IT UTILIZATION IN PUBLIC ORGANIZATIONS AND ITS IMPACT ON JOB PERFORMANCE

By

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Title of Dissertation	**IT Utilization in Public Organizations and Its Impact on Job Performance**
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Abstract

This research attempts to study the status of IT utilization in Thai public organizations as well as to use the concept of fit in contingency theory to test a model to measure the effects of three sets of fit: (technology-individual attitude fit, technology-task fit, and technology-organizational structure fit) upon job performance.

Also, this research explores the outputs of the three sets of fit which would affect job performance of IT personnel in public organizations. In addition, this study attempts to compare the three sets of fit to determine which one has more influence in explaining job performance of IT personnel.

The study employs the descriptive research method. The study sampled 530 IT personnel in two public organizations: the Revenue Department, and the Customs Department. Data were obtained through questionnaires. Percentage, correlation, and multiple regression analysis were adopted for data analysis.

The results of this research confirmed the assumption of the study that information technology used in the studied public organizations at this moment fit with individual attitude, task and organizational

structure, and these three sets of fit determined the job performance of IT personnel. Within the three sets of fit, technology-individual attitude fit was the most influential factor of job performance; and technology-organizational structure fit was the least influential factor.

The study found that the three sets of fit produced six important outputs which were significance predictors of job performance. They are job satisfaction, commitment, reduced role stress, timeliness of data, formalization and communication.

The policy implications that have been proposed are that the studied public organizations need to adapt themselves to utilize IT to achieve improved job performance. There is also need to employ many management concepts to gain individual performance as well as to gain organizational effectiveness. Furthermore, various process reengineering strategies are required for the studied public organizations. In addition, the essential elements of quality, and compatibility of data need to be focused to make the organizations' operations more efficient and effective. Implementation of IT utilization policy will likely be strongly supported because people in the organizations are willing to accept, and to cooperatively implement IT.

In addition. the guidelines for future research for IT utilization in organizations have been proposed.

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CHAPTER ONE

INTRODUCTION

1.1 PURPOSE OF THE STUDY

The purpose of this study is to develop and to test a theoretical framework for explaining the effect of information technology (IT) utilization upon job performance in Thai public organizations. The main assumption is that for information technology to have a positive impact on the job performance of the individual in the organization, the technology must be a good fit with the individual's attitude, the task he/she performs and the organizational structure. Each of these "fit" will provide the essential consequences, when technology fits with individual attitude, it will create and increase job satisfaction and commitment; meanwhile, it will decrease role stress. The outputs of technology and individual attitude fit will magnify job performance. In addition, when technology fits with the task, it will generate quality data, compatible data and timely data. As a result, these outputs will also make job performance increase. The last fit is technology and organizational structure fit; this fit will contribute to formalization, decentralization of task decision-making and better communication. All of the three outputs from technology including organizational structure fit, will lead to increases in job performance.

This research attempts to employ the concept of fit in contingency theory to explain the effect of three sets of fit ; technology-individual attitude fit, technology-task fit , and technology-organizational structure fit, and examine whether the output of all these fits impacts individual performance. The research also studies each output in each set of fit to determine the job performance of IT personnel.

Thai public organizations were selected for this study because the concept of IT utilization in the Thai public sector in order to increase organizational productivity, performance and improve quality of public services has seldom been mentioned,-especially the study of technology and its effect on people at work. This research attempts to study the impact of technology on both the technical and social system of IT personnel in Thai public organizations.

With the importance of IT, most public organizations are now seriously interested in utilizing IT for their operations. Therefore, to provide a background for this study, the next section will briefly define the terms of technology and information technology. Next, it will describe the scope of IT utilization. The final section will present the importance of IT and national development.

1.2 TECHNOLOGY AND INFORMATION TECHNOLOGY

1.2.1 Definition of Technology and IT

There is little agreement as to the exact meaning of technology. A general definition with some measure of acceptance is that technology is the means by which an organization transforms inputs into outputs.

Some researchers have confined the term "technology" to equipment and apparatus while others, such as Woodward (1965), considered it to be the collection of plant, machines, tools and methods available at a given time for the execution of the production task. Dosi (1984) defined technology as "a set of pieces of knowledge, both practical and theoretical, know-how, methods, procedures and physical devices which incorporate such knowledge", while Gillespie and Milet (1977) suggested that technology can be defined as "the type and patterns of activity, equipment and material, and knowledge or experience used to perform tasks".

From these perspectives of modernist organization theory, technology is typically defined in terms of its:

"... 1. physical objects or artifacts including products and the tools and equipment used in their production;
2. activities or processes that comprise the methods of production;
3. the knowledge needed to develop and apply equipment, tools, and methods to produce a particular output..." (Hatch,1994).

More specifically, technology can be defined as the techniques or processes used to transform labor, knowledge, capital, and raw materials into finished goods or services .

The term information technology or IT is also broadly defined as "the collection of computer hardware and software, networks and related telecommunications capabilities, and peripheral office automation

equipment that enables an organization to manage its information-related resources" (Cash,1992, Leavitt,1985). IT would, therefore, include a wide range of new and old technologies, from microelectronics, computers, facsimile, software, databases, satellite technology, cellular telephone, optical fibers, to HDTV, interactive multimedia and video-on-demand (Vongpanitlerd,1996). It is inclusive of all computer technology brought into the service of information systems, such as management information systems (MIS), decision support system (DSS), executive information systems (EIS), geographical information systems (GIS), and artificial intelligence (AI).

Nowadays, the scope of information technology is changing. At the start of this decade, people generally accepted that information technology was about computers. By the end of this decade the distinction will have become blurred. For many, telephones, fax machines and stand-alone personal computers will be things in the past. The rapid growth of service like the Internet will bring information and communication to the individual, wherever they may be (Jones,1999).

IT in this research can be defined as the integration of computer hardware, software, data and storage technology, networks and human resources required to operate equipment in order to collect, process, store and distribute information to support the management process.

1.2.2 Scope of IT Utilization

IT is widely recognized as an essential tool for enhancing the competitiveness of the nation and for national economic and social development. It brings about a historic period of technological change.

Both public and private sectors are realizing the potential of IT utilization in products and services management , wealth creation and better quality of life. The scope of IT utilization is summarized in table1.1

Table 1.1 IT Applications

Economic Sector	Social Sector
■ Agriculture ■ Forestry ■ Fishery ■ Mining ■ Oil and Natural Gas ■ Construction ■ Manufacturing ■ Servicing ■ etc.	■ Administration and Governing ■ Public Services ■ Data and Information Services ■ Public Health Services ■ Education ■ Disaster ■ Natural Conservation ■ Natural Resource Management ■ etc.

Source : TDRI. 1993. The Role of Information Technology in the Information Society in the Year 2010. TDRI Journal (October) : 5.

Even though IT utilization has a wide scope in both the economic sector and the social sector, Thailand does not fully utilize IT for development. When considering the criteria of IT utilization in economic and social development which is one of the criteria of national competitiveness, Thailand was ranked thirty-third from forty-seven nations. The United State was first, while Singapore placed second; Malaysia was ranked twenty-fifth (International Institute for Management Development-IMD,2000). When viewing the whole

picture by employing the criteria of science and technology for national competitiveness, Thailand was in the lowest rank (forty-seventh). This information indicated the difference between IT utilization in Thailand and its neighbors as well as the lower performance of our country in utilizing new technology to respond to economic and social development and also to enhance national competitiveness.

At present, technology has had a profound impact on the competitiveness of nations. The world competitiveness yearbook 2000, stated,

"...Today, infrastructure cannot be considered only in the traditional terms of roads, trains, harbor facilities and even airports. Technological infrastructure is becoming a key for the future competitiveness of a nation. The availability of cheap and efficient telecommunication systems, connections to Internet, are just few of the new technological priorities of nations that want to compete. Therefore, the priority of competitive nation is to develop the new technological infrastructure and strive to be on the leading edge of future development..." (IMD,2000).

IT development in Thailand was formally started in 1992 , when the National Information Technology Committee (NITC) was founded to oversee the policy aspects of information technology development and deployment in Thailand. The National IT policy has been approved by the government and was part of the Eighth National Economic and Social Development Plan (NITC,1995).

In order to successfully implement the IT policy at the most basic level, the country must first have the physical infrastructure - the so called information superhighways and access roads - to transport information in the coming Information Age. Secondly, Thailand also need a population capable of generating and utilizing the information and knowledge via the National Information Infrastructure (NII) to the fullest extent possible. And finally, there is a need for investment in good governance which aims to enhance government services through the use of IT. This is also very important because the ultimate objective of IT utilization in the public sector is to provide more responsive and effective services to all Thai citizens (NITC,1995).

In viewing the three main basic levels , all of them seem to be very difficult goals to achieve due to the poor state of the country's economy.

However, the government has attempted to invest and encourage the capable public organizations to develop their IT utilization plans and government will support the feasible plans, especially a plan that will provide better public services to Thai citizens.

1.3 IT AND NATIONAL DEVELOPMENT

IT plays an important role in national development in both developed countries and underdeveloped countries. Even though IT does not play an obvious role in manufacturing and trades in underdeveloped countries, it performs an outstanding role in social development and in improving the quality of life of people, especially in providing public

services (education, public health, etc.). It is also has significant impact in administration and in natural resources utilization to achieve sustainable development.

1.3.1 Roles of IT in Economic Development

IT development and economic growth share a crucial relationship, IT in its many forms and applications, is a vital part of the infrastructure of economic growth. The rapid diffusion of IT throughout the economy for more than three decades made the IT industry the largest manufacturing industry in the world. The estimate of world market for computer equipment, both hardware and software, telecommunication and other peripheral was 1,600 billion US dollars in 1994; its growth rate has been about 20 percent each year (McLaughlin,1996).

Developed countries consider that IT is a key aspect of economic growth. The Japanese government announced, "Key aspects of economic growth will be based on the emergence of information technology and communication policies that are likely to sustain Japan as a global power"(Anderson,1995).

In addition there is strong evidence to believe that the industrial world is now in the process of a technological revolution of enormous scale. This will entail significant changes in many production activities and will pervasively affect almost all aspects of social and economic development. IT is playing a prime role in this process. In the industrialized world, billions of dollars are being invested to develop the new technology. It is a given that IT can generate significant productivity and quality gains (Chantramonklasri,1994).

IT can be used directly and indirectly in all fields of the industrial sector, an example of direct use is in electronic firms and automobile firms. These companies can exploit computer-aided-design (CAD) technology which enables designers to use computers in place of drawing boards. (Senker and Senker,1992). Apart from manufacturing firms, at present the growth in the use of IT in financial and business services has been more rapid than in manufacturing. In the service sector, IT can be used directly in the core process and also used as an important tool in storing and retrieving information for other activities such as research and development, marketing, planning and organizing to achieve organizational effectiveness.

Therefore, it can be concluded that the investment in IT will effect the economic development of each country both directly and indirectly. A study of 11 countries in the Asia-Pacific region which included the developed countries, the newly developed countries and the developing countries between 1983 - 1990, found that IT investment was closely correlated to the growth of GDP (Ministry of University Affairs,1990).

In the case of Thailand, the economic growth from the late 1980's to 1996 was impressive. The country was in a state of transition from a traditionally agro-based economy to more industrially-oriented one. Despite the economic success at that time, there were still questions about the country's long term ability to sustain economic growth. The fact is that throughout Thailand's industrial development, there has been a strong reliance on imported technology (Chantramongklasri,1994). Without substantial efforts to develop

indigenous capability in technology to support economic development, Thailand now face a major economic and social crisis . The most important challenge for Thailand is to be able to recognize the limitations of its past pattern of science and technology development, especially the recognition of the importance of IT for economic development.

1.3.2 Roles of IT in Social Development

It is not only the economic sector in which IT plays a vital role in upgrading public and private sectors effectiveness, but IT can also be used as a tool in social development in order to achieve a better quality of life.

Developing countries and underdeveloped countries have learned the lessons from developed countries; that IT can bring great consequences to social development. It can be used in the social development process as follows :

1) IT and Educational Development

Lifelong learning is a necessity for every human being, and education is the key to the advancement of society. IT has the potential to facilitate both. The application of IT has rapidly expanded opportunities for distance learning and distance education. In addition, the content of the best libraries in the world are now available to anybody with a computer and a modem. These virtual libraries are more dynamic, user friendly, and mobile.

Apart from this, the impressive advance of the most popular network "the Internet" also brings the promise of learning and education to all people in every country.

In case of Thailand, the government declared 1995 as the IT year of the nation. One of its goals was the promotion of the usage of IT in education. But the major obstacle was the lack of a nationwide telecommunication infrastructure, the lack of equipment, both hardware and software (appropriate software for Thai students) and the lack of qualified teachers. Furthermore, the promotion process of IT usage in education also brought the problem of corruption in purchasing computers for governmental schools throughout the country. As a result, IT year of the nation was merely a year that catered to some IT exhibitions and other minor issues such as the essay contest on an IT topic. Furthermore, it could not achieve its goal of promoting IT in education.

2) IT and Public Health Development

Medicine has long been known as a field that embraces and exploits new technology, and this trend shows no signs of slowing down. Telemedicine is an important example of how the application of IT continues to advance public health. By connecting patients to doctors electronically, a patient in a remote area can access a specialist who may be physically located on the other side of the country. In addition to simple applications such as the sharing of records and X-ray images, current and future systems enable surgeons to conduct a surgical procedure from a remote site (Viriyavetchakul,1994).

Telemedicine can occur only in the most developed countries, such as USA or Japan, which have a sophisticated and intelligent network. In the case of a developing country like Thailand, it seems to be impossible in the near future. The only attempt that Thailand can make is to create a "Health Information Highway" through which patients can communicate with their doctors or medical centers to ask for health advice, and medical information via computers and telephones (Viriyavetchakul,1994). Again, the insufficiency of IT infrastructure, especially the telephone lines, is the great hindrance in using IT for public health development.

3) IT and Environmental Development

Many developing countries have been using IT for environmental development. Organizations such as the Environmental Systems Research Institute (ESRI) develop and implement systems, called Geographical Information System or GIS, which are used for a variety of resources management activities. These systems can be used for environmental policy planning , for surveying and for collecting natural resource information etc.(Pequet and Bacastow, 1991)

Many agencies in Thailand, both public and private sectors, already use GIS for their operation. For example, the Department of Land Development uses GIS for soil and agriculture research, the Communication Authority of Thailand uses GIS for site allocation, and Thailand Environment Institute uses GIS for environmental research (NITC,1995). But the major barrier is the lack of qualified technicians who have appropriate skills in this technology. Therefore, in order to

achieve the long term success of GIS as a tool in helping to solve the country's environmental problems, Thailand should sharpen the GIS technological skills to overcome present and future environmental problems.

From the details above, IT is determined as a critical factor in economic and social development. One can conclude that, if exploited fully, IT can open up a whole world of new opportunities to spread wealth and distribute social benefits to every corner of a country. But among the beautiful promises of IT, lies a darker side. If the country is not well-prepared, IT can pose threats and create new kinds of social ills, like violation of personal privacy, computer crimes, threats, blackmail, information overload, cultural domination, or alienation. The proliferation of pornography on the Internet only serves to remind us of the negative side of technology (Vongpanitlerd,1996).

In addition, any strategies for IT development must be geared with a firm goal in mind that, it should reduce the gap between the information "haves" and "have-nots" not to widen it. IT development could widening the education gap between the rich and the poor, those that have computers and computer access and those who do not. As well, the better educated segment of the society will gain the most benefits from the use of IT, whereas the city-poor and the rural residents are more likely to be left behind (NECTEC,1998).

1.4 SIGNIFICANCE OF THE PROBLEM

One of the major objectives of IT utilization in the public sector is to increase organizational productivity and performance, and improve the quality of public service. Unfortunately, the Thai public sector has not yet achieve that goal because of bureaucratic problems. The Thai bureaucracy can be blamed for inefficiency, red tape, excessive formalization, and low quality of public services, which reduces the effectiveness of IT utilization.

There are external forces such as globalization and world competitiveness; these forces lead to the necessity of utilizing IT in the public sector in order to solve the bureaucratic problems and to enhance the performance of public agencies. IT utilization can :

1. Reduce direct labor costs for manual tasks and the associated overhead costs for management, support and facilities. Therefore IT will improve efficiency of government agencies.

2. Improve quality of public service because IT will provide quicker response, reduce errors and improve accessibility of information. IT will improve public service by enabling civil servants to move on to more value-added, knowledge-based functions.

3. Enhance competitiveness by providing timely, economical and accurate information for both the public and private sectors.

With regards to IT utilization in the public sector, most studies focus on the investment in IT facilities, especially in equipment, hardware, software and IT infrastructure, and while research into the

technical side is growing, there have been relatively few studies into the human side.

Furthermore, when considering the rapid growth rate of IT utilization and its impact in the workplace, work conditions and new ways of working, there have been relatively few studies . Actually, IT has made huge impacts in the workplace. It plays a crucial role in all aspects of organizational activity from top-level corporate strategy to administration, production, service and human resources. IT also impacts organizational structure, process, goals, work design, day-to-day behavior, etc. Unfortunately, previous studies have consistently overlooked the need to consider relevant theoretical frameworks, especially those that emphasize the impact of IT on individual job performance in the organization.

Organizations around the world spend over $ 1 trillion each year on information technology in order to increase job performance (Albrecht and Cortada, 1998). Therefore individual job performance is very important. One of the objectives of IT utilization in public organizations in most countries is to provide better public services to their citizens, and the provision of better service is related to the importance of enhancing individual job performance of public employees. Therefore the performance issue in the public sector will be an increasingly crucial issue for every government (APS,1996).

Therefore, this study employs the essential theme in organizational theory that the successful performance of the organization is the outcome of a proper "fit' or alignment between an organization (its management processes, structure, and strategy) and its environment

(Van de Ven and Drazin,1985), most contingency theory on organization- environment relations is based on this proposition.

This study highlights the importance of various "fits" in explaining performance impacts of the individual in the public organization. It attempts to employ the system perspective of fit to explain the relationship among technology and task characteristics, individual attributes, organizational character and job performance. It will also indicate which set of "fits" has the most influence on job performance.

1.5 MAJOR OBJECTIVES OF THE STUDY

This dissertation has four major objectives :

1.5.1 To study the status of IT utilization in Thai public organizations.

1.5.2 To test a model to measure the effects of the three sets of fit upon job performance.

1.5.3 To describe the outputs of the three sets of fit (technology-individual attitude fit, technology-task fit, and technology-organizational structure fit) which would affect job performance of IT personnel in public organizations.

1.5.4 To compare the three sets of fit to determine which one has more influence in explaining job performance.

1.6 SCOPE OF THE STUDY

The scope of this research can be identified as follows:

1.6.1 This research mainly studies the factors that have an impact on the job performance of IT/personnel in public organizations which joined in the national project called "GINET" (Government Information Network).

1.6.2 This research focuses on the job performance of IT personnel who perform tasks by utilizing IT as a tool to complete their work, they are IT operators and IT users in public organizations.

1.6.3 This research is mainly based on quantitative research. Therefore, the research results are deduced from inference of the characteristics of the samples in the study.

1.7 LIMITATIONS OF THE STUDY

This study integrated quantitative and qualitative methods of research to enhance the understanding of the concept of fit in contingency theory to explain the job performance of IT personnel. Qualitative method was used at the very first stage of research design to examine and provide the rich explanation of phenomena mainly the organization culture which has an effective on the success of IT utilization in organizations. Then the conceptual model was developed after this stage which made the research model a more comprehensive and powerful model in explaining and interpreting the research results.

However, the results of this research are limited due to some sampling and data collection issues.

1.7.1 Sample

There were some limitations which might be a threat to internal validity, which was that the sample consisted of operational users and few first line supervisors and managers. Within this sample, some have been using information systems for a short period of time and have little experience in information technology even though they were in one of the advanced departments in IT utilization.

1.7.2 Data Collection

This study is cross-sectional in design, so it does not directly investigate changes over time. Therefore, certain precedent or historical events may inevitably confound the results of the study.

1.7.3 Measurement

This research was mainly based on the measurement of the subjects' perception, evaluation judgment and attitudes on the issue of interest. The subject's expression may to some extent distort the configuration of reality.

Job performance in this study was measured by perceived performance because objective measures for performance were unavailable and it was incompatible to measure across individuals with different task portfolios.

1.7.4 Generalizability

Since the research was a field study, it provided higher external validity than experimental and quasi-experimental designes (Kerlinger,1986). However, sample selection can be a threat to external validity. For instance, only one government agency from six government ministries in the "GINET" project which was involved with economic development, was selected for the study. This was to control exogenous variables and because of budget and time constraints.

Therefore, external validity in this study was limited due to the inability to generalize to other related public and private organizations. This was because the tasks and environments of other organizations differ from the selected agencies. Therefore, while the model may be extended to other organizations, the result may differ.

Within the four limitations, this study clearly shows that attitude toward tasks and task characteristics itself should be an important consideration in designing an information system. Different organizations and different work units within the same organization face different levels of uncertainty. Therefore the information processing requirement should fit with individual attitude, the nature of the task and its structure.

1.8 DEFINITION OF TERMS

In order to facilitate a better understanding of this study, some of the terms used are defined below :

1.8.1 Job performance refers to the level of productivity on several job-related behaviors and outcomes. Job performance in this study is evaluated on seven factors, they are : 1) quality of work; 2) quantity of work; 3) timeliness; 4) efficiency; 5) job knowledge and skills; 6) judgment ability; and 7) adaptability.

1.8.2 Technology-Individual Attitude Fit is the degree to which information technology is matched with work-related attitude. The best match between technology and individual attitude will generate high job satisfaction, high commitment and reduced role stress.

1.8.3 Technology-Task Fit is the degree to which information technology is congruent with the tasks that an individual performs. The right fit between technology and task will provide high quality, compatible and timely of data.

1.8.4 Technology-Organizational Structure Fit is the degree to which information technology is consonant with organizational structure. The appropriate fit between technology and organizational structure will bring high formalization, high decentralization of task decision-making and better communication.

1.8.5 IT Personnel refers to one who performs tasks by utilizing information technology as a tool to complete his or her work. IT personnel is classified into two groups; they are IT operators and IT users. IT operators are personnel who work in information or computer centers , IT users are general or end-users.

1.9 ORGANIZATION OF THE DISSERTATION

This dissertation is organized into seven chapters. The first chapter provides an overview of the scope and background for the study. It includes the scope of IT utilization and the importance of IT and national development in order to point out that IT can generate economic growth as well as to enhance quality of life. It also states the significant of the problem, the objectives, the scope and the limitation of the study.

Chapter Two presents the literature on IT and public sector in both the advanced countries group and developing countries group. The status and problems of IT utilization in the Thai public sector is also discussed, along with IT utilization and organizational effectiveness. Chapter two also presents the impact of IT on the organization and the individual in the organization.

Chapter three reviews the theories of technology and performance, starting with contingency theory and the concept of fit. Models of contextual factors and organizational outcome, and models of technology and job performance are presented. Then the strengths and weaknesses of previous models are discussed.

Chapter Four proposes a model for this study; research variables are defined and hypotheses are specified.

Chapter Five describes the methodology used in this study which included the research sample, data gathering, measurement, and data analysis.

Chapter Six presents the survey sample and general characteristics of the sample along with data analysis and research results.

The Final chapter focuses on a discussion of the results, recommendations and implications for future research.

CHAPTER TWO

INFORMATION TECHNOLOGY AND THE PUBLIC SECTOR

This chapter attempts to explain the importance of information technology and the public sector by reviewing the literature on IT and public sector in both the advanced countries group and the developing countries group. It also presents the relationship between IT utilization and organizational effectiveness. Next, the status and problems of IT utilization in the Thai public sector are discussed. The last section is concerned with the impact of IT on organizations and individuals in order to link the understanding of IT utilization and its impact with theories of technology and performance in the next chapter.

2.1 IT AND THE PUBLIC SECTOR

The public sector is distinguished from private sector by fact that

"... making profit and maximizing shareholders value is not the main objective of public sector organizations, and that the continuity of public sector organizations does not depend upon outperforming competitors. The existence and continuity of most public sector organization is, however, not self-evident. Though they do not depend on profit or shareholder value for their survival, public organizations also face a strong pressure to minimize their costs and to maximize the quality of their services..." (de Loff,1996).

The concept of IT utilization in public organizations to increase organizational effectiveness and improve quality of public services has seldom been mentioned in the past. But rapid technological change is creating opportunities for all governments, whether they are advanced countries such as USA., Canada and Japan or developing countries such as the Philippines, Malaysia and Thailand. In addition, opportunities to utilize IT for national development and to serve their citizens creates chances for governments to deliver public services in ways that are more accessible, responsive and affordable (Venugopal,1992).

The primary processes of most public sector organizations are very information intensive or contain information processing only. Handling requests for social benefits, maintaining the land registry, and even political decision making, are essentially information processes (de Loff,1996); therefore the demand for information products and services is expected to grow. These trends place pressure on the governments to strengthen administrative capability generally in order to exploit IT application (Venugopal, 1992). Many governments began to reinvent themselves by using IT to improve the way they administer their business and deliver their public services (Tricker,1996).

The next section describes some examples of IT utilization in the public sector- lessons from both the advanced and developing countries groups.

2.1.1 Advanced Countries Group

Most of the countries in this group, have a strong commitment in using IT as a tool for their economic growth and social development. They put more investment in IT and have appropriate IT policy. More importantly, most of them have already passed through the process of reinventing or reforming their public administration by utilizing information technology. For example, in the USA the period of 1970-1990 was a period of intensive investment in IT. The Reagan Administration in that period adopted a policy of computerization as an alternative to federal employment growth and as an expression of its "government as business" ideology, an inheritance of the progressive tradition of good government (OTA,1986).

Another example of advanced countries that pay more attention to utilizing IT in public administration, particularly in public services, is Canada. The Government of Canada is focused on the potential of IT to stimulate economic growth while reducing the cost of Government. It believes IT can increase the level of service delivery to the public. The government realized that people were disappointed by, and irritated with the poor quality of services provided by many public institutions. To correct this, the government developed several policies. One of its policies was "ACCESS Canada". The main objective of "ACCESS Canada" was utilizing IT to rationalize operating costs, and provide more responsive and effective services to all Canadian citizens. IT aimed to improve quality and program delivery for the full range of government services, from health and education programs, to social and environmental programs. Another objective of this policy was to

improve individual Canadians' accessibility to government information and services and provide more open communication between citizens and government officials (ACCESS Canada,1993).

Australia is another example of a country that has passed through the process of government reformation. The Government of Australia made recommendations directed at making information technology a more efficient and effective means of achieving the objectives of the government. It was found that there was room for reform in how the government used IT to develop policy and conduct its administration. One of the IT policies is to improve the public service. The argument was that the government needed to develop a service vision that puts clients first. Government services must be affordable, accessible and responsive directly to clients. (GISPB,1995).

This advanced countries group has its own potential to utilize information technology because they have clear and continuous IT policies, their governments and their private sectors have a strong will and effective coordination in utilizing information technology to achieve the developmental objectives. Also, they already have appropriate IT infrastructure throughout their countries. In addition, they have qualified personnel in utilizing and developing information technology.

2.1.2 Developing Countries Group

The developing countries group here refers only to the countries in Southeast Asia and Pacific region, including Singapore, Malaysia, and the Philippines. These countries have some common characteristics closely resembling Thailand. Among these countries, Singapore seems

to be the most successful country in IT utilization. The Government of Singapore pronounced its vision of becoming an Intelligent Island in early 1992 and developed a policy named IT 2000 (Joo,1995).

From the World Competitiveness report in the year 1999, Singapore was ranked as the second most competitive country behind the U.S.A. because of its people, pro-trade government policies, and support. Singapore has enjoyed an advanced telecommunication infrastructure with island-wide ISDN availability since 1989, and computer literacy amongst employees in Singapore was ranked second highest in the world. (IMD,1999). Singapore also had a public service computerization program like the advanced countries group. The primary goal of this program was to increase the efficiency and effectiveness of the civil services through innovative application of IT. It can be stated that Singapore has leaders who have vision and have a strong intention to use IT as its developmental tool. Singapore also has an appropriate IT infrastructure as well as qualified citizens. Therefore in the area of IT, Singapore can move faster than any other country in this region.

Malaysia was another country in this zone that saw the proliferation of computers in the public sector. It focused on the issues of acquisition and usage, standards, and human resource development for IT, It also emphasized more effective utilization of computers, development of public services through the use of IT and IT industry development (Venugopal,1992). Malaysia is another example of a country that has been quite successful in utilizing IT in the public sector

because of the vision and strong will of its leaders, coupled with successful IT policy implementation.

In the case of the Philippines, the status of IT utilization is quite close to Thailand. Both of the countries declared its IT national year. The year 1995 was IT national year of Thailand, and 1996 was IT national year for the Philippines. The pace of IT utilization in the Philippines was slower than Singapore and Malaysia because of the lack of IT infrastructure, especially the telephone lines. Also, its IT policy implementation was not complete due to lack of leadership and the financial status of the country.

Most investigations into IT utilization in many countries, starting from advanced industrialized countries , newly industrial countries, and developing countries, focused not only on the power of IT in improving government administration, but also the role of IT in providing better public services to their citizens and how their people could gain the maximum benefit of IT.

There are many factors that determine successful IT implementation in those countries. The foremost factor was the strong determination of the countries leaders to set up an IT policy and attempt to implement it to achieve the national goals. The obvious examples referred to earlier were Canada and Singapore. These two countries have shown a commitment to use IT to serve their administration as well as to serve their people.

2.2 IT UTILIZATION AND ORGANIZATIONAL EFFECTIVENESS

Organizational effectiveness is one of the focal point in organization theory. Heffron (1989) states,

"... organizational effectiveness has been and remains the central theme of organizational theory and behavior. From Max Weber to the most recent culture, power and motivation approaches, as well as organizational effectiveness had emerged as unifying concepts underlying the disparate and conflicting approaches to the study of organizations. The unity shatters, however, over definitions of effectiveness and its determinants. Although dictionaries define *effective* as producing the intended or expected results, there is no agreement on what the intended results of organizations are or should be..." (Heffron,1989).

Pfeffer and Salanick (1978) defined organizational effectiveness as "an external standard of how well an organization is meeting the demands of the various groups and organizations that are concerned with its activities" (Pfeffer and Salancik,1978).

Extensive work has been done in attempting to define and measure organizational effectiveness. Steers (1975) reviewed the organizational effectiveness literature and noted a distinction between univariate and multivariate performance measures. He compared seventeen multivariate models in the literature and found a lack of consensus about what constitutes a useful and valid set of effectiveness

measures and very little overlap across the various approaches (Campbell, 1977;Goodman & Pennings,1977). Cameron and Whetten (1983) asserted that no single, universal model of effectiveness is possible. Based on Steers (1975) analysis, he identified eight general problems in assessing organizational effectiveness, which were:
"(1) construct validity; (2) criterion stability; (3) time perspective; (4) generalizability; (5) theoretical relevance; (6) multiple criteria; (7) precision of measurement; and (8) level of analysis".

However, many researchers attempted to propose the method and indicators in measuring effectiveness. Campbell (1977) provided an extensive list of criteria measures or variables proposed in the literature as indices of organizational effectiveness. Such factors as overall effectiveness (general evaluation by a knowledgable judge), productivity (can be measured at individual, group, and total organization) and efficiency were identified as valid indices. The thirty separate criteria that have been used as measures of organizational effectiveness are summarized and grouped by approach in Table 2.1

These criteria are derived from social values, and as social values do, many of the criteria conflict. Robey (1982) concludes, "Effectiveness is a multidimensional concept, and the criteria do not necessarily correlate. Consequently, no organization can be effective on all criteria" (Robey,1982).

Since building organizational effectiveness is the ultimate outcome of all organizations. Robey (1982) emphasized the need for organizations, as well as researchers, to adopt a theory or model of

Table 2.1 Organizational Effectiveness Criteria

GOAL APPROACHES	HUMAN RESOURCE APPROACH
Achievement emphasis	Job satisfaction
Productivity	Motivation
Efficiency	Morale
Profit	Value of human resources
Quality of services/products	Training and development
Planning and goal setting	Absenteeism
Goal consensus	Turnover
Internalize of organizational goals	Accident rates
Readiness	Role and norm congruence
INTERNAL PROCESS APPROACHES	SYSTEMS APPROACHES
Control	Stability/maintenance
Conflict/cohesion	Growth
Managerial interpersonal relation skill	Flexible/adaptation
Managerial task skills	Utilization of environment
Information management and control	Evaluations by external actors
Participation and shared influence	
POLITICAL APPROACHES	OVERALL EFFECTIVENESS
Responsiveness	
Accountability	
Representativeness	
Constitutionality	
Adherence to democratic values	

Source : Adapted from John P. Campbell, " On the Nature of Organizational Effectiveness", in Goodman and Pennings, New Perspectives on Organizational Effectiveness , San Francisco : Jossey-Bass,1977.

effectiveness. They must know the mission of the organization and the organizational objectives for each process or task in order to measure effectiveness.

Because of the importance of organizational effectiveness, both public and private organizations have attempted to achieve it. Since one of the major objectives of IT utilization in public sector is to increase organizational effectiveness in terms of productivity, performance and quality of public service, the Thai public sector has long been interested in public organizational effectiveness. The following sections will discuss the necessity of improving public organizational effectiveness and the concept of "organizational effectiveness improvement projects" which is the background of this study.

2.2.1 The Necessity of Improving Thai Public Organizational Effectiveness

The Thai government has attempted to reform the bureaucratic system by searching for many appropriate management concepts such as re-engineering, total quality management, or result-based management etc. The agency who handle this issue was the Office of Civil Service Commission (OCSC). Since 1974, the Office has been assigned to initiate the reform of the Thai civil service. The reform program for the Thai civil service is complex and comprehensive. Also it involves different actors in the implementation process. The OCSC has concentrated its reform efforts to carefully selected areas perceived as of particular importance for the development of an effective and

efficient civil service. One of the important projects established, was the Organizational Effectiveness Improvement project (OCSC,1998).

2.2.2 The Concept of the Organizational Effectiveness Improvement Project

The main concept of the organizational effectiveness improvement project is as follows:

When considering the necessity of the need for improving public organizational effectiveness and performance, one must consider both internal and external factors that lead to the need for improvement.

For internal factors, it was found that the Thai bureaucracy was inefficient and ineffective in terms of :

1. A lack of concern about cost-effectiveness, goals, and standardization of work because the government supports the entire budget. The public organization can not die. Therefore, the members work for their organization because of duty, not for the survival of the organization. As a result, civil servants do not have the concept of ownership;

2. The bureaucratic system has complex rules, regulations and many complicated work procedures which made the practitioners waste their time examining and referring to many sources. This leads to confusion between "end" and "means". Therefore most of bureaucratic work were tedious and boring for the civil servant involved;

3. There is lack of management direction and tools to make the public service more efficient and effective.

External pressure came from other private and public organizations in other countries. These organizations attempted to review their basic principle and redesign the new process to achieve improvements that can be measured in terms of cost, expenses, quality of service and convenience. They did this by focusing on customers' need and satisfaction and reinventing new work processes by emphasizing results rather than focusing on rules, regulations and internal activities. The above concept is the concept of result-based management.

Result-Based Management has been developed due to the economic crisis in the Western World where resources available for public services were decreasing. In the past, the public sector put more emphasis on the input, that is the resources allocated to different public service organizations and on the activities, such as what is happening within the organizations in terms of meetings, planning etc. But Result Based Management shifted the focus to the results, outputs or outcomes of public organizations. Result-based management was introduced because it was believed that it was a good way of improving the performance of the public sector (OSCS, 1998).

The above events were contemporary phenomena that occurred in accordance with the globalization and shifting paradigm in modern management. Many countries, including the United States, Canada, Sweden, Australia, New Zealand and Japan are successfully employing various management concepts including Result-Based management to improve the performance of public organizations. Therefore, Thailand

has to change and improve the bureaucratic system in order to compete with other countries.

2.2.3 The Methods for Improving Thai Public Organizational Effectiveness

The improvement of public organizational effectiveness in the sense of OCSC's project combined many management concepts; they are :

1) Result-Based Management (RBM). OCSC's project employed RBM which is a set of method and techniques developed to facilitate efficiency and effectiveness in the public service. RBM is based and focused on results, such as output and outcome, as the key concepts. Management deals with functions such as planning, controlling, motivating, and communicating. RBM is used as a management tool when carrying out these functions. As RBM puts emphasis on results, it puts less emphasis on the ways to achieve the result, i.e. rules and regulations. In this method, output and outcome of public organizations should be measured by the satisfaction of their customers. These indicators should tell the level of public service quality.

2) Re-engineering . The project also used the re-engineering concept in some processes by redesigning some processes and retooling, which is the concept of re-engineering.

3) Total Quality Management (TQM). The changes occurring from result-based management and re-engineering will lead to the concept of total quality management. Therefore, the project also employed the concept of TQM.

4) Information technology (IT). This project also employed IT to improve the efficiency and effectiveness of public organizations (OSCS,1998).

After integrating the above concepts, the model of public organizational effectiveness was created and a search began for the best practice in the process as well as the creation of benchmarking in order to measure and compare the level of effectiveness and efficiency.

Of the methods in improving public organizational effectiveness, IT was considered an important factor in performing work, in changing the systems and in work processes. IT was also considered as a factor that determined organizational efficiency and effectiveness. This was the main concept in this research which attempt to prove that IT utilization will determine and increase individual performance and thus will lead to organizational effectiveness if there is a good fit among technology, task, individual work-related attitude, and organizational characteristics.

Before entering into a discussion of the concept of fit which will determine the performance of individuals and, hence organizational effectiveness, the status of IT utilization in the Thai public sector must first be discussed to lay out the background of how public organizations adopt, adapt or use IT as their tool to increase organizational effectiveness.

2.3 STATUS AND PROBLEMS OF IT UTILIZATION IN THAI PUBLIC SECTOR

Some decades ago, when mainframe computers became commercially available to the world, the Thai government was a clear leader in utilizing IT. The explicit example was the installation of the first two computers in the Department of Statistics, Faculty of Commerce, Chulalongkorn University, and in the National Statistics Office, in the year 1963. This marked the beginning of computerization in the Thai public sector.

After the rapid growth in computers, the government established the National Computer Policy and Management Committee in 1977 to look after the projects concerned with computers. Unfortunately this committee caused great delays in considering new projects so it was abolished in 1983. Later, in 1984, the National Computer Committee (NCC) was established. Its main responsibility was to formulate policy and approve all computer plans and projects submitted by government agencies. NCC also created a delay in approving government projects so it was abolished in 1992.

In the same year, the National Information Technology Committee (NITC) was established to be the central IT agency. NITC was responsible for formulating IT plans and played a supporting role for IT promotion and IT development.

According to the Regulation Authority in the " Promotion of IT Development in 1992", the National Electronics and Computer Technology Center (NECTEC) served as NITC's secretariat and

operated under the Science and Technology Development Bill of 1991. NECTEC is responsible for three aspects of technology development. First, it oversees the building of IT knowledge in the country through research and development. Second, it looks after creating technology for public use, such as the School Net project. Finally, it cooperates with private companies to build technology prototypes for commercial application (NECTEC,1992). One of the main responsibilities of NITC and NECTEC is to promote IT utilization in the public sector. At present the state of IT utilization in the public sector has slipped far behind the private sector in all counts.

In the report of the National Science and Technology Development Agency (NSTDA), it was stated that at present the government sector's investment in IT is extremely low and uneven in hardware, software and peopleware. This is specially true in peopleware , where, in 1995 only 25% of all IT manpower was in the government departments and state-own enterprises while the other 75% was in the private sector (NSTDA,1995).

In addition, the state is experiencing considerable IT manpower braindrain to the private sector. Apart from the problem of IT investment and IT manpower, the state also faces many problems concerning IT utilization. These problems are as follows :

Research by NECTEC in the year 1992, " The Determination of Promoting Public Sector in Computer Utilization" (NECTEC,1992), found that the Thai public sector has utilized computer for more than three decades. However, the computer systems have been developed separately in each agency which leads to the problem of redundancy of

data and systems, the problem of connection, the problem of data-sharing, and especially the problem of under-utilization of computers. Most of the computers in government agencies were used to replace electronic typewriters. Many agencies requested funds for purchasing or upgrading to new models of computers every budget year. However they did not use the full features of those new model of computers; they just used the common features of them which made annual upgrading unnecessary. This was one of the severe problems of IT utilization. But in the time of economic boom, no one seemed to care about this excessive budgetary waste.

This study also found a serious problem occurring in both the private and the public sector. This was the problem of the shortage of qualified computer personnel. Eighty-one percent of public organizations responded that they had computer personnel problem while 67 percent and 50 percent of private organizations and state enterprise affirmed that they also faced the problem of unqualified IT personnel and a shortage of IT personnel. The other problems that public organizations, private organizations and state enterprise faced were the problems of IT executives and budgeting. They indicated that the successful implementation of IT in the organizations depended on the leadership of their executives.

In the same study, computer personnel problem can be prioritized according to its seriousness as follows:

1. The shortage of computer personnel;
2. The lack of training /coaching and providing knowledge;
3. The lack of up-to-date knowledge among computer personnel;

4. Braindrain to private sector;

5. The lack of development of computer personnel;

6. The lack of appreciation of the value of computers by executive; they could not use a computer, and they had a problem communicating with computer personnel.

In order to promote computer utilization in the public sector, the NECTEC research suggested that the government should have the following measures :

The first period - To promote computer utilization in general work (1992-1995).

The second period - To increase the effectiveness of work by using computer (1992-1996).

The third period - To exchange information among government agencies via electronic media (1994-1997).

The fourth period - To have full computer utilization in all government agencies (1997 onward).

At present (1999), most government agencies are in the first period, which is to promote computer utilization in general work. Some of them are in the second period. An example of the later group is the Customs Department with the EDI (Electronic Data Interchange) project which will make a lot of changes in the custom work. Another example is the Ministry of Interior with the population database project.

One of the reasons government can not promote computer utilization in the public sector, according to the measure suggested by

NECTEC research, is the economic recession in the period of 1996 onward. Therefore, most of the IT projects were postponed or abandoned.

Another research from NECTEC in 1995, called " the Impacts of Changing Technology Toward IT Manpower", found that there was an unbalanced development between IT development and IT manpower. The research also found IT personnel did not have the skills to learn and develop themselves to keep pace with the rapid changes in information technology. The fast pace of technological changes made continuous training and skills upgrading in IT a necessity to avoid obsolescence. However training of IT personnel in the government sector was about one tenth of the private sector, which was a wide gap and the gap was widening with the ever-accelerating pace of technological changes (NITC,1995).

Even though there was a problem of insufficient IT manpower, most government agencies attempted to develop many IT projects. These projects were developed to enhance government service. There are several computerization projects currently on going in many departments/ministries with the goal to enhance the efficiency of public services and administration. These include the tax computerization projects (Revenue Department), - import/export duties automation (Customs Department), population database (Ministry of Interior), labor information system (Ministry of Labor and Welfare) etc.

The recent research of NECTEC called "IT for Good Governance" indicated that, to promote "good governance" there were at least three factors to be considered: good civil servants, good

information systems and good administrative systems. It also stated that, the Thai public sector has paid more attention to the use of IT but the lack of qualified manpower and an inadequate evaluation process in utilizing IT were still big obstacles. The same study also found that the three main problems and obstacles included manpower, data, and management/services, specifically :

1. There was a lack of chief information officers (CIO),

2. there was no nation wide IT plan,

3. existing IT plans have never been reevaluated and, in some cases, are not even being followed,

4. IT projects concentrated on what to do rather than how the information system could improve the efficiency of the public sector, and

5. Technology that can help in reducing communication time and in saving money, such as Internet, was not encouraged.

2.4 IMPACTS OF INFORMATION TECHNOGY

It is important to examine the impact of technology in order to relate this concept to the theories of technology and performance presented in the next chapter.

Information technology or IT is a technology that has been changing at breathtaking rates, and this rate of change put pressure on and impacts all individuals, organizations and society.

2.4.1 The Impact of IT on Society

Some theorists and researchers are interested in studying the impact of IT on the macro level. Bell (1976) who wrote a classic account about the varied element of post-industrial trends in knowledge-based society and Toffler (1993) penned a best seller "Third Wave" in which he discussed the new technologies , particularly information technology.

Analysis of the varied impacts on societies is critical for adjusting public policy and sustaining economic growth. Many social analysts have concluded that the introduction of IT will become a major force in industrial societies. The three major trends in those societies are the impacts of aging, international openness and information-civilization which has developed a new set of patterns of human life-style (Rohlen,1992).

Lucus (1992) proposed that the impact of IT, or the order effect of IT has three distinct categories. He defined the three categories of impact as:

"...1. First order - what was the immediate impact of technology on the firm development it?

2. Second order - what was the largely unintended impact of technology looking broadly at the organization?

3. Third order - what was the unanticipated impact of technology on the industry and society as a whole...?"

At present, theorists and researchers have shifted their intention to the impact of IT on the organizations and individuals rather than studying the impact of IT at the macro level, because IT was interacted and had more influences with organizations and individuals in every-day work life.

2.4.2 The Impact of IT on Organizational Structure

On the micro level, organizational theorists seem to be more interested in the impact of IT on organizational structure and the impact of IT on individual in the organization.

In particular, the impact of IT on organizations has been recognized as far back as the early 1960s. Herbert Simon stated that "technology affected organizational structure, goals, work design, values, competition between interest group, decision making and day-to-day behavior" (Simon,1975). Furthermore, most organizations felt uncomfortable about admitting this change. Consequently, there was a term "social inertia" coined for the phenomena of institutional and individual resistance to change caused by new technologies or innovations (Keen,1981).

Organizational theorists proposed that IT has impacted on organizational structure in three main areas:

1. **The hierarchical structure has been flattened to facilitate the flow of communication.** "By 1970, information had begun to transform organizations. We soon learned that the introduction of information to the organization as a structural and organic element,

means the elimination of many, if not most layers of management" (Drucker,1985). Flatter organizations are more receptive to keeping communication open and honest. Flattening hierarchical structures through the elimination of middle managers is a practical approach to restructuring. "When employees are making decision and solving problems, middle managers become superfluous. Too often, middle managers stand in the way of progress and innovation, because their instinct is to justify their existence" (Osborne and Gaebler,1990). Through IT, executive management have ready access to technical expertise, and can make informed decisions. Responsible organizations must eliminate layers of management to benefit from information technology.

2. **The span of control is broader.** With the integration of IT, the physical proximity of subordinates to their supervisors is no longer a problem. The use of e-mail and telecommunication devices have facilitated the flow of communication so that individuals can interact any time or any place. The complexity of tasks have been simplified through the use of IT, specifically the Internet. Information, data and sources are readily available to anyone who has access to a computer terminal equipped with World Wide Web software. With IT literally at managers fingertips, they can supervise far more people than they once could, so the span of control is broader (Graham and Hay,1977).

3. **Division of labor and specialization has occurred.** Organizational structure defined how an organization divided it work(division of labor), and provided mechanisms for coordinating and integrating the work of separate organizational units (Gibson,1992). It

should be structured to accomplish the desired goal and objectives of the organization. Classical theorist felt that efficiency was the primary goal of an organization, and that a well-designed structure can promote efficiency. Dividing labor was but one aspect of organizational structuring, but has been a reality of industrial life and, indeed, has been with us since the beginning of time. It entailed separating activities and job assignments into specialized tasks. Specialization can be troublesome, because the need to coordinate activities with other departments within an organization often took a back seat to concerns of the specialists. But technology can facilitate the integration and coordination of tasks. Through advanced information technology and access to resources, employees can interact on a more cohesive level (Cohen and Eimick,1987). Therefore, IT has changed the nature of division of labor and specialization in IT-based organizations.

2.4.3 The Impact of IT on Individuals.

Introducing information technology means bringing changes to the organization. Generally individuals in the organization do not like or want changes in their normal, day-to-day procedures because it is human nature to resist change. They frequency resist change because it is perceived as threatening to some valued self-interest. Similarly, information technology change may be viewed as implied criticism, wounding employees' self-esteem. Employee may fear that their skills and abilities will be devalued and that they will be unable to acquire needed new skills (Heffron,1989). Any attempts at change, especially forced change, will surely meet with opposition. This attitude was

perhaps most prevalent among middle-level managers who deal with information flow on a broad, irregular basis, rather than technology end-users, who would normally be expected to handle detailed information daily. However, daily contact and use of IT created a completely different mind-set from those who only manage or deal with information. This is an important distinction to note that, IT end-users are important organizational constituents who can promote or hinder the implementation process (Peuquent and Bacastow,1991).

IT has many effects on individuals in the organization; therefore, in order to successfully implement IT , the major concern should be placed on the following factors:

1) Information Technological Change and Commitment

As stated above, information technology bring changes to the organization. An organization must therefore develop a commitment to change if it is to successfully implement a new technology. Individuals within the organization must see technology as being worthwhile, valuable both to them as individuals as well as to the organization as a whole (Peuquent and Bacastow,1991).

Commitment is one of the critical factors in successfully utilizing IT in any organization. Mowday, Steers and Porter (1979) found a relationship between organizational commitment and job performance and summarized positive finding of organizational commitment and job performance in two different occupational groups (hospital and retail employees). Meyer (1989) found organizational commitment to be related to supervisor ratings of job performance and promotability.

In order to fully utilize IT in any organization, commitment is one of the key factors. Employees in the organization must be involved, committed, and focus on improvement. This is the key to change. Successful implementation of IT depends on the abilities of employees and the smooth transition of staff to a new work environment.

2) IT and Role Stress in Organizations

Apart from emphasizing the development of a commitment to change in order to implement a new technology or IT, there are evidences to confirm that all kinds of technology bring uncertainty to workplaces and this also effects people in the organization. Individuals who occupy particular roles generally exhibit certain types of behaviors and adopt roles certain. They create stable patterns of behaviors in their groups, and disruptions in role relations can be stressful (Trimmer,1993).

Role Ambiguity and Role Conflict

Carayon-Saintfort (1992) found that new technology and new forms of work procedures create role stress which include role ambiguity and role conflict. He also indicated that, as the frequency of computer problems increased , so did operator's perceived workload, work pressure and stress. Previous research indicated that IT personnel have high stress because they are expected to develop perfect computer systems which must facilitate executive work and make them work faster, more effectively and more efficiently. Computer work needs personnel who have specific knowledge, high abilities and skills. There is a constant need to learn new programs because of the rapid change

of technology. Furthermore, computer personnel are always faced with the problem of relationships with other people or other agencies. IT executives frequently have problems with operators while IT operators have problem with end-users.

There is some evidence indicates that since those early, glowing-value technology days, there have invariably been tensions between the technical people charged with maintaining and programming computers, and the business managers eager to reap the benefits of computerization. IT staff members have often come to view employees in other departments as naive and ignorant with regard to computer application. On the other hand, executives or other managers evaluate IT staff as "techies with no business sense". The relationship between the IT department and the rest of the company has not been a happy one (Trimmer,1993). This situation also creates stress among IT staff.

The stresses from organization and job also occur from role ambiguity and role conflict. Role ambiguity occurs when the behaviors associated with a role are poorly defined and a lack of clarity exists about what one is supposed to do or how one should behave or perform properly. Role ambiguity is characterized by uncertainty as to expected behavior in common job situations, and it reduces performance through diminished effort and delay in taking action (Brown and Leigh,1996). Role ambiguity is also characteristic of many public sector occupations and is directly related to the vague and conflicting goals of public organizations (Heffron,1989).

Role conflict refers to phenomenon when the work expectations and requirement of two or more persons are incompatible. It occurs

when group members occupy two or more roles that call for incompatible behaviors (interrole conflict) or when the demands of a single role are contradictory (intrarole conflict). Sometimes role conflict is caused by conflicting demands imposed from external sources. Some occupational role are characterized by explicitly conflicting requirements : teachers are expected to maintain discipline, to be understanding, and to teach, police officers are expected to be polite, courteous, and respectful of constitutional rights while making arrests and fighting crime (Heffron,1989). IT staff are also expected to have advanced knowledge in new technology, to be able to solve any problems concerning with computer and to be helpful in dealing with end users or service receivers. Role conflict and role ambiguity are often created where non-technical personnel i.e. Human Resources Officers or managers create job description and requirements without fully understand the nature of IT work.

Role conflict in any organization affects both performance and job satisfaction directly and negatively (Behrman and Perreault,1984). Researchers have implied both role ambiguity and role conflict create a negative affect, lower positive job appraisals, and result in lower job satisfaction.

3). IT, and Human resource Development

When introducing IT to any organization, it is anticipated that the organizational performance will be increased. But before organizational performance can increase, individual performance should be first increased and one way to enhance individual performance is human

resource development. IT implementation is often accomplished by a dramatic change in human resource development.

This occurs for several reasons. First, new technologies can dramatically change the work environment because they are integrative and information intensive. Second, these innovations may empower workers by providing them with more information about activities in other functional areas. IT personnel acquire a significant of information power. Finally, innovation could stimulate an increase in the demand for highly skilled or highly educated workers who may be more adept at "learning" the new technology. Under conditions of rapid technological change, creating an environment that speeds up organizational learning can be a critical source of competitive advantage. Such an environment may begin with more adept employees (Cats-Barl and Thompson,1997). These arguments underscore the importance of human resource development strategies in the successful implementation of new technology (Kling,1996).

One of the key components of successful IT implementation in organizations, whether they are public organizations or private organizations, is human resource development. Many governments invested a lot of money on IT projects; and they attempted to rationalize operations and empower knowledge workers to provide better public services directly to the citizens. Therefore enhancing the knowledge, skills and active participation of IT manpower to ensure that they can meet the changing needs of clients and provide quality services is very important (Laudon,1974). The value of investing time and resources in human resource development to enhance IT employees' knowledge,

skills and abilities and of involving employees in changes must also be recognized as essential to IT utilization in any organization.

Unfortunately, little effort has been spent in training non IT employees in the uses and benefits of IT.

HRD aims to improve organizational effectiveness and individual performance by providing employees with opportunities to develop the competencies required to fulfill their current responsibilities and by helping them to pursue their career goals (Laudon and Laudon,1999).

The belief that people are the key to getting maximum performance from the organizations has led to a growing emphasis on human resource development. HR managers who are responsible for HRD strategies, especially for IT personnel, now realize that they are dealing with a group of new professionals whose career aspirations and job characteristics are unique as a result of their highly valued expertise which is subject to quick obsolescence. These professionals are under constant stress from diverse demands (Applegate et al.,1988).

In the case of Thailand, the IT project survey in the year 1994, found that the serious problem in the IT field was the lack of IT manpower both in quantity and quality which means that the shortage of IT manpower occurred in private sector as well as in public sector. In addition, IT personnel who performed work in most of the organizations were unqualified. This phenomena led to an insufficient employment of human resource development which created a problem of low productivity. As a result, the development of IT in the nation could not catch up with world economic growth and the globalization (NECTEC,1994).

In 1998, the study of "IT for Good Governance" also stated that most severe problems of IT utilization in the public sector were the lack of qualified manpower and inadequate evaluation processes in utilizing IT . This study also found that the Thai public sector did not respond to HRD seriously, IT personnel lacked adequate training in order to perform their job effectively. Also IT personnel did not have any motivation and promotion to develop themselves. These two problems of HRD were the second and third ranked among the 25 most serious problem of IT for good governance (NECTEC,1998).

From reviewing the literature concerning the impact of information technology on the organization and the individual, one can conclude that IT has impacts on organizational factors of structure and human resource development . IT also has impacts on personal factors in the aspect of job-related attitude (commitment, role stress etc.), The impacts of IT on the individual in the organization is an important issue in Information Systems theories because IT users are important organizational constituents who can promote or hinder the implementation process (Peuquet and Bacastow, 1991). IT will effect each employee in various ways such as their attitude toward new technology, their commitment, and their job satisfaction. Also IT may increase their stress.

2.5 SUMMARY

Information technology is an important tool for development. Both the public and private sectors have attempted to employ IT to accomplish their goals. At present, Thai public organizations are concerned with the necessity of improving public organizational effectiveness by employing various management concepts as well as information technology. However, when introducing new technology to the organization, it may affect the individuals as well. Therefore, in order to successfully utilize IT to increase performance, the main concern must be placed on the relationship between technology and the individual in the organization which will affect their performance. This will be discussed in chapter three.

CHAPTER THREE

THEORIES OF TECHNOLOGY AND PERFORMANCE

The purpose of this chapter is to review the theory of technology in organizations. It will focus mainly on contingency theory and the concept of fit. Next, some previous studies of technology and performance are presented along with their strengths and weaknesses in order to lay out the backgrounds of the contingency studies on technology and job performance; this will used to develop a more comprehensive model in the following chapter.

3.1 CONTINGENCY THEORY AND TECHNOLOGY

In the past decades, organization theory has taken an important step forward. Researchers have learned that a theory of organizations cannot be independent of the environments in which they operate (Lawrence and Lorch,1970; Galbraith,1973). Lawrence and Lorch (1970), argued that the internal functioning of organizations must be consistent with the demands of the organization's task, technology, its external environment, and the needs of its members, if the organization is to be effective. Basically, this approach led to the development of a "contingency" theory of organization with the appropriate internal states and processes of the organization contingent upon external requirements and member needs. This concept has been the primary theme in organization theory since then. Contingency theory states that successful

performance is the outcome of a proper "fit" or alignment between an organization (its management processes, structure and strategy) and its environment (Van de Ven and Drazin,1985). Therefore, most theory and research on organization-environment relations were based on this proposition.

However, research which focused on how organizations adapt to changing environments to produce a better "fit" had a wide difference of opinion. Nevertheless the main approach was contingency theory. Contingency theory was developed during the late 1950s and 1960s as an outgrowth of the application of systems theory to the social sciences. It was concerned with identifying the key variables and relationships that comprised different systems and with understanding the multitude of roles and defining the patterns of relationships (interactions) that contributed to the organization's ability to achieve its objectives efficiently and effectively (Newstrom, Reif and Monczaka, 1975). Contingency theorists also examined whether some organizational designs fit different environmental conditions better than others and concluded that managers should choose the design that best fits prevailing environmental conditions. Contrary to the other management schools, the contingency approach did not assume it could provide ready answers to most situations; rather it provides the conceptual framework and accompanying techniques, methods, and diagnostic tools that management could use to understand the situation, and identify contextual factors or contingencies affecting the organization and its various interest groups (Newstrom, Reif and Maczka,1975; Narayanan and Nath,1993).

Organization theorists have identified several contextual factors or contingencies that influence the internal characteristics of organizations. The crucial contingencies that have been discovered over the years were : size, environment, and technology (Narayanan and Nath,1993). Since the purpose of this study is to focus on technology, the following section will discuss the concept of technology.

Technology

As mentioned in the previous chapter, in organization theory, technology referred to "the knowledge, tools, techniques and action required to transform inputs into outputs. Technology included such things as machinery, employee skills, and work procedures" (Narayanan and Nath,1993). Just how did technology influence the internal characteristics of an organization? The answer to this question was first provided by a research team headed by Joan Woodward. Woodward stated that technology was an important determinant of the management structure. She argued that "different technologies impose different kinds of demands on individuals and organizations, and those demands had to be met through an appropriate structure" (Woodward,1965).

Contingency studies on the relationship between technology and organizational structure were supported by many researchers (Perrow, 1967; Thompson,1967; Lawrence and Lorch,1967; Galbraith,1977). For example, Thompson's work attempted to include both manufacturing and service technologies in one typology in order to correct the weakness of Woodward's work, while Perrow's work

corrected a shortcoming in both Woodward's and Thompson's theoretical assumptions which treated organizations as if they had only one dominating technology. Perrow picked up the discussion of technology from the unit level of analysis. His greater sensitivity to the number of different technologies that comprised every organization enabled him to recognize the diversity of organizational technology (Hatch,1992).

Other researchers used a contingency approach to study the relationship between technology and strategies (Newman,1972), the relationship among technology, management, and organizational output (job satisfaction, attitudes, work behavior and productivity) (Monczka and Reif,1973) etc.

From the above discussion, one can conclude that contingency theory implied that one thing was related to another. It was an admission of the highly complex and interrelated character of organizational characteristics (Kast and Rosenzweig,1985). Scott (1992) noted that contingency theory is guided by the general orientating hypothesis that organizations whose internal features best match the demands of their environments will achieve the best adaptation. The most difficult challenge here is what is meant by " best match" or "best fit".

3.2 THE CONCEPT OF FIT

Contingency theorists placed great emphasis on the common proposition that an organizational outcome was the consequence of a

"fit" or match between two or more factors; for example the fit between organization environment, strategy, structure, style and culture (Van de Ven and Drazin,1985). A "fit" was determined as the key to effectiveness; if the elements of an organization fit among themselves and with the environment, then the organization should prosper (Narayanan and Nath,1993; Van de Ven and Drazin,1985).

"Organizational fit theory" was a phrase coined by Galbraith and Nathanson (1978) to describe this search to match technology, structure, people, tasks, rewards, or other variables to achieve successful performance. Some researchers noted that a "matching", or "congruence" between certain factors did help explain organizational success and survival (Wren,1994). Others emphasized that the primary managerial role was to seek congruence between the organization and its environment and among its various subsystems. Systems and contingency concepts facilitate a more thorough understanding of complex situations and increase the likelihood of appropriate managerial actions (Nightingale and Toulose,1977).

3.2.1 The Three Approaches for Defining "fit"

As mentioned earlier , the key concept in a contingency proposition is fit, therefore the definition that is adopted is central to the development of the theory, to the collection of data, and to the statistical analysis of the proposition. Van de Ven and Drazin (1985) indicated that "in the development of contingency theory, at least three different conceptual approaches to fit have emerged, the selection, interaction, and system approaches".

The theoretical views of the selection approach is as follows. Fit was an assumed premise underlying a congruence between context and structure. In contrast, interaction approach focused on the bivariate interaction in which fit was viewed as the interaction of pairs of organizational context-structure factors on performance (Van de Ven and Drazin,1985). Fit in this approach was defined as adherence to a linear relationship between context and structure, and a lack of fit was a result of a deviation from the relationship. Deviations in any direction and at any level of context result in lower performance (Alexander,1964).

The selection and interaction approaches focused on how single contextual factors affected single design characteristics, and how these pairs of context and design factors interact to explain performance. As a result these two approaches could not present the whole picture of the organization. Therefore the third approach was required : the system approach. The system approach views fit as the internal consistency of multiple contingencies, structure and performance characteristics (Van de Ven and Drazin,1985; Child,1977).

From the discussion of the three approaches of fit, the system approach seems to be the most suitable approach in explaining organizational outcomes. As Van de Ven and Drazin (1985) concluded; "contingency studies should be designed to permit comparative evaluation of as many forms of fit as possible. The systems approach, focusing on a multivariate pattern of fits among context and design characteristics may yield the most meaningful information". Dessler (1976) also confirmed that the system approach to organization

studies has been significant for at least two reasons. First, it has stressed that the various social and technical aspects of the organization were highly interrelated and that a change in one factor usually affected other parts of the organization. Second, it stressed the interrelationship between the organization and its external and internal environment. Because of the significance and appropriateness of the systems approach, it has become one of the most used approaches in contingency studies.

3.2.2 Contingency Predictions

In research studies, the common theoretical predictions are universalistic and contingency predictions. Universalistic predictions, are simple causal statements that some variable, such as unity of command, has a direct effect on another, such as unity of direction (Fayol,1949). On the other hand, contingency predictions contain the notion of a fit, to the extent that the contextual factors and intraorganizational characteristics were contingent, the effectiveness was enhanced. For example, the fit between two variables, such as the degree of differentiation and integration, predicted a third, such as effectiveness (Lawrence and Lorch,1967). The Fiedler contingency theory of leadership, one of the most widely accepted theories of leadership, is based on the premise that fit among leader-member relations, task characteristics and leader style, would predict group performance (Narayanan and Nath,1993).

The intent to present this concept here is, to confirm that contingency variables are frequently as good as, or even better than

universal variables as predictors of organization outcome such as productivity, effectiveness or performance, and to reinforce the concept that contingency approach is well suited for the study of technology and job performance in this study.

Actually, both kinds of predictions may be important in explaining organizational outcomes (Child,1974 and 1975). But there is confirmation that contingency predictors were better than universalistic ones because contingency predictors consider the environment and variation in context variables (Dewar and Werbel,1979).

This research has attempted to employ the strength of contingency theory in terms of contingency predictors and the systems approach for defining fit among technology and internal states of organizations to predict the third variable, which was job performance.

3.3 MODELS OF CONTEXTUAL FACTORS AND ORGANIZATIONAL OUTCOMES

From reviewing the literature on the impacts of IT, one can conclude that IT has impacts on organizational and individual factors. IT is a contextual factor that affects both of them. Organizational theorists have identified several contextual factors that influence the internal characteristics of organization. The crucial contingencies in organization theory are size, environment, task and technology. The early contingency theorists postulated that in effective organizations, there was congruence between management structure on the one hand, and

task, technology, size and environment on the other. The fit among these factors would determine organizational outcome, whether they were effectiveness,, productivity or performance. For example, size inevitably led to greater bureaucracy, dynamic environments push organizations to organic forms, while technology primarily affects features of management structure close to production work flow. And when technology best matches with task, then it would determine the effectiveness of the organization (Woodward,1965; Narayanan and Nath,1993; Scott,1992).

The following section is a discussion of previous researches which employed the concept of fit between technology and internal organization characteristics such as task, structure and organization-member relations. The output between these fits would determine organizational outcome.

3.3.1 Technology - Organizational Structure Fit

Many contingency theorists have been interested in the fit between technology and organizational structure. They believe the fit between them will provide some crucial organizational outcomes such as employee satisfaction, conflict, and the productivity of individuals and organizations.

Early contingency theorists and researchers suggested that a particular structure should be "appropriate for" a given technology (Thompson,1967),that organizations were more successful when their structures "conform" to their technologies (Woodward,1965), that organizations should attempt to maximize "congruence" between

technology and their structure and adapt their structure to "fit" their technology. (Perrow,1970), and that technology and structure need to be properly "aligned".

The phrases quoted earlier, such as that structure should be properly "aligned with" technology, "consonant with" technology, "fit", and be "appropriate for" the technological circumstances, can be interpreted several ways. Therefore, later contingency researchers attempted to solve the problem of ambiguity by carefully defining the interaction between technology and other organizational variables.

In the period of the 70s and 80s, many publications attested to a contingency of scholars documenting fit relationships between technology and dimensions of structure or design in the organizational work units (Schoonhoven,1971; Fry and Slocum,1984, Drazin and Van de Ven,1985). The concern has generally been to show that the degree of fit or misfit between technology and organizational structure is related to the level of efficiency or effectiveness attained.

Many structural contingency theories were in fact congruence theories because they simply hypothesized that technology was related to structure (centralization, formalization, complexity) without examining whether this technology-structure relationship produced crucial outputs that can affect organizational effectiveness or performance of members in the organization.

However, some researchers attempted to study the fit between technology- structure and organizational outcome. For example, Dewar and Werbel (1979) studied technology-structure fit which would predict the employees' satisfaction and conflict. They choose three pairs

of fit; the first one was technology-organizational fit, the second was technology-formalization fit and the third was technology-surveillance and enforcement fit. Their results support that centralization and its fit with technology had no effect on employees' satisfaction and conflict while formalization decreased satisfaction, which indicated that the practice of specifying members' activities with rules and procedures clouded the climate of the organization. The contingency variable which had the largest effect on satisfaction was clearly the fit between technological routines and surveillance and enforcement.

From the groups of research presented above, one can conclude , the early contingency studies emphasized effective organizational structure that would lead to desirable outcomes; then, in later studies many theorists called for the application of the concept of fit to contingency theories in general, not specifically on structure . As Van de Ven and Drazin (1985) suggested a large amount of research has addressed the structural contingency theory. However, fit was the concept of broad utility that was central to an increasingly wide set of theories in organizational behavior, management strategy and policy.

Therefore, contingency studies in later years turned to focus on various contextual factors or contingencies and various organizational outcomes, which was the consequence of the fit between or among the factors.

3.3.2 Technology-Task - People Fit

Soon after, came the call for studying contingency factors fit with other organizational factors in order to move away from structural

contingency researches. Theorists such as Burns and Stalker put their emphasis on the relationship among task and people who perform the tasks in the organization. However, their concepts were still based on organizational structure. Burns and Stalker suggested that a fit between task, organization and people must exist. These theoretical assumptions emphasize that the appropriate pattern of organization was contingent on the nature of the work to done and on the particular needs of the people involved(Burn and Stalker,1961;McGregor,1960; Morse and Lorch,1965).

Morse and Lorsch (1965) used the above assumption to explore more fully how the fit between organization and task was related to successful performance. That is, did a good fit between organizational characteristics and task requirements increase the motivation of individuals and hence produce more effective individual and organizational performance? This type of research attempted to prove that the result of best fit between organizational characteristics and task characteristics can increase performance of individuals in the organization, which was the crucial output from organization-task-people fit.

From this study, Morse and Lorch found a major managerial implication-that the task-organization-people fit was a crucial fit to achieve individual and organizational performance. Although this interrelationship was complex, they suggested that the best possibility for managerial action probably was in tailoring the organization to fit the task (which includes knowledge, procedure and technology to perform task) and the people. If such a fit was achieved, both effective

unit performance and a higher sense of competence motivation seem to result. Managers could start this process by considering how certain the task was, how frequently feedback about task performance was available, and what goals were implicit in the task. The answers to these questions would guide their decisions about the design of management hierarchy, the specificity of job assignments and the utilization of rewards and control procedures. Selective use of training programs and a general emphasis on appropriate managerial style would move them toward a task-organization fit. They also suggested that the investigation of what personality characteristics fit various tasks and organizations must be studied. Even with the limited knowledge, however, there were indications that people will gradually gravitate into organizations and tasks that fit their personalities (Morse and Lorch,1965).

Morse and Lorch paid more attention to people or individual characteristics fit within the organization. Kubicek (1972) had nearly the same concept as Morse and Lorch; he focused on both the technical system which included technology they used and the social system in the organization. He studied the fitting between organization process and its internal and external environment which could predict efficiency. He paid particular attention to the capacity and expectation of the organization, its technical and social systems, and technological and competitive environment that may affect its ability to perform efficiently. The dimensions of Kubicek's model of "good fit" were the fit among the organization which included its capacity and expectation, the individual which referred to their potential and their expectation, and

the environment which meant its constraints and challenges, whether it was task, technology, size or other environments.

Another study that called for the search to match technology, structure, people, tasks, rewards or other variables to achieve successful performance was the work of Gaibraith and Nathanson (1973). Galbraith agreed that technical complexity led to structural complexity, and uncertainty promoted organic forms. These factors increase the communication load carried by an organization, which in turn, affects its structural form. Thus, technology was related to social structure through the mediating effects it has on communication, which increases demands for coordination among members in the organization.

The above studies paid more attention to people or individuals in organization as well as focused on the social subsystem in the organization. Thus they differ from the first group of contingency studies described earlier. The group of research on technology-organizational structure fit emphasized the structural or functional subsystems in the organizations. The second group of research focused on the concept of social subsystems which were very broad, complex and are defined differently in each research. For example, Kuhn (1970) and Berrien (1976) explained that social subsystem was consisted of culture, goals, values, human resource attitudes, perception, motivation, leadership, interpersonal relations etc., while Narayanan and Nath (1993) viewed the focus and components of social subsystem as, focusing on the social interaction of people within an organization. Its components, according to Narayanan and Nath were social activities, sentiments, feelings, needs and attitudes. If this subsystem had a good

fit with technology or the technical subsystem, then it would lead to organizational effectiveness, productivity and performance.

The challenge for contingency theorists was how to answer the question of, what was the appropriate fit among technology and other factors in the social subsystems in order to predict the performance of individuals and organizations?

In recent research, more theorists have paid attention to social subsystems. Even more recently, a few sociotechnical systems theorists have offered an approach to the study of technology which is named "social construction" of technology. Its view is the belief that technological artifacts were socially constructed and interpreted. Thus both social groups and technologies are generated in the contingent arrangement of the concepts, techniques, and resources brought together in the relevant technological frames (Pinch and Wiebe,1987). Proponents of this perspective argue that there is nothing inevitable about the way that technologies evolve because there was not one best way to design artifacts. Flexibility in how artifacts are designed leaves room for choice based on non-technical criteria such as cultural values, social norms or power considerations. One can conclude that theorists who subscribe to the "social construction" of technology perspective, argue that technology influences society as much as society influences technology. Since organizations are the major components in society, then technology is the major factor or major contextual factor that influences an organization and its personnel (Hatch, 1992).

Moreover, in information systems research, one of the key concerns is to understand the relationship or fit between information

technology and internal organizational characteristic to predict job performance. Goodhue and Thompson (1995) proposed a model called the Technology-to-Performance Chain (TPC), which was the assertion that for an information technology to have a positive impact on job performance, the technology must be utilized, and the technology must be a good fit with the tasks it supports.

Individuals may use technologies to assist them in the performance of their tasks. Characteristics of the individual (training, computer experience, motivation) can affect how easily and well he or she utilizes the technology (DeLone and McLean,1992). For many IT personnel, utilization is more a function of how jobs are designed than the quality or usefulness of an IT system, or the attitude of users toward using them. To the extent that utilization was not voluntary, performance impacts would depend increasingly upon task-technology fit than utilization. For example, a study involving IRS auditors found that even though they had positive attitudes toward Personal Computers (PCs) and used them extensively, utilization had little impact on performance, and even possibly negative impacts. The suggested reason for this was because PCs and their software were a poor fit to the tasks portfolios of the auditors (Pentland,1989).

Therefore, task-technology fit (TTF) is important for successful IT implementation. According to Goodhue and Thompson (1995), TTF is the degree to which a technology assists an individual in performing his or her portfolio of tasks. More specifically, TTF is the correlation between task requirement, individual abilities and the functionality of the technology.

In the previous section, the investigation of model of fit among contingency factors and organizational outcomes has been presented in order to indicate that those models mainly focus on structural or functional subsystems in the organization and a few models focus on the fit between technology and the social subsystems in order to achieve the desired outcomes. The next section will present the concept of job performance along with the outputs of technology and social subsystems that can predict job performance.

3.4 MODELS OF TECHNOLOGY AND JOB PERFORMANCE

The linkage between technology especially IT and job performance has been an on-going concern in information systems research (Goodhue and Thompson,1995). This is because IT can have an impact on all kinds of organizations and their personnel whether they are blue collar, white collar, civil servant or chief executive officer. Organizations around the world spend over $ 1 trillion each year on information technology in order to increase job performance (Albrecht and Cortada,1998).Therefore, individual performance or job performance is very important because higher performance implies some mix of improved efficiency, improved effectiveness, and/or higher quality (Goodhue and Thompson,1995) and every organization desires a high performance workforce. The ability to create, apply and extend knowledge in the workplace to achieve a high performance workforce requires the integration of work, people, technology, and information

with an organization's strategy and culture. This integrated approach will help an organization achieve its objectives and will have an impact on the performance of individuals, work teams and the total organization.

While much has been written concerning IT and job performance, defining and measuring it have proved to be difficult. Many believe that the use of IT is the key to increase individual performance, but they also feel that in practice, the promise of technology has not been fulfilled (Scudder and Kucic,1991). It is clear that many researchers have been concerned with this state of events and that they are determined to improve the situation. Models for doing this, however, were not readily available. Therefore in this section, a variety of models and their variables which have been or which are used in practice, to explain the relationship between IT and job performance, are described, together with their strengths and weaknesses. Further, an attempt is made to describe a set of variables and performance measurements which will be used in a framework for analysis in this study.

3.4.1 The Concept of Job Performance

Job performance is one of the major concepts in organizational behavior theory and information systems theory. In organizational justice theory, it is stated that, performance is strongly affected by many other factors including relations among members of work groups, the quality of leadership they receive from supervisors, and their perceptions that they are being treated fairly or unfairly by management (Greenberg,1987). In expectancy theory, people are characterized as

rational beings who think about what they have to do to be rewarded and how much the reward means to them before they perform their job. But the theory does not just focus on what people think; it also recognizes that these thoughts combined with other aspects of organizational environment to influence job performance (Greenberg,1990).

In Information Systems research, many models and frameworks have been proposed to facilitate research in IT fields concerned with job performance. Numerous variables have been suggested and have employed job performance as a dependent variable in the literature. Lucus (1975) utilized managerial "performance" as one of his dependent variables. Snitkin and King(1986)used "perceived effectiveness" of the system as a dependent variable. But they went on to note that it was particularly difficult to measure performance and effectiveness.

In social cognitive theory, Compeau, Higgins and Huff (1995) proposed a model which identifies the linkages between cognitive factors, self-efficacy and performance-related outcomes as their dependent variable. Outcome expectations in this model can be defined as the perceived likely consequences of using computers, and have two dimensions: 1) performance related outcomes are those associated with improvement in job performance (efficiency and effectiveness) associated with using computers; 2) personal outcome expectations are related to expectations of change in image or status or to expectations of rewards , such as promotions, raises or praise. They found that, self-efficacy influences both personal and performance-related outcome

expectations (Bandura,1986). Outcome expectations in this study were similar to the concepts of perceived usefulness(Davis,1989). They also suggested that, computer training has been found to represent an important means of increasing self-efficacy which leads to higher performance-related outcome expectations(Compeau and Higgins,1995; Gist et al.,1989; Webster and Martocchio,1993). This finding did not represent new ways of thinking but rather provides additional evidence for the arguments in favor of investing in computer training.

Performance Measurement

Technically, when talking about performance measurement in information technology, the focus is always on the systems performance. Performance measures of this type are useful for determining overall technical system operability, predicting the impact of proposed applications, and identifying hardware performance bottlenecks (Anderson,1984). Jones(1988) also suggested the need for multiple performance measurements that are more broad-ranging than the single one. The suggested set provides insight into many of the performance aspects of IT, it includes information on additional areas such as user satisfaction, staff training etc. Jones suggested employee satisfaction, and staff training as new factors to predict performance. Employee satisfaction can be measured through surveys. Jones argued that it was important to track levels of employee morale within the organization. He also noted that, companies which provide 40 days of staff training per staff-year show higher performance (measured by function points) than companies that provide no training.

Dickson and Wetherbe (1985) are responsible for one of the most comprehensive sets of IT and performance measures. These sets focused on five major groups of IT performance measures; they are 1) personnel performance; 2) managerial performance; 3) developmental performance; 4) operational performance; and 5) financial performance. The first set of performance was concerned mainly with personnel in the organization. Personal performance consisted of 6 dimensions: technical capabilities, business knowledge, training, replacement projections, career satisfaction, and job satisfaction.

Note that measurement of personnel performance involves the perceptions of Information Systems staff in the organization about their knowledge, skills, abilities, and attitude toward his/her job.

3.4.2 The Outputs of Technology-Organizational Variables Fit as the Predictors of Job Performance

As stated in chapter two, technology, especially IT has an effect on the individual in the organization in many dimensions such as job satisfaction, role stress, and work environment, and these factors are the crucial factors that will determine his/her performance. These factors are universalistic predictions because they are simple, causal statements that some variables such as job satisfaction, have a direct effect on another variable such as job performance, or put it in the simple way, "satisfaction causes performance" (Vroom,1964).

In this section, discussion of the crucial factors that affect job performance, reviewed in chapter two and three is picked up. These prediction factors are the outputs of technology and organizational

variables fit. This research categorized the output of technology and organizational variables fit as predictors of job performance into three groups which were : work-related attitude, system and information quality, and organization structure.

1. Work-related attitude and job performance. The first and foremost factor that affects job performance is work-related attitudes. These attitudes are important, for they often influence key aspects of organizational behavioral, especially task performance, absenteeism, and turnover. Work-related attitudes can be defined as feelings, beliefs, and behavior tendencies directed toward various aspects of work, work settings, or the people in them (Baron,1988).

Work-related attitudes in this research consists of three variables: job satisfaction, commitment and role stress.

Many models and frameworks of job satisfaction and performance have been proposed to facilitate research in the organizational behavior field as well as in the Information Systems field. Most of managers seem to operate according to the belief that "happy workers are productive workers". Is this really the case? Is job satisfaction directly linked to task performance or productivity? Some evidence suggests that this was so.

The notion that job satisfaction and job attitudes are related to job performance continues to attract organizational researchers. Early theorists (e.g. Mayo,1933; McGregor,1960; Likert,1961) implied that employee satisfaction and well-being are related to performance. The rationals to include job satisfaction in many of performance models

is the assumption that when a worker is satisfied with his or her job, they will be more productive or better performers.

In the last 40 years, a sizable portion of research in organizational and individual psychology has examined the relationships between job satisfaction and job performance in a wide variety of work situations ranging from the unskilled to managers and professionals, in diverse administrative and technological environments, using individuals or groups as the unit of analysis and employing various measures of both satisfaction and performance.

The methodologies and their findings were reviewed by Vroom (1964), and Srivastva (1975). Vroom's research from 1945-1963 indicated that among 20 correlational studies, only two studies found a strong positive correlation while the others found a weak positive relationship or no relationship between job satisfaction and performance. Most recently, the relationship between job satisfaction and productivity has begun to yield interesting results.

Srivastva reviewed the studies after Vroom's work. He included studies which were published during the 1970's and late 1960's. Among 31 correlational studies, covering a diversity of populations, a positive relationship existed between job satisfaction and performance.

From the various research studies on job satisfaction, there have been two approaches to investigating job satisfaction. In the first approach, job satisfaction was concerned in terms of a worker's general job facets. It is called a "global' measure of job satisfaction or "facet-free" job satisfaction. In the second approach, a worker's job satisfaction is conceived in terms of his or her evaluation of specific

facets of a job; this includes comfort, challenge, financial rewards, relation to co-workers, resource adequacy, and advancement (Smith, Kendall, and Hulin, 1969).

Many Information Systems theorists admitted that job satisfaction was one of the most powerful predictors of job performance. Woodruff (1990) found that job satisfaction and job performance were valued in Information Systems organizations. He studied individual job satisfaction and job performance as the outcomes influenced by perceptions of organizational practices and the underlying climate and culture of the organization. Woodruff employed three sets of independent variables to predict job satisfaction and job performance. The three sets of predictors were 1) people-oriented factors; 2) structural-oriented factors, and 3) task- oriented factors. Interestingly, neither structural nor task oriented factors impacted on job performance. He found that job performance variance was explained by three of the people-oriented factors : 1) job pressure; 2) intergroup cooperation, and 3) personal development. This finding might question the common emphasis on the structural and task oriented factors to enhance IT job performance.

For role stress, Lucus (1975) proposed a model predicting Management Information Systems utilization and job performance, it employed "use" and "performance" as dependent variables. "Personality" and "attitude and perceptions" were two independent variables. He found that personal characteristics as well as attitude and perception of IT staff role would determine job performance. In particular, role stress was predicted to decrease use and performance.

Woodruff (1990) studied individual job performance and job satisfaction as the outcome influenced by perceptions of organizational practices and the underlying climate and culture of the organization. One of independent variables that would predict job performance was job pressure, which referred to the degree to which manpower and time are inadequate to accomplish the tasks assigned for the schedule committed. Woodruff found that job pressure would decrease job satisfaction and job performance. Baroudi (1985) also provided confirmatory evidence that IS personnel were faced with the problem of role conflict and role ambiguity and both were negatively related to job satisfaction and organizational commitment. These results were also confirmed by Lysonski and Woodside (1989) that role stresses were associated with decreased job satisfaction and also decreases in individual performance.

The theoretical and empirical literature suggests that occupational stress was not a characteristic of either the work environment or the person, but was the consequence of the interaction of these two. Shirom (1982) presented the person-stress-outcome linkage among information system personnel. The work environment which consisted of job, role, career and organization are served as independent variables and determined the stress of information systems personnel. The outcomes of his model were divided into 3 groups; 1) psychological outcome; 2) behavioral outcome; and 3) organizational outcome. With regards to organizational outcome, his research indicated that stress would predict the performance of IS personnel in terms of the quality and quantity of work.

Ivancevich, Napier and Wetherbe (1983) also used the Person-Environment Fit model for information systems personnel to test the significance of some variables. Their findings indicated that seven job-related stressors(work overload, rewards, role ambiguity, career development, organization rewards, change and communication) have the most potential for being appraised as stressful in the work environment of the IS personnel.

The research about role stress in the Information Systems field has called attention to the appraisal of job-related stress among information system personnel who are, today, an extremely significant occupational group(Ivancevich, Napier and Wetherbe,1983).

2. System and information quality and job performance. The second group of factors that determines job performance especially in the IS and IT fields is the system they use. Frequently information technology is used without a full understanding of its applicability effectiveness, efficiency or performance. Information Systems managers often lack the tools they need to decide if they were engaging in the right activities (Davis and hamann,1986).

Evidence suggests that poor performance of the information system was a serious inhibitor to good business performance (Carlson and McNurlin,1992). Carlson and McNurlin also found evidence in several of the organizations they studied that high Information Systems effectiveness was associated with high organizational performance. Others reported a clear connection between assessment and productivity

(Taylor, 1994). Better use of information, both internal and external, positively related to profitability (Strassman,1990).

The importance of proper information system which can determine the performance of the organization, produced plenty of research that attempted to study the relationship between the efficiency of the information system and job performance (Carlson and McNulin,1992, Taylor,1994). Actually, most early studies attempted to assess information systems on measures of system availability and performance. For example, Borovits and Neumann (1979) described several indices of performance : capacity, response time, throughput rate and overhead percentage, reliability measures, system utilization measures, speed and availability. They and others also presented in-depth procedures for system evaluation (Ein-Dor and Jones,1985). However few of researchers really focused on the proper characteristics of information which are the output of the system. This can also determine the performance of individuals as well as the organization.

DeLone and McLean (1992) created the Information Systems success model which depicted the relationships of the six IS success dimensions which were the antecedents of individual impact. This impact on individual performance should eventually have some organizational impact. One of the six IS success dimensions was information quality. DeLone and McLean used content, availability, accuracy, timeliness, conciseness and relevance as measures of information quality, while Saakajarvi and Talvineen (1993) used content, availability, and accuracy as measures of information quality in their study of two specific marketing information systems. In the study

of the key to executive information system success, Rainer and Watson (1995) used accuracy, timeliness, conciseness, convenience, and relevance of the information as measures of information quality. These information qualities are the predictors of individual performance as well as organizational performance.

Goodhue and Thompson (1995) created a model which was consistent with one proposed by DeLone and McLean (1992). This model was called the Technology-to-Performance Chain (TPC); it is a model of the way in which technologies lead to performance impacts at the individual level. One of the major independent variables was the task-technology fit. To measure task-technology fit, there were eight components included : 1) data quality, 2) locatability of data, 3) authorization to access data, 4) data compatibility, 5) training and ease of use, 6) production timeliness, 7) systems reliability and 8) Information System relationship with users. They found strong support that the eight components of task technology fit were the predictors of performance impacts.

3. Organizational structure and job performance. The last group of factors that determine job performance is organizational structure. Many structural contingency theorists argued that organizations which have structures that more closely match the requirements of the context (size, technology or environment) were more effective than those that do not. The structural variables presumably affected by these context variables were those emerging from a Weberian (1947) conception of organizational structure : the size of the administrative component, the

degree of centralization, and formalization within the structure. The concern had generally been to show that the degree of fit (or misfit) between organizational structure and context variables was related to the level of efficiency or effectiveness attained. A bulk of the research has examined one feature of context at a time (e.g. Van de Ven and Ferry,1980 ; Drazin and Van de Ven,1985). Results indicated that lower performance is often related to a lack of fit between unit context whether they were size, technology, or environment and design.

Previous reviews of contingency theory have stressed the need to distinguish between predictions of context-design relationships and predictions of performance, based on context-design combinations. Context-design predictions have been labeled selection approaches, performance predictions based on them have been called fit (Van de Ven and Drazin,1985). The purposes of such performance predictions was to specify both the ideal system state or design configuration that produces optimal performance and to show that deviations from this ideal state, i.e. misfit usually results in lower performance (Fry and Smith,1987).

Particularly, there was a focus on one context variable, which was technology and organizational structure. This variable can determine the state of performance. Hage and Aiken (1969) found that organizations characterized by routine technology were more centralized and more formalized. It was clear that routine technology permits rules and formal procedures to be developed and implemented because how to do the job was well understand. In addition the job was repetitive enough to justify the investment in system procedures and forms.

Schoonhoven (1981) studied the relationships between technology, structure and organizational effectiveness. He suggested that this relationship was more complicated than contingency previously assumed. The three dimensions of organizational structure he focused on were rules and procedures, decentralization of decision-making, and professionalization of the work force. He found that when technology had greater certainty, there was a greater positive impact on formalization and on task decisions which lead to effectiveness of the organization.

This group of research, especially the structural contingency research, tended to focus more simply on the fit between organization context (technology) and organizational structure (formalization, centralization etc.) to explain performance.

3.5 STRENGTHS AND WEAKNESSES OF THE CONTINGENCY MODELS LINKING TECHNOLOGY AND PERFORMANCE

Generally, the purpose of contingency models linking technology and individual performance is to help improve managerial and individual performance through the effective use of technology. Many researchers attempted to propose factors that can significantly explain or predict the level of individual performance. From reviewing literature, the contingency approach seems to be a proper approach to predict and explain the relationship among technology, organization and job performance. The strength of this approach is that, it allows and encourages practitioners and managers to be flexible regarding

organizational solutions. Managers have to be pragmatic rather than rule-bound because the contingency perspective upholds the notion that there are no absolutely good or bad management style or organizational practice. In addition, the contingency perspective is useful if managers treat it as an orienting strategy and augment it with a theory of change (Narayanan and Nath,1993) because it will provide alternative ways for managers to solve the management problems.

But the contingency perspective also has limitations. One of its limitations is that, contingency theorists have primarily focused on variables that are associated with the functional subsystem in organizations. They had little to say about other subsystems - such as informational, social, or cultural subsystems, therefore, the previous contingency models cannot provide a complete picture of an organization.

The limitation of the contingency perspective, especially the neglect of other subsystems in the organization, is that it can not provide the whole picture of the organization. This research study attempts to remedy this limitation by providing various variables which will fit with the internal states and subsystems of the organization. As a result, these variables can explain or predict job performance better than the previous ones.

From reviewing literature it can be concluded that there were two perspectives in explaining the model of IT and job performance. The first perspective proposed that technology-organizational structure fit has a strong relationship with individual performance. The second form of fit is technology-task-people fit. In the previous research, these

perspectives were studied separately and most of the them focused on one feature of context at a time such as technology uncertainty and design structure.

Therefore, this research proposes a third perspective by integrating the two forms of fit in order to develop a comprehensive model consisting of three sets of fit: technology-individual attitude fit, technology-task fit, and technology-organizational structure fit that can thoroughly explain and predict the level of job performance.

3.6 SUMMARY

Contingency theory is the main theory that can be used to explain the relationship between technology and performance. Therefore, the assumption of this study implies the core concept of contingency theory that, the successful performance is the outcome of a proper fit between technology and other organizational variables. Therefore, the concepts of fit among technology, structure, task, and people in previous studies are presented as well as the concept of job performance and the output between the various fit of technology and organization variables as the contingency predictors of job performance.

CHAPTER FOUR

RESEARCH VARIABLES AND HYPOTHESES

4.1 Conceptual Overview

This chapter describes the conceptual framework of the research for examining how IT utilization affects job performance. The conceptual framework derived from the literature review states that IT utilization which refers to particular information system used in the organization has impacts on IT personnel in terms of their job-related attitude, their tasks, and their organizational structure, and these impacted variables will be the predictor of job performance. This concept is combined with the concept of fit in contingency theory. Therefore the analysis of conceptual framework suggests that there are three main sets of independent variables. These are technology-individual work-related attitude fit, technology-task fit, and technology-organizational structure fit. These three sets of fit are the predictors of job performance of IT personnel in public organizations. Job performance is treated as a dependent variable (see figure 4.1).

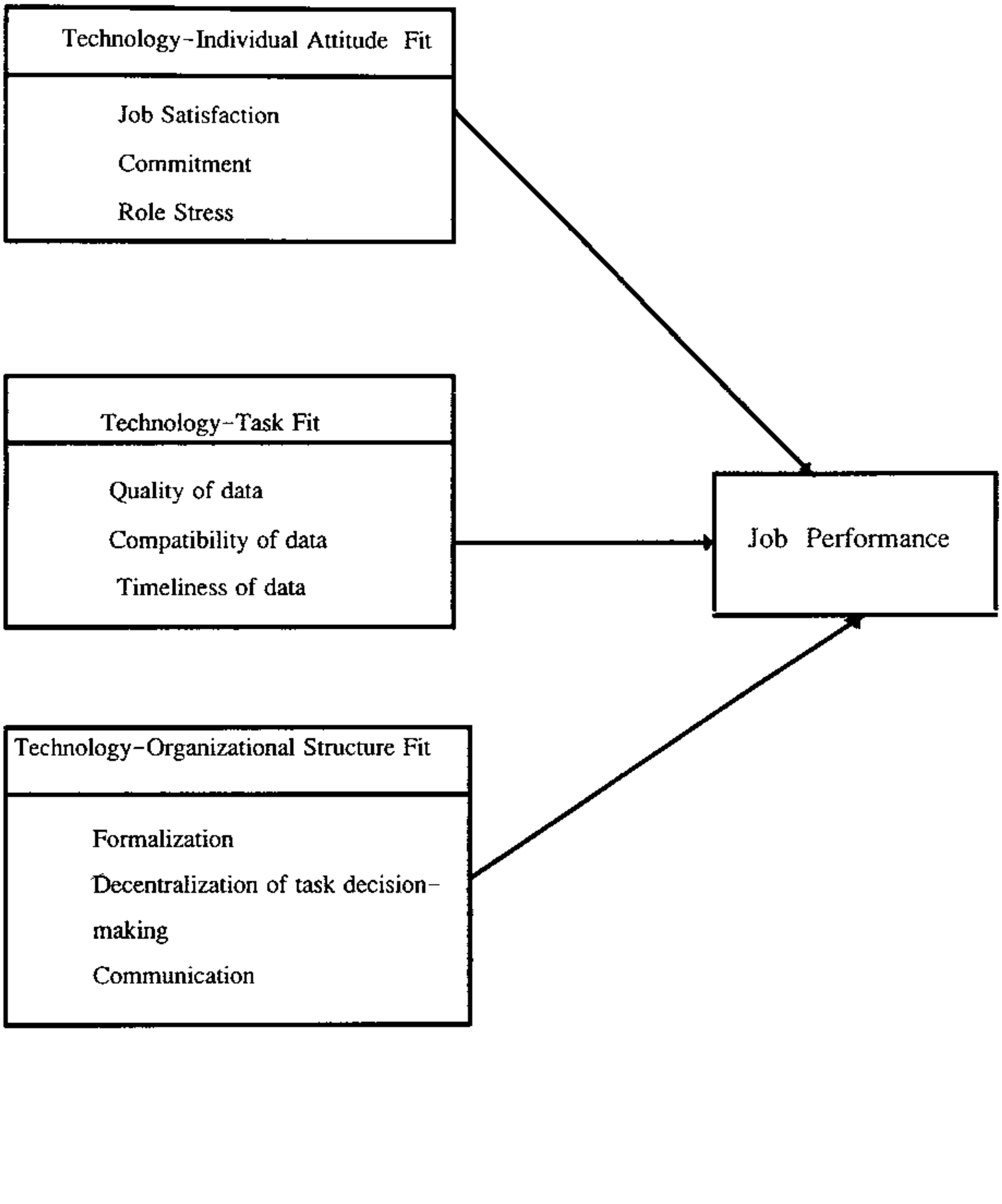

Figure 4.1 Conceptualizing the information technology utilization and its impact on job performance

The assumptions of this research are as follows

1. When technology fits with individual work-related attitude, it will provide job satisfaction, commitment and remove role stress, which will help employees perform better; hence his or her job performance will increase;
2. When technology fits with the task, it will provide quality of data and information, compatibility of data and information and timeliness of data, information, and outputs, which will assist an individual to perform tasks better; consequently, his or her job performance will increase;
3. When technology fits with organizational structure, then it will create formalization, decentralization of task decision-making and also provide better communication. All of these outputs will increase job performance of individual in the organization.

The overall conceptual framework has two important issues to consider： the reasons for selecting three sets of fit, and the relationship between variables. The variables in this framework are derived from contingency theory, by employing the concept of fit which stated that an organizational outcome (in this case, job performance) is the consequence of "fit" , as reviewed in chapter three.

The essence of this framework is the assertion that for an information technology to have a positive impact on job performance, the technology must be a good fit with the work-related attitudes of the people in the organization, the characteristics of the tasks they perform

and the characteristics of the organization in order to enhance the level of IT personnel performance.

This research model is consistent with research studies in technology-individual-task and organizational-structure fit using contingency approach, conducted by many organizational theorists and researchers (Morse and Lorsch,1970; Lucus,1975;; Ives, Hamilton, and Davis,1980; Mawhinney & Lederer,1990; Goodhue and Thompson,1995; DeLone and McLean,1992). The model suggests that technology-individual attitude fit, technology-task fit and technology-organizational structure fit, all lead to individual performance impacts. This research model goes beyond the previous models of technology-individual- task - organization fit in two areas.

First, it highlights the importance of various fits in explaining performance impacts. It is necessary to consider multiple factors or organizational variables that match or fit with technology in order to build a comprehensive model that can explain the relationship among these factors and job performance.

Previous contingency studies using the concept of fit to explain or predict the level of job performance had some limitations; the first one is that they focused mainly on structural or functional subsystems and neglect to examine other subsystems (Narayanan and Nath,1993, Woodward,1965, Van de Ven and Drazin,1985). The conceptual framework in this study attempts to fill the missing part by adding the crucial factors in other subsystems to the framework. These parts include attitude and perceptions of employees as well as interpersonnel relations in a psychosocial subsystem. Within the functional or

structural subsystem, this framework focused strictly on the tasks, work flow, rules and procedures, decision-making and communication which are the major characteristics of IT work. This study will use a different view in focusing on structural subsystems, because most of the previous contingency research focused on design dimensions which determined the pattern of organization, whether they are a mechanical or an organic pattern. In this research, the structure of public organizations, which are the units of study, have the same formal characteristics; therefore the design dimensions of organizational structure are omitted from this study. As a result, this study will emphasize the structural subsystem of the organization in terms of task, work flow, procedures, decision making and communication instead of the general concept of dimension of organization structure which was used in other studies.

The other focal point of this research is that it is an effort to avoid the problem of the selection and interaction perspective of fit in contingency theory which focuses on single factors affecting single desired outcomes or pairs of variables interacting to explain performance (Child,1977; Van de Ven and Drazin,1985). This conceptual framework employed the system perspective of fit to explain the relationship among multiple contingencies, organization characteristics, and individual performance characteristics.

Much organizational research used causal relationships to explain the dependent variable e.g. satisfaction caused performance, strategy determined structure and performance. These kind of research studies disregard the situational factors which also have a strong effect on organizations. Therefore, after examining various research studies that

employed universalistic predictors to explain the level of job performance, this study attempts to build up these predictors to be contingency predictors by adding technology which is the situational factor in the relationship.

Consequently, this conceptual framework is more explicit concerning the links between the variables, providing a stronger theoretical basis for thinking about a number of issues relating to the impact of job performance. It is integrating the multiple "fit" from both organization theory researches and Information Systems research to fulfill the limitations of organization theory.

Second, this conceptual model will be a successful model to predict job performance because, it choose specific independent and dependent variables with theoretical rationales linking them. For independent variables, it does not use just context, structure and outcome variables conveniently at hand but uses various variables derived from functional, psychosocial and managerial subsystems in the organization . For the dependent variable (job performance), it is chosen because there was a well-founded theoretical expectation that job performance would be influenced more by aspects of social system as well as technical system along with the situation of the organization.

The above discussion intends to describe the reasons for selecting the variables and the relationship between them along with the limitation of contingency theory and the limitations of previous research concerning with the concept of fit among contingency factor, structure and organizational outcomes. It also proposes that new model explains the relationship of the three sets of fit and job performance.

The following sections are the discussion of the dependent and independent variables. Also, the details of the hypotheses of this study are presented.

4.2 DEPENDENT VARIABLE : JOB PERFORMANCE

When talking about performance, it implies the fit between two things; for example, the performance of human resource development programs, refers to how well the organization's HRD is performing in terms of improving the fit between the individual employee and the job. The performance of information systems, refers to how well the organization's information system is performing in terms of improving the fit between the system and the job to provide a useful database, automating routine clerical operations, assisting managers in making routine decisions, and providing information necessary for strategic decisions, etc. (Wheelen and Hunger,1995).

In this study, job performance refers to individual job performance; it implies the fit between the individual and the job the individual performs. Job performance also refers to the level of productivity of an individual, in several job-related behaviors. It refers to outcome and how it was affected by work-related variables including satisfaction, commitment, role stress and human resource development (Locke,1976).

It is important for managers and executives to focus on both activities that generate the performance (behavior) or on actual

performance results (outcome), because outcome measures serve the needs of the organization as a whole, whereas behavior measures serve the individual manager in determining and improving the employee's job performance (Ouchi and Maguire,1975).

From the above definition and the importance of job performance, job performance in this study is defined the same as Locke's definition which was "the level of productivity of an individual on both work-related behavior and outcome".

Since performance impacts from IT are difficult to measure directly, job performance is measured by perceived performance impacts. This study must use perceived performance because objective measures for performance are unavailable in this field context and job performance an incompatible measure at individuals with different task portfolios.

Woodruff (1990) ascertained that organizational practices, as perceived by individuals comprising information systems professional groups (i.e., system analysts, programmer analysts, programmers, and operation personnel), were related to job satisfaction and job performance. He proposed eight dimensions of Job Performance Characteristic Traits :

1. Quality of work, that is the characteristics of output that enhance the usefulness to the recipient. The employee had direct control over output and there was minimum of subsequent rework of the output.

2. Quantity of work, which refers to the volume of useful output associated with the employee's job assignment. Output was of sufficient

quantity to satisfy the requirements of the job assignment over which the employee has direct control.

3. Judgment ability, which refers to the ability of the employee to exercise discretionary behavior to arrive at a wise decision when confronted with problem situations, often unstructured and at short notice.

4. Job knowledge and skills, which refers to those characteristics of the employee which enable the employee to sufficiently solve problems, technical, conceptual, structurally oriented, etc., which were normally encountered in the job assignment.

5. Innovativeness, which refers to the demonstrated ability of the employee to introduce something new or novel to effect a desired change to alleviate or solve problems, which were generally characterized by their uniqueness or complexity.

6. Adaptability, which refers to the ability of the employee to adjust properly and expeditiously to changing and unstructured situations, as well as problems encountered in the job environment.

7. Job initiative, which refers to those characteristics which allow the employee to undertake, without specific instructions, actions and activities deemed to be desirable in the performance of the job assignment.

8. Cooperation, which refers to those displayed characteristics of the employee to act or operate jointly with facility users and fellow workers.

Since this study uses Thai public organizations as the sample of the study, it should consider the factors or dimensions of job performance evaluation of Thai civil servants employed by the Civil Servant Commission. There were two groups of civil servants, the non-supervisory position holders and the supervisory position holders. The factors or characteristics of non-supervisory position holders to be evaluated were slightly different from those of supervisory position holders.

The factors or characteristics of non-supervisory position holders to be evaluated were 1) Quality of work; 2) Quantity of work; 3) Timeliness; 4) Performance ability; 5) Discipline; 6) Conduct and Ethics; 7) Industry and Accountability.

Moreover, the supervisory position holders have to have additional abilities in planning, organizing, staffing, directing and controlling the activities which will lead to fulfill the organization's objectives.

IT personnel were considered to be non-supervisory position holders; therefore, the first group of factors in performance evaluation is used to measure them.

However, information system work is different from other work and requires personnel who have specific characteristics. Therefore, this study will select the common factors of job performance of civil servant and Woodruff's Job Performance Characteristic Traits to create a new set of job performance factors that suit IT personnel when evaluating their job performance. Thus the new dimensions of job performance used in this study are as follows:

1. Quality of work
2. Quantity of work
3. Timeliness
4. Efficiency
5. Job knowledge and skills
6. Judgment ability
7. Adaptability

4.3 CONTINGENCY PREDICTORS OF JOB PERFORMANCE

This study is based on the assumption that there are three sets of contingency predictors: technology-individual attitude fit; technology-task fit and technology-organizational structure fit, that determine job performance.

4.3.1 Technology-Individual Attitude Fit

Individual attitude in this study refers to work-related attitude. In the Information System field, there was a lot of research that studied the attitude and reaction of individuals toward technology. Many authors have studied different aspects of the phenomenon, from a variety of theoretical perspectives, including Diffusion of Innovations (e.g. Compeau and Meister,1997; Moore and Benbasat,1991), the Technology Acceptance Model (TAM) (e.g. Davis, Bagozzi and Warshaw,1989; Venkatesh and Davis,1996) and Social Cognitive Theory (SCT)(e.g. Compeau and Higgins,1995). These research studies have produced useful insights into the cognitive, affective and

behavioral reactions and attitudes of individuals toward technology and into factors which influence these reactions. However, most of their results emphasized the behavioral aspect of individuals, for example computer self-efficacy, computer anxiety, individual effect (or liking) and computer usage. None of them studied the fit between technology and individual work-related attitude .

Technology-individual attitude fit in this study refers to the technology that assists an individual to perform his or her work. This technology must work well with individual work-related attitude and will provide three outputs, which are job satisfaction, commitment and reduced role stress.

Job Satisfaction

The satisfaction and attitudes of employees are important factors in determining their behavior and responses at work. Satisfied employees are more likely to engage in collaborative efforts and accept organizational goals that could increase productivity, whereas dissatisfied employees either may fail to work collaboratively or may work collaboratively, but divert effort away from the achievement of organizational goals (Ostroff,1992).

Job satisfaction represents an effective responses to specific aspects of job or career and denotes the pleasurable or positive emotional state resulting from an appraisal of one's job or career (Locke,1976). Previous empirical research suggested a modest positive, direct relationship between job satisfaction and performance (Brown and Peterson,1994). It was perceived as a logical correlate of

job performance, with a popular hypothesis that job performance would increase as workers become more satisfied with their work. The positive effects between job satisfaction and job performance have been reported in many works (Child,1987; Evans,1987; Guiliano,1982).

Many organizational theorists proposed many definitions of job satisfaction; for example, job satisfaction has been defined as the level of satisfaction of participants with the organization and with their jobs (Schmidt and Kochan,1972). Job satisfaction was a positive state resulting from the appraisal of one's job (Locke,1976). This study will combine the two definitions together because they are concerned with individual, organization, and job; therefore the evaluation of job satisfaction must combine the three of them.

Therefore, in this study job satisfaction is defined as a positive state resulting from the appraisal of one's job that fits with the organization's goal. Job satisfaction was measured in four dimensions adapted from Locke (1976). The reason to select the job satisfaction definition from Locke was that these dimensions are a good match with the works of IT personnel. The four dimension of job satisfaction are:

1.Comfort. Comfort represents a worker's desire for a job that provides freedom from pain or trouble. It is the "convenience" dimension of job characteristics which includes pleasant physical surroundings. Actually computer technology did not bring pain to the workers, but it brought some troubles. With the new technology, new tools, new work procedures, new skills, some employees felt threatened and anxious. There are a large number of research studies that have

documented attitudes toward computers (Bandulos and Benson,1990) and computer anxiety (McInerney, McInerney and Sinclair,1994; Koohang,1987). They found that negative attitudes toward computer, computer anxiety or the feeling of discomfort about work led to low productivity and performance.

2. Challenge. The challenge measure reflects an employee's desire to be stimulated and challenged by his/her job and to be able to exercise acquired skill at work. Challenge is an intrinsic dimension of job satisfaction which refers to characteristics associated with the task itself. It was characterized as a motivator factor in Herzberg's two-factor theory. According to Herzberg's theory, the challenge factor can influence workers to be highly productive (Herzberg, Mausrer and Snyderman, 1959).

In the IS field, Nath (1990) studied the impact of local area networks (LAN) on users and their work and found that these devices made the users' job easier, improved their skill level, and made their job more challenging. Thus, based on previous research and based on Herzberg's theory of work motivation, the challenge variable is expected to have a positive influence on job performance.

3. Relations with co-workers. This variable was characterized as a hygiene factor in Herzberg's theory of work motivation, which can not influence workers to be highly productive. However, based on the human relations theory of Elton Mayo(1933), friendly relations among co-workers was regarded as an important element underlying increased

productivity. As such, a positive effect would be produced by Mayo's human relations approach, while a zero or negative effect was predicted by Herzberg's model. Because there was no definitive research in this area, it is expected that this variable could have either a positive or negative influence on productivity or performance.

For IT personnel , there is some research which confirms that IT personnel always face the problem of relationships with other people or other agencies . Furthermore, the relationship between the IT department and the rest of the organization has not been a happy one (Trimmer,1993). Since this variable was not tested in any model which concerned IT and job performance , it is interesting to test this variable to see whether it had a positive or negative impact on job performance.

4. Advancement. Advancement was an intrinsic dimension of job satisfaction; this referred to the opportunities the job provides for a career. Based on Herzberg's theory of motivation, this variable was expected to exert a positive influence on job performance. This variable is quite an important variable for IT careers especially for IT personnel in public organizations. One of the causes of braindrain or high turnover of IT personnel in public organizations is the unclear career path and advancement in this field. Thus it is vital to find out whether the above situation is still true .

Commitment

Many models concerned with commitment, especially organizational commitment, have noted that organizational commitment

derived from many different sources. First, it is affected by several aspects of jobs themselves. The higher the level of responsibility and autonomy connected with a given job, the less repetitive and the more interesting it is, the higher the level of commitment expressed by the person who fills it is. On the other hand, the fewer the promotional opportunities, and the greater the tension and ambiguity associated with a job, the lower the level of commitment it tends to generate (Curry,1986)

Second, commitment was also affected by several personal characteristics. Older employees, those with tenure or seniority, and those who were satisfied with their own level of work performance tend to report higher levels of organizational commitment than others (Bruning and Snyder,1983).

Finally, commitment is strongly affected by several factors related to work setting such as work environment, work procedures as well as technology used to perform work.

Commitment appeared to greatly affect several aspects of work behavior and it also appeared to be linked to both effort and performance (Saal and Knight,1987). The higher employees' commitment toward their company, the greater the effort they were willing to invest on its behalf and so, in many cases, the better their performance was (Baron and Greenberg,1989).

Role Stress

There is evidence to confirm that all kinds of technology brings uncertainty to the workplace and also affects people in the organization.

Individuals who occupy particular roles generally perform certain types of behaviors in their group, and disruptions in role can be stressful. As mentioned, in the previous chapter, role stresses have two dimensions, role conflict and role ambiguity.

Much research confirms that IT personnel faced the problem of role conflict and role ambiguity and both were negatively related to job satisfaction, commitment and decreased individual performance (Baroudi,1985; Lysonski and Woodside,1989). Role stresses affected both performance and job satisfaction directly and negatively (Behrman and Perreault,1994; Good, Sister, and Gentry,1988).

Based on the discussion on job satisfaction, commitment and role stress, the following hypotheses are suggested :

H1 : 1.1) IT personnel who have high job satisfaction as a result of technology-individual attitude fit will have high job performance.

1.2) IT personnel who have high commitment as a result of technology-individual attitude fit will have high job performance.

1.3) IT personnel who have reduced stress as a result of technology-individual attitude fit will have high job performance.

4.3.2 Technology-Task fit

Technology

The context variable, or the variable that the organization, individual and task must fit according to the contingency perspective, is

the perceived routineness of technology. This study adopted Perrow's (1970) definition of technology because it deals with the perceived characteristics of tasks rather than the arrangement or type of machines (e.g. Hickson, Pugh, and Pheysey,1969). Since the contingency rationale linking the variables is based on assumptions of the participants' reactions to structure and control styles, it is important to use a definition of technology that conceptualizes it from their point of view. Definitions focusing on external observers' impressions of machines (e.g., Hickson, Pugh, and Pheysey,1969), or work process (e.g., Woodward,1965) are less likely to be relevant in a prediction of job performance. The degree of routineness of technology increases as work is perceived to have fewer exceptions and as these exceptions are better understood (Perrow,1970).

This study adopts Perrow's definition of technology; it also combines the definition of technology used in the context of information systems research, that is, technology is viewed as tools used by individuals in carrying out their tasks. These tools refer to computer systems (hardware, software, and data) and user support services (training , help lines, etc.) provided to assist users in their tasks (Goodhue and Thompson, 1995).

Therefore, technology in this study refers to the perceived routineness of technology which occurs from employing computer system by individuals in carrying out their tasks.

Tasks

Tasks are broadly defined as the actions carried out by individuals in turning inputs into outputs. Narayanan and Nath (1993) proposed that various tasks performed in an organization can also be captured by two dimensions : variety, and analyzability.

1. Variety. Task variety referred to the frequency of unexpected and novel events that occur during the performance of the task. When an individual encountered a large number of unexpected situations, with frequent problems, variety is considered to be high. When there were few problems and when day-to-day job requirements were repetitions, tasks contain little variety.

2. Analyzability. When a task was analyzable, work can be reduced to mechanical steps, and participants can follow an objective computational procedure to solve problems. Problems solution may involve the use of standard procedures such as instructions and manuals, or technical knowledge from the textbooks or procedures to tell a person exactly what to do; so employees rely on experience, intuition, and judgement.

The principal of fit between tasks and information in information system theory is

1. When the task variety is high, problems are frequent and unpredictable. Consequently, the amount of information required is greater. When variety is low, the amount of information processes is low.

2. When tasks are analyzable, managers used lean media, and when tasks are not analyzable, employee need rich information (Daft,1989).

For example, the need to answer many varied and unpredictable questions about company operations would move a user to depend more heavily upon an information system's capacity to process queries against a database of operational information (Goodhue and Thompson,1995).

Technology-Task fit

There was a small number of research studies that focused on the technology-task fit, but within these studies, they argued that performance impacts would result from technology-task fit , which meant that, technology could provide features and support that "fit" the requirement of the task. Two studies, reported that over a series of laboratory experiments, the impact of technology characteristic on performance seemed to depend on the fit with the task (Benhasat, Dexter and Todd., 1986, Dickson, DeSanctic and McBride.,1986). Another study proposed that mismatches between technology characteristic and tasks would slow decision making performance (Vessey,1991). Still other found strong support for this linkage between "cognitive fit" and performance in laboratory experiments (Jarvenpaa,1989 ; Vessey,1991). The study of Goodhue (1988) has been made for a more general "fit" theory of tasks, systems, individual characteristics, and performance. The study proposed that information systems (system, policies, IS staff, etc.) have a positive impact on

performance only when there was a correlation between their functionality and the task requirement of users. In addition, there was a significant relationship between end-users' attitudes and the factors affecting their job performance. End-users must react favorably to a system to ensure that it will be used widely, effectively and should add to their performance (DeSanctis,1982).

Technology-task fit in this study employs the definition of Goodhue and Thompson (1995) which was, "the degree to which a technology assists an individual in performing his or her portfolio of tasks".

According to this research assumption, when technology fit with the task, it will produce the quality of data, information and output, compatibility of information, and timeliness of information and output, which will assist individuals to perform tasks better; therefore, the output of this fit will determine job performance of individuals in organizations.

The three outputs of technology-task fit that determine job performance are :

1. Quality of data and information which include the currency of data and information, maintenance of right data and information and right level of data and information as well as the quality of outputs.

2. Compatibility of data and information consists of two dimensions: the consolidation of data and consistency of data.

3. Timeliness refers to production timeliness.

From the discussion above, the hypotheses concerned with task-technology fit in this study are :

H2 : 2.1) IT personnel who work with high quality data as a result of technology –task fit will have high job performance.

2.2) IT personnel who work with highly compatible data as a result of technology –task fit will have high job performance.

2.3) IT personnel who work with timely data as a result of technology –task fit will have high job performance.

4.3.3 Technology–Organizational Structure Fit

Organizational Structure

Organizational structure is an internal arrangement of divisions, departments and work teams. It indicates how tasks and responsibilities are to be divided, how communication is supposed to take place, and where power or authority rests. The formal structure of an organization is shaped by two factors : technologies and the external environment (Baron and Greenberg,1990).

According to Morse and Lorsch (1970) , technology must fit with the organizational characteristics if the organization is to be effective. They divided organizational characteristics into two sets of factors : formal characteristics and climate characteristics. Formal characteristics included formalization, centralization, complexity and specialization.

Technology–Organizational Structure Fit is the degree to which technology is consonant with organizational structure. The appropriate fit between technology and organization structure will bring high

formalization, high decentralization of task decision-making and better communication.

1. Formalization. Formalization is a key dimension of organizational structure. It refers to the extent to which an organization relies on written documentation and formal rules. Since technology provide task certainty, therefore it increases the level of formalization.

2.Decentralization of Task Decision-Making. In some organizations, important decisions were made only by top-level managers. In others, decision making was shared widely, so that even persons at relatively low levels in the hierarchy can offer input or participate in some manner. When technology is congruent with the arrangement of tasks, participants in that task should have authority to decide what to do.

3. Communication. Communication is defined as the transformation of information, ideas, understandings or feelings among people within the organization. The communication process is influenced by many factors, such as the kinds of technology used on the job. Technology can enhance the flow of information and hence the quality of organizational functioning.

Although the use of "on-line" technology can improve organizational productivity, there is a hidden cost in using it. The problem, Zuboff notes, is that such automation minimizes important contact between managers and their subordinates (Zuboff,1988).

However, organizational scientists are just beginning to recognize the challenge to effective communication posed by the use of modern technology. Most of them believe that if technology fits with the task they perform or the organization they work in, then that fit will create better communication in the organizations.

From the discussion above then the hypotheses of the study are :

H3 : 3.1) IT personnel who work in highly formalized jobs as a result of technology-organizational structure fit will have high job performance.

3.2). IT personnel who work in an area where there is high decentralization of task decision-making as a result of technology-organizational structure fit will have high job performance.

3.3). IT personnel who work in better communication situation as a result of technology-organizational structure fit will have high job performance.

4.4 SUMMARY

This chapter has described a conceptual framework for analysis derived from the contingency theory by using a systems perspective. This framework suggests that there are three sets of fit, technology-individual work-related attitude fit, technology-task fit and technology-organizational structure fit, and these fit will provide

outputs. Each of the output as well as the whole set of fits are considered as contingency predictors of job performance of IT personnel in public organizations.

CHAPTER FIVE

RESEARCH METHODOLOGY

This chapter describes the research methodology used in this study. The chapter is divided into 3 major sections :

5.1 Research Procedure and Sampling Methods

5.2 Operational Definitions and Measurements

5.3 Data Collection

5.1 RESEARCH PROCEDURE AND SAMPLING METHODS

This research is a descriptive and cross-sectional type of study. Both qualitative and quantitative techniques were adopted in combination, with the assumption that both techniques would provide more reliable and valid information for data analysis according to the hypotheses under research. The process of research was as follows:

5.1.1 Target Population and Unit of Analysis

The target population of this study was the IT personnel in public organizations. The concept of IT utilization in public organizations in order to achieve organizational effectiveness and improve quality of public services has been mentioned less frequently in public administration than in business administration.

However, with the importance of IT, public organizations have seriously invested in utilizing IT for their operations.

The research of the National Information Technology Committee (NITC), stated that IT utilization in the public sector aims to support the good governance which requires qualified manpower to enhance the organizational effectiveness and provide better public services to all citizens. To invest in good governance, all public agencies and government departments must be equipped with IT, and their personnel adequately trained to utilize the potential of IT. Such opportunities to use IT, if properly capitalized upon, will reduce administrative costs, improve public services and administrative work (NECTEC,1998). Because of the importance of public organizations, which have attempted to develop themselves to be high performance, IT-enabled organizations, they were chosen to be the target population.

5.1.2 Sample Selection

In this study, data were gathered from IT personnel in public organizations which already have their own network. Their IT is mainly used to serve people or to enhance national competitiveness. These organizations were the first group to join in the national project called "GINET" (Government Information Network), they are:

1. Ministry of Interior
2. Ministry of Agriculture
3. Ministry of Finance
4. Ministry of Commerce
5. Ministry of Public Health

6. Ministry of University Affairs

The "GINET" project was planned to start in 1997 onward, but due to the economic recession, the project has been postponed and will start again when the economy has recovered. However, the sample organizations were selected from the "GINET" project because those organizations are assumed to have almost the same level of IT capability. From six ministries, a multi-stage sampling technique was used as follows:

Stage 1 Purposive selection of one ministry as the research sample by considering its public service characteristics which are economically supported public services; it was Ministry of Finance .

Stage 2 Purposive selection of departments by considering their advancement and the necessity of IT utilization in each department. These two departments were: Revenue Department, and Customs Department, which have the same level of IT advancement, considering the ratio of computer equipment to users.

Stage 3 IT personnel sampling : IT personnel in the Revenue Department and Customs Department (only in Bangkok and Nonthaburi)

IT personnel refers to employees who perform tasks by utilizing IT as a tool to complete their works. They are classified into 2 groups ; they are :

1. IT operators, - personnel who work in information or computer centers. They may be hardware operators, system analysts, programmers or data entry operators.

2. IT users, - general or end-users; They may be administrative staff, coordinators, trainees and others.

The total population of IT personnel is calculated from the ratio of computer equipment and users; for the Ministry of Finance, the ratio is 2.5 persons for 1 computer.

Revenue Department has 345 computers, so IT personnel are 826.

Customs Department has 352 computers, so IT personnel are 850.

According to Krejcie and Morgan, when the population size is close to 800 and 900 , the sample size may be set at 265 and 269 elements, assuming that each element will be randomly selected and each has an equal chance to be chosen.

From this estimate, the sample size for this study was set at 265 for the Revenue Department and 269 for the Customs Department. The number of population and sample is shown in Table 5.1

Table 5.1 Number of Population and Sample

Public Organization	Population	Sample
Ministry of Finance		
● Revenue Department (7 Departments, 8 Divisions)	862	265
● Customs Department (11 Departments)	880	269
Total	1,742	534

Source : Krejcie and Morgan Sample Size Table, at the level of confidence of 95%

5.2 OPERATIONAL DEFINITIONS AND MEASUREMENTS

The type of measurement techniques chosen were very important because they determined the process of transforming the abstract or conceptual framework into concrete variables of both qualitative and quantitative data (Prasithrathsint,1993 : 94). Therefore, each variable required both the operational definition and a measurement.

The following section explains the measure of dependent and independent variables used in this study.

5.2.1 Dependent Variables : Job Performance

Job performance refers to the level of productivity on several job-related behaviors and outcomes. It is assessed through a self-report measure adapted from Woodruff's Job Performance Characteristic traits and the Thai Civil Servant's Job Performance Evaluation. It consists of seven factors, which are :

1. Quality of work - the characteristics of output which enhance the usefulness to the recipients.

2. Quantity of work - the volume of useful output associated with the worker's job assignment.

3.Timeliness - the production of timely data, information and output.

4. Efficiency - the ability of the employees to minimize input and maximize output.

5. Job knowledge & skills - the ability of the worker to sufficiently solve problems, technical, conceptual, structurally oriented.

6. Judgment ability - the ability of the worker to exercise discretionary behavior to arrive at a wise decision.

7. Adaptability - the ability of the worker to adjust properly to changing and unstructured situations.

The perception of job performance is measured by using a rating scale from "5" = most , to "1" = least.

5.2.2 Independent variables

Technology-Individual attitude Fit

Technology-Individual attitude fit is the degree to which technology matches with work-related attitude. The best match between technology and individual attitude will generate high job satisfaction, high commitment and low role stress.

1. Job satisfaction refers to the positive state resulting from the appraisal of one's job that fits with the organization. It consists of four factors

- *Comfort* : A worker's desire for a job that provides freedom from trouble and which includes pleasant physical surroundings.
- *Challenge* : A worker's desire to be stimulated and challenged by his/her job and to be able to exercise acquired skill at work.
- *Relations with co-worker* : A friendly relationship among co-workers.
- *Advancement* : The opportunities the job provides for a career.

Job satisfaction is assessed through a self-reported measure on the above factors. Five-point rating scale is used as indicators, from "5" = most, to "1" = least.

2. Commitment is the aspects of employee attitudes which are the belief in acceptance of the major values and goals of organization, and the willingness to exert high levels of effort for the organization.

Commitment is assessed through a self-reported measure adapted from Organizational Commitment Questionnaire, using a 5-point rating scale.

3. Role stress refers to the degree which work expectations and work requirements are incompatible and there is uncertainty about one's job. It is assessed through a self-reported measure adapted from Rizzo et.al. by using five-point rating scale.

Technology-Task Fit

Technology-task fit is the degree to which technology is congruent with the tasks that an individual performs. The right congruence between technology and task will provide high quality of data, information and output, compatibility of data and information and timeliness of data and output.

1. Quality is referred to the currency of data, information, output. As well, the right data is maintained, and the appropriate level of data is available.

2. Compatibility is consists of two dimensions ; the consolidation data and consistency of data.

3. Timeliness is the production timeliness or timeliness in producing data, information and outputs.

The outputs of technology-task fit are assessed through self-reported measure on three factors adapted from Goodhue and Thompson by using 5-point rating scale from "5" = most, to "1" = least.

Technology-Organizational Structure Fit

Technology-Organization structure fit is the degree to which technology is consonant with organizational structure. The appropriate fit between technology and organizational structure will bring high formalization, high decentralization of task decision-making and better communication in the organization.

1. Formalization is the degree to which an organization relies on rules and procedures to direct the behavior of employees.

2. Decentralization of task decision making means the locus of decision-making authority lies within the employees who perform the tasks.

3. Communication is the transfer of information, ideas, understanding or feelings among people within the organization.

Technology-Organizational structure fit is assessed through a self reported measure on three factors ; formalization, decentralization of task decision-making and communication. It is assessed by using a 5-point rating scale.

Table 5.2 The Measure of Research Variables

Variables	Description	Indicators	Question no.
Dependent Variables			
Job Performance	The level of productivity on several job-related behaviors and outcomes.	Job performance is assessed through a self-reported measure adapted from Wooddruff's Job Performance Characteristic traits and Thai Civil Servant's job performance evaluation on seven factors, using 5-point rating scales.	25-35
1. quality of work	The characteristics of output which enhance the usefulness to the recipients.		25-27
2. quantity of work	The volume of useful output associated with the worker's job assignment.		28
3. Timeliness	The production timeliness or timelines in producing data, information and output.		29
4. Efficiency	The ability of employee to minimize input and maximize output.		30
5. Job knowledge and Skills	The ability of the worker to sufficiently solve problems, technical, conceptual, structurally oriented.		31-32
6. Judgment ability	The ability of the worker to exercise discretionary behavior to arrive at a wise decision.		33-34
7. Adaptability	The ability of worker to adjust properly to changing and unstructured situations.		35

Variables	Description	Indicators	Question no.
Independent Variables			
Technology-task fit	Technology-task fit is the degree to which technology is congruent with the tasks that an individual perform. The right congruence between technology and task will provide high quality of input, output, compatibility of data and timeliness of data and output.	Technology-task fit is assessed through self-reported measure on three factors adapted from Goodhue and Thompson by using 5-point rating scale.	1-6
1. Quality	Quality refers to the currency of data; the right data is maintained and the appropriateness of data is available.		1-2
2. Compatibility	Compatibility consists of two dimensions, the consolidation data and consistency of data.		3-4
3. Timeliness	The production timeliness of data, information and output.		5-6
Technology-Individual attitude Fit	Technology-Individual attitude fit is the degree to which technology matches with work-related attitudes. The best match between technology and work-related attitude will generate high job satisfaction, high commitment and low role stress.		7-19

Variables	Description	Indicators	Question no.
1. Job satisfaction	A positive state resulting from the appraisal of one's job that fits with the organizational technology.	Job satisfaction is assessed through a self-reported measure on four factors adapted from Locke. Using 5-point rating scale.	
- comfort	A worker's desire for a job that provide freedom from trouble which includes pleasant physical surroundings.		7-8
- challenge	A worker's desire to stimulated and challenged by his/her job and to be able to exercise acquired skill at work.		9-10
- relation with co-workers	A friendly relationship among co-workers.		11
- advancement	The opportunities the job provides for a career.		12-13
2. Commitment	The aspects of employee attitudes which are the belief in acceptance of the major values and goals of the organization, and the willingness to exert high levels of effort for the organization.	Commitment is assessed through a self - reported measure adapted from Organizational Commitment Questionnaire. Using 5- point rating scale.	14-15
3. Role stress	The degree to which work expectations and work requirements are incompatible and the uncertainty about one's job exist.	Role stress is assessed through a self-reported measure adapted from Rizzo et.al. By using 5- point rating scale.	16-19

Variables	Description	Indicators	Question no.
Technology-Organizational Structure Fit	Technology-Organizational structure fit is the degree to which technology is consonant with organization structure. The appropriate fit between technology and organization structure will bring high formalization, high decentralization and better communication.	Technology-Organizational structure fit is assessed through a self- reported measure on three factors ; formalization, decentralization of task decision and communication. By using 5-point rating scale.	20-24
1. Formalization	The degree to which an organization relies on rules and procedures to direct the behavior of employees.		20-21
2. Decentralization of task decision-making	The locus of decision-making authority lies within the employees who perform the tasks.		22-23
3. Communication	The transfer of information, ideas, understanding or feelings among people within the organization.		24

5.3 DATA COLLECTION

Data are gathered from questionnaires, interviews and documentation analysis.

1. Questionnaires. IT personnel (IT operators and IT users) responded to the questions concerning the status of IT utilization in their organization, the impacts of IT on their performance and the factors that will predict their job performance.

2. Interviews. Executives who are responsible for the overall performance of their subordinates responded to the questions concerned with IT utilization and its performance. These questions focused on the details in some important issues which need the opinion of the executives on IT utilization and performance.

3. Documentation analysis. Data from documentation are mainly from the National Information Technology Committee , National Electronics and Computer Technology Center, the Office of Civil Service Commission and other related sources.

5.3.1 Questionnaire Design

The questionnaire was designed by using the guidelines recommended by Sudman and Bradburnn (1983) and was reviewed by the Thesis Committee. The revised questionnaire was then pre-tested with IT personnel in the Revenue Division (Region 2).

The questionnaire package contained a cover letter asking for cooperation in completing the questionnaire and separate letters signed

by the Dean of Public Administration Faculty which were given to the heads of the government agencies asking for permission in distributing and collecting data from their subordinates.

The objectives of the research were explained on the front page. The questionnaire also emphasized that the purpose of the research was not to evaluate the respondents' performance, but to be used only for academic purposes.

The questionnaire was arranged into three parts, with items in each part numbered consecutively. The first part dealt with general information about the respondents' status, the current position, the length of service in the current position and the duration of information system use. The second part dealt with the status of IT utilization in the respondents' organization. It asked about the frequency of use, the type of information system, the objective of the information systems used in the respondents' organization, and the characteristics of the information systems.

The third part used a 5-point rating scale response format to measure respondents' opinions of IT utilization in their representative Thai public organizations.

5.3.2 Pilot Test

The questionnaire was pilot-tested on respondents similar to those sampled in the main study. The main objective of the pilot test was to check the wording and its format as well as to measure the reliability of the questionnaires. The questionnaires were distributed by researchers at

Revenue Division (Region 2) to 30 officials whose work was related to computers, and all 30 questionnaires were collected back by the researchers, so the response rate was 100%.

A revision of the questionnaire was made as a result of both the pilot test and consultation with a statistics professor. Some modification of format and content were made, especially some wordings that were not clearly understood, in order to improve the overall questionnaire.

The item concerning the characteristics of IT personnel task was removed from the questionnaire because the answer was quite the same as the item asking for the type or category of information system the respondents used.

The item in Section Two which concerned the status of IT utilization was revised, especially the item requesting for the frequency of IT use, by adding the rating number for easy checking.

Some items in Section Three regarding the opinion of IT utilization were reworded for better understanding.

5.3.3 Validity and Reliability

Validity refers to the degree to which a scale performs the function it was designed to perform. Evaluation of scale validity requires investigating the extent to which a scale is measuring what it was designed to measure.

The validity of the questionnaire was established by using the expert method which is called content validity. Content validity is concerned with item adequacy, that is, the extent to which a specific set

of items reflects a content domain of the dependent variable (Kerlinger,1973). Two IT experts were requested to examine and make comments about the items in the questionnaire for content validity during the questionnaire development stage.

After revising the item's content according to the comments and suggestions, the questionnaires were distributed to try out in order to find reliability.

Reliability refers to dependability, stability, consistency, predictability and accuracy of the measurement. Some variables were measured using multiple items to improve reliability (Kerlinger,1986, Simon & Burstein,1985). To test the reliability of the questionnaire, Cronbach alpha coefficients were used to determine the internal consistency of a measure (Kerlinger,1973).

5.3.4 Pretest Results

After all questionnaires had been collected, the data were entered in SPSS for window to identify the research instrument reliability. The acceptable level of this reliability coefficient in this study was 0.70.

1) Technology - Individual Attitude Fit Scale

The 13 items statements that were constructed to measure the "technology- individual attitude fit scale" were gathered, adapted and developed from Organizational Commitment Questionnaire (OCQ) of Rizzo. The alpha value of reliability of the scale is 0.77.

2) Technology-Task Fit Scale.

The technology-task fit scale contained 5 items measuring quality of data which included currency of data and the right level of data. It also measured the consolidation and consistency of data, information and outputs. The Cronbach value of reliability of technology-task fit scale is 0.92.

3) Technology-Organization Structure Fit Scale

The scale containing 5-itemized statements. It was found that the Cronbach's value of reliability was about 0.77, which is acceptable.

4) Job Performance Scale

This scale contained 11-itemized statements measuring seven dimensions of job performance. The alpha value of reliability was 0.82 which is considered highly reliable.

All scales in this study have alpha coefficients higher than 0.70 as shown in Table 5.3

Table 5.3 Research Instrument Reliability Test

Scales	Items	Alpha value
Technology-Task Fit Scale	1-6	0.92
Technology-Individual Attitude Fit Scale	7-19	0.77
Technology-Organization Structure Fit Scale	20-24	0.77
Job Performance Scale	25-35	0.82

5.4 SUMMARY

This chapter has explained the quantitative methodology used in this research along with an examination of the validity and reliability of the questionnaire. The next chapter will discuss the results of the data analysis.

CHAPTER SIX

DATA ANALYSIS AND RESEARCH RESULTS

This chapter presents the survey sample and general characteristics of samples along with data analysis and research results. It also includes a test of the hypotheses.

6.1 SURVEY SAMPLE

6.1.1 Response Rate

The questionnaires were distributed to the sampled organizations by researchers and then collected back within 2 weeks. A total of 530 questionnaires were distributed, and 391 were returned– a response rate of 73.77%. The number and percentage of the distributed and returned questionnaires is shown in Table 6.1

Table 6.1 Number of Questionnaires Distributed and Response Rate

Population	Distributed	Responded and Usable	Response Rate(%)
Revenue Department	**265**	**181**	**63**
1. Division of Examination	72	40	55
2. Revenue Division (Region 4)	120	90	75
3. Information Technology Center	40	31	77.5
4. Revenue Division (Region 2)	33	20	66.5

Table 6.1 (Continued)

Population	Distributed	Responded and Usable	Response Rate(%)
Customs Department	**265**	**210**	**79.2**
1. Office of Import Customs, Port of Bangkok	73	58	79.4
2. Office of Export Customs, Port of Bangkok	80	57	71.2
3. Information Technology Center	65	55	84.6
4. Office of Export Customs, Bangkok Airport	47	40	85.1
Total	**530**	**391**	**73.7**

6.1.2 The General Characteristics Of the Samples

Table 6.2 presents several basic demographic statistics of the respondents. From the analysis, over half of the respondents (65.5%) were female. The majority (49.6%) of them were 31-40 years of age; 26.5 percent of them were 19-30 years. The rest (18.6%) were 41-50 years.

Seventy-three point nine percent of the respondents held a bachelor's degree, while 18.2 percent had qualification lower than a bachelor's. Only 7.7 percent held master degree.

With regard to current positions, the respondents were divided into two categories: computer-related positions and general positions. In the computer-related categories, 17.9 percent of the respondents were computer professionals, 7.9 percent were data entry operators and 0.8 percent were system analyst/programmers. Most of the respondents

(50.6 %) in the general category do not specify their current position. Five percent of them were managerial staff and administrative staff.

Table 6.2 Demographic Background of the Samples

Characteristics	No. of Respondents	Percent
Sex		
Male	133	34.0 %
Female	256	65.5 %
Not Reported	2	0.5 %
Total	391	100.0 %
Age		
19-30 years old	104	26.5%
31-40 years old	194	73.9%
41-50 years old	73	18.6%
51-59 years old	11	2.8%
Not Reported	9	2.3%
Total	391	100.0%
Education		
Lower than Bachelor Degree	71	18.2%
Bachelor's Degree	289	73.9%
Master's Degree	30	7.7%
Not Reported	1	0.3%
Total	391	100.0%

Table 6.2 (Continued)

Characteristics	No. of Respondents	Percent
Current Position		
Computer Professional	70	17.9 %
Hardware Operator	16	4.1 %
System Analysts/Programmer	3	0.8%
Data Entry Operator	31	7.9%
Managerial Staff	20	5.1%
Trainee	5	1.3%
Academic Staff	19	4.9%
Administrative Staff	29	7.4%
Other	198	50.6%
Total	391	100.0 %
Length of service in current position		
1-5 years	225	57.5 %
6-10 years	102	26.0 %
11-15 years	23	5.8%
16-20 years	17	4.3%
21-25 years	4	1.0%
26-30 years	3	0.7%
31-35 years	1	0.2%
Not Reported	1	0.3%
Total	391	100.0 %

Table 6.2 (Continued)

Characteristics	No. of Respondents	Percent
Duration of IT use		
1-5 years	320	81.8 %
6-10 years	34	8.6 %
11-15 years	4	1.0%
16-22 years	30	7.6%
Not Reported	30	7.6%
Total	391	100.0 %

Fifty-seven percent of respondents had been in their current position for 1-5 years while 26 percent had served for 6-10 years. Only 0.2 percent had served in their position for longer than 35 years.

Most of the respondents (81.8%) had used information technology for 1 to 5 years and 7.6 % had used information technology for more than 15 years.

Table 6.3 The General Characteristics of the Samples

Variables	Mean	Standard Deviation	Maximum Score	Minimum Score
Age	35.57	7.45	59.00	19.00
Length of service in current position	5.85	5.40	35.00	1.00
Length of IT use	3.02	2.75	22.00	1.00

Variables	Mean	Standard Deviation	Maximum Score	Minimum Score
Frequency of IT use				
PC	3.11	1.04	4.00	1.00
Printer	3.01	1.07	4.00	1.00

The average age of IT personnel in sampled public organizations was 35 years and majority of them have served in their current position for 6 years. The length of IT use is about 3 years. IT personnel in sampled public organizations generally use PC computers, printers and fax machine for their operations.

6.1.3 The Status of IT Utilization in Sampled Organizations

Table 6.4 presents the frequency of information technology utilization in sampled organizations. The IT utilization was divided into 2 categories,(1) computer technology and, (2) telecommunication technology. In the first category, most of the respondents used PC computers (48.6%) and printers (39.4%) every day while portable and mini computer were the least used. On telecommunication technology, 7.4% of the respondents used the fax machine every day. Almost half of them never used e- mail (46%) or the Internet (46.5%).

Table 6.4 The Frequencies of Information Technology Used

Type	Never	%	1-2days a week	%	3-4day a week	%	Every day	%
Computer								
Technology								
Mainframe	181	46.3	40	10.2	18	4.6	41	10.4
Mini	205	52.4	29	7.4	9	2.3	15	3.8
PC	31	7.9	89	22.8	60	15.3	190	48.6
Portable	224	57.3	23	5.9	11	2.8	4	1.0
Printer	40	10.2	70	17.9	73	18.7	154	39.4
Telecommunication								
Technology								
Fax	90	23.0	171	43.7	42	10.7	29	7.4
E-mail	180	46.0	51	13.0	18	4.6	38	9.7
Internet	182	46.5	42	10.7	25	6.4	43	11.0
Mobile Phone	109	27.9	51	13.0	35	9.0	141	36.1
Pager	233	59.6	15	3.8	4	1.0	31	7.9

Table 6.5 presents the status of information systems used in sampled organizations. Most of the agencies in the sampled organization used information systems as their service system (67.8%); the second most used system is the accounting (31.2%) followed by personnel (25.3%). Utilization of information systems for inventory is the least used (16.4%).

Table 6.5 Status of Information Systems Used in the Sampled Organizations

Items	Frequency	Percent
Information Systems in Sampled Organizations		
Personnel	99	25.3%
Budgeting	89	22.8%
Accounting	122	31.2%
Inventory	64	16.4%
Service System	265	67.8%
Other Systems	102	26.1%
The Objective of Information Systems		
To increase the effectiveness of main work.	266	68.0%
To increase the effectiveness of the support work	124	31.7%
To improve administrative and decision making system	74	18.6%
The Characteristics of Information Systems		
Database Utilization	336	85.9%
Telecommunications Utilization	83	21.2%
Processing without any human involvement	77	19.7
Utilization of specific equipment	12	3.10%

Table 6.5 (Continued)

Items	Frequency	Percent
Utilization of Information Systems in Public Organizations		
Individual usage without professional specialty	235	60.1%
Individual usage with professional specialty	138	35.3%
Usage for intra division network	242	61.9%
Usage for inter division network	218	55.8%
Usage for inter department network	101	25.8%

The major objective of information systems in the sampled organizations was to increase the effectiveness of the main work (68%); thirty-one percent of the sample stated that the objective of the information system was to increase the effectiveness of the supportive work, and 18 % stated that the information system in their organizations was used to improve the administrative and decision making process.

For the characteristics of the information systems, most of the agencies in the sampled organizations used database (85.9%) for their operation. Twenty-one percent used the information systems for telecommunication and only 3.1% used specific equipment for their information systems.

Most of the respondents (61.9%) used the system for intra division networking and 60 percent of them used the information systems for individual use without professional specialty. Fifty-five

percent used information systems for inter division networking and only 25.8% use information systems for inter department network.

6.2 DATA ANALYSIS AND RESEARCH RESULTS

This section is divided into two parts: the relationship between the outputs of technology fit and job performance, and hypotheses testing.

6.2.1 The Relationship Between the Outputs of Technology Fit and Job Performance

As stated in the earlier chapters, the outputs of technology-organizational variables fit are the predictors of job performance of IT personnel in public organizations.

In this study, there are nine predictors of job performance which are the outputs of the three sets of technology fit, that is Technology-Individual Attitude Fit, Technology-Task Fit and Technology-Organizational Structure Fit.

The ideal predictive situation is when the correlations between the independent variables (the nine outputs of technology fit) and dependent variables (job performance) are high, and the correlations among the nine outputs are low. This principle is important. The more the independent variables are intercorrelated, the more difficult the interpretation (Kerlingers and Lee,2000).

Table 6.6 shows the correlation matrices of predictors used in the analysis. The correlations among the nine predictors were not high. (r is

Table 6.6 Correlation Matrix

Variables	TAF_J	TAF_C	TAF_R	TTF_Q	TTF_C	TTF_T	TOF_F	TOF_D	TOF_C
TAF_J	1.000								
TAF_C	.544**	1.000							
TAF_R	.507**	.537**	1.000						
TTF_Q	.458**	.346**	.442**	1.000					
TTF_C	.447**	.380**	.446**	.644**	1.000				
TTF_T	.504**	.438**	.433**	.584**	.614**	1.000			
TOF_F	.540**	.515**	.535**	.483**	.451**	.401**	1.000		
TOF_D	.395**	.303**	.434**	.261**	.224**	.256**	.447**	1.000	
TOF_C	.459**	.398**	.514**	.403**	.338**	.401**	.511**	.445**	1.000
JP	.681**	.543**	.553**	.427**	.447**	.586**	.574**	.346**	.466**

** Correlation is significant at the 0.01 level

N = 388 (Listwise Deletion of Missing Data)

Abbreviation

Predictors : TAF = Technology-Individual Attitude Fit
TAF_J = Job Satisfaction
TAF_C = Commitment
TAF_R = Reduced Role Stress

TTF = Technology-Task Fit
TTF_Q = Quality of Data
TTF_C = Compatibility of Data
TTF_T = Timeliness of Data

TOF = Technology-Organization Structure Fit
TOF_F = Formalization
TOF_D = Decentralization of Task Decision
TOF_C = Communication

Dependent Variable : JP = Job Performance

less than 6, $p < .01$). An exception is in two pairs of predictors in Technology-Task Fit set, which were quality of data and compatibility of data ($r=.67$, $p < .01$) and compatibility of data and timeliness of data ($r=.61$, $p < .01$).

However these two pairs of predictors were not highly correlated; they were in the range of moderately highly correlated. Thus they were kept in the regression terms for further analysis.

6.2.2 Hypotheses Testing

In this section, the hypotheses set forth at the outset of this research will be proven with the use of empirical data. The data from cases of approximately 391 IT personnel in two sampled public organizations have been gathered to prove the forthcoming hypotheses. The first set of hypothesis is stated as :

Hypotheses Testing 1 :

1.1 IT personnel who have high job satisfaction as a result of technology-individual attitude fit will have high job performance.

1.2 IT personnel who have high commitment as a result of technology-individual attitude fit will have high job performance.

1.3 IT personnel who have reduced role stress as a result of technology-individual attitude fit will have high job performance.

The correlations (Pearson's R) between the outputs of technology-individual attitude fit and job performance perceived by IT personnel in sampled public organizations are presented in Table 6.7

Table 6.7 Correlation Matrix of the Outputs of Technology-Individual Attitude Fit and Job Performance

Variables	JP	TAF_F	TAF_C	TAF_R
JP	1.000			
TAF_J	.681**	1.000		
TAF_C	.543**	.544**	1.000	
TAF_R	.553**	.507**	.537**	1.000

** Correlation is significant at the 0.01 level.

N = 388 (Listwise Deletion of Missing Data)

From the correlation matrix developed in Table 6.7, it is possible to infer that job satisfaction, commitment and reduced role stress are positively correlated to job performance perceived by IT personnel in the sampled public organizations.

Within the three outputs of Technology-Individual Attitude Fit, the relationship between job satisfaction and job performance is quite strong (r = .681). This can be explained by the fact that IT personnel who have high job satisfaction are likely to perceive that his or her job performance is also high.

The relationship between the other two outputs, commitment and job performance and reduced role stress and job performance are also moderately strong (r =.543 and .553).

In order to gain more insight on the impact of outputs of technology-individual attitude fit in relation to job performance, the three outputs (job satisfaction, commitment and reduced role stress) were entered into the multiple regression analysis model.

Table 6.8 Regression Analysis of the Outputs of Technology-Individual Attitude Fit and Job Performance

Variables	b	Beta	t	Sig
Job Satisfaction	0.727	0.480	11.021	.000
Commitment	0.891	0.163	3.651	.000
Reduced Role Stress	0.752	0.220	5.064	.000
(Constant)	5.480		3.087	.002

R^2 = .733, SEE = 4.6135, F = 148.234 ($p < .001$)

The results in Table 6.8, confirm the prediction that all the three outputs of Technology-Individual Attitude Fit are statistically significant in explaining the variation of job performance.

In the first set of fit, Technology-Individual Attitude Fit, job satisfaction is the most influential predictor (beta = 0.480), reduced role stress is the second most influential predictor (beta = 0.220) and commitment is the least influential predictor (beta = 0.163). Also, the aggregate impact of these three outputs of Technology-Individual Attitude Fit is able to explain the variation of job performance by 73%

Therefore the three hypotheses in the first set of fit, Technology-Individual Attitude Fit are supported.

Hypotheses Testing 2 :

2.1 IT personnel who work with high quality data as a result of technology-task fit will have high job performance.

2.2 IT personnel who work with highly compatible data as a result of technology-task fit will have high job performance.

2.3 IT personnel who work with timely data as a result of technology-task fit will have high job performance.

As stated in the previous argument regarding the rationale behind the construction of the hypothetical model of Technology-Fit and Job Performance of IT personnel in public organizations, Technology-Task Fit is the degree to which technology is congruent with the tasks that an individual performs. The right congruency between technology and task will provide high quality of data, compatibility and timeliness of data.

Table 6.9 Correlation Matrix of the Outputs of Technology-Task Fit and Job Performance

Variables	JP	TTF_Q	TTF_C	TTF_T
JP	1.000			
TTF_Q	.427**	1.000		
TTF_C	.447**	.644**	1.000	
TTF_T	.553**	.586**	.614**	1.000

** Correlation is significant at the 0.01 level.

N = 388 (Listwise Deletion of Missing Data)

Table 6.9 shows the correlation matrix between the outputs of technology-task fit and job performance. It indicates that quality of data, compatibility of data and timeliness of data are positively related to job performance as perceived by IT personnel.

The timeliness of data showed the strongest correlation(r= .553) with job performance. Compatibility of data was the next strongest (r = . 447),and the quality of data showed the weakest relationship(r = .427).

Theoretically, quality of data was the most important characteristic of data that IT personnel must be concerned about. However, the results here do not indicate that. The reason behind this might be that most of the IT personnel in this study are operational staff; therefore they are mainly concerned about timeliness of data which will allow them to complete their daily work in time rather than the quality of data and compatibility of data.

To assess the impact of the Outputs of Technology-Task Fit and

Table 6.10 Regression Analysis of the Outputs of Technology-Task Fit and Job Performance

Variables	b	Beta	t	Sig
Quality of Data	0.400	0.088	1.152	.131
Compatibility of Data	0.468	0.095	1.601	.110
Timeliness of Data	2.017	0.472	8.612	.000
(Constant)	20.263		13.777	.000

R^2 = .595, SEE = 5.4258, F = 70.126 ($p < .001$)

Job performance, quality of data, compatibility of data and timeliness of data are entered into multiple regression analysis. The results of this study are shown in Table 6.10

Table 6.10 shows evidence that timeliness of data and job performance as perceived by IT personnel is statistically significant to explain the variation of job performance. The other two outputs of technology-task fit, quality of data and compatibility of data are not significant. In addition to this, it is important to state that the outputs of technology task-fit explains the change in IT personnel job performance by about 59% and the relationship between technology-task fit and job performance are statistically significant.

In the second set of fit, Technology-Task fit, the third hypothesis is supported while the first and second hypotheses are not supported.

Hypotheses Testing 3 :

3.1 IT personnel who work in highly formalized jobs as a result of technology-organizational structure fit will have high job performance.

3.2 IT personnel who work in an area where there is high decentralization of task decision-making as a result of technology-organizational structure fit will have high job performance.

3.3 IT personnel who work in better communication situation as a result of technology-organizational structure fit will have high job performance.

These hypotheses are based on the premise that technology must fit with organizational structure (Morse and Lorsch,1970). Technology-Organizational Structure Fit is the degree to which technology is consonant with organizational structure. The appropriate fit between technology and organization structure will bring high formalization, high decentralization of task decision-making and better communication. All these three outputs will determine the job performance of IT personnel in the sampled public organizations. To test the above hypothesis, the correlation matrix between the outputs of Technology-Organizational Structure Fit and Job Performance is shown in Table 6.11

Table 6.11 Correlation Matrix of the Outputs of Technology-Organizational Structure Fit and Job Performance

Variables	JP	TOF_F	TOF_D	TOF_C
JP	1.000			
TOF_F	.574**	1.000		
TOF_D	.346**	.447**	1.000	
TOF_C	.466**	.511**	.445**	1.000

** Correlation is significant at the 0.01 level.

N = 388 (Listwise Deletion of Missing Data)

It seems evident that formalization, decentralization of task decision-making and better communication are positively related to job performance and their relationships are statistically significant.

Within the three outputs of Technology-Organizational Structure Fit, the relationship between formalization and job performance is the

strongest (r = .574),communication has moderate relationship (r = .446)and decentralization of task decision-making (r = .466) showed the weakness relationship in relation to job performance.

To assess the impact of Technology-Organizational Structure Fit and Job Performance, the three outputs of Technology-Organizational Structure Fit are entered into the multiple regression analysis model.

Table 6.12 Regression Analysis of the Outputs of Technology-Organizational Structure Fit and Job Performance

Variables	b	Beta	t	Sig
Formalization	1.922	0.440	8.935	.000
Decentralization of Task Decision- making	0.224	0.044	0.937	.349
Communication	1.784	0.219	4.459	.000
(Constant)	20.263		12.586	.000

R^2 = .606, SEE = 5.3637, F = 74.452 ($p < .001$)

The regression analysis results shown in Table 6.12, indicate that IT personnel in sampled public organizations are experiencing both formalization and better communication and their relationship to job performance is significant. Formalization (beta = 0.440) is the most influential predictor. Communication (beta = 0.219) is the second most influential predictor. The only output of Technology-Organizational Structure Fit , which is not significant, is decentralization of task decision-making. Moreover, it is expected that formalization,

decentralization of task decision-making and better communication would explain the variation of job performance by 60 %

In the last set of fit, Technology-Organizational Structure Fit the first hypothesis is supported as well as the third hypothesis while the second hypothesis is not supported.

Table 6.13 summarizes the findings. The results of the regression demonstrate that there were significant effects on job performance. Six out of the nine hypotheses were supported.

Table 6.13 Summary of Results of Hypotheses Test

Hypotheses	Results
1. IT personnel who have high job satisfaction as a result of technology-individual attitude fit will have high job performance.	Supported
2. IT personnel who have high commitment as a result of technology-individual attitude fit will have high job performance.	Supported
3. IT personnel who have reduced role stress as a result of technology- individual attitude fit will have high job performance.	Supported
4. IT personnel who work with high quality data as a result of technology-task fit will have high job performance.	Not supported
5. IT personnel who work with highly compatible data as a result of technology-task fit will have high job performance.	Not supported
6. IT personnel who work with timely data as a result of technology-task fit will have high job performance.	Supported
7. IT personnel who work in highly formalized job as a result of technology-organizational structure fit will have high job performance.	Supported

Table 6.13 (Continued)

Hypotheses	Results
8. IT personnel who work in an area where there is high decentralization of task decision-making as a result of technology-organizational structure fit will have high job performance.	Not Supported
9. IT personnel who work in better communication situation as a result of technology-organizational structure fit will have high high job performance.	Supported

After considering the effect of each of the predictor on job performance, the next step was to examine how the three sets of fit effect job performance.

The combining of each predictor into one set of fit, is based on the reliability of the predictors. If the alpha coefficient was high then each predictor can combined into one set of predictors because the high alpha coefficient reflected the unidimensions of measurement

The first set of fit was Technology-Individual Attitude Fit (TAF) which added three predictors: job satisfaction, commitment, and reduced role stress. The alpha coefficient of TAF was 0.802.

The second set of fit was Technology-Task Fit (TTF) which consisted of three predictors: quality of data, compatibility of data and timeliness of data. The alpha coefficient of TTF was 0.867.

The last set of fit was Technology-Organizational Structure Fit (TOF) which merged three predictors : formalization, decentralization of task decision-making and communication. The alpha coefficient of TOF was 0.738.

After combining nine predictors into three sets of fit, regression analysis was performed to analyze the relationship between job performance and the three sets of fit.

Table 6.14 Regression Analysis of the Three Sets of Technology-Fit and Job Performance

Variables	b	Beta	t	Sig
TAF	0.567	0.548	10.951	.000
TTF	0.303	0.175	3.982	.000
TOF	0.260	0.116	2.487	.000
(Constant)	3.951		2.405	.017

R^2 = .751, SEE = 4.4659, F = 164.614 ($p < .001$)

From the analysis, it appears that all the three sets of fit can explain the variance of job performance of up to 75%. The three sets of fit significantly effect job performance. Technology-Individual Attitude Fit (TAF) (beta =0.548 , $p < .01$) was the most influential predictor, followed by Technology-Task Fit (TTF) (beta =0.172, $p < .01$) and Technology-Organizational Structure Fit (TOF) (beta = 0.116, $p < .01$) respectively.

6.3 SUMMARY

This chapter presented the characteristics of the survey sample; it stated that the respondents were suitable for this research. The results of descriptive statistics, correlation analysis and multiple regression analysis were also presented along with the results of hypothesis testing. Multiple regression analysis offered six supported hypotheses. In addition the three sets of fit : Technology-Individual attitude Fit, Technology-Task Fit, and Technology-Organizational Structure Fit significantly effect job performance. The next chapter will discuss these results further.

CHAPTER SEVEN

DISCUSSION, RECOMMENDATIONS AND IMPLICATION

This chapter reports a discussion of the findings, followed by a discussion of the contributions to theory and research. The chapter provides a recommendation and also presents some implications for future research.

7.1 DISCUSSION OF THE FINDINGS

This study examined the status of IT utilization and impact of IT utilization upon job performance of IT personnel in studied public organizations by using contingency theory to prove the model of technology-fit and job performance. The main theme of contingency theory states that in order to achieve organizational effectiveness, the internal functioning must be consistent with technology, task and the needs of its members. Thus successful performance is the outcome of a proper "fit" between organization (task, structure, individual) and its environment (technology). Theoretically, a "fit" is determined as the key to successful performance and organizational effectiveness; when the elements of an organization fit among themselves and with the technology, then the organization should prosper. Most of contingency theory literature has focused on subsystems in the organization one at a time. Some paid attention to structural or functional subsystems in the

organization while some were interested in social subsystems. Many of them concentrated on technical subsystems. The weaknesses of those studies are that they neglect to examine other subsystems in the organization. Therefore this research attempted to fill in the missing part by adding a psychosocial subsystem with the structural or functional subsystem, and by examining the structural subsystem on task, work flow, rules and procedures, decision making and communication which is a different view of a structural subsystem from previous contingency research, which mainly focused on the design dimensions. In addition, this research employs a systems approach to explain the relationship among multiple contingencies, organizational characteristics and individual characteristics.

This research focused on the four organizational variables which are the targets for change. When administrators or managers seek to improve or change their organization, they must be concerned with these four variables - people, tasks, structure, and technology. Since technology in this study is considered to be a contingency variable, then the other three variables are the targets for change . Actually, there are other contingency variables that influence an organization, for example size, age, and strategy. However technology was selected to be a contingency variable because at present, technology is a driver of organizational change, especially for organizational effectiveness. Progressive organizations, whether they are public or private, are doing all they can do to utilize IT to streamline work to improve operating efficiency and to make overall performance improvements. Therefore, this research examines and tests the fit between technology and the other

three organizational variables, which are technology-individual attitude fit, technology-task fit, and technology-organizational structure fit. The study measures the effect of these fits on job performance.

This study also emphasized the systems approach because it focused on a multivariate pattern of fits among technology, the structural subsystem and the psychosocial subsystem. The systems approach made this research more comprehensive because it allowed the research to design the research model to permit a comparative evaluation of fit in as many ways as possible.

The results of this research confirmed the assumption of the study that information technology used in the studied organization at this moment fit with individual attitude, task and organizational structure. In addition the three sets of fit determined job performance of IT personnel in the sampled public organizations. Within the three sets of fit, technology-individual attitude fit was the most influential factor of job performance and technology-organizational structure was the least influential factor. This study also found that the three sets of fit produced six important outputs which were significance predictors of job performance. These outputs are job satisfaction, commitment, reduced role stress, timeliness of data, formalization and communication.

The following discussion is organized into two sections; (1) the status of IT utilization in studied organizations; and (2) technology fit and job performance. The discussion in this section uses quantitative empirical data from questionnaires.

7.1.1 The Status of IT Utilization in the Studied Organizations

The purpose of this section is to discuss the present situation of IT utilization in the studied organizations which can be divided into two parts : the basic characteristics of IT personnel and the characteristics of information systems used in the studied public organizations.

From the empirical data, the average age of IT personnel is 35. This finding is supported by the demographic trends taking place in the labor force all over the world. Naisbitt (1985) reports that the number of entry-level workers (age 18-24) has dropped substantially in the 1980s, with the figure expected to drop even further in the 1990s. As a result, the average worker of the 1990s will be between 35 and 44 years old. In this research, the average age of IT personnel seemed appropriate. Some important points concerning IT personnel and IT utilization are summarized in Table 7.1

Table 7.1 IT Personnel and IT Utilization in the Studied Public Organizations

items	Percent
IT personnel use PC computer	48%
use printer	39%
use fascimile (fax)	39%
never use e-mail	48%
never use Internet	48%

The computer has been utilized in Thai public organizations for almost 40 years. However, information technology was well-known and more utilized in public organizations recently. From empirical data most of IT personnel (81%) in the studied organizations have been using IT for their operation five years or less. This information is consistent with the government policy to promote government agencies towards computer utilization for their general work during the period of 1992-1997.

Since IT was utilized in general work, therefore the computer technology IT personnel used most were PC computers (48%) and printers (39%). For telecommunication technology, most IT personnel used facsimile (fax) (43%) for their telecommunication. Most public organizations even publicized the fact that they encourage their public agencies to use modern technology to increase their productivity and provide for better public services to all citizens. However from statistical results, there were many public servants who never used modern technology such as electronic mail (46%) and Internet (46%). It is undeniable that the Internet is becoming the fundamental technological infrastructure for information sharing and that public organizations must provide citizens and businesses with choices to contact them electronically. According to government IT policy, at present, all government agencies must have the ability to send and receive electronic mail, and at the same time, public information should be made accessible electronically on demand. Unfortunately the actual practice is far from the objective of IT utilization in public organizations. One of the reasons that explains this situation is the

complex set of policy guidelines and regulations on telecommunications in Thailand which is shared among several government agencies.

Within the existing telecommunication regulatory regime, the Ministry of Transport and Communications (MOTC) has control over certain aspects of telecommunication, while the Telephone Organization of Thailand (TOT) continues to have authority to regulate the public fixed wired telephone lines. As well, there are other agencies such as the National Telecommunications Commission(NTC), the National Information technology Committee (NITC) which are concerned with this situation.(Hossain,1998).

In addition to the complexity of policy guidelines, the public organizations are also faced with enormous change in a highly political and regulatory environment. Economic conditions of the country are also the crucial factors in promoting IT utilization in public organizations as well as the investment in IT infrastructure within public organizations and throughout the country.

Some important points regarding the characteristics of information systems used in the studied public organizations are summarized in Table 7.2

Table 7.2 Summary Of the Status of IT Utilization in the Studied Organizations

Items	Percent
Information System used for Service System	67
Information System used to support central work	68
The agencies used database System	85
The agencies used intra Division Network	62
The agencies used inter Division Network	55
The agencies used inter Department Network	25

From the statistical results, the information systems in the studied organization which was most used was the information system for the service system (67%) and the major objective of the information system was to increase the effectiveness of the central work (68%). This objective was relevant to the National IT policy whose goal was to enhance all public agencies to deliver good and efficient services to all citizens through the use of IT. The initiative used to achieve this objective was to reengineer public agency work routines and methods in order to use IT to produce improved service and reduce public administration costs (NITC,1995). In other words, IT implementation can be used to facilitate organizational reengineering. However, there are several factors that foster organizational change.

For Thai public organizations, the pilot project of reengineering was conducted in volunteered public agencies such as the Land department, the Revenue department and other public agencies.

Reengineering was implemented in some of the core processes of the volunteered organizations.

In case of the data system, the result of this research study indicated that most public agencies used database (85%) for their operation which was appropriate for the development of IT in public organizations, because in the early stages of IT utilization, databases are very important. Public organization should be able to manage the public services which operate on data and information as effectively and efficiency as they can. Therefore, extensive and appropriate databases are the focal point for managing public organizations to meet the challenges of the information age.

The type of information system the studied organizations used was an intra-division network (62%) for information sharing within their department. Only a few used an inter-department network (25%). Since most of IT personnel did not use the inter-department network the problem of "islands of information" was created; the consequences of this problem were the redundancy of data, the non timeliness of data processing, the lack of cooperation between departments in information sharing. These problems were the same problems found in other related studies. Malaiwong (1997) found that the problems and obstacles in computer utilization in public sector were that IT personnel did not cooperate in data and information sharing because they felt that they were the owners of the information and did not want anybody to utilize their information. To solve this problem, he suggested that there should be some criteria and proper standard in sharing information within and

between organization and at the same time there should be measures to protect the privacy of other people.

From this point, it seems that the trend or status of IT utilization in studied organizations was not positive side because it did not develop as much as expectations for the following reasons :

1. IT in the studied public organizations seemed to be not fully utilized. When organization decide to utilize information technology, it should be used in a strategic manner. The strategy for effective IT utilization in public organizations should be for providing better public service which is easy accessible and affordable.

However the major objective of IT utilization in the sampled organizations was to increase the effectiveness of the main and supportive works which rely on a transaction processing system (TPS). These two characteristics were considered to be the first wave of information technology innovation and it can be considered that IT was not fully utilized. Therefore public organizations should aim or plan to utilize IT in a strategic way and not only for day- to- day activities.

2. Inter department networks were used by only a few IT personnel. As a result the information technology was not fully utilized to provide better public information sharing.

3. Most IT projects in public organizations have limited budgets, especially in data communication, but most of them required a network for their operations.

In conclusion, this section presents the current situation of IT utilization in the studied organizations wherein the personnel perceived that they had achieved the objective in utilizing IT to increase the effectiveness of their main and supportive work.

The next section presented the results of model testing of technology fit and job performance. Two public organizations were selected as representative of Thai public organizations. The reasons to choose these two organizations were because they were the two prototype organizations which passed through the process of reengineering for their core process . Reengineering and better use of information technology can streamline the core process, customers, teamwork, and efficiency, which are central to Hammer's notion of process reengineering. In addition, these two organizations were part of the national IT project "GINET" or Government Information Network. For the above reasons, these two organizations were selected to test the model of technology fit and job performance.

7.1.2 Technology Fit and Job Performance

The assumption of this research is stated as follows :

For information technology to have positive impact on the job performance of individuals in the organization, the technology must be a good fit with the individual's attitude, the task he/she performs and the organizational structure. Each of these "fits" will provide the essential consequences, when technology fits with individual attitude, it will increase job satisfaction, and commitment; meanwhile, it will

decrease role stress. The output of technology and individual attitude fit will magnify job performance. In addition, when technology fits with the tasks, it will generate quality data, compatible data and timely data. As a result, these outputs will also make job performance increase. The last fit is technology and organizational structure fit; this fit will contribute to formalization, to decentralization of task decision-making and to better communication. All of the three outputs from technology-organizational structure fit, will lead to improvements in job performance.

The outputs from each of the three sets of fit are the predictors of job performance as well as the three sets of fits themselves. From statistical analysis, all of the three sets of fits; Technology-individual attitude fit, Technology-task fit, and Technology-organizational structure fit significantly affect job performance.

(1) Technology-Individual Attitude Fit (TAF)

Within the three set of fits, technology-individual attitude fit was the most influential predictor on job performance which implies that the social subsystem plays a very important part in an organization. The attitude of people in the social subsystem of an organization will be a strong determinant of their job performance.

In previous research concerning the social system, many researches attempted to answer the main question of how and why do people act as they do? In answering this question, researchers tended to explore the major areas of the social subsystem, which are namely

individual behavior, group behavior and the informal organization (Hodgetts,1999). Therefore, modern practitioners and researchers are realized that they must give increased attention to the study of the sociotechnical system or the technical-human interface. The result of this study also emphasizes the importance of people in the organization, especially their attitude, capabilities and behavior, which are the factors that are most affected by technology.

The fit between technology and individual attitude is applied from the model of person-environment fit; the term "person" refers to both individual characteristic and individual attitude, and environment refers to technology. From the model of person-environment fit, the model proposes that any misfit in person and environment components leads to more negative outcomes such as lower satisfaction, lower performance and higher strain (French et. al.1974; Harrison,1978). Conversely the fit between person and environment may yield positive outcomes such as higher satisfaction and performance.

The results from this study supported the works of technical-human interface research and the model of person-environment fit, because the fit between technology and attitude is the most influential predictor of job performance. A possible explanation of this finding is that, technology has an effect on the individual at work for two reasons. First, technology leads to change in individual's values which they bring to the workplace. Second, technology also leads to changes in work environment (Hodgetts,1999). Therefore the essence of technology-individual attitude is very important.

The misfit between technology and individual attitude may create dysfunction in task performance. Senge (1993) examined the effects of technology and found that individual attitude, especially work-related attitude of employees, was very important. They need to feel confident that in the long run, what they will gain from technology. Also there must be a supportive climate between the individual and the organization when technology is brought to the work place. If the supportive climate can be created, the employees will be more receptive to the changes being pushed on them by technology. This is the most desirable climate in the organization because it will lead to the development of a "knowledge-based organization", where information sharing, teamwork, and thrust are key characteristics.

After confirming that technology-individual attitude fit was a predictor of job performance as stated in the assumption of the study, then it was necessary to examine the effect of outputs of this fit to see whether or not each of them are predictors of job performance.

The assumption of this study predicted that when technology fit with individual attitude, it will generate three important outputs. They are job satisfaction, commitment and reduced role stress. If each of these helps employees perform tasks better; his or her job performance will increase.

When considering each of the outputs occurring from the fit between technology and individual attitude, job satisfaction, commitment and reduced role stress all have positive effects on job performance. From the three predictors of job performance; job satisfaction has the strongest influence on job performance, the next

strongest was reduced role stress while commitment had the least effect on job performance.

A job is the collection of tasks a person performs in support of organizational objectives as well as individual objectives. Job satisfaction is the degree to which an individual feels positively or negatively about a job. In the present context, job satisfaction is an important attitude that can and does influence behavior at work. Therefore, job satisfaction was widely studied as an outcome in person-environment fit studies. Person-environment fit was positively related to job satisfaction in many studies (Caplain et.al.,1980; Furnham and Schaeffer,1984). However only a few studies of person-environment fit and job performance have been conducted .

However the literature on person-environment fit suggested that the fit facilitated performance.

In information systems literature, there is some research that has documented a variety of individual characteristics and their association with the use of computer and technology. There have been studies of attitudes toward computers (Bandolos and Berson,1990), computer self-efficacy (Delcourt and Kinzie,1995), computer anxiety, (McInerney, McInerney and Sinclair,1994), and computer experience, (Gos,1996). They all found that when technology matched with individual attitude toward computers, when individuals feel that they have computer self-efficacy, and they did not have computer anxiety and when individuals have computer experience then job satisfaction was evident and positively related to job performance. All of these studies confirm the result of this research that when technology fit with

individual attitude then job satisfaction results and job satisfaction is a predictor of job performance.

Previous empirical research suggested a direct relationship between job satisfaction and job performance. The positive effects between job satisfaction and job performance have been reported in many works (Brown and Peterson,1994; Child,1987; Evan,1987; Guiliono,1982).

In this research, job satisfaction had 4 dimensions; comfort, challenge, relations with co-worker and advancement. All of the four factors of job satisfaction were the main characteristics of IT jobs with which IT personnel were seriously concerned.

IT personnel should feel comfortable with their work, their new technology, new work procedure, and new tools and should not feel threatened. A large number of researches have documented that positive attitudes toward computers lead to high performance; on the other hand a feeling of dissatisfaction about work leads to low performance (Bandulos and Berson,1990; Koohang,1984).

Challenge is an intrinsic dimension of job satisfaction and the challenge factor can influence workers to be highly productive (Herzberg, Mausrer and Snyderman,1959). IT is challenging work in itself; therefore it would be expected that IT personnel have challenging work which would make them more satisfied with their work.

Relation with co-workers is also an important factor in job satisfaction of IT personnel. If they have a good relation with co-workers, they should be satisfied with their work (Trimmers,1990).

The last factor of job satisfaction is advancement which is quite an important variable for IT careers, especially for IT personnel in public organizations. An unclear career path and advancement in their career is a cause of high turnover in IT personnel in public organizations.

Therefore, when IT personnel have positive attitude toward the 4 factors which combine to be job satisfaction, then job satisfaction will predict job performance as stated in the assumption of the study.

The second output of technology-individual attitude fit which also has a positive effect on job performance was reduced role stress.

The statistical results of this study confirmed that when technology fit with individual attitude, it would generate reduced role stress which meant that IT personnel had less occupational stress. This result is supported by other research studies which investigated occupational stress.

Accompanying the growth of information technology are questions about its effect on attitudes, performance, and well-being of employees who produce the information. Nussbanum (1981) contended that information technology causes work to be structured and raises stress levels. Personal opinions and assumptions about how such workers feel, perceive , and react to their jobs are finding their way into the popular press (Petre,1983).

Stress occurs when a person feels he or she has exceeded his or her personal resources and is endangering personal well-being. Consequently, when an information systems employee's environmental demands exceeds his or her capability, stress results. Therefore,

attention was called to the appraisal of stress among IT personnel who are today an extremely significant occupational group. Since there are increased application of information technology, therefore the understanding of person-environment fit especially technology-individual attitude fit among IT personnel becomes even more crucial for coping with the rapid pace of the use of IT, and changes in the technology itself.

IT personnel in many research studies are faced with the problem of work overload, role conflict, and role ambiguity like any other employee. For example, nurses who reported significantly higher levels of work overload and role conflict showed higher levels of stress. They also indicated significantly lower levels of intrinsic job satisfaction.

IT personnel in the studied public organizations perceived that the technology they used matched with their attitude; therefore they have no problem of role stress. Factors that can explain this were personal factor especially the age and education. The age of IT personnel or computer end users has been thought to play a significant role in attitude toward computers and computer utilization. It is also a common belief that older persons exhibit higher levels of computer anxiety (Howard and Smith,1986), which will determine role stress. The average age of IT personnel in this study was 35 years old, which can be considered not too old. In addition, most of them have earned a bachelor's degree. Thus they are a group of people who can easily adapt to change and adjust themselves. Learning about, and then working with IT, requires the acquisition of new skills and knowledge to modify old

attitudes which the younger person can do better than the older worker (Howard and Smith,1986).

Moreover, there was a significant relationship between personal factors and computer user's attitudes. Igbaria and Parasumaran (1989) found that education is negatively related to computer anxiety which means that the higher education level IT personnel have, the less computer anxiety they will possess. Culpan (1995) also found that most computer users agreed that computer use increased their competence in performing their job but disagreed that usage generated work-related stress. These two research studies confirm the results of this research that when IT users did not have computer anxiety, feel more positive toward technology they used and were adaptable to their technology, then they have reduced role stress. And like the first output (job satisfaction) of technology-individual attitude fit, reduced role stress was a significant determinant of job performance.

The third output of technology-individual attitude fit, commitment, also significantly determined job performance. The empirical results support the assumption that, when technology matches with individual attitude, then it would create organizational commitment and this commitment would predict or determine job performance. This result conformed to the work of many research studies (Calpan, et al,1975; Chesney and Rosenman,1980; Cox,1978). Most research studies reported that organizational commitment is the concept that is closely related to job satisfaction. When people are satisfied with their jobs, they should also have organizational commitment. This occurred in this research as stated in the assumption.

When introducing information technology to the organization, it means bringing changes to the organization. The organization must develop a commitment to change if it is to successfully implement a new technology. Individuals within the organization must see technology as being worthwhile, valuable both to them as individuals as well as to the organization as a whole (Peuquet and Bacastow,1991). Mowday, Steers and Porter (1979) studied the linkage between organizational commitment and job performance and summarized positive findings of organizational commitment and job performance. Meyer (1989) concluded that in order to fully utilize IT in any organization, commitment is one of the key factors. Employees in the organization must be involved, committed and focused on improvement. This is the key to change. Successful implementation of IT depends on the attitude and ability of employees to work in a new work environment which implies a fit between the person and the environment.

This research found that IT personnel who have high commitment as a result of technology-individual attitude fit will perceive high job performance.

Interestingly, commitment in this study has the weakest influence upon job performance. One possible explanation concerns organization culture, which is the system of shared beliefs and values that develops within an organization and guides the behavior of its members. Organization culture is recognized as a key predictor of employee satisfaction, competitive performance and commitment (Cook, Hunsaker and Coffey,1997). Commitment can be organizational

commitment, task commitment, professional commitment and management commitment (Johns,1996).

The organizational culture of a bureaucratic organization like a Thai public organization guides the behavior of the member in the organization to commit to their boss, their supervisor, or their leader, in order to survive and keep going on in the organization. The form of commitment is management commitment. Therefore, the members in the studied organizations may commit to the individual rather than commit to the organization. Therefore the employees in the studied organizations perceived that organizational commitment has little affect on their job performance .

(2) Technology-Task Fit and Job Performance (TTF)

Technology-Task Fit (TTF) was the second most influential predictor upon job performance of IT personnel in the studied public organizations. This research attempted to highlight the importance of TTF in explaining how technology leads to performance impacts; therefore it proposed that IT has an impact on job performance when there is correspondence between the technology and the task they perform.

From statistical analysis, TTF significantly affected job performance. This confirms the assumption of this study, and also is supported by other IS models such as the Technology-to-Performance Chain (TPC). TPC asserted that IT would have a positive impact on individual performance when the technology was a good fit with the tasks it supported (Goodhue,1988).

The assumption of this study also predicted that when technology matched with task, it will generate three important outputs which are quality of data, compatibility of data and timeliness of data. These outputs assist the individual to perform tasks better; therefore his or her job performance will increase.

From the three outputs of TTF, there was only one output that significantly effected job performance. It was timeliness of data. This finding supported the hypothesis that ; IT personnel who work with high timeliness of data occurring from technology-task fit will have high job performance. Interestingly, quality of data and compatibility of data did not prove to be significant for job performance.

The possible explanations for this finding concern the information systems in the studied public organizations and the characteristics of the tasks.

IT personnel in the studied public organization consider that timeliness of data was important for them in meeting day-to-day operational needs. Therefore timeliness of data is more important to them than quality and compatibility of data. Most of the studied IT personnel were operational employees. The statistical data in the preceding chapter indicated that the information systems they used were transaction processing systems (TPS) which primarily operate day-to-day activities.

The principal purpose of information systems at this level is to answer routine questions and to track the flow of transactions through the organization. At this level of work, tasks, resources and goals are predefined and highly structured(Loudon and Loudon,1999).

Therefore, timeliness of data which focuses on meeting day-to-day operational needs was considered to be the most influential factor of job performance.

This finding confirmed the hypothesis that, IT personnel who work with high timeliness of data as a result of technology-task fit have high performance. The other two hypothesis in this set of fit were not confirmed. They were: IT personnel who work with high quality of data and compatibility of data as a result of technology-task fit will have high performance. In this study quality of data and compatibility of data did not prove to be significant for job performance. These results were contradicted the work of Goodhue and Thompson (1995). They found that individuals engaged in more routine tasks required high quality of data and compatibility of data.

The possible explanation for this findings was, high quality of data and compatibility of data were the two characteristics of data that basically focus on the tasks that need decision making rather than being suitable for the meeting day-to-day operation needs. Most of IT personnel in the studied organizations in this study respond that their routine tasks are rarely concerned with decision-making; therefore they did not consider quality and compatibility of data as the influential predictor for job performance.

Another possible explanation was, perhaps "quality of data" is the same - i.e. routine information so IT personnel do not know the difference between high and low quality of data. Also compatibility may also be a given. Therefore IT personnel has not faced incompatible data.

Thus they did not consider quality and compatibility of data as the influential determinant of job performance.

The third possible explanation for this finding was, the information systems that used in the studied organization was a transaction processing system (TPS). TPS was the information systems that require timeliness of data to process and produce transaction outputs. Therefore, other characteristics of data whether they were quality of data or compatibility of data, are perceived by IT personnel as less important and did not affect their routine tasks. Therefore, these two outputs of technology-task fit did not determine their performance as stated in the assumption.

However, if the IT personnel in this study are in the management level and used other information systems such as Management Information Systems (MIS) or Decision-Support Systems (DSS), quality and compatibility of data would determine job performance. Because MIS primarily serve the functions of planning, controlling, and decision making at the management level, and these systems are dependent on underlying Transaction Processing System (TPS) for their data (Laudon and Laudon,1999). Therefore, MIS need quality and compatibility of data for the decision-making process. In addition DSS also serve the management level of organization and help managers make decisions. Therefore, when the studied public organizations utilized three types of Information Systems : TPS, MIS, and DSS then the outputs of technology-task fit which are quality and compatibility of data would determine job performance as predicted in the assumption.

The last possible explanation concerns the problem of measurement for quality of data. This refers to currency of data, maintenance of correct data and availability. For compatibility of data, it means consolidation and consistency of data. The measurement of quality of data and information is very difficult because of the uncertain meaning of "quality". This was one of the problems in IS research, that is, to define and measure the quality of data and information.

(3) Technology-Organizational Structure Fit and Job Performance (TOF)

The least influential predictor of job performance was technology organizational-structure fit. This study tried to prove that when technology matches with organizational structure, then it will produce three important outputs. These are formalization, decentralization of task decision-making and better communication. From the three outputs, formalization and better communication were the two outputs that significantly affect job performance. Decentralization of task decision-making did not prove to be significant for job performance.

Formalization was an important predictor of job performance because IT applications permit rules and formal procedures to be developed and implemented. How to do IT work needs to be well understood. In addition, the job is repetitive enough to justify the investment in procedures. Therefore the more formalized the structure becomes, the more performance was enhanced. This study confirmed the work of Hage and Aiken (1969) who found that organizations

characterized by routine technology were more formalized and the formalization was related to the level of job performance.

This study found that decentralization of task decision-making did not prove to be significant for job performance. Theoretically, when IT was implemented in the organizations, it would lower the level of management decision-making into a flatter organization. Flatter organizations have fewer levels of management and lower level employees are being given greater decision-making authority. Those employees are empowered to make more decisions than in the past (Laudon and Laudon,1999).

Therefore the decision-making tended to be decentralized. However, the statistical result indicated that decentralization of task decision-making did not determine or make job performance increase.

The possible explanation of this finding is that IT, which was implemented in the studied public organization was mainly a transaction processing system (TPS) which performed and recorded the daily routine transaction necessary to conduct the day-to-day activities. At this level, tasks and goals were predefined and highly structured. The decisions made by the operational level were according to predefined criteria in the form of rules and procedures. Since the task decision was on rules and procedures, IT personnel perceived that this kind of task decision-making did not determine or increase job performance.

The last hypothesis of technology-organization fit, stated that IT personnel who work in better communication situation as a result of technology-organization structure fit will have high job performance. The statistical result support this hypothesis.

As stated earlier, communication is the exchange and comprehension of information. This exchange is usually to influence decision-making, behavior and employees. When technology fits with the organizational structure, it will provide better communication, and better communication will increase job performance. Communication in organizations can benefit greatly from advancements in information technology. As discussed earlier, employees in the new workplace are expected to be computer literate and will use the new technology to maximize advantage. The new age of communication is one of e-mail, voice mail , video conferencing and more. These communication techniques have several advantages. Greater volumes of information can be accommodated and transmitted through computer-based systems. Also information can be sent faster and to more people through faxes and electronic mail.

This research finding confirmed that better communication as a result of technology-organizational structure fit will enhance the increasing of job performance. But communication had the least influence on job performance.

One possible explanation of this finding was that the behavior of the employees in the studied organizations still focused on the original pattern of communication or communication norms, especially the norm which is used in bureaucratic organizations. In some bureaucratic organizations, everything should be put in writing or nothing gets done. Therefore, even if they have technology fit with the structure which also produces better communication, they might not make use of it and still follow the basic procedures in communication which require more time.

Some personnel do not realize the strength of better communication which can increase job performance. Therefore, they perceived that better communication occurring from technology-organizational structure fit has little effect on job performance.

7.2 CONTRIBUTION

7.2.1 Contingency Theory

This study contributes theoretically to a better understanding of the relationship of the concept of fit and job performance. It fills a significant gap in contingency theory in explaining job performance by focusing on the structural subsystem, the functional subsystem and the psychosocial subsystem. It employed the system perspective of fit to explain the relationship among multiple contingencies, organization characteristics and individual performance characteristics.

In addition, this study developed predictors of job performance to be contingency prediction which make this study more explicit concerning the links between the variables, thereby providing a stronger theoretical basis for thinking about a number of issues relating to the impact of job performance. This research also integrated the multiple "fit" concept from both organizational theory and information systems research to fulfill the limitation of organizational theory.

Furthermore, this study developed a successful model to predict job performance. All the three sets of fit, technology-individual attitude fit, technology-task fit and technology-organizational structure fit, significantly determine job performance as stated in the assumption of

the study. The study revealed that effect of three sets of fit become stronger when combining the three sets of fit together.

7.2.2 Measurement

A further contribution of this study to research is with respect to measurement. This study develops the measures of job performance. It selects the common factors of job performance characteristic traits of the information system professional group and the common factors of job performance evaluation of Thai civil servant to create a new set of job performance traits that are suited for IT personnel to evaluate their job performance.

7.3 RECOMMENDATION AND POLICY IMPLICATION

The discussion in this section mainly focuses on the studied public organizations that are required to adapt themselves to utilize IT to achieve improved job performance which will lead to organizational effectiveness.

7.3.1 It is strongly recommended that the studied public organizations need to employ many management concepts to gain individual performance as well as to gain organizational effectiveness. Information technology is just a tool that public organizations can utilize to improve the efficiency and effectiveness of public organizations. Result-based management concepts and reengineering concepts that public organizations use will make changes in their operations. Thus the

concepts of continuous improvement should be applied and the changes occurring from result-based management, reengineering, and continuous improvement will lead to the concept of total quality management. All of these management concepts are recommended for use in public organizations to improve Thai public organizational effectiveness.

7.3.2 Various process reengineering are required for the studied public organizations. The essence of process reengineering is to redesign processes to center control with an identifiable group of people, and to focus the entire system on meeting customer needs and expectations. It also tries to eliminate duplication of work and system bottlenecks. In doing so, it tries to reduce costs and streamline operational efficiency. These two studied public organizations have already redesigned some of their core processes but some did not. When most of the core processes have been redesigned and IT has been used as the tool to streamline the core process, then it can make an operation more efficient.

7.3.3 IT personnel need to focus more on the quality and compatibility of data and information. These two characteristics are important predictors of job performance; they are the outputs of technology-task fit which occurred in the studied organizations. However IT personnel seem to be ignorant of their importance. Quality and compatibility of data is important, and when strategically developed, they can make the operation more efficient and effective.

7.3.4 IT utilization is the policy that should be strongly supported. It is a policy that people in the organization are willing to accept, and to cooperatively implement. Technology-individual attitude fit in the studied public organizations proves to have more influence on job performance. In the past, when introducing new technology to the organization, there were always some people who resisted change, but it does not presently occur with IT. Acceptance of information technology is part of the new generation and the progressive person. Therefore, when fully utilized, IT in public organizations, will enhance productivity, performance and organizational effectiveness.

7.3.5 There is a need to reduce the problem of information sharing, which results from the bureaucratic atmosphere, by establishing procedures and standards for sharing information among public organizations.

Other recommendations related to government policies to support IT utilization in public organization are :

- To focus on the concept of connectivity which emphasizes the need to share and optimize utilization of resources such as data and application systems both within and across the organizations.
- To classify and disseminate information by resolving legislative and administrative issues related to information access, authorization and confidentiality in order to promote information sharing to fully utilize IT in public organizations.

7.4 IMPLICATION FOR FUTURE RESEARCH

Future research should address some limitations of this study by extending this approach to different samples and research designs. Future research should employ both qualitative and quantitative methods for research design and further efforts should be directed to other organizational contexts. In a private, for-profit context, the concept of fit and performance outcomes could be very different, because the public sector typically has older technology-related equipment than the private sector (Oven,1987) and has traditionally found it more difficult to attract and train quality computer professionals. Therefore, it would be interesting to study the appropriate fit between technology and individual performance in the private sector.

Future studies should also use a multivariate concept of performance, rather than focusing simply on job or individual performance. The individual performance tested here is conditioned by the value judgments which may be lead to some bias. Accurate performance testing requires various dimensions in measuring performance of IT personnel and should use perceived job performance from other evaluations such as the immediate supervisor who is responsible for the overall performance of his/her subordinates.

Further research might consider closely the matching process between IT and human resource development, IT and leadership style, IT and work environment, and its effect on job performance

Finally, future research should also attempt to propose and test arguments regarding causal relationships, for which a longitudinal study is certainly required.

7.5 CONCLUSION

This study has proposed to develop and test a theoretical framework for explaining the effect of IT utilization upon job performance. It employed the concept of fit in contingency theory to explain the effect of three sets of fit; technology–individual attitude fit, technology–task fit, and technology–organizational structure fit. The outputs of all these fits lead to individual performance impacts.

The findings indicate that the three sets of fit are predictors of job performance. Within these three sets of fit, technology–individual attitude fit was the most influential predictor. Job satisfaction, commitment and reduced role stress were the outputs of technology–individual attitude fit that had a positive effect on job performance. Timeliness of data was the only output of technology–task fit that significantly determined job performance. The least influential predictor of job performance was technology–organizational structure fit which, produced two outputs: formalization, and better communication, that positively effect job performance. This study has also increased the understanding of contingency theory and suggests that the existence of multiple sets of "fits" within the organization will increase the level of individual performance.

APPENDIX A

QUESTIONNAIR COVER LETTERS

REFERENCE LETTER

ที่ ทม 1802/ 337

คณะรัฐประศาส
สถาบันบัณฑิตา
คลองจั่น บางก

11 สิงหาคม 2542

เรื่อง ขอความอนุเคราะห์ในการเก็บข้อมูล

เรียน ผู้อำนวยการ สำนักเทคโนโลยีสารสนเทศ

สิ่งที่ส่งมาด้วย แบบสอบถามเรื่อง การนำเทคโนโลยีสารสนเทศมาใช้ในองค์การภาครัฐ

ด้วย นางสาววัลยา ชูประดิษฐ์ นักศึกษาปริญญาเอกนานาชาติ สาขาการบริหารการพัฒนา คณะรัฐประศาสนศาสตร์ สถาบันบัณฑิตพัฒนบริหารศาสตร์ กำลังอยู่ในระหว่างการจัดทำวิทยานิพนธ์ เรื่อง "IT Utilization in Public Organization and Its Impact on Job Performance" การวิจัยครั้งนี้จำเป็นอย่างยิ่งที่จะต้องเก็บรวบรวมข้อมูลจากเจ้าหน้าที่ ซึ่งเกี่ยวข้องกับการใช้เทคโนโลยีสารเทศในองค์การภาครัฐ

คณะรัฐประศาสนศาสตร์ จึงใคร่ขอความอนุเคราะห์จากท่าน ขออนุญาตให้นางสาววัลยา ชูประดิษฐ์ นักศึกษาปริญญาเอกนานาชาติ เข้าเก็บข้อมูลโดยใช้แบบสอบถามที่แนบมาพร้อมนี้ สำหรับคำตอบที่รวบรวมได้ ผู้วิจัยจะนำไปวิเคราะห์และนำเสนอในภาพรวมมิได้นำเสนอเป็นรายกรม ทั้งนี้เพื่อประโยชน์ในทางวิชาการโดยตรงเท่านั้น

คณะรัฐประศาสนศาสตร์ หวังว่าคงได้รับความอนุเคราะห์จากท่านเป็นอย่างดี จึงขอขอบคุณล่วงหน้ามา ณ โอกาสนี้ อนึ่ง นักศึกษาจะประสานงานกับหน่วยงานของท่านโดยตรง หากหน่วยงานของท่านจะแจ้งความคืบหน้าในเรื่องนี้ ขอความกรุณาติดต่อโดยตรงที่นักศึกษา ที่หมายเลข 938-7068 และ 511-0568

ขอแสดงความนับถือ

ผู้ช่วยศาสตราจารย์

(ทวีศักดิ์ สุทกวาทิน)

รองคณบดีรักษาราชการแทน

คณบดีคณะรัฐประศาสนศาสตร์

โทรศัพท์/ โทรสาร 374-4977

คณะรัฐประศาสนศาสตร์
สถาบันบัณฑิตพัฒนบริหารศาสตร์

SCHOOL OF PUBLIC ADMINISTRATION
NATIONAL INSTITUTE OF DEVELOPMENT ADMINISTRATION

กรกฎาคม 2542

เรื่อง ขอความร่วมมือในการตอบแบบสอบถาม

เรียน ท่านผู้ตอบแบบสอบถาม

สิ่งที่ส่งมาด้วย แบบสอบถามเรื่อง การนำเทคโนโลยีสารสนเทศมาใช้ในองค์การภาครัฐ
จำนวน 1 ฉบับ

ด้วยดิฉัน นางสาววัลยา ชูประดิษฐ์ นักศึกษาปริญญาเอกนานาชาติ สาขาการบริหารการพัฒนา สถาบันบัณฑิตพัฒนบริหารศาสตร์ กำลังอยู่ในระหว่างการจัดทำวิทยานิพนธ์ เรื่อง " การนำเทคโนโลยีสารสนเทศมาใช้ในองค์การภาครัฐ" การวิจัยครั้งนี้จำเป็นอย่างยิ่งที่จะต้องเก็บรวบรวมข้อมูล จากเจ้าหน้าที่ซึ่งเกี่ยวข้องกับการใช้เทคโนโลยีสารสนเทศในองค์การภาครัฐ

จึงใคร่ขอความกรุณาจากท่านได้โปรดให้ความร่วมมือในการตอบแบบสอบถามที่แนบมาพร้อมนี้ สำหรับคำตอบที่รวบรวมได้ ผู้วิจัยจะนำไปวิเคราะห์และนำเสนอในภาพรวม มิได้นำเสนอเป็นรายกรม ทั้งนี้เพื่อประโยชน์ในทางวิชาการโดยตรงเท่านั้น

ผู้วิจัยหวังเป็นอย่างยิ่งในความกรุณาจากท่านที่จะให้ความร่วมมือด้วยดี และขอขอบพระคุณเป็นอย่างสูงมา ณ โอกาสนี้ด้วย

ขอแสดงความนับถือ

(นางสาววัลยา ชูประดิษฐ์)

APPENDIX B

FINAL QUESTIONNAIRS
(THAI AND ENGLISH VERSION)

แบบสอบถาม

การนำเทคโนโลยีสารสนเทศมาใช้ในองค์การภาครัฐ

คำชี้แจง

1. การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาสถานภาพการใช้เทคโนโลยีสารสนเทศ (IT) และความคิดเห็นของเจ้าหน้าที่ที่ทำหน้าที่ เกี่ยวข้องกับการใช้เทคโนโลยีสารสนเทศในองค์การภาครัฐ เพื่อให้ทราบสถานภาพในปัจจุบัน ตลอดจนความคิดเห็นของเจ้าหน้าที่ที่มีต่อการนำเทคโนโลยีสารสนเทศมาใช้ เพื่อนำไปวิเคราะห์ในเชิงวิชาการ มิได้มีวัตถุประสงค์เพื่อการประเมินผลงานของท่านแต่อย่างใด คำตอบของท่าน**ผู้วิจัยจะนำไปวิเคราะห์และนำเสนอในภาพรวม** มิได้นำเสนอเป็นรายกรม ทั้งนี้เพื่อประโยชน์ในทางวิชาการโดยตรงเท่านั้น
2. <u>โปรดตอบแบบสอบถามตามความคิดเห็นของท่านที่เป็นจริง</u> และ<u>กรุณาตอบคำถามให้ครบทุกข้อ</u> คำตอบของท่านทุกข้อมีค่ายิ่งสำหรับการวิจัยครั้งนี้

ส่วนที่ 1 สถานภาพของผู้ตอบแบบสอบถาม

คำชี้แจง กรุณาทำเครื่องหมาย / หรือเติมคำตอบที่ท่านคิดว่าตรงกับความเป็นจริงที่สุด

1. เพศ ☐ ชาย ☐ หญิง
2. อายุ _____ ปี
3. วุฒิการศึกษาสูงสุดของท่าน
   - ☐ ต่ำกว่าปริญญาตรี
   - ☐ ปริญญาตรี (โปรดระบุสาขา).....
   - ☐ ปริญญาโท (โปรดระบุสาขา).....
   - ☐ ปริญญาเอก (โปรดระบุสาขา).....
4. ปัจจุบันท่านดำรงตำแหน่ง
   - ☐ นักวิชาการคอมพิวเตอร์
   - ☐ เจ้าหน้าที่เครื่องคอมพิวเตอร์
   - ☐ เจ้าหน้าที่ระบบงานคอมพิวเตอร์/โปรแกรมเมอร์
   - ☐ เจ้าหน้าที่บันทึกข้อมูล
   - ☐ เจ้าหน้าที่บริหาร
   - ☐ เจ้าหน้าที่ฝึกอบรม
   - ☐ เจ้าหน้าที่วิชาการ
   - ☐ เจ้าหน้าที่ธุรการ
   - ☐ อื่น ๆ (ระบุ).....
5. ระยะเวลาที่ท่านดำรงตำแหน่งปัจจุบัน_____ปี
6. ท่านใช้ระบบสารสนเทศในหน่วยงานนี้มาเป็นเวลา_____ปี

ส่วนที่ 2 สถานภาพการใช้เทคโนโลยีสารสนเทศ

7. ใน 1 สัปดาห์ ท่านใช้เทคโนโลยีสารสนเทศเหล่านี้ มากน้อยแค่ไหน

ชนิด 7.1 เทคโนโลยีคอมพิวเตอร์	ไม่เคยใช้	1 - 2 ครั้ง	3 4ครั้ง	ทุกวัน
เมนเฟรมคอมพิวเตอร์	1	2	3	4
มินิคอมพิวเตอร์	1	2	3	4
ไมโครคอมพิวเตอร์ (PC Computer)	1	2	3	4
คอมพิวเตอร์กระเป๋าหิ้ว	1	2	3	4
เครื่องพิมพ์ (Printer)	1	2	3	4
7.2 เทคโนโลยีโทรคมนาคม เครื่องโทรสาร (Fax)	1	2	3	4
อิเล็กทรอนิกส์เมล์ (E-mail)	1	2	3	4
อินเตอร์เน็ต (Internet)	1	2	3	4
โทรศัพท์เคลื่อนที่	1	2	3	4
วิทยุติดตามตัว	1	2	3	4

8. ระบบสารสนเทศที่ใช้ในหน่วยงานของท่าน ได้แก่ (ตอบได้มากกว่า 1 ข้อ)

☐ ระบบบริหารหน่วยงานด้านบุคลากร

☐ ระบบบริหารหน่วยงานด้านงบประมาณ

☐ ระบบบริหารหน่วยงานด้านบัญชี

☐ ระบบบริหารหน่วยงานด้านพัสดุ

☐ ระบบการให้บริการ

☐ ระบบงานด้านอื่นๆ (โปรดระบุ) .....

9. วัตถุประสงค์ของระบบงานคอมพิวเตอร์ ในหน่วยงานของท่าน คือ (โปรดเรียงลำดับ ลำดับที่ 1- สำคัญที่สุด)

☐ เพิ่มประสิทธิภาพในการทำงานหลัก เช่น การให้บริการประชาชน

☐ เพิ่มประสิทธิภาพในงานสนับสนุน เช่น งานธุรการ งานบัญชี/การเงิน งานบุคลากร

☐ ปรับระบบการบริหารและการตัดสินใจ

☐ เพิ่มผลตอบแทนจากสินทรัพย์

☐ เพิ่มขีดความสามารถในการแข่งขัน

☐ เชื่อมโยงกับลูกค้าผู้รับบริการ

☐ อื่นๆ (โปรดระบุ) .....

10. ลักษณะของระบบงานในหน่วยงานของท่าน คือ

☐ ใช้ฐานข้อมูล

☐ ใช้อุปกรณ์โทรคมนาคม

☐ สามารถประมวลผลจนได้ผลลัพธ์ โดยปราศจากการทำงานเพิ่มเติมของบุคลากร

☐ ใช้อุปกรณ์พิเศษอื่น ๆ (ระบุ).....

11. การใช้ระบบงานคอมพิวเตอร์ในหน่วยงานของท่าน คือ (ตอบได้มากกว่า 1 ข้อ)

☐ ใช้เฉพาะบุคคล : ไม่ต้องใช้ความรู้ในวิชาชีพเฉพาะด้าน

☐ ใช้เฉพาะบุคคล : ต้องใช้ความรู้ในวิชาชีพเฉพาะด้าน

☐ ใช้เครือข่ายร่วมภายในกอง/ฝ่าย

☐ ใช้เครือข่ายข้ามกอง/ฝ่าย

☐ ใช้เครือข่ายข้ามกรม

ส่วนที่ 3 **ความคิดเห็นเกี่ยวกับการนำเทคโนโลยีสารสนเทศ (IT) มาใช้ในหน่วยงานของท่าน**

โปรดวงรอบตัวเลขคำตอบที่ท่านคิดว่า ตรงกับความเห็นของท่านมากที่สุดเพียงข้อเดียว **และกรุณาตอบทุกข้อ**

ข้อ	คำถาม	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	ท่านมีข้อมูลที่ทันสมัยเพียงพอในการทำงานให้สำเร็จ	5	4	3	2	1
2.	ท่านได้รับข้อมูลที่ถูกต้องเหมาะสมในการทำงาน	5	4	3	2	1
3.	ข้อมูลและสารสนเทศที่ท่านใช้จากแหล่งต่าง ๆ ภายในกรม สามารถปรับเปลี่ยนให้เหมาะสมกับงานของท่านได้	5	4	3	2	1
4.	ข้อมูลและสารสนเทศที่ท่านใช้จากแหล่งต่าง ๆ ภายในกรมมีความเที่ยงและความตรง	5	4	3	2	1
5.	ระบบงานของท่านสามารถจัดส่งข้อมูลและรายงานที่สำคัญได้ตามเวลาที่กำหนด	5	4	3	2	1
6.	กิจกรรมที่เกี่ยวข้องกับระบบงานคอมพิวเตอร์ (เช่น การจัดพิมพ์รายงาน การประมวลผล) จะสำเร็จและเสร็จทันกำหนดเสมอ	5	4	3	2	1
7.	ท่านมีความสุขในงานที่ทำ	5	4	3	2	1
8.	ท่านมีเวลาเพียงพอในการทำงานให้แล้วเสร็จ	5	4	3	2	1
9.	งานของท่านน่าสนใจมากขึ้น เมื่อนำ IT มาใช้	5	4	3	2	1
10	ท่านมีอิสระในการตัดสินใจในการทำงานต่าง ๆ มากขึ้น เมื่อนำ IT มาใช้	5	4	3	2	1
11	เพื่อนร่วมงานของท่านมีความเป็นมิตรและช่วยเหลือดี	5	4	3	2	1

ข้อ	คำถาม	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
12	ท่านมีโอกาสก้าวหน้าในสายงานของท่าน	5	4	3	2	1
13	การนำ IT มาใช้ เปิดโอกาสให้ท่านได้พัฒนาความรู้ความสามารถ	5	4	3	2	1
14	ท่านเชื่อและยึดมั่นในเป้าหมายขององค์การ	5	4	3	2	1
15	ท่านทุ่มเทแรงกายแรงใจในการทำงานให้บรรลุเป้าหมายขององค์การ	5	4	3	2	1
16	ท่านรู้หน้าที่และความรับผิดชอบของท่านเป็นอย่างดี	5	4	3	2	1
17	งานของท่านมีวัตถุประสงค์และเป้าหมายชัดเจน	5	4	3	2	1
18	ท่านได้รับมอบหมายให้ทำงานโดยมีเครื่องมือและอุปกรณ์ด้าน IT เพียงพอ	5	4	3	2	1
19	ผู้บังคับบัญชาของท่านมักสั่งให้ทำงานที่เกินความสามารถของระบบ	5	4	3	2	1
20	งานและกิจกรรมประจำวันต่าง ๆ ที่ท่านทำอยู่ มี กฎ ระเบียบ และขั้นตอนการปฏิบัติงานที่ชัดเจน	5	4	3	2	1
21	หน่วยงานของท่านมีขั้นตอนมาตรฐานที่ชัดเจนให้สามารถปฏิบัติตามได้	5	4	3	2	1
22	ท่านสามารถตัดสินใจเกี่ยวกับงานประจำวันได้ด้วยตนเอง	5	4	3	2	1
23	ผู้บังคับบัญชาของท่าน เป็นผู้พิจารณาให้ความเห็นชอบในงานเพียงส่วนน้อย	5	4	3	2	1
24	การสื่อสารภายในองค์กรของท่านมีประสิทธิภาพดี	5	4	3	2	1
25	การนำ IT มาใช้ช่วยให้งานของท่านมีคุณภาพมากขึ้น	5	4	3	2	1
26	งานของท่านมีความผิดพลาดน้อยลงเมื่อนำ IT มาใช้	5	4	3	2	1
27	IT ช่วยให้การทำงานของท่านสะดวกและง่ายขึ้นกว่าระบบเดิม	5	4	3	2	1
28	IT ช่วยให้ท่านทำงานได้มากขึ้น	5	4	3	2	1
29	IT ช่วยให้ท่านทำงานบรรลุเป้าหมายได้รวดเร็วขึ้น	5	4	3	2	1

ข้อ	คำถาม	มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
30	ท่านสามารถประหยัดค่าใช้จ่ายได้มากขึ้น เมื่อมีการนำ IT มาใช้ในงาน	5	4	3	2	1
31	ท่านมีความรู้ความสามารถเพียงพอที่จะปฏิบัติงานให้สำเร็จลุล่วงได้	5	4	3	2	1
32	ท่านต้องการเพิ่มพูนทักษะและความชำนาญเพื่อให้สามารถปฏิบัติงานได้อย่างมีประสิทธิภาพ	5	4	3	2	1
33	IT ช่วยให้การพิจารณาตัดสินใจของท่านถูกต้องขึ้น	5	4	3	2	1
34	เมื่อนำ IT มาใช้ การพิจารณาตัดสินใจของท่านมีความน่าเชื่อขึ้น	5	4	3	2	1
35	เมื่อนำ IT มาใช้ ท่านสามารถปรับตัวให้เข้ากับการทำงานในระบบใหม่ได้	5	4	3	2	1

ผู้วิจัยขอขอบพระคุณเป็นอย่างสูง ที่ท่านได้กรุณาตอบแบบสอบถามฉบับนี้

IT UTILIZATION IN PUBLIC ORGANIZATIONS AND ITS IMPACT ON JOB PERFORMANCE

Explanation

1. The objective of this questionnaire is to study the status of information technology (IT) utilization in public organizations including the opinions of IT personnel who involving with IT utilization. The data will be used only for academic purposes and it is not an evaluation of you or your department. Answers to the question will be reported only in terms of statistical summaries of overall organizations, not individual departments.
2. Please answer the questionnaire to the best of your knowledge and please answer all questions.

PART 1 : PERSONAL BACKGROUND

Please complete the blank or mark / on the true answer(s).

1. Your gender ☐ male ☐ female

2. Your present age ..... years

3. What is the highest level of education you have received ?

☐ Diploma or certification

☐ Bachelor's degree (please specify degree).....

☐ Master's degree (please specify degree).....

☐ Doctorate's degree (please specify degree).....

4. Your current position

☐ Computer Professional	☐ Managerial Staff
☐ Hardware Operator	☐ Trainee
☐ System Analyst/Programmer	☐ Academic Staff
☐ Data Entry Operator	☐ Administrative Staff

5. Length of service in your current position.....years

6. You have used the information system in this organization for.....years.

PART 2 : THE STATUS OF IT UTILIZATION

Please mark / on the answer(s) that best describe the IT utilization in your organization.

7. How often do you use information technology?.

Type 7.1 Computer Technology	never	1-2days a week	3-4 days a week	every day
Mainframe Computer				
Mini Computer				
Micro Computer				
Portable Computer				
Printer				
8.2Telecommunication Technology Fax				
Electronic mail (E- mail)				
Internet				
Mobile Phone				
Pager				

8.Information System in your department are (answer more than 1 item)

☐ Administrative System in Personnel

☐ Administrative System in Budgeting

☐ Administrative System in Accounting

☐ Administrative System in Inventory

☐ Service System

☐ Others System (please specify).....

9. The Objective of Information System in your department are mainly for (please rank the priority, 1 = the most important)

☐ Increase the effectiveness of the main work such as citizen services

☐ Increase the effectiveness of the supportive work such as administrative work, accounting/financial work, personnel work.

☐ Improve administrative and decision making system

☐ Increase benefit from asset

☐ Increase competitive advantage

☐ Connect with the direct customers

☐ Others (please specify).....

10. The characteristics of information system in your organization is

☐ Use the database

☐ Use the telecommunication

☐ Processing without any human involvement

☐ Use specific equipment

11. Information technology in your organization are (answer more than 1 item)

☐ Individual use without professional specialty

☐ Individual use with professional specialty

☐ Use intra division network

☐ Use inter division network

☐ Use inter department network

PART 3 : THE OPINION OF IT UTILIZATION IN PUBLIC ORGANIZATIONS

This part is designed to solicit your opinions on IT utilization in public organizations. Please indicate the level of your opinion by circle only one number that best describes your opinion. Please give your opinions to every statement.

No	Statement	Most	More	Moderate	Less	Least
1.	I can get data that is current enough to finish my tasks.	5	4	3	2	1
2.	I can get pretty much right data to carry out my tasks.	5	4	3	2	1
3.	Data and information that I get from different sources are compatible and can be consolidated.	5	4	3	2	1
4.	Data and information that I get from different sources in the department are reliable and valid.	5	4	3	2	1
5.	Our systems can produce reports and critical data and information right on time.	5	4	3	2	1
6.	Information system activities (such as printed report delivery or running schedule jobs) are completed on time.	5	4	3	2	1
7.	I am happy with my work.	5	4	3	2	1
8.	I have enough time to get the job done.	5	4	3	2	1
9.	IT utilization makes my work more interesting.	5	4	3	2	1

No	Statement	Most	More	Moderate	Less	Least
10	IT utilization gives me a lot of freedom to decide how to do my own work.	5	4	3	2	1
11	The people I work with are friendly and helpful.	5	4	3	2	1
12	I have good chance for advancement in my career path.	5	4	3	2	1
13	IT utilization allows me to have an opportunity to develop my knowledge and abilities.	5	4	3	2	1
14	I believe and trust in organizational goals.	5	4	3	2	1
15	I do all my best to fulfill the organizational goals.	5	4	3	2	1
16	I know exactly what my duties and responsibilities are.	5	4	3	2	1
17	There are clear, planned goals and objectives for my job.	5	4	3	2	1
18	I receive an assignment with enough IT resource.	5	4	3	2	1
19	I was assigned to do things that are beyond the system capabilities.	5	4	3	2	1
20	Most of my normal daily activities in the department have rules and procedures stating the way I am to perform them.	5	4	3	2	1
21	There are standard procedures I am to follow for doing the tasks in my job.	5	4	3	2	1

No	Statement	Most	More	Moderate	Less	Least
22	I can make my own decision concerning with my daily work.	5	4	3	2	1
23	There are little actions that need the supervisors' approval.	5	4	3	2	1
24	My organizational communication is effective.	5	4	3	2	1
25	IT utilization makes my works having more quality.	5	4	3	2	1
26	IT utilization helps reducing the errors in my work.	5	4	3	2	1
27	IT utilization makes my works more convenience and easier.	5	4	3	2	1
28	IT utilization allows me to produce more volume of works.	5	4	3	2	1
29	IT utilization helps me to accomplish work's goal quicker.	5	4	3	2	1
30	IT utilization allows me to save budget and expenses.	5	4	3	2	1
31	You have sufficient knowledge to complete your works.	5	4	3	2	1
32	You need more skills and specialization to finish your work in an effective way.	5	4	3	2	1
33	IT utilization assists me to make more right decision.	5	4	3	2	1
34	IT utilization helps me to make more credible decision.	5	4	3	2	1
35	I can adapt myself to the new system when IT is utilized in my organization.	5	4	3	2	1

Thank you very much for your assistance in completing this questionnaire

APPENDIX C

RESEARCH INSTRUMENT

RELIABILITY TEST

Research Instrument Reliability Test

Table C1 Reliability Test of Technology-Individual Attitude Fit Scale (on Pretest)

Statistics for Scale	Mean	Variance	Std. Dev.	No.of Var.		
	44.26	31.44	5.60	= 13		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.40	2.56	4.26	1.03	1.66	0.28
Item Variance	Mean	Minimum	Maximum	Range	Max/Min	Variance
	0.67	0.32	1.35	1.03	4.15	0.10
Inter-item	Mean	Minimum	Maximum	Range	Max/Min	Variance
Correlations	0.24	-0.66	0.82	1.43	-1.33	0.09

Alpha Value = 0.77

Table C2 Reliability Test of Technology-Task Fit Scale (on Pretest)

Statistics for Scale	Mean	Variance	Std. Dev.	No.of Var.		
	17.80	12.78	3.57	= 6		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.96	2.46	3.40	0.93	1.37	0.10
Item Variance	Mean	Minimum	Maximum	Range	Max/Min	Variance
	0.49	0.28	0.66	0.38	2.37	0.021
Inter-item	Mean	Minimum	Maximum	Range	Max/Min	Variance
Correlations	0.66	0.23	0.93	0.70	3.94	0.33

Alpha Value = 0.92

Table C3 Reliability Test of Technology-Organizational Structure Fit Scale (on Pretest)

Statistics for Scale	Mean	Variance	Std. Dev.	No.of Var.		
	14.30	16.14	4.01	= 5		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.86	1.76	3.56	1.80	2.01	0.48
Item Variance	Mean	Minimum	Maximum	Range	Max/Min	Variance
	1.22	0.99	1.54	0.54	1.54	0.05
Inter-item	Mean	Minimum	Maximum	Range	Max/Min	Variance
Correlations	0.42	-0.13	0.89	1.03	-6.39	0.11

Alpha Value = 0.77

Table C4 Reliability Test of Job Performance Scale (on Pretest)

Statistics for Scale	Mean	Variance	Std. Dev.	No.of Var.		
	39.43	21.49	4.63	= 11		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.58	3.26	4.26	1.00	1.30	0.07
Item Variance	Mean	Minimum	Maximum	Range	Max/Min	Variance
	0.48	0.21	1.30	1.09	6.14	0.09
Inter-item	Mean	Minimum	Maximum	Range	Max/Min	Variance
Correlations	0.35	-0.17	0.88	1.05	-4.94	0.07

Alpha Value = 0.82

Table C5 Reliability Test of Technology Fit and Job Performance Scale (on Pretest)

Statistics for Scale	Mean	Variance	Std. Dev.	No.of Var.		
	115.8	260.3	16.13	= 35		
Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.30	1.76	4.26	2.50	2.41	0.27
Item Variance	Mean	Minimum	Maximum	Range	Max/Min	Variance
	0.66	0.21	1.54	1.32	7.24	0.13
Inter-item	Mean	Minimum	Maximum	Range	Max/Min	Variance
Correlations	0.33	-0.61	0.93	1.55	-1.52	0.07

Alpha Value = 0.93

Bibliography

ACCESS Canada.

1993. Public Works and Government Services.

Available at http :// www.pw.gov.ca/govser/framework.html.

Albrecht, M. and J.W. Cortada.

1988. Optimizing Investments in Information Technology.

National Productivity Review 43 (Summer) : 53-60.

Alexander, C.

1964. **Notes on the Synthesis of Form.** Massachusetts : Harvard

Business Press.

Anderson, G.

1984. The Coordinated Use of Five Performance Evaluation Methodologies. **Communication of the AC.** 27 (February) : 119-125.

Anderson, S. J.

1995. From Crisis to Information Society in Japan. Paper presented at the Japan Studies Association of Canada. 30 September. University of Victoria, British Columbia.

Applegate, L.M. et.al.

1988. Information Technology and Tomorrow's Manager. **Harvard Business Review.** (November-December) : 128-136.

Australian Public Service (APA).

1996. A Human Resource Framework for the Australian Public Service.

Available at http://www.psmpc.gov.au/publications/frameworkspt2glossary.html.

Bandalos, D. and J. Benson.

1990. Testing the factor Structure Invariance of a Computer Attitude Scale Over Two Grouping Conditions. **Educational and Psychological Measurement**. 50 (January) : 49-60.

Baron, R. A.

1988. Negative Effects of Destruction Criticism : Impact on Conflict, Self-efficacy, and Task Performance. **Journal of Applied Psychology**. 73 (March) : 199-207.

Baroudi, J.J.

1985. The Impact of Role Variables on IS Personnel Work Attitudes and Intentions. **MIS Quarterly**. 9 (December) : 341-356.

Benhasat, I. , A. S. Dexter and P. Todd.

1986. An Experimental Program Investigating Color-Enhanced and Graphical Information Presentation : An Integration of the Finding. **Communications of the ACM**. 29 (November) : 1094-1105.

Behrman, D. H. and W. D. Perreault, Jr.

1984. A Role Stress Model of the Performance and satisfaction of Industrial Salespersons. **Journal of Marketing.** 48 (fall) : 9-12.

Bell, D.

1976. **The Coming of Post-Industrial Society.** New York : Basic Book.

Berrien, K.F.

1976. A General Systems Approach to Organizations. In **Handbook of Industrial and Organizational Psychology.** Marvin D. Dunnette, ed. Chicago : Rand McNally College Publishing Company.

Brown, S. P. and R.A. Peterson.

1994. The Effect of Effort on Sales Performance and Job Satisfaction. **Journal of Marketing.** 58 (April) : 70-80.

Burns, T. and G.M. Stalker.

1961. **The Management of Innovation.** London : Tavistock Publications.

Cameron, K. S. and D. A. Whetten.

1983. **Organizational Effectiveness : A Comparison Multiple Models.** New York : Academic Press.

Campbell, J. P.

1977. On the Nature of Organizational Effectiveness. P. S. Goodman and J. M. Pennings (eds.) **New Perspectives on Organizational Effectiveness.** San Francisco : Jossey-Bass.

Caplan, R. D. et. al.

1980. **Job Demand and Worker Health**. Michigan : Institute for Social Research.

Carayon-Sainfort, P.

1992. The Use of Computer in Offices : Impact on Task Characteristics and Worker Stress. **International Journal of Human Computer Interaction**. 4 : 245-261.

Carlson, W. and B. McNurlin.

1992. Basic Principles for Measuring IT Values. **I/S Analyzer**. 30 (October) : 1-16.

Cast, J. et. al.

1992. **Corporate Information Systems Management**. 3rd ed. Illinois : Irwin.

Cats-Barl, W. and R. Thompson.

1997. **Information Technology and Management**. Chicago : Irwin.

Chesney, M. A. and R. H. Roseman.

1980. Type A Behavior in the Work Setting. C. L. Cooper and R. Payne (eds.) **Current Concerns in Occupational Stress**. New York : John Wiley.

Child, J.

1974. Managerial and Organization Factors Associated with Company Performance-Part I. **Journal of Management Studies**. 11 (June) : 175-189.

Child, J.

1975. Managerial and Organization Factors Associated with Company Performance-Part II. **Journal of Management Studies.** 12 (March) : 12-27.

Child, J.

1977. **Organization : A Guild to Problems and Practice.** New York : Hreper & Row Publishers.

Child, J.

1987. Information Technology, Organization, and Response to Strategic Challenges. **California Management Review.** 30 : (March) : 33-50.

Cohen S., and W. Eimicke.

1987. The New Effective Public Manager. Structuring System, Tasks and Responsibility. Available at http ://www.som.csudh.edu/pub_admin/dkarber/cbaldwin/Homepage/research.html.

Compeau, D. R. and C. A. Higgins.

1995. Computer Self-Efficacy : Development of Measure and Initial Test. **MIS Quarterly.** 19 (February) : 189-221.

Compeau, D. R., C.A. Higgins, and S. Huff.

1995. Social Cognitive Theory and Individual Reactions to Computing Technology : A Longtitudinal Study. Available at http ://www.acs.ucalgary.ca/compeau/RN2550/RN2560.html.

Compeau, D.R. and D.B. Meister.

1997. Measurement of Perceived Characteristics Of Innovation : A Reconsideration Based on Three Empirical Studies. Available at http://www.asc.ucalgary.cal/compeau/RN2560/RN2560.html.

Cook, C.W., P. L. Hunsaker and R.E. Coffery.

1997. **Management and Organizational Behavior.** Chicago : Irwin.

Cooper, R. and R.W. Zmud.

1990. Information Technology Implementation Research : A Technology Diffusion Approach. **Management Science.** 34 (February) : 123-139.

Cox, T.

1978. **Stress.** Baltimore : University Park Press.

Culpan, O.

1995. Attitudes of End-users Towards Information Technology in Manufacturing and Service Industries. **Information & Management.** 28 (February) : 167-176.

Curry, J. et al.

1988. On the Causal Ordering of Job Satisfaction and Organizational Commitment. **Academy of Management Journal.** 27 (No. 4) : 847-858.

Daft, R. L.

1989. **Organization Theory and Design.** St. Paul, Minn. : West Publishing.

Davis, G.B. and J.R. Hamann.

1988. In - Context Information systems assessment : A proposal and an evaluation. N. Bjorn-Anderson and G.B. Davis (eds). **Information Systems Assessment : Issues and Challenges.** New York : Elsevier.

Davis, F. D., R. P. Bagozzi and P. R. Warshaw.

1989a. User Acceptance of Computer Technology : A Comparison of Two Theoretical Models. **Management Science.** 35 (August) : 982-1003.

Davis, F. D.

1989b. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. **MIS Quarterly.** 13 (March) : 319-342.

De Looff, L. A.

1996. IS Outsourcing by Public Sector Organizations. Available at http://www.acs.org.au/president/1996/ifp96

DeLone, W.H. and E.R. McLean.

1992. Information Systems Success : The Quest for the Dependent Variable. **Information Systems Research.** 3 (January) : 60-95.

Dessler, G.

1976. **Organization and management : A Contingency Approach.** New Jersey : Prentice-Hall. Inc.

Dewar, R. and J. Werbel.

1979. Universalistic and Contingency Predictions of Employee Satisfaction and Conflict. **Administrative Science Quarterly**. 24 (September) : 426-448.

Dickson, G.W. G. DeSanctis, and D.J. McBride.

1986. Understanding the Effectiveness of Computer Graphics for Decision Support : A Communicative Experimental Approach. **Communication of the ACM**. 29 (January) : 40-47.

Dickson, G. and J. Wetherbe.

1985. **The Management of Information Systems.** New York : McGraw-Hill.

Drazin R. and Van de Ven, A. H.

1985. Alternative Forms of Fit in Contingency Theory. **Administrative Science Quarterly**. 30 (December) : 514-539.

Dosi, G.

1984. **Technical Change and Industrial Transformation.** London : The Macmillian Press Ltd.

Drucker, P.K.

1985. **Post Capitalist Society.** Cambridge : MIT Press.

Ein-Dor, P. and C.R. Jones.

1985. **Information Systems Management.** New York : Elsevier.

Evan, J.

1987. Women, Men, VDU Work and Health : A Questionnaire Survey of British VDU operators. **Work and Stress.** 1 (March) : 271-283.

Fayol, H.

1949. **General and Industrial Management.** New York : Pitman.

French, J. R. P. et. al.

1974. Adjustment as Person-Environment Fit. G.V. Coelho et. al. (eds.) **Coping and Adaptation**. New York : Basic Books.

Fry, L. W. and J. W. Slocum, Jr.

1984. Technology, Structure and Work Group Effectiveness : A Test of Contingency Model. **Academy of Management Journal.** 27 : 221-246.

Fry, L. W. and D. A. Smith.

1987. Congruence, Contingency, and Theory Building. **Academy of Management Review.** 12 : 117-132.

Furnham, A. and R. Schaeffer.

1984. Person-Environment Fit, Jib Satisfaction and Mental Health. **Journal of Occupational Psychology.** 57 : 295-307.

Galbraith, J.R.

1973. **Designing Complex Organizations.** Massachusetts : Addison - Wesley.

Galbraith, J.R.

1977. **Organization Design.** Massachusetts : Addison-Wesley.

Galbraith, J. R. and D. A. Nathanson.

1978. **Strategy Implementation : The Role of Structure and Process.** Minnesota : West Publishing.

Gibson, C.E.

1992. The Information I,perative : Managing the Impact of Information technology on Business and People. DC. : Lexington.

Gillespie, D.F. and D.S. Mileti.

1977. Technology and the Study of Organizations : An Overview and Appraisal. **Academy of Management Review.** 2 (February) : 7-16.

Gist, M.E. , C.E. Schwoerer, and B. Rosen.

1989. Effects of Alternative Training Methods on Self-Efficacy and Performance in Computer Software Training. **Journal of Applied Psychology.** 74 (April) : 884-891.

Giuliano, V.

1982. The Mechanization of Office Work. **Scientific American.** 274 (April) : 148-165.

Good, L.K., G.F. Sisler and J.W. Gentry.

1988. Antecedents of Turnover Intentions Among Rental Management Personnel. **Journal of Retailing.** 64 (Fall) : 295-314.

Goodhue, D.L.

1988. IS Attitude : Toward Theoretical and Definition. **DataBase.** 19 (Fall/Winter) : 6-15.

Goodhue, D.L. and R.L. Thompson.

1995. Task-Technology Fit and Individual Performance. **MIS Quarterly.** (June) : 213-236.

Goodman, P. S. and J.M. Pennings.

1977. Perspectives and Issues : An Introduction. P. S. Goodman and J.M. Pennings (eds.). **New Perspectives on Organizational Effectiveness.** California : Jossey-Bass.

Gos, W. W.

1996. Computer Axiety and Computer Exeprience : A New Look at an Old Relationship.

Available at http:// www.educ.msu.edu/homepage/ropp/Area/Quant.html.

Graham, C. B. and S.W. Hay.

1994. Managing the Public Organizations.

Available at http://som.csudh.edu/pub-admin/dkarber/cbaldwin/Homepage/research.html.

Greenberg, J.

1987. A Taxonomy of Organizational Justice Theories. **Academy of Management Review.** 12 (February) : 9-22.

Greenberg, J.

1990. Looking Fair VS Being Fair : Managing Impressions of Organizational Justice. **Research in Organizational Behavior.** B. M. Staw and L.L. Cummings eds. Greenwich : JAI Press.

Hage, J. and M. Aiken.

1969. Routine Technology, Social Structure and Organization Goals. **Administrative Science Quarterly.** 14 (September) : 366-387.

Harrison, R. V.

1978. Person-Environment Fit and Job Stress. C.L. Cooper and R. Payne (eds.) **Stress at Work.** New York : John Wiley & Sons.

Hatch, M.J.

1997. **Organization Theory : Modern, Symbolic, and Postmodern Perspectives.** New York : Oxford University Press.

Heffron, F.

1989. **Organizational Theory & Public Organization : The Political Connection.** New Jersey : Prentice-Hall.

Herzberge, F., B. Mausrer and B.B. Snyderman.

1959. **The Motivation to Work.** New York : Wiley.

Hickson, D.J., D.S. Pugh and D.C. Pheysey.

1969. Operations Technology and Organization Structure : An Empirical Reappraisal. **Administrative Science Quarterly.** 14 (July) : 378-397.

Hodgetts, R. M.

1999. **Modern Human Relations at Work.** 7th ed. Fort Worth : The Dryden Press.

Hossain, L.

1998. Meeting the Global Challenge : The Case of Thai Telecom Regulations. Paper presented at the Seminar of Information Technology for Graduate Studies in the 21st Century. 26-27 November 1998.

Howard, G. S. and R. D. Smith.

1986. Computer Anxiety in Management : Myth or Reality. **Communication of ACM**. July : 611-615.

Igbaria, M. and S. Parasuraman.

1989. A Path Analytic Study of Individual Characteristics, Computer Anxiety and Attitudes Toward Microcomputer. **Journal of Management**. 15 (March) : 373-388.

Igbaria, M., G. Meredith, and D.C. Smith.

1994. Predictors of Information of IS Professionals to Stay with the Organization in South Africa. **Information & Management.** 26 (May) :245-256.

International Institute for Management development (IMD).

1999. **World Competitiveness Yearbook**. IMD.

International Institute for Management development (IMD).

2000.**World Competitiveness Yearbook**. IMD.

Ivancevich, J.M., Napier, H.A. and J.C. Wetherbe.

1983. Occupational Stress, Attitudes, and Health Problems in the Information Systems Professional. **Communications of the ACM.** 26 (October) : 800-806.

Ives, B.S., S. Hamilton, and G.B. Davis.

1980. A Framework for Research in Computer-Based Management Information System. **Management Science.** 29 (August) : 910-934.

Jarvenpaa, S.L.

1989. The Effect of Task Demands and Graphical Format on Information Processing Strategies. **Management Science** 35 (March) : 285-303.

Johns, G.

1996. **Organizational Behavior**. New York : Harper Collins College Publishers.

Jones, C.

1988. Building a Better Metric. **Computer World Extra**. (June) : 38-39.

Jones, C.

1999. The Scope of Information Technology.
Available at http : // www.ame.or/change/gcn100.html

Joo, C. T.

1995. Public Services Through Information Technology-The Singapore's Experience. Govern Computerization Newsletter No.7.
Available at http:// www.unesap.or/stst/gc/gsnl/gcn107.html.

Kast, F. and J. Rosenzweig, eds.

1985. **Contingency Views of Organization and Management**. Chicago : SRA.

Keen, P .W.

1981. Information Systems and Organizational Change. **Communications of the ACM**. 24 : 24-33.

Kerlinger, F. N.

1973. **Foundations of Behavior Research**. New York : Hott, Rinehart and Winston.

Kling, R.

1996. Computerization at Work. **CMC Magazine.** (August) 1-5.

Kraemer, K. L., et. al.

1989. **Managing Information Systems : Change and Control in Organizational Computing**. California : Jossey-Bass.

Krejcie, R.V. and D.W. Morgan.

1970. Determining Sample Size for Research Activities. **Educational and Psychological Measurement**. 30

Koohang, A.A.

1987. A Study of the Attitudes of Pre-service Teachers Toward the Use of Computers. **Educational Communications and Technology Journal**. 35 (March) : 145-149.

Kubicek, T.

1972. Organizational Planing : What It Is and How to Do It (Part 2 -Designing the "Good Fit"). **Cost and Management.** (March-April) : 33-42.

Kuhn, T.S.

1970. **The Structure of Scientific Revolutions**. 2nd. ed. Chicago : University of Chicago Press.

Laudon, K.C.

1974. **Computers and Bureaucratic Reform**. New York : John Wiley.

Laudon, K. C. and J.P. Laudon.

1999. **Management Information Systems.** 6th ed. New Jersey : Prentice-Hall.

Lawrence, P. R. and Lorch, J.

1967. **Organization and Environment : Managing Differentiation and Integration.** Boston : Graduate School of Business Administration, Harvard University.

Lawrence, P. R. and Lorch, J.

1970. **Studies in Organization Design.** Illinois : Richard D. Irwin and The Dorsey Press.

Likert, R.

1961. **New Patterns of Management.** New York : McGraw-Hill.

Locke, E. A.

1976. The Nature and Causes of Job Satisfaction. M.D. Dunnete ed. **Handbook of Industrial and Organizational Psychology.** Chicago : Rand McNally.

Locke, E.A.

1988. The Nature and Causes of Job Satisfaction. M. Dunnettce, ed. **Handbook of Industrial and Organizational Psychology.** 2nd. ed. California : Consulting Psychologists Press.

Lucus, H. C. Jr.

1975. Performance and the Use of an Information System. **Management Science.** 21 (April) : 908-919.

Lysonski, S. and Woodside, A.G.

1989. Boundary Role Spanning Behavior, Conflicts and Performance of Industrial Product Managers. **Journal of Product Innovation Management**. 6 (September) : 169-184.

Mawhinney, C.H. and Lederer, A.L.

1990. A study of Personal Computer Utilization by Manager. **Information & Management**. 18 (June) : 243-253.

McGregor, D.

1960. **The Human Side of Enterprise**. New York : McGraw-Hill Company, Inc.

McLaughimg, G. J.

1990. Information Revolution : The Changing Nature of U.S. Information Competitiveness. **CRS Review**. 11 : 7-18.

McInerney, V.,D.M. McInerney and K.E. Sinclair.

1994. Student, Teachers, Computer Anxiety and Computer Experience. **Journal of Educational Computing Research**. 11 (January) : 27-50.

Meyer, J.P. et. al.

1989. Organizational Commitment and Job Performance. **Journal of Applied Psychology**. 74 : 152-156.

Monczka, R.M. and W.E. Reif.

1973. A Contingency Approach to Job Enrichment Design. **Human Research Management**. 7 (Winter) : 9-17.

Moore, G.C. and I Benbasat.

1991. Development of an Investment to Measure the perceptions of Adopting an Information Technology Innovation. **Information Systems Research.** 2 (March) : 192-222.

Morse, J.J. and J.W. Lorsch.

1970. Beyond Theory Y. **Harvard Business Review** (May-June) : 61-68.

Mowday, R. et. al.

1979. The Measurement of Organizational Commitment. **Journal of Vocational Behavior.** 14 (March) 145-160.

Murdick, R.G. & J.C. Munson.

1986. **MIS Concepts and Design.** 2nd ed. New Jersey : Prentice-Hall.

Naisbitt, J.

1985. **Re-inventing Corporation.** New York : Warner Books.

Narayanan, V.K. and R. Nath.

1993. **Organization Theory:A Strategic Approach.** Illinois:Irwin.

Nath, R.

1990. The Impact of Local Area Networks on Users and Their Work : A Field Study. **Journal of Microcomputer Systems Management.** 2 (Sping) : 15-23.

Newman, W.H.

1972. Strategic and Management Structure. **Journal of Business Policy.** 1971-1972 (Winter) : 56-66.

Newstrom, J.W. , W.E. Reif and R.M. Monczka.

1975. **A Contingency Approach To Management : Readings.** New York : McGraw-Hill Book Company

Nightingale, D.V. and J.M. Toulouse.

1977. Toward a Multi-level Congruence Theory of Organization. **Administrative Science Quarterly.** 22 (June) : 264-280.

Nussbaum, K.

1981. Women Office Workers in a Race Against Time as Automation Impacts the Work Place. **Computerworld** . 107 : 69-82.

Office of Technology Assessment (OTA).

1986. SSA and Information Technology. Available at http://www. uscongress.or/stat/gcnl/gc.html.

Osborne, D. and T. Baebler.

1993. **Reinventing Government.** New York : Penguin Book.

Ostroff, C.

1992. The Relationship between Satisfaction, Attitude, and Performance : An Organizational Level Analysis. **Journal of Applied Psychology.** 77 (May) : 963-974.

Ouchi, W.G. and M. A. Maguire.

1975. Organizational Control : Two Functions. **Administrative Science Quarterly.** 20 (December) : 559-569.

Pentland, B. T.

1989. Use and Productivity in Personal Computers : An Empirical Test. Paper presented at the Tenth International Conference on Information System. December.

Perrow, C.

1967. A Framework for the Comparative Analysis of Organizations. **American Sociological Review.** (April) : 194-208.

Peuquet, D. T. and T. Bacastow.

1991. Organizational Issue in the Development of Geographical Information Systems. **International Journal of GIS.** 5 (No.3) : 303-319.

Petre, P. D.

1983. Meet, the Lean, Mean, IBM. **Fortune** (No.107) : 69-82.

Rainer, R. K. Jr. And H.J. Watson.

1995. The Keys to Executive Information System Success. **Journal of Management Information Systems.** 12 (No. 2) : 83-95.

Rohlen, T.P.

1992. Learning : The Mobilization of Knowledge Economy. **Political Economy of Japan.** No.3.

Saakajarvi, M. V. T. and J.M. Talvinen.

1993. Integration and Effectiveness of Marketing Information Systems. **European Journal of Marketing.** 27 (January) : 64-69.

Senker, J and P. Senker.

1992. Gaining Competitive Advantage from Information Technology. **Journal of General Management.** 17 (No.3) : 31-45.

Serge, P. M.

1993. Transforming the Practice of Management. **Human Resource Development Quarterly.** (Spring) : 5-32.

Schmidth, S. and T. Kochan.

1972. Conflict : Toward Conceptual Clarity. **Administrative Science Quarterly.** 17 (December) 359-370.

Schoonhoven, C.E.

1981. Problems with Contingency Theory : Testing Assumptions Hidden with the Language of Contingency Theory. **Administrative Science Quarterly.** 26 (May) : 349-377.

Scott, R.W.

1992. **Organizations : Rational, Natural, and Open Systems.** 3rd. ed. New Jersey : Prentice Hall.

Scudder, R.A. and A. R. Kucic.

1991. Productivity Measures for Information Systems. **Information & Management.** 15 (January) 343-354.

Shirom, A.

1982. What is Organizational Stress? A Facet Analytic Conceptualization. **Journal of Occupational Behavior.** 3 (June) : 21-37.

Simon, H. A.

1975. Applying Information technology to Organization Design. **Public Administrative Review**. May/June : 35-56.

Simon, J. L. and P. Burstein.

1985. **Basic Research Methods in Social Science**. 3rd ed. New York : Rardon House.

Snitkin, S.R. and W.R. King.

1986. Determinants of Effectiveness of Personal Decision Support Systems. **Information & Management**. 10 (February) : 82-90.

Smith, D. C., L.M. Kendall and C. L. Hulin.

1969. **Measurement of Satisfaction in Work and Retirement**. Chicago : Rand McNally.

Srivastva, S. et al.

1975. **Job Satisfaction and Productivity**. Cleveland : Case Western Reserves University Press.

Steers, R. M.

1995. Problems in the Measurement of Organizational Effectiveness. **Administrative Science Quarterly**. 20 (June) : 546-558.

Strassman, P. A.

1990. The Business Value of Computers. **The Information Economic Press**. Connecticut : New Canann.

Sudman, S. and N. M. Bradburn.

1982. **Asking Questions**. San Fransisco : Jossey-Bass.

Tayntor, C. B.

1994. Partners in Excellence : Metrics and Productivity Programs. **Information Systems management.** 11 (January) : 81-83.

The Government Information Service Policy Board (GISPB).

1997. Australian Government determined to put clients first. Government Computerization Newsletter. No.7. Available at http://www.unescap.org/stat/gc/gsnl/gsnl107.html

Thompson, J. D.

1967. **Organizations in Action : Social Science Bases of Administrative Theory.** New York : McGraw-Hill.

Toffler, A.

1980. **The Third Wave.** New York : Bantam.

Tricker, B.

1996. Information and Power-The Influence of IT on Corporate Governance. **Corporate Governance and International Review.** No.2 : 25-36.

Trimmer, D.

1993. **Downsizing : Strategies for Success in the Modern Computer World.** New York : Addison-Wesley.

Van de Ven, A.H. and D. L. Ferry.

1980. **Measuring and Assessing Organizations.** New York : Wiley.

Van de Ven, A.H. and R. Drazin.

1985. The Concept of fit in.Contingency Theory. L.L. Cummings and B.M. Staw. eds. **Research in Organizational Behavior.** 7 (September) : 333-365.

Venkatesh, V. & F.D. Davis.

1996. Understanding Information Technology Usage : A Test of Competing Models. **Information System Research.** 6 (February) : 144-176.

Vessey, I.

1991. Cognitive Fit : A Theory-Based Analysis of the Graphs vs. Tables Literature. **Decision Sciences.** 22 (February) : 219-240.

Venugopal, P.

1992. Malaysia Government Computerization Policy. **Information and Public Service.** Kaula Lumpur.

Vroom, V.H.

1964. **Work and Motivation.** New York : John Wisey & Sons., Inc.

Webster, J. and J. J. Martocchio.

1993. Turning Work into Play : Implications for Microcomputer Software Training. **Journal of Management.** (March) :

Woodruff, C.K.

1990. Managing for Results : An examination of Professional Group Perceptions of Organizational Practices. **Information and Management.** 19 (April) :135-147.

Woodward, J.

1965. **Industrial Organization : Theory and Practice.** New Jersey : Oxford University Press.

Wren, D. A.

1994. **The Evolution of Management Thought.** 4th ed. New York : John Wiley & Sons, Inc.

Zuboff, S.

1988. **In the Age of the Smart Machine : The Future of Work and Power.** New York : Basic Books.

Thai Bibliography

Chantramonklasri, N.

1994. Science and Technology Development for Industrial Competitiveness in Thailand : Problems and Lessons. **TDRI quarterly Review.** 9 (5).

Malaiwong, K.

1997. **Public Servant and IT : The Ways to Choose ?** Bangkok : NECTEC.

National Information Technology Committee (NITC).

1995a. **Social Equity and Prosperity : Thailand IT Policy into the 21st Century.** Bangkok : NITC.

National Information Technology Committee (NITC).

1995b. **IT 2000 Thailand : National IT Policy.** Bangkok : NITC.

National Science and Technology Development Agency (NSTDA)

1995c. The Fifth International Conference on Advanced Science and Technology Exchange with Thailand "Information Technology" 20-22 July 1995,Bangkok.

National Electronics and Computer Technology Center (NECTEC)

1992. The Determination of Promoting Public Sector in Computer Utilization. Bangkok : NECTEC.

National Electronics and Computer Technology Center (NECTEC)

1998. **IT for Good Governance.** Bangkok : NECTEC.

Thailand Development Research Institute (TDRI)

1993. The Role of Information Technology in the Information Society in the year 2010. **TDRI Quarterly Review.** 8 (10).

Viriyavetchakul, A.

1994. Thai Public Health in the Next Century : The Impact of the advancement of IT. Paper presented in Thai Medical Information Seminar. November 1994.

Vongpanitlerd, S.

1996. Toward Social Equity and Prosperity : Thailand IT 2000. **TDRI Quarterly Review.** 11(1).

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