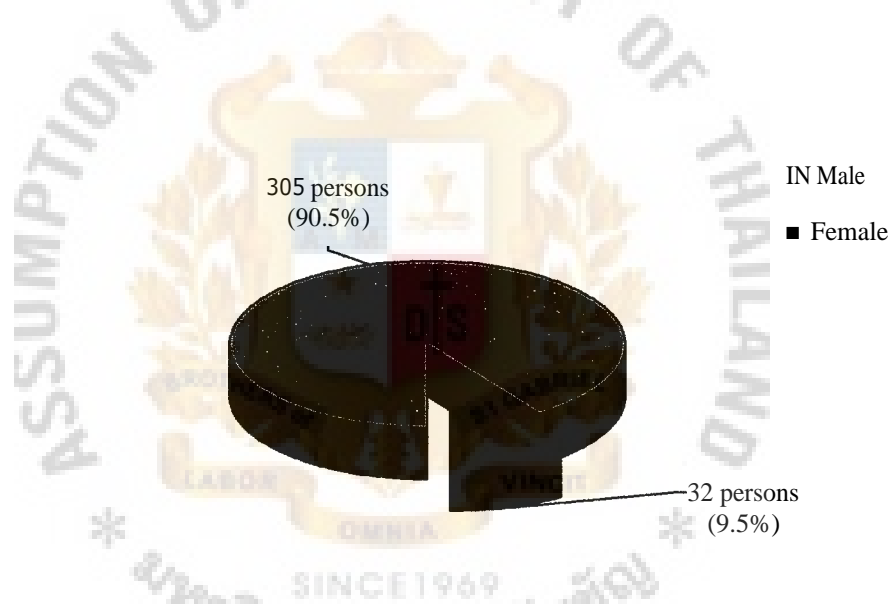


Figure 4.1. Profile of Policemen Gender.

As can be seen in Figure 4.1, out of the total number of respondents 90.5% or 305 respondents are male police while female police accounted for 32 respondents or 9.5%.

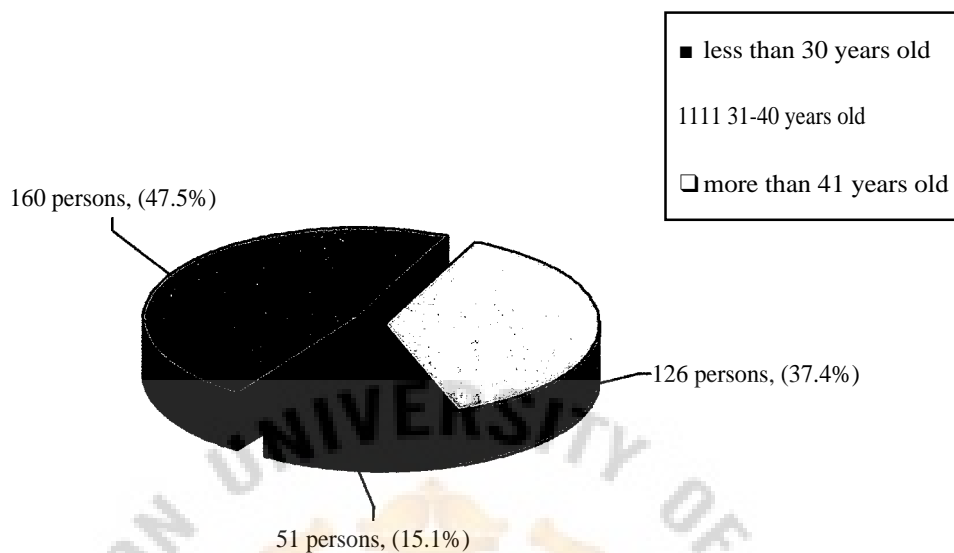


Figure 4.2. The Age of the Sample Group.

Figure 4.2. shows that 31-41 years age group is the biggest age group with 160 persons or 47.5%. The second higher group is the age group '41' years old, accounted for 126 persons or 37.4%. The smallest age group is under 30 years age group, accounted for 51 persons or 15.1%.

Figure 4.3. shows that a larger percentage of police work at Ayutthaya Police Station than at any other police station. In fact, Ayutthaya Police Station accounted for 48 persons or 14.2 in percentage, while Sena Police Station accounted for 24 persons or 7.1%, Rasom Police Station, 2 persons or 0.6% respectively.





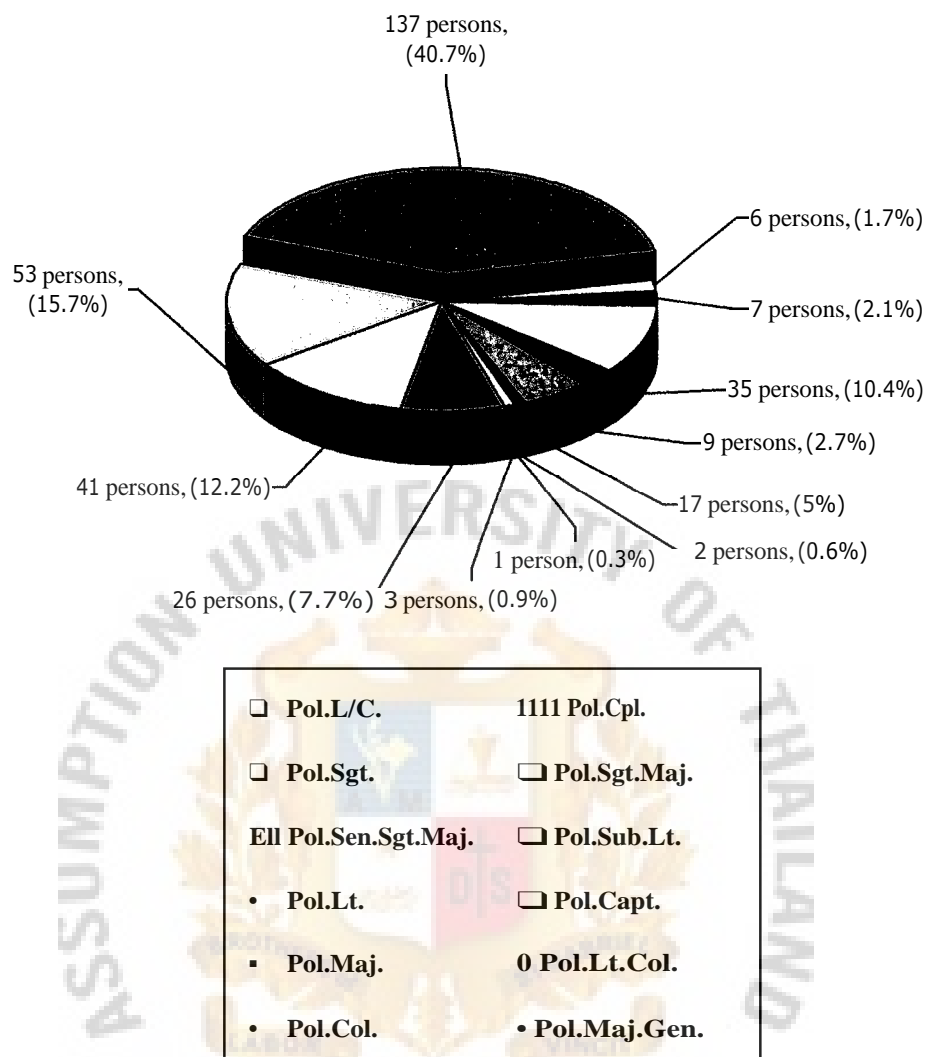
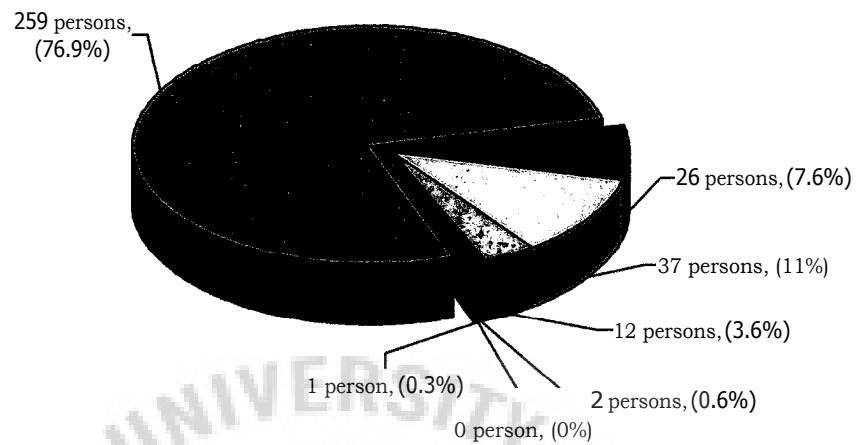


Figure 4.4. The Ranks of the Sample Group.

It can be seen from figure 4.4. that the Pol.Sen.Stg.Maj. rank is the biggest group with 137 persons, the largest percentage, 40.7%. It is followed by the rank Pol.Sgt.Maj., accounting for 53 persons or 15.7%. The smallest group is the rank Pol.Maj.Gen., accounted for 1 person only or 0.3%.



M Squad Leader	111 Sub-Inspector
0 Inspector	0 Deputy Superintendent
M Superintendent	III Deputy Commander
NI Commander	

Figure 4.5. The Position of the Sample Group.

According to figure 4.5., the position squad leader is a larger percentage of the position than any other positions. In fact the position squad leader accounted for 259 persons or 76.9% followed by the position inspector, accounted for 37 persons or 11%. None of the respondents holds the position 'constable'.

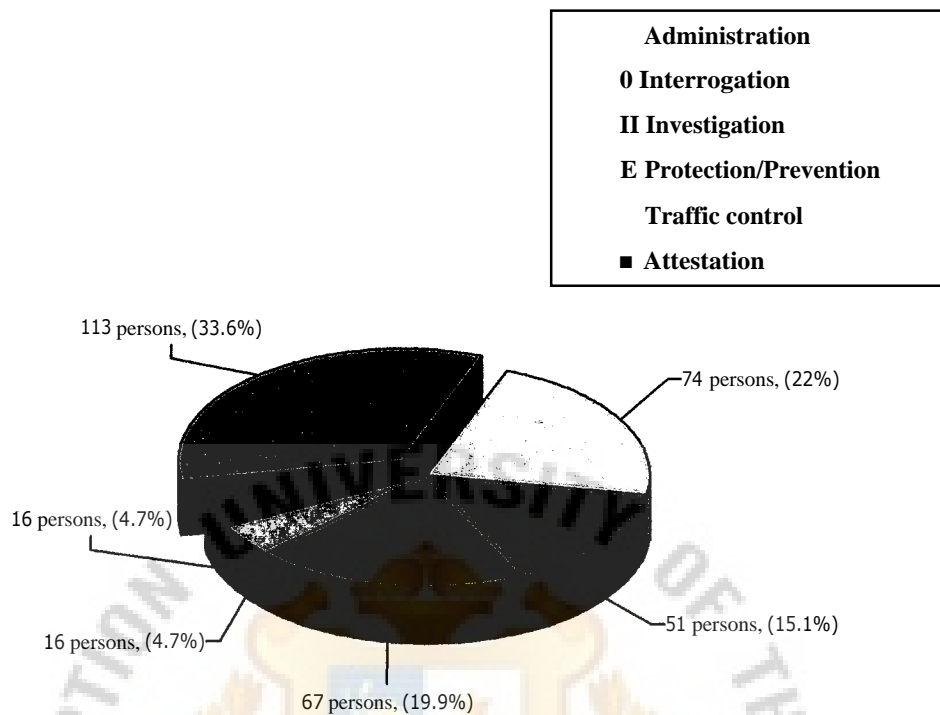


Figure 4.6. Field of Work of Sample Group.

Figure 4.6. shows that 'administration' is the biggest group with 113 persons or 33.6 by percentage. It is followed by 'interrogation' with 74 persons or 22%. The smaller group is 'traffic control and attestation', accounted for 16 persons or 4.7%.

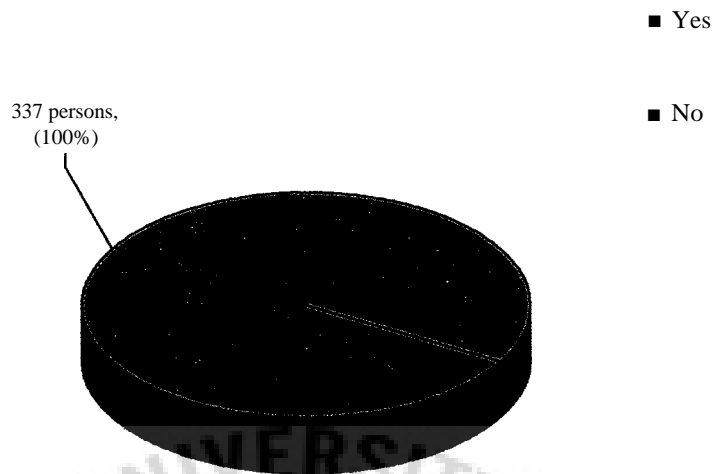


Figure 4.7. Computer Usage of the Sample Group in Their Line of Work.

Figure 4.7. shows that all of the sample group use computer in their line of work. It means that 100% of the respondents or 337 persons use computers.

Figure 4.8. shows that the police use the computer for work purpose the most with the total of 177 persons or 52.2%. It is followed by for both work and personal purposes, accounted for 132 persons or 39.2%. It can be seen that the police use the computer for personal purpose the least, accounted for 28 persons or 8.3%.

Figure 4.9. shows that the police use the computer 'for report and documentation' the most with the total of 230 respondents or 68.3%. It is followed by 'for communication', (sending to and receiving information from other stations) accounted for 53 persons, 15.7%. As can be seen in the figure that the respondents use the computer 'for entertainment' the least.

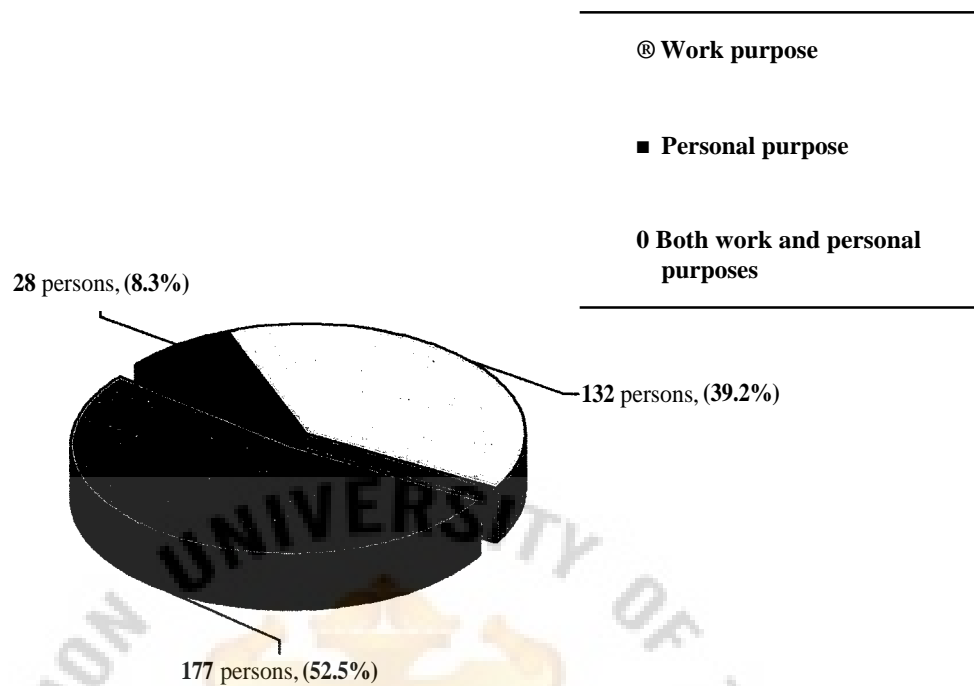


Figure 4.8. The Purpose of Police Computer Usage.

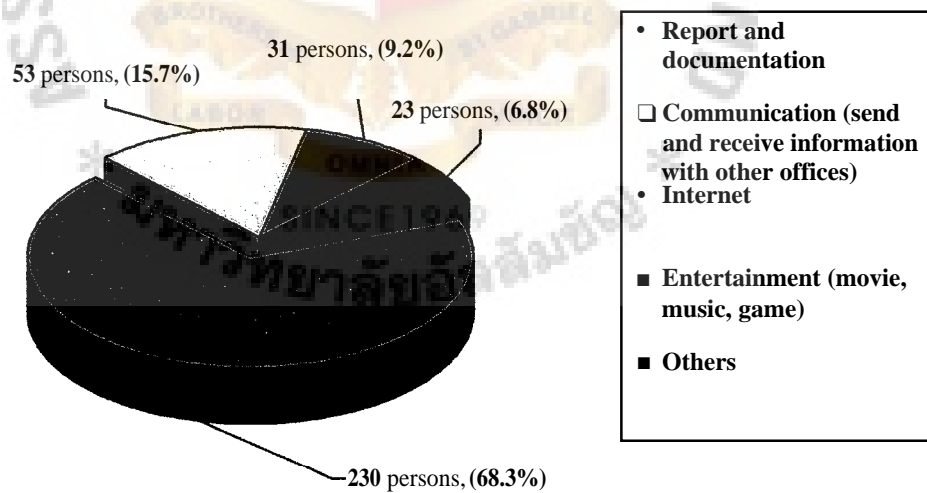


Figure 4.9. The Kind of Work used on the Computer.

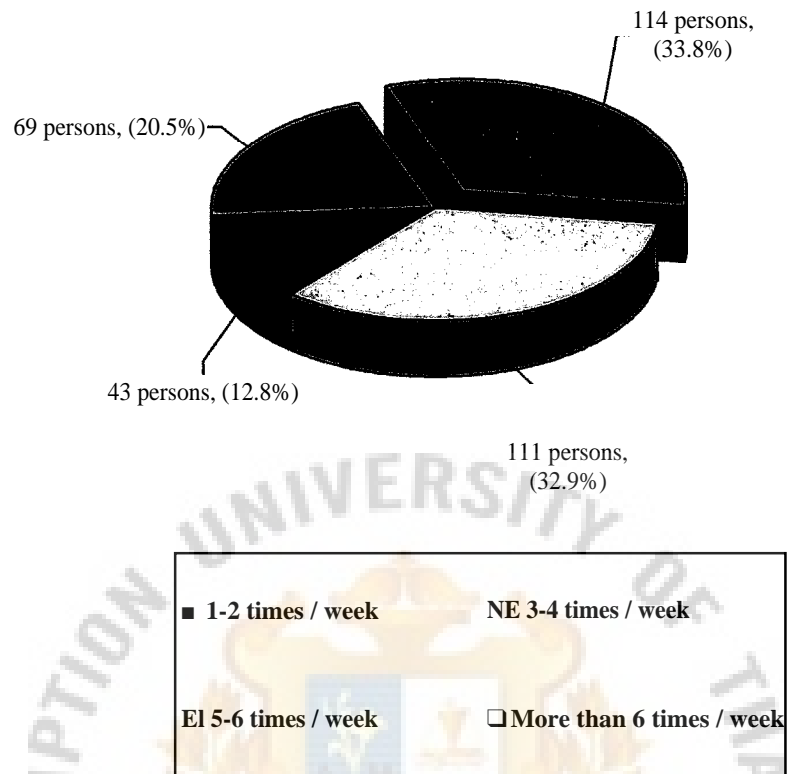


Figure 4.10. The Frequency of Police's Computer Usage.

According to figure 4.10., using the computer for more than 6 times per week is the highest frequency among the respondents with 114 persons, 33.8%. It is followed by 5-6 times/week, accounted for 111 persons, 32.9% and 1-2 times per week, 43 persons or 12.8% respectively.

**4.2 Knowledge of Police's Competency in Computer Usage.**

Table 4.1. The Sample Group Knowledge about Computer Hardware.

Knowledge about Computer Hardware	Right		Wrong and Don't Know	
	Number	Percentage	Number	Percentage
- Central Processing Unit (CPU) is the central information assessment.	264	78.3	73	21.7
-Keyboard is used to input information, such input shows on the printer.	111	32.9	226	67.1
- RAM is the primary memory of the computer.	200	59.3	137	40.7
- All computers must have mainboard.	238	70.6	99	29.4
- Power Supply sends information to other computer parts.	113	33.5	224	66.5
- Laser printer can print better quality than dot matrix printer.	237	70.3	100	29.7
-CD writer is used to record information on CD.	267	79.2	70	20.8
- Notebook or laptop works faster than PC.	170	50.4	167	49.6
-Computer hardware consists of different tangible parts/materials of the computer that we assemble together into a computer.	216	64.1	121	35.6
- Personal Digital Assistant (PDA) eg. palm, pocket PC can be connected to the Internet	181	53.7	156	46.3



According to the figures on Table 4.1., 267 respondents or 79.2% of the respondents have the knowledge about computer hardware that CD writer is used to record information on CD. On the contrary only 70 respondents or 20.8% of the respondents, the smallest group chose the wrong answer, which means they do not know that CD writer is used to record information on CD. 264 respondents or 78.3% of the respondents know that Central Processing Unit (CPU) is the central information assessment. However, 226 respondents or 67.1% chose the wrong answer to the question that the keyboard is used to input information, such input shows on the printer. 224 respondents or 66.5% of the respondents chose the wrong answer, which means that they do not know that power supply sends information to other computer parts.

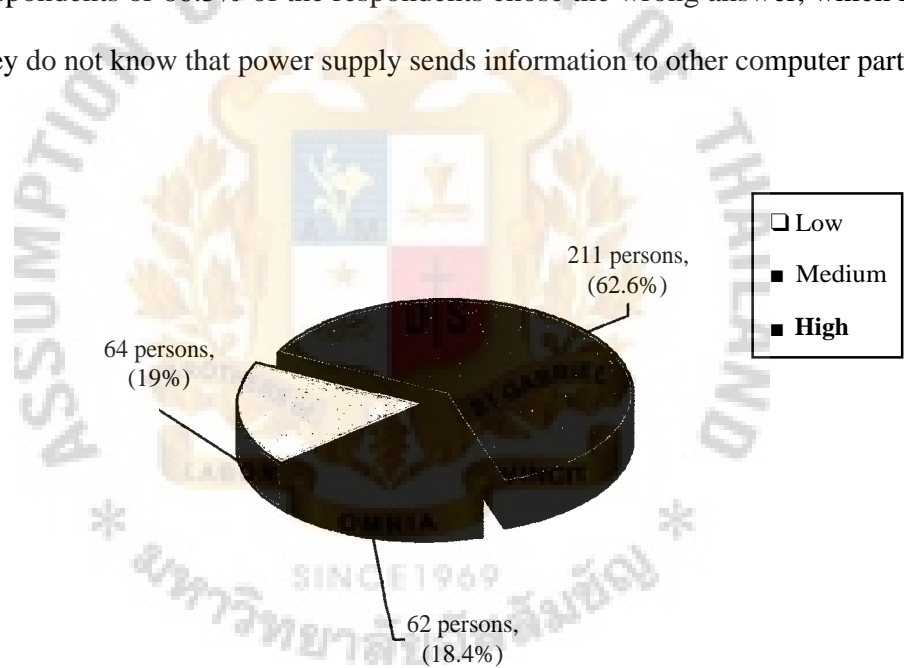


Figure 4.11. Competency Level of Computer Usage on the Aspect of Knowledge about Computer Hardware.

Figure 4.11. shows that the biggest percentage 62.6 or 211 respondents have the medium knowledge about computer hardware. 64 persons or 19 percentage have the lowest competence level followed by the smallest group, 62 respondents or 18.4% who have a high competence level.

Table 4.2. The Sample Group Knowledge about Computer Software.

Knowledge about Computer Software	Right		Wrong and Don't Know	
	Number	Percentage	Number	Percentage
- Software is a program written in computer languages.	241	71.5	96	28.5
-Microsoft Office is a kind of software.	245	72.7	92	27.3
- Software can be designed according to specific usage.	188	55.8	149	44.2
- One software can be used with only one computer.	185	54.9	152	45.1
- It is a copyright violation to create or design your own program.	167	49.6	170	50.4
- Microsoft word is a program used for presentation.	210	62.3	127	37.7
-Microsoft excel is suitable for computation work.	257	76.3	80	23.7
-All programs can be used on Windows operation system.	81	24.0	256	76.0
- A package program is a ready-to-use program.	250	74.2	87	25.8
-One limitation of software is it cannot be traded.	190	56.4	147	43.6

According the result, 257 respondents or 76.3% chose the right answer that Microsoft excel is suitable for computation work and only 80 respondents or 23.7%, chose the wrong number. 250 in number or 74.2 in percentage, know that a package program is a ready-to-use program. Only 81 respondents or 24% chose the right answer which means they understand the fact that all programs can be used on Windows operation system. On the contrary, 256 respondents, the biggest number or 76% chose the wrong answer for this item. They did not think that all programs can be used on Windows operation system. In addition, 170 respondents or 50.4%, the smaller number chose the wrong answer, which means that they understand that it is a copyright violation to create or design your own program.

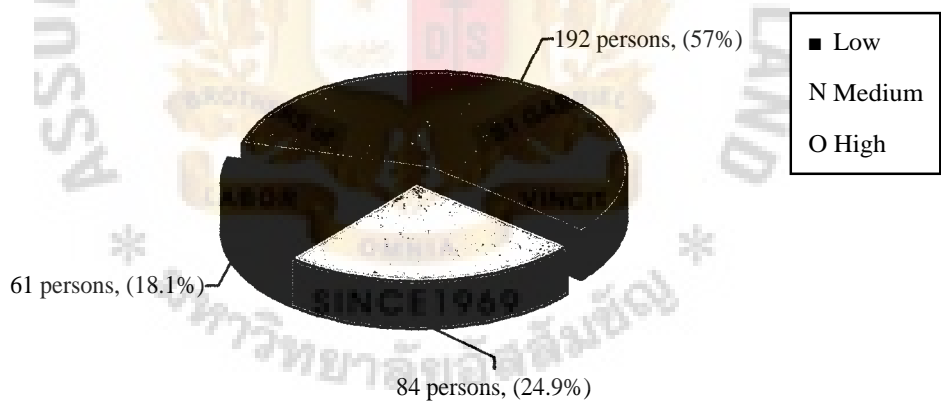


Figure 4.12. Competency Level of Computer usage on the Aspect of Knowledge about Computer Software.

Figure 4.12. shows the competency of policemen computer usage. 192 respondents have the medium competency level which is the largest percentage of the

entire respondents, 57%. It is followed by the high competency level, accounted for 84 persons, 24.9% and the low level, 61 persons or 18.1% respectively.

Table 4.3. Sample Group Knowledge about Computer Network.

Knowledge about Computer Network	Right		Wrong and Don't Know	
	Number	Percentage	Number	Percentage
- Computer network is to connect more than 2 computers together with a network tool.	255	75.7	82	24.3
- Local Area Network (LAN) is to connect computers to the same network	217	64.4	120	35.6
- Different computers are connected with telephone lines.	146	43.3	191	56.7
- Network can work only when computers are in the same area eg. same building.	180	53.4	157	46.6
- Hub is a network device.	191	56.7	146	43.3
- It is possible to have wireless LAN.	209	62.0	128	38.0
- The Internet is the largest network in the world.	246	73.0	91	27.0
- Home network is a package network ready to be used at home.	101	30.0	236	70.0
- Telephone line is the only means to connect different networks.	163	48.4	174	51.6
- Wireless network can only be used via authorized frequency.	204	60.5	133	39.5

According to the result, 255 persons or 75.7% of the respondents chose the right answer, which means they understand that computer network is to connect more than 2 computers together with a network tool. However, 246 persons or 73.0% chose the wrong answer, which means they do not think so. The smaller group of 246 respondents or 73.0%, know that the Internet is the largest network in the world and the smallest group of 101 respondents or 30.0% of the respondents, know that home network is a package network ready to be used at home. On the contrary, the biggest group of 236 respondents or 70% of the respondents chose the wrong answer, which means they do not think that home network is a package network ready to be used at home. The smaller group of 191 persons or 56.7% of the respondents, do not think that different computers are connected with telephone lines.

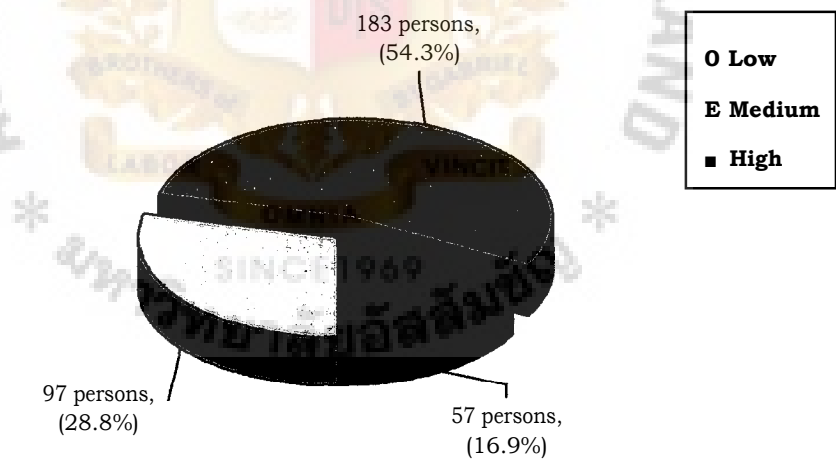


Figure 4.13. Competency Level of Computer Usage on the Aspect of Knowledge about Computer Network.

The competency level of 183 persons or 54.3% that is the majority of the police respondents is medium. 97 persons or 28.8% of the police respondents have a low level of computer competency. 57 persons or 16.9% of the respondents, which is the smallest group have a high level of computer competency

Table 4.4. The Sample Group Knowledge about Computer Technology.

Knowledge about Computer Technology	Right		Wrong and Don't Know	
	Number	Percentage	Number	Percentage
-Wireless technology enables computer parts to make long distance connection.	249	73.9	88	26.1
- GPRS is a cellphone technology that allows wireless information exchange.	242	71.8	95	28.2
- The Internet allows us to communicate faster and cheaper than other ways of communication.	241	71.5	96	28.5
-Modern technology permits minimized parts which work slower.	188	55.8	149	44.2
- Pentium III is the newest and fastest CPU.	207	61.4	130	38.6
-Modem software technology can make still pictures into perfect motion pictures.	226	67.1	111	32.9
- Nowadays we have camera, computer and cellphone all in one device.	267	79.2	70	20.8

Table 4.4. The Sample Group Knowledge about Computer Technology. (Continued)

Knowledge about Computer Technology	Right		Wrong and Don't Know	
	Number	Percentage	Number	Percentage
- It is more favorable to keep information in the form of physical document than file on a computer because it is more convenient and it saves time and cost.	144	42.7	193	57.3
- Thai postmen now use PDA to record information of letters and packages.	175	51.9	162	48.1
- MK Suki uses PDA eg. Pocket PC and Palm to take orders and compute the bills.	174	51.6	163	48.4

According to the result, it can be seen that 267 respondents or 79.2% respondents, the majority of the police respondents know that nowadays we have camera, computer and cellphone all in one device but, 70 persons or 20.8%, the smallest group do not know about that. 249 persons or 73.9%, the second biggest group know that wireless technology enables computer parts to make long distance connection. Only 144 persons or 42.7% chose the right answer which means that they know that it is more favorable to keep information in the form of physical document than file on a computer because it is more convenient and it saves time and cost, but the majority of the respondents chose the wrong answer. In addition, 163 respondents or 48.4% chose the wrong answer which means that they do not know that MK Suki uses PDA eg. Pocket PC and Palm to take orders and compute the bills.

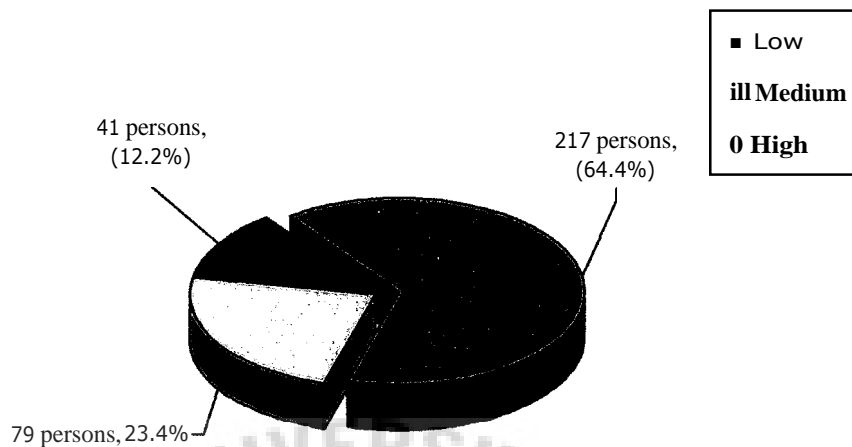


Figure 4.14. Competency Level of Computer Usage on the Aspect of Knowledge about Computer Technology.

Figure 4.14. shows that the biggest percentage of the respondents have the medium level of competency in computer technology, accounted for 217 persons or 64.4%. 79 persons or 23.4 percent have the high level computer competency and 41 persons or 12.2% have the low competency level.

According to figure 4.15., it can be seen that 205 persons or 60.8% of the police respondents (the largest group) have the medium competency level on all aspects. 83 respondents or 24.6% have the low competency level while the smallest group of 49 persons or 14.5% has the high competency level.



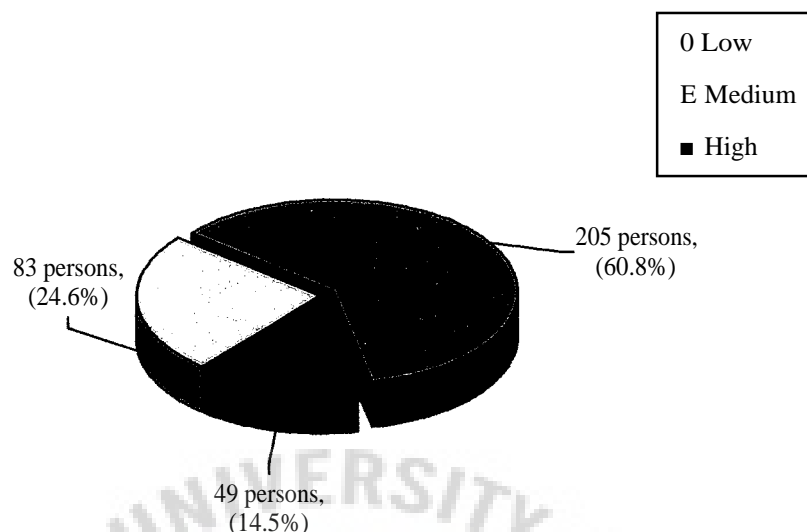


Figure 4.15. Competency Level of Computer Usage on All Aspects.

The result from the open-ended questionnaire in which the police made comments on the computer system in their stations can be seen in the following table.

Table 4.5. Police's Comments.

Comments	Frequency	Sequence
(1) There are not enough computers in the station.	101	1
(2) Computer system in the station is out of date, it should be improved to be more efficient.	97	2
(3) There should be a special computer training for police.	74	3
(4) There should be a loan project to buy computers for police so that they can improve their computer skills.	66	4

4.3 Result from Hypotheses

The result of the analysis will be described in the following detail to answer the statement of the hypothesis:

Hypotheses 1. : Gender has relationship with the competency in computer usage.

Table 4.6. The Relationship between Gender and Competency in Computer Usage.

Gender	Competency of computer usage		
	Low	Medium	High
Man	73 ( 21.6% )	188 ( 55.8% )	44 ( 13.1% )
Woman	10 ( 3.0% )	17 ( 5.0% )	5 ( 1.4% )
Total	83 ( 24.6% )	205 ( 60.8% )	49 ( 14.5% )

$\chi^2 = 1.003$  sig. = .606

From the result, gender has no relationship with the computer competency significance at .05. The male and female police are free to do many things. Thus, the gender factor will have no influence on the computer competency. The female police have the high knowledge level, the same as the male police who have the high knowledge level. They must be computer literates or experts. So this factor has no relationship because it has no standard measurement method.

Hypotheses 2. : The difference of age has the difference of competency in computer usage.

Table 4.7. The Comparison of Competency in Computer Usage Classified by Age.

Source of Variation	SS	DF	MS	F
Between Groups	9.312	2	4.656	10.299
Within Groups	150.997	334	0.452	0
Total	160.309	336	0	0

sig. = .000

From the result, it can be seen that the level of competency differs in different age groups and the difference of competency in computer usage of significance is at .05. Age is an indicator of experience. As the old saying goes one could gradually gain experience as he grows, he will learn and improve his skills. If every age is needed to improve his computer knowledge, he should be trained intensively. In this ever changing world, one should be computer literate.

Hypotheses 3. : Rank has relationship with the competency in computer usage.

Table 4.8. The Relationship between Rank and Competency in Computer Usage.

Rank	competency of computer usage		
	Low	Medium	High
A non-commissioned officer (Pol.L/C., Pol.Cp1., Pol.Sgt., Pol.Sgt.Maj., Pol.Sen.Sgt.Maj.)	79 ( 23.4%)	165 ( 49.0%)	16 ( 4.7% )
A commissioned officer (Pol.Sub.Lt., Pol.Lt.)	4 ( 1.2% )	32 ( 9.4%)	12 ( 3.6% )
A commissioned officer (Pol.Capt., Pol.Maj., Pol.Lt.Col., Pol.Col., Pol.Maj.Gen.)	0 ( 0% )	8 ( 2.4% )	21 ( 6.2% )
Total	83 ( 24.6%)	205 ( 60.8%)	49 ( 14.5% )

$$X^2 = 104.639 \quad \text{sig.} = .000$$

From the result, Rank has relationship with the computer competency significance at .05. Police ranks tell their status. A police officer at a higher rank must have more responsibility. To operate his work efficiently, he has to be well-informed. Opportunity is an important variable in learning so it should be provided to non-commissioned officers who need to improve their computer knowledge and have to be assigned with computer work. When his duty has to be dealt with computer, it is necessary for him to develop his potentiality to meet his work objectives.

Hypotheses 4. : Position has relationship with the competency in computer usage.

Table 4.9. The Relationship between Position and Competency in Computer Usage.

Position	Competency of computer usage		
	Low	Medium	High
Squad Leader	78 ( 23.1% )	165 ( 49.0% )	16 ( 4.7% )
Sub-Inspector and Inspector	4 ( 1.2% )	36 ( 10.6% )	23 ( 6.8% )
Deputy Superintendent, Superintendent, Deputy commander and Commander	1 ( 0.3% )	4 ( 1.2% )	10 ( 3.0% )
<b>Total</b>	83 ( 24.6% )	205 ( 60.8% )	49 ( 14.5% )

$$X^2 = 78.447 \text{ sig.} = .000$$

From the result, it can be seen that position has relationship with the computer competency significance at .05. Position plays the same role as rank and they are related to each other. If a police officer holds a higher rank, he also is in a higher position and it means he has more responsibility as well. It is essential for him to learn the new technology which is always sensitively changed. It will be helpful when he applies his skill and knowledge in the line of duty.

Hypotheses 5.: Field of work has relationship with the competency in computer usage.

Table 4.10. The Relation between Field of Work and Competency in Computer Usage.

Field of work	Competency of computer usage		
	Low	Medium	High
Administration	32 ( 9.5% )	74 ( 22.0% )	7 ( 2.1% )
Interrogation, Investigation, Protection/Prevention, and Attestation	43 ( 12.7% )	125 ( 37.1% )	40 ( 11.8% )
Traffic control	8 ( 2.4% )	6 ( 1.7% )	2 ( 0.6% )
<b>Total</b>	83 ( 24.6% )	205 ( 60.8% )	49 ( 14.5% )

$X^2 = 16.587$  sig. = .002

From the result, it can be seen that Field of Work has relationship with the computer competency of significance at .05. Only the work in some fields of the sample group is related with computer. A policeman who works with the computer has a higher computer skill than the one who does not work with it. If policemen are to improve their knowledge on computer skill, the office computer system has also to be developed at every police station to make it available for every policeman to use the computer occasionally. Development of the computer system is directly beneficial to their performance.

Hypotheses 6.: The difference of computer usage frequency has the difference of competency in computer usage.

Table 4.11. The Comparison of Competency in Computer Usage Classified by the Computer Usage Frequency.

Source of Variation	SS	DF	MS	F
Between Groups	9.731	2	4.865	10.158
Within Groups	159.979	334	0.479	0
Total	169.709	336	0	0

sig. = .000

From the result, it can be seen that the difference of computer usage frequency affects the competency in computer usage of significance at .05. As the old saying "Practice makes perfect" goes, the more one uses the computer, the better his skill becomes. In addition, developing knowledge excluding his routine work by being well-informed of information technology which is changing all the time will sharpen their skill that can be applied in his work.

## V. CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusions

Nowadays, technology has been advancing rapidly and it has been making a lot of changes in every aspect of it such as hardware technology, software technology, and network technology.

Computer hardware, software, and network technology can develop organizational performance. Computer hardware, software, and network selection should be based on organizational and business needs.

The information technology has rapidly changed which effects every dimension of the country development including justice management dealing with several government sectors such as the Office of National Police. The efficient justice management must be prompt, clean and fair, so it is necessary to introduce the information technology system to finish the justice procedure. The master plan of information technology system is the direction which every sector dealing with the justice procedure must be developed or improved to make it efficient. The Office of National Police is part of the crime prevention and elimination sector, so the information technology system must be improved.

So the objectives of the study are, to assess the knowledge on computer usage skills of the policemen in Pranakorn Sri Ayutthaya Province and to improve the police computer system in Pranakorn Sri Ayutthaya province. This project focuses on personnel information, knowledge and acknowledgement of the computer skills. Also the usage of the computer is included. The information of the usage of the computer from the police in Pranakorn Sri Ayutthaya Province will be collected from 2,123 persons.



Among the respondents, there are more males than female respondents. Most of them are between 31-40 years old. At Ayutthaya police station, the rank of Pol.Sen.Sgt.Maj and Squad Leader are the biggest sample groups. Administration is the highest field of work. All of them use computers mainly for their work purpose. Working on computers for report and documentation, 6 times a week is the most.

The result of the research shows that the police's computer competency on all aspects is medium.

When each aspect of knowledge was concerned, most of the police have knowledge about computer hardware. 267 persons or 79.2% know that the CD writer is used to record information on CD. On the contrary only 70 persons or 20.8% do not know about that.

From the result of the knowledge about computer software, it is found out that 76.3% of the police respondents understand that Microsoft excel is suitable for computation work. However, 23.7 in percentage do not think so.

From the result of the knowledge computer network, it is found out that 75.7% of the police respondents know that computer network is to connect more than 2 computers together with a network tool. And only 24.3 in percentage do not know about that.

From the result of the knowledge about computer technology, it is found out that 79.2% of the police respondents know that nowadays we have camera, computer and cell phone all in one device. However, the smallest sample group, 20.8% of the respondents do not think like that.

There were relationships between age, rank, position, field of work, computer usage frequency and competency in computer usage of significance at .05. On the

contrary, there was only one factor which has no relationship with the competency in computer usage of significance at .05. That factor is "gender".

## 5.2 Recommendations

### 5.2.1 Problems and difficulty in this study

For the sake of the future study, problems and difficulties which the researcher encountered are mentioned below.

It is difficult to collect all of the questionnaires which had been sent out because there was a lack of co-operation from some of the police respondents. It was not because of the fact that they were unwilling to co-operate but because their working shifts were changed around the clock. As a result, there was a delay in returning the questionnaires in time.

The time limitation is another problem and difficulty so a study plan is suggested and the time for correction about the research should be sub set.

### 5.2.2 Recommendation for Police Training for Development and Computer System in Police Department.

It is recommended that there should be an improved computer system to work efficiently and have enough computers installed for operation. Besides, the development of operation system is needed to make every field of work co-operate with each other more conveniently and speedily both within the station and others. In addition, personnel must be trained continuously for computer knowledge and skill so that they can apply it in their operation efficiently.

Both male and female should have the right to improve their computer competency because it can be seen from the result that the level of their potentiality is nearly the same.

If every age is needed to improve his computer competency for the efficient operation, the one who has low competency of computer usage should be provided with a special training program gradually and continuously.

It is essential to train non-commissioned officers who have low competency of computer usage to improve their skill for their duty.

It is necessary for everyone who must have computer competence usage in the line of his duty, so that suitable training can be arranged according his to need.

Development of computer system plays the most important role in every police station to give opportunity to officers to use the computer occasionally. They will get accustomed to it and can develop themselves to be computer literate.

It is the fact that one who works with the computer must have higher computer skill than the one who does not work with it so the more the police use computer, the better their computer competency becomes. Not only they should be well-informed of information technology, but also the assignment in their line of duty should be provided.

### 5.2.3 Recommendation for future study

This research was conducted only on the police in Phranakorn Sri Ayuthaya Province. There are many other governmental sectors in other provinces which are related with justice procedure so a study in those organizations is suggested.

The study is a quantitative research and the data is collected by means of questionnaire. For a future study, it could be qualitative so the data may be collected by means of interviews which will bring more reliable data.

For the future study, the independent variables may be about the background of the sampling group such as education, computer learning and computer experience etc. and the dependent variable would be studied in other areas which this study have not touched.





## APPENDIX A

DELIVERY SYSTEM QUESTIONNAIRE (IN ENGLISH)

**Questionnaire topic:** Survey of computer knowledge and usage of the police in Ayutthaya.

**Commentary:** This questionnaire mainly surveys the level of computer knowledge and usage of the **police** in Pranakorn Sri Ayutthaya Province as a model for further development. This questionnaire does not aim at any specific person and the information received is confidential. Thank you for completing the questionnaire.

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**Please check ( ✓ ) or fill in the provided space.**

1. Gender ( ) 1. Male ( ) 2. Female

2. Age ..... years

3. Station

( ) 1. Ayutthaya Provincial Police Station

( ) 2. Special Operation Section

( ) 3. Ayutthaya Police Station

( ) 4. Bangpain Police Station

( ) 5. Prainracha Police Station

( ) 6. Bangsai Police Station

( ) 7. Changyai Police Station

( ) 8. Ladbualaung Police Station

( ) 9. Sena Police Station

( ) 10. Marnwichai Police Station

( ) 11. Pakhai Police Station

( ) 12. Jakkarach Police Station

( ) 13. Uthai Police Station

( ) 14. Wangnoi Police Station

( ) 15. Pachee Police Station

( ) 16. Rasom Police Station

( ) 17. Tharuea Police Station

( ) 18. Paktha Police Station

19. Bangpahun Police Station

- ( ) 20. Bankalor Police Station
- ( ) 21. Maharach Police Station
- ) 22. Rongchang Police Station
- ) 23. Bangban Police Station
- ) 24. Prakaow Police Station
- ) 25. Nakornluang Police Station
- ) 26. Thachang Police Station
- ) 27. Banprak Police Station
- ) 28. Bangsai Police Station

#### 4. Rank

- ( ) 1. Pol.L/C.
- ( ) 2. Pol.Cpl.
- ( ) 3. Pol.Sgt.
- ( ) 4. Pol.Sgt.Maj.
- ( ) 5. Pol.Sen.Sgt.Maj.
- ( ) 6. Pol.Sub.Lt.
- ( ) 7. Pol.Lt.
- ( ) 8. Pol.Capt.
- ( ) 9. Pol.Maj.
- ( ) 10. Pol.Lt.Col.
- ( ) 11. Pol.Col.
- ( ) 12. Pol.Maj.Gen.

#### 5. Position

- ( ) 1. Squad Leader
- ( ) 2. Sub-Inspector
- ( ) 3. Inspector
- ( ) 4. Deputy Superintendent
- ( ) 5. Superintendent
- ( ) 6. Deputy Commander
- ( ) 7. Commander

6. Field of work

- ☐ 1. Administration
- ☐ 2. Interrogation
- ☐ 3. Investigation
- ☐ 4. Protection / Prevention
- ☐ 5. Traffic control
- ☐ 6. Attestation

7. Do you use computer in your line of work?

- ☐ 1. Yes
- ☐ 2. No (If your answer is 'no', don't answer the questions below.)

8. What is the purpose of your computer usage?

- ☐ 1. Work purpose
- ☐ 2. Personal purpose
- ☐ 3. Both work and personal purposes

9. What kind of work do you do on the computer? (please choose only one that is most applicable)

- ☐ 1. Report and documentation
- ☐ 2. Communication (Send to and receive information from other offices)
- ☐ 3. Internet
- ☐ 4. Entertainment (movie, music, game)
- ☐ 5. Others (please specify).....

10. Frequency of your computer usage.

- ☐ 1. 1-2 times / week
- ☐ 2. 3-4 times / week
- ☐ 3. 5-6 times / week
- ☐ 4. More than 6 times / week



### **Computer Hardware Knowledge**

11. Central Processing Unit (CPU) is the central information assessment.  
☐ Yes                      ☐ No                      ☐ Don't know
12. Keyboard is used to input information, such input shows on the printer.  
☐ Yes                      ☐ No                      ☐ Don't know
13. RAM is the primary memory of the computer.  
☐ Yes                      ☐ No                      ☐ Don't know
14. All computers must have the mainboard.  
☐ Yes                      ☐ No                      ☐ Don't know
15. Power Supply sends information to other computer parts.  
☐ Yes                      ☐ No                      ☐ Don't know
16. Laser printer can print better quality than dot matrix printer.  
☐ Yes                      ☐ No                      ☐ Don't know
17. CD writer is used to record information on CD.  
☐ Yes                      ☐ No                      ☐ Don't know
18. Notebook or laptop works faster than PC.  
☐ Yes                      ☐ No                      ☐ Don't know
19. Computer hardware consists of different tangible parts/materials of the computer that we assemble together into a computer.  
☐ Yes                      ☐ No                      ☐ Don't know
20. Personal Digital Assistant (PDA) eg. palm, pocket PC can be connected to Internet.  
☐ Yes                      ☐ No                      ☐ Don't know

### **Computer Software Knowledge**

21. Software is a program written in the computer language.

☐ Yes ☐ No ☐ Don't know

22. Microsoft Office is a kind of software.

☐ Yes ☐ No ☐ Don't know

23. Software can be designed according to specific usage.

☐ Yes ☐ No ☐ Don't know

24. One software can be used with only one computer.

☐ Yes ☐ No ☐ Don't know

25. It is a copyright violation to create or design your own program.

☐ Yes ☐ No ☐ Don't know

26. Microsoft word is a program used for presentation.

☐ Yes ☐ No ☐ Don't know

27. Microsoft excel is suitable for computation work.

☐ Yes ☐ No ☐ Don't know

28. All programs can be used on Windows operation system.

☐ Yes ☐ No ☐ Don't know

29. A package program is a ready-to-use program.

☐ Yes ☐ No ☐ Don't know

30. One limitation of software is it cannot be traded.

☐ Yes ☐ No ☐ Don't know

Computer Network knowledge

31. Computer network is to connect more than 2 computers together with a network tool.

☐ Yes                      ☐ No                      ☐ Don't know

32. Local Area Network (LAN) is to connect computers to the same network.

☐ Yes                      ☐ No                      ☐ Don't know

33. Different computers are connected with telephone lines.

☐ Yes                      ☐ No                      ☐ Don't know

34. Network can work only when computers are in the same area eg. same building.

☐ Yes                      ☐ No                      ☐ Don't know

35. Hub is a network device.

☐ Yes                      ☐ No                      ☐ Don't know

36. It is possible to have wireless LAN.

☐ Yes                      ☐ No                      ☐ Don't know

37. The Internet is the largest network in the world.

☐ Yes                      ☐ No                      ☐ Don't know

38. Home network is a package network ready to be used at home.

☐ Yes                      ☐ No                      ☐ Don't know

39. Telephone line is the only means to connect different networks.

☐ Yes                      ☐ No                      ☐ Don't know

40. Wireless network can only be used via authorized frequency.

☐ Yes                      ☐ No                      ☐ Don't know

**Computer Technology knowledge**

41. Wireless technology enables computer parts to make a long distance connection.

☐ Yes ☐ No ☐ Don't know

42. GPRS is a cellphone technology that allows wireless information exchange.

☐ Yes ☐ No ☐ Don't know

43. The Internet allows us to communicate faster and cheaper than other ways of communication.

☐ Yes ☐ No ☐ Don't know

44. Modern technology permits minimized parts which work slower.

☐ Yes ☐ No ☐ Don't know

45. Pentium III is the newest and fastest CPU.

☐ Yes ☐ No ☐ Don't know

46. Modern software technology can make still pictures into perfect motion pictures.

☐ Yes ☐ No ☐ Don't know

47. Nowadays we have camera, computer and cellphone all in one device.

☐ Yes ☐ No ☐ Don't know

48. It is more favorable to keep information in the form of physical document than a file on a computer because it is more convenient and it saves time and cost.

☐ Yes ☐ No ☐ Don't know

49. Thai postmen now use PDA to record information of letters and packages.

☐ Yes ☐ No ☐ Don't know

50. MK Suki uses PDA eg. Pocket PC and Palm to take orders and compute the bills.

☐ Yes ☐ No ☐ Don't know

51. In your opinion, should there be any improvement regarding computer system and equipment and staff training? How?

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## **APPENDIX B**

DELIVERY SYSTEM QUESTIONNAIRE (IN THAI)

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loo4um ,trwtYliivill-nli-A11150115ndfIfilaEjsui niatiluttinm.111,1011111011161111411

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1. tiAlff ( ) 1.9510 ( ) 2.11611

2. aId 

3. 1111H1114

( ) 1. fl.9'1.0pE11

( ) 2. utlyi.

( ) 3. V/1.D.aqzo1

( ) 4. Vfil.D.11111L'61.1

( ) 5. rff1.0.115 61-alf511f1

( ) 6. rff1.0.9J1111/15

( ) 7. Vf1.191.411114f1j

( ) 8. V1f1.0. 1fllrdcllM1

( ) 9. ffil.D.M1.41

( ) 10. Vffl.A.11151978

( ) 11. ffi1.D.rlf1114

( ) 12. c11ll.A.f151/f

( ) 13. dll.D.9:VIEJ

( ) 14. M1.0.5'11100

( ) 15. ca fl.ea.f111f

( ) 16. M1.91.511d11

( ) 17. vli.a.viiga

( ) 18.

( ) 19. VID.O.1J1111'011'W

( ) 20. Vii1.0. 111,111 &

( ) 21. M1.0.111411195

- ( ) 22. d/1.91.151411
- ( ) 23. V1/1.0.1J111J1f
- ( ) 24. Vf1.91.1A1U;T1'3
- ( ) 25. V/1.0.1105110'31
- ( ) 26. V/1.91.1(f19'11
- ( ) 27. r(f1.0.111111,1115f1
- ( ) 28. 'C 6.0.111141E1

#### 4. Elff

- ( ) 1. V.91.91.
- ( ) 2. rf.91.1(1.
- ( ) 3. V1.91.0.
- ) 4. .V1'91.
- ) 5. A.A.
- ) 6. 5.91.91.
- ) 7. 5.91.11
- ) 8. 5.91.0.
- ( ) 9. 11.91.91.
- ( ) 10. 11.91.11.
- ( ) 11. 11.91.0.
- ( ) 12.110.91.91

#### 5. 91111111411111

- ( ) 1. N11.1111
- ( ) 2. 501V155915
- ( ) 3. r(15'7915
- ( ) 4. 501016'11
- ( ) 5.
- ( ) 6. 5016171h1115
- ( ) 7. 6171411615



6. V10111.4

- ) 1. ฐรการ
- ) 2. สอบสวณ
- ) 3. สืบสวณ
- ) 4. ป้องกัณปรามปราม
- ) 5. จราจร
- ) 6. พิสูจน์หลักฐาน

7. Vind141114t1011iNADil3D111

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- ( ) 2. 1,1114 ( 611,8Dfl " 11114 " )

8. 14111141114f1DIJ13TVIDIrilaflilV11410

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- ) 5. 6119 (11.15fl5,1\_1).....

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- ( ) 3. 1`19111 5-6 /
- ( ) 4. till 114 1.11f1f1T1 6 flil / li110111

## Computer Hardware

11. Central Processing Unit (CPU) is the brain of the computer.

( ) ( ) ( ) 13.1 ymu

12. Keyboard is an input device used to enter data into the computer.

( ) ใช่ ( ) ไม่ใช่ ( ) 111151

13. RAM (Random Access Memory) is used for temporary storage of data.

( ) ( ) ( ) 1,1 jy151v

14. Motherboard (Mainboard) is the central circuit board that connects all components.

( ) 6 ( ) ไม่ใช่ ( ) ไม่ทราบ

15. Power Supply (PSU) provides electrical power to the computer components.

( ) ( ) U1.111f ( )

16. Laser Printer is a type of printer that uses a laser beam to create text and images.

Dot Matrix Printer is a type of printer that uses a series of dots to create text and images.

( ) ( ) ( ) 13.1117-u

17. CD Writer is a device used to burn data onto compact discs.

11 ( ) ( ) 13.1111-ni

18. Notebook (Laptop) is a portable computer that can be used anywhere.

(PC)

( ) 131N ( )

19. Computer Hardware refers to the physical components of a computer system.

Software refers to the programs and data that run on the hardware.

( ) ( ) ( ) 131115-ni

20. Personal Digital Assistant (PDA) is a small, handheld device used for personal information management.

Palm OS is a mobile operating system developed by Palm, Inc.

( ) ไม่ใช่ ( ) ไม่ทราบ

f111481101119.111111H11A1141i01^1911/14 (Software)

21. clfDIAIrritt'3i' (Software) ;I'D I1J511f151Jilt9IE.114f130f11111111f1DIA 31001

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22. III If1511DIAIli'DOTITAIV (Microsoft Office) fled cISMAITittli'llcal 1111

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24. 9SMAIcuitt'15111-41111514151.1 V111M11-1111101qi111111f1101f1D1A 11ADMILIE111411111011,1111-111

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26. iihhtnnIllin5TMAilft V0 (Microsoft word) riluithtm5L1411144 uniniiraualicu  
(Presentation)

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27. Ilhttf1511111f151SMAW1Df1411 (Microsoft excel) 111111141111T11f1514111141111f115f111nill

( )1i ( )1111i ( )11.11/5111

28. TihttfMarithhtn53JrnlInIfigall4ilinniinidiTifinilafli (Windows)

( )11 ( )13711; ( )ไม่ทราบ

29. i1J5ttf1511i111 111cilli1J511f151.11AI?01.11911114

( )19i ( )1371i ( )ไม่ทราบ

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46. rirfl11141a41141sMAITitni<sup>1</sup>Vfik111131 VIDJ17015114f111111 14a11416cillaTIAltflADVIIIITVIIDLI  
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47. UII\_T14141f1IIIITaGUOf1D1, altdillia<sup>1</sup>TD1f103J1<sup>1</sup>%91Di<sup>1</sup> LiMal<sup>1</sup>f1IIII6691D1I1/154431060  
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48. fliStt11191DLINTIALDflff15d119 iitd11141A9411.4tDflff15111flfYil f1141.1111,7:111,11111114h111.1  
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49. 9:df15fliflOUNITVIDi<sup>1</sup>llf11/11<sup>6</sup>U1419411 DEillcULD (PDA) 111149:11115flificiclati1115116171910T1C1  
1.1111114sluniAcuEUmpuolfrnimovanuttmAimi

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)13.1m-rn

50. 1A111,fl 1.111,f11D1c1;itD (PDA) DüllvIDfltf1O MI (Pocket PC) 1,M2<sup>1</sup>, 1114<sup>3</sup>,1 (Palm) 11114114  
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51. Y11,1F1A 15',111f1DIATVIDi111fft11`11011/11A (15'1J1111,"M',11Jf15Uff1DI111'MIDi 5 Mt111115  
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