Shu-Te University

College of Informatics

Graduate School of Information Management

Masters Thesis

Research on Setting up a Project for Management Information System at the Department of Public Health in Phu Tho Province

Student: Do Thanh Vinh

Advisor: Dr. Ming- Hsiung Hsiao

Dr. Tran Minh Tien

June 2009

Research on Setting up a Project for Management Information System at the Department of Public Health in Phu Tho Province

Student: Do Thanh Vinh
Advisor: Dr. Ming-Hsiung Hsiao
Dr. Tran Minh Tien

A Thesis
Submitted to
Institute of Information Management
Shu-Te University
In Partial Fulfillment of the Requirements
For the Degree of Master
in
Information Management

June 2009
Yan Chao, Kaohsiung, Taiwan, Republic of China

博碩士論文電子檔案上網授權書
（提供授權人裝訂於紙本論文書名頁之次頁用）

本授權書所授權之論文為授權人在 <u>樹德科技</u> 大學（學院）
<u>資訊管理</u> 系所_____組 ___ 學年度第___<u>二</u>___學期取得
<u>碩</u>___士學位之論文。

論文題目：<u>Research on Setting up a Project for Management Information System at the Department of Public Health in Phu Tho Province</u>

指導教授：

茲同意將授權人擁有著作權之上列論文全文（含摘要），非專屬、無償授權國家圖書館及授權人畢業學校之圖書館，不限地域、時間與次數，以微縮或其他各種數位化方式將上列論文重製，並得將數位化之上列論文以上載網路方式，提供讀者基於個人非營利性質之線上檢索、閱讀，或下載、列印。

○ 讀者基於非營利性質之線上檢索、閱覽或下載、列印上開論文，應依著作權法相關規定辦理。

授　　權　　人
姓　　　　　名：　　　　　　　　　　（請簽名並蓋章）

中　華　民　國　　　　　　2009　年　5　月　23　日

樹 德 科 技 大 學
研究所碩士班
論文指導教授推薦書

本校 Institute of Information Management　碩

士班 Do Thanh Vinh 君

所 提 論 文　Research on Setting up a Project for Management Information System at the Department of Public Health in Phu Tho Province

係由本人指導撰述，同意提付審查。

指導教授

2009 年　5　月　23　日

Research on Setting up a Project for Management Information System at the Department of Public Health in Phu Tho Province

Student: Do Thanh Vinh

Advisors: Dr. Ming-Hsiung Hsiao
Dr. Tran Minh Tien

Institute of Information Management
Shu-Te University

ABSTRACT

In recent years, thanks to the development of information technology as well as its applications, information system management has been applied in a variety of fields. Its role is becoming more and more important. As shown from the fact, an effective information system is considered as a major factor to improve management activities. In Phu Tho Department of Public Health particularly, the operations related to information exchange as well as administrative management are currently performed in a very traditional way (in the form of incoming and outgoing documents). Therefore, it is necessary to computerize those operations for better management efficiency. This study describes the information system model applied in the Phu Tho Department of Public Health. After designing the system, in order to ensure the success of its implementation, two surveys were conduct for the purpose of checking the current situation of information technology infrastructure as well as the level and ability of staff and officers. These surveys were delivered directly to staff and officers in all divisions/hospitals/health centers/organization directly under phu Tho Department of Public Health. The result showed that in general, department did build a basic infrastructure to ensure the success of system implementations. Most of the unit equip computer system, 50% set up LAN network and high-speed internet connection. However, no divisions or units have designed its own website yet; and also many staff and officers can use computer but few exploited information via the internet or use technology applications.

Keywords: Information System, Phu Tho Department of Public Health, Information System Compositions, Information System Implementation

Acknowledgment

I would like to take this opportunity to express my gratitude to all those who gave me the possibility to complete this thesis.

First, I am deeply indebted to my supervisors Prof. Ming-Hsiung Hsiao and Dr. Tran Minh Tien whose help, stimulating suggestions and encouragement helped me in all the time of doing research as well as writing this thesis. Their inspiring advice is extremely essential and valuable in my thesis. They are really knowledgeable and nice professors. I feel very lucky and deeply appreciate them to give me the opportunity of being their student.

Dr. Chen Pi Yun, Dr. Nguyen Linh Trung, and Dr. Ming-Hsiung Hsiao deserve special thanks as my thesis committee members and advisor for their encouragements, insightful comment, and questions.

My sincere thanks also goes to my colleagues in Phu Tho Department of Public Health for their support as well as assistance, so that I can complete thesis smoothly.

Last but not the least, my deepest thanks goes to my family for their unflagging love and support throughout my life; especially my wife whose patient love and care enabled me to complete this thesis.

Table of Content

List of Tables

List of Figures

Chapter 1 Introduction

In recent years, information system management has been applied in a variety of fields. Its role is becoming more and more important; therefore, the need of building a standard information system with high quality has been raised (Barnett et al., 1979). Together with general trend, Vietnam has applied information technology in many areas, especially building information system for the purpose of reforming administrative management. In accordance with national objective, Phu Tho Province set up a project for information technology development in the period from 2010 to 2013. The purpose of this project is to apply information technology effectively and synchronously. This application process must be conducted step by step, and in accordance with the characteristics of particular industry as well as unit (Yakel, 2005).

As an administrative unit directly under the People's Provincial Committee, Phu Tho Department of Public Health not only participates in general project but also tries to improve effectiveness of management as well as performance (IOM, 2003). In recent years, managerial activities in Phu Tho Department of Public Health have been improved. However, they are facing a difficulty of the information technology application not having it unified in terms of the guidance. Therefore, it is essential to built computerized information system in order to improve managerial activities as well as provide necessary information for Manager and units (Ellis, 2003). This information will be used to support for their guidance and to manage the operations of the department as well as the entire health branch. There are several advantages supporting for carrying out the above mission as follows:

- Information technology is considered as one of the most important driving forces for the development of the country (McDonal et al., 2003). It has currently applied in every ministries, departments and branches. The project for information technology development in the period from 2010 to 2013 assists ministries, departments and branches in setting up their own system of information technology which is connected with national system for the purpose of improving the effectiveness of the operations towards the national administrative reform Program.

- The project for information technology development in the period from 2010 to 2013 in Phu Tho Province was approved by People's Provincial Committee. Its main purpose is to computerize the national administrative management, including People's Provincial Committee, and departments, units directly under the People's Provincial Committee.

- Information technology has developed quickly in information and infrastructure as well. With the fast popularization and technological transfer, the needed time to implement the system of information technology is shortened while practicability is much higher.

The project for information technology development in Phu Tho Province was drawn basing on analyzing the current needs as well as the possibility of future development. Those analyses that combine with technological achievements are considered as foundation for effective investment and ensure processes once the system is extended.

The objectives of This Study

General Objectives

The project for information technology development in the period from 2010 to 2013 in Phu Tho Province needs to achieve the following general objectives:

- Setting up the system of information network and infrastructure supporting for managerial activities (for instance, sick-room management, examination and treatment activities) as well as administrative management of People's Provincial Committee, departments and branches.

- Building infrastructure for information technology network will foster to reform: (1) the application of managerial software in professional information exchange, data exchange; (2) electronic information pages (web pages); (3) the application of multi-service basing on branch's information technology infrastructure. Thanks to those improvements, the citizen do not have to go to medical department for health examination and treatment, and therefore avoiding the overload in medical departments.

- Training and nurturing officers and staffs for the purpose of enhancing their information technology knowledge.

Particular Objectives:

The general objectives of the project need to be realized according to the criteria, as follows:

- Setting up information infrastructure for the health care agencies so as to be well-prepared for computerizing the administrative management process and joining in other services in the health care branch.

- Integrating and setting up the system of information network basing on the current internal information network to have it unified as a synchronous information system for the entire branch.

- Building information technology infrastructure and resources for applying system's software, and current information technology

- Improving the staffs' ability and specialists' ability to exploit information as well as manage information system. Popularizing information technology for staffs who are able to use computer and computer network to perform their daily work. Finally, training experts for the purpose of maintaining as well as developing data and information system.

- Setting up technical infrastructure of information technology, which will be the foundation for implementing the multi-media integrated network on the bases such as VOIP/IP/AVVID/ATM/VIDEO/ADSL…

The Scope of This Study

Basing on the nature of work, the scope of the project for information technology development in the period from 2010 to 2013 in Phu Tho Province includes:

- Guidance and management work of leadership levels

- Activities of officers and staffs in terms of administrative management

- Activities to provide public administrative services for citizen and businesses

The following components are the main object that can apply information technology within the scope of this project:

- The director of Phu Tho Department of Public Health

- Department and units directly under the department

- Unions, political organizations, and professional associations

In Phu Tho Department of Public Health, administrative activities as well as information exchange activities are currently in the form of documents and performed in a very traditional way. Therefore, a critical objective of the project for information technology development is to set up an information system for the purpose of computerizing administrative management activities and information exchange activites.

From the needs of the fact, the purpose of this study is to set up and describe the information system using in Phu Tho Department of Public Health. Moreover, after designing the information system, two surveys is conducted to ensure the success and effectiveness of its implementation.

This study is divided into five chapters:

Chapter 1: Introduction

Chapter 2: Phu Tho Department of Public Health and its current process of information exchange

Chapter 3: Information system model for management activities in Phu Tho Department of Public Health

Chapter 4: Data analysis on the information system implementation

Chapter 5: Conclusion

Chapter 2 Phu Tho Department of Public Health and Its Current Process of Information Exchange

2.1. Function, Mission, Authority, and Apparatus of Phu Tho Department of Public Health

2.1.1. Function, Mission, and Authority of Phu Tho Department of Public Health

Phu Tho Department of Public Health is run under the direction of the People's Provincial Committee, assisting the People's Provincial Committee in functioning the state management that is related to medical activities in the region of Phu Tho Province.

Phu Tho Department of Public health is not only operated under the comprehensive management of People's Provincial Committee but also under the direction, guidance related to technique and professional knowledge of Ministry of Public Health.

Phu Tho Department of Public Health enjoys legal personality and is approved to use its own stamp as well as open own account for the purpose of fulfilling assigned tasks (according to the current regulations).

The mission and authorities of Phu Tho Department of Public Health are as follows:

- Setting up a scheme for developing medical work in the province; checking and supervising the scheme's implementation after it is ratified

- Promulgating technical standards, rules of medical operations, basing on general standards and rules of Government as well as Ministry of Public Health; Instructing

and checking the implementation of those rules and standards in the region of province

- Managing and distributing financial sources according to the regulations of Department of National Finance.

- Inspecting the issues of hygiene, epidemic prevention, medical examination and treatment, rehabilitation, food hygiene, cosmetic, pharmaceutical products, and medical equipment

- Managing officers, staffs, wage; training and cultivating health-officers.

- Managing and using effectively materials, facilities, and assets.

- Checking the implementation of regulations, standards, norm, economic norm, and technical norm that related to medical management, equipment management, and is promulgated by Government, Ministry of Public health, and People's Provincial Committee.

- Managing the practice of medicine and private pharmacy in the region of Phu Tho Province; issuing and revoking medical work permit according to the law.

- Coordinating with branches, unions, and social organizations in organizing and effectuating health education as well as health care activities.

- Performing other tasks and authorities assigned by People's Provincial Committee and Ministry of Public Health.

2.1.2. Phu Tho Department of Public Health Apparatus

∗ Department's leadership:

- A director

- Two or three deputy directors

∗ Functional Departments/Offices:

- Planning Department

- Department of Medical Operation

- Department of pharmaceutical Management

- Department of Finance and Accounting

- Department of Personnel and Administration

- Office of Health Inspection

∗ Centers/Organizations (directly under the Department of Public Health)

- Preventive Medicine Center

- Center of Pharmaceutical and Cosmetic Test

- Reproductive Health Center

- Center of AIDS Prevention

- Center of Health Education and Communication

- Center of Social Disease Prevention

- 12 district, town Health Center

- Provincial General Hospital

- National Hospital of Traditional Medicine

- Sanatorium and Rehabilitation Hospital

- Pulmonary Tuberculosis Hospital

- Provincial Psychiatric Hospital

- Center of Forensic Examination

- Bureau of Provincial Population

∗ Units/Organizations (directly under the Branch of Public Health)

- College of Pharmacy and Medical Equipment

- Committee of Health Protection

- Phu Tho Medical College

- The Red Cross

Phu Tho Department of Public Health apparatus can be illustrated in the Figure 1:
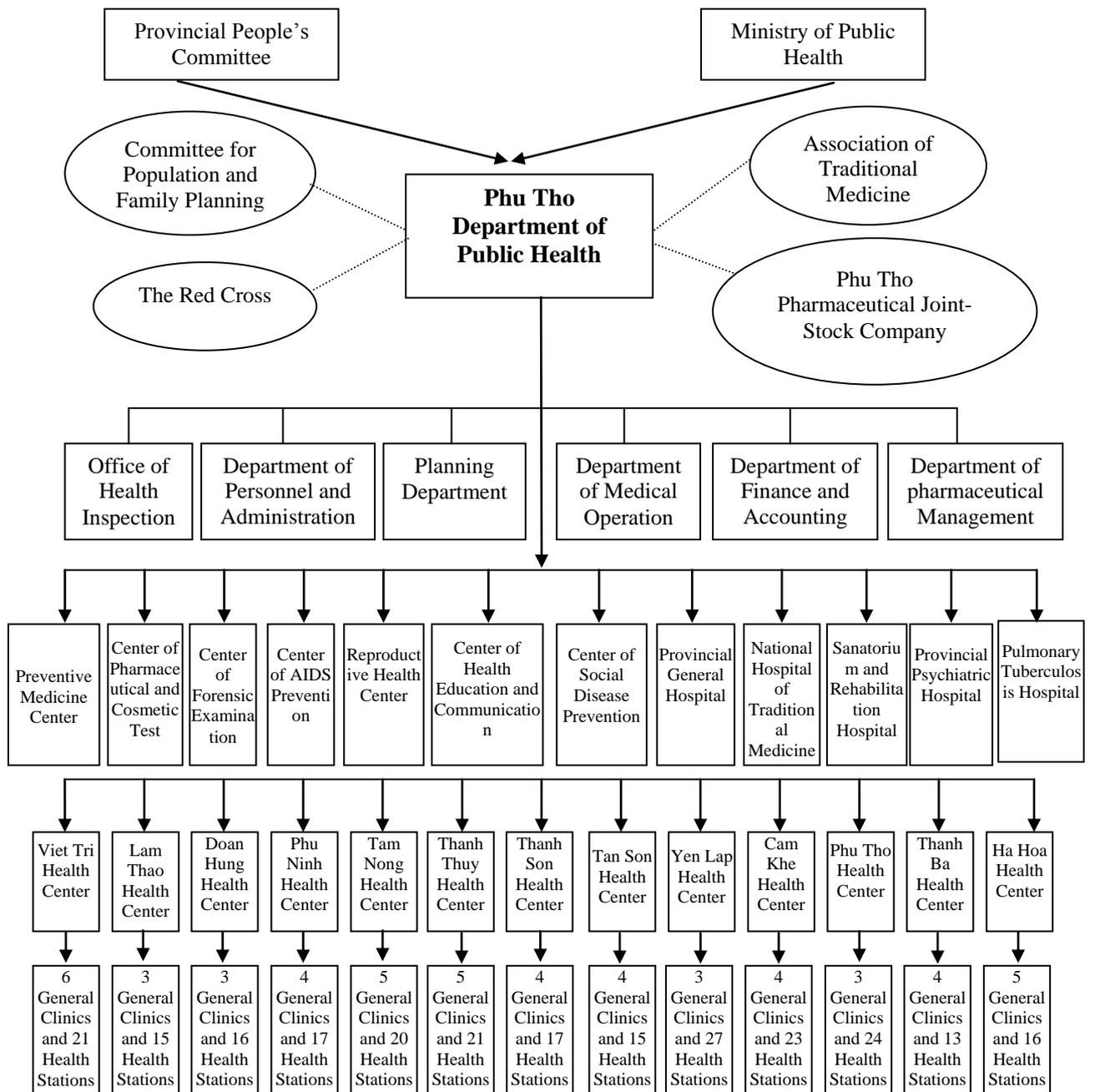
```
┌─────────────────────┐                          ┌─────────────────────┐
│ Provincial People's │                          │ Ministry of Public  │
│     Committee       │                          │       Health        │
└─────────────────────┘                          └─────────────────────┘

    ╭──────────────╮          ┌──────────────────┐         ╭──────────────╮
   ╱  Committee for  ╲        │     Phu Tho      │        ╱  Association of ╲
  │  Population and   │       │  Department of   │       │   Traditional    │
   ╲ Family Planning ╱        │  Public Health   │        ╲    Medicine    ╱
    ╰──────────────╯          └──────────────────┘         ╰──────────────╯

    ╭──────────────╮                                       ╭──────────────╮
   ╱                 ╲                                     ╱    Phu Tho       ╲
  │   The Red Cross   │                                   │ Pharmaceutical Joint-
   ╲                 ╱                                     ╲  Stock Company  ╱
    ╰──────────────╯                                       ╰──────────────╯
```

Office of Health Inspection	Department of Personnel and Administration	Planning Department	Department of Medical Operation	Department of Finance and Accounting	Department of pharmaceutical Management

Preventive Medicine Center	Center of Pharmaceutical and Cosmetic Test	Center of Forensic Examination	Center of AIDS Prevention	Reproductive Health Center	Center of Health Education and Communication	Center of Social Disease Prevention	Provincial General Hospital	National Hospital of Traditional Medicine	Sanatorium and Rehabilitation Hospital	Provincial Psychiatric Hospital	Pulmonary Tuberculosis Hospital

Viet Tri Health Center	Lam Thao Health Center	Doan Hung Health Center	Phu Ninh Health Center	Tam Nong Health Center	Thanh Thuy Health Center	Thanh Son Health Center	Tan Son Health Center	Yen Lap Health Center	Cam Khe Health Center	Phu Tho Health Center	Thanh Ba Health Center	Ha Hoa Health Center

6 General Clinics and 21 Health Stations	3 General Clinics and 15 Health Stations	3 General Clinics and 16 Health Stations	4 General Clinics and 17 Health Stations	5 General Clinics and 20 Health Stations	5 General Clinics and 21 Health Stations	4 General Clinics and 17 Health Stations	4 General Clinics and 15 Health Stations	3 General Clinics and 27 Health Stations	4 General Clinics and 23 Health Stations	3 General Clinics and 24 Health Stations	4 General Clinics and 13 Health Stations	5 General Clinics and 16 Health Stations

Figure 1. Phu Tho Department of Public Health Apparatus

-10-

2.2. Information Description and Information Process

2.2.1. Information Classification

Information sources that Phu Tho Department of Public Health needs to exploit, collect, and manage are diversified. Those information sources can be classified basing on different criteria as follows:

- Basing on the purpose of use (Ellis, 2003): information is used for the purpose of: (1) managing department's operations; (2) referring in order to support for decision making; (3) researching; (4) meeting the need of public use

- Basing on the field of operations (McDonal et al., 2003): information is used for: (1) planning for the development of Public Health Branch; (2) pharmaceutical and cosmetic management; (3) management of development and investment plan (including civil engineering plan and capital investment plan); (4) Improving infrastructure of Health Centers; (5) aid works;...

- Basing on the data sources (McDonal et al., 2003): (1) Information that exchanged between Department of Public Health and local authorities; (2) Information that exchanged between Department of Public Health and Organizations/Units of Central Government; (3) Information for plan implementation management; (4) Information that exchanged with external information system;…

- Basing on the information types (McDonal et al., 2003): (1) Data; (2) Document; (3) Map; (4) Graph; (5) Image

2.2.2. Information Activities carried out in Phu Tho Department of Public Health

The main works in the Department of Pubic Health:

- Operation management according to daily bassists (managing documents, daily works, working schedule; keeping track of meeting minutes; ...)

- Management of health operations in the main fields: yearly plan, plan of capital investment, health aids, health work permit, disease prevention activities, medical examination and treatment activities, medicine management, health program,...

- General management in the internal department: personnel, finance, accounting, equipment and material,…

- Providing and disseminating information related to health issues.

In order to perform the above works, Phu Tho Department of Public health needs to perform the information activities, such as:

- Collecting information

- Storing information

- Synthesizing and classifying information

- Searching and seeking information for reference

- Integrating information from different types and sources

- Drawing up reports, documents basing on summarization and analyses of the original information sources

- Providing and disseminating information related to health issues periodically and according to the need.

2.2.3. The Current Process of Information Exchange in Phu Tho Department of Public Health

2.2.3.1. Information Exchange among Divisions within Phu Tho Department of Public Health

In Phu Tho Department of Public Health, the incoming information as well as outgoing information is in the form of documents. Each document is processed in one division or more. After presenting this document for director's signature, it will be send back to administrative division in order to send to external departments/organizations or to use in internal divisions.

Moreover, internal divisions coordinate closely to perform general works. Presently, the information exchange among divisions within the Department is mostly performed via text, form, or document.

2.2.3.2. Information Exchange between Phu Tho Department of Public Health and External Departments/Organizations

Every official information exchange between Phu Tho Department of Public Health, especially documents or forms is under the management of administrative divisions. The information exchange between Phu Tho Department of Public Health and External Departments/Organizations that assists national administration is as following:

2.2.3.2.1. With Provincial People's Committee:

Phu Tho Department of Public Health takes full responsibility to Provincial People's Committee for national administration related to health issues

- Information from Provincial People's Committee to Phu Tho Department of Public Health: such as Provincial People's Committee circulars, instructions related to managing health issues in the main fields (branch annual plan, capital plan for the investment of local health development, health aids, disease prevention activities, health examination and treatment activities, medicine management, health programs…)

- Information from Phu Tho Department of Public Health to Provincial People's Committee includes: (1) documents for direction, reports related to department operation and management activities; (2) summary reports of department general operations (for instance, or organizing, finance…) related department internal management; (3) periodic reports of development plan, the plan implementation in department and units directly under the Phu Tho Department of Public Health.

2.2.3.2.2. With Ministry of Public Health

- Information from Ministry of Public Health to Phu Tho Department of Public Health: (1) legal documents; (2) circulars, instructions from departments of ministry; (3) health related information,…

- Information from Phu Tho Department of Public Health to Ministry of Public Health: (1) documents of proposal and recommendation related to health speciality; (2) reports of development plan, the plan implementation of department; (3) reports of aid management and coordination

2.2.3.2.3. With Provincial Committee of the Party

- Information from Provincial Committee of the Party to Phu Tho Department of Public Health: announcing related circulars, instructions, decisions

- Information from Phu Tho Department of Public Health to Provincial Committee of the Party: reporting about health related issues.

2.2.3.2.4. With other Departments

- With Department of Planning and Investment: Currently, Phu Tho Department of Public Health is coordinating with Department of Planning and Investment in working out manual development plan, and regulating health aid sources,…

- With Department of Finance and Prices: Phu Tho Department of Public Health is coordinating with Department of Finance and Prices in planning budget for department operations as well as regulating health aid resources.

- Aside from two above departments, there is the exchange of two-way information between Phu Tho Department of Public Health and: (1) others provincial departments/branches/units; (2) financial office and planning office in districts and towns; (3) health centers.

2.2.4. The Necessity to Computerize Informational Activities in Phu Tho Department of Public Health

In the very short term, the project for information technology development in the period from 2010 to 2013 in Phu Tho Department of Public Health will be drawn up basing on the following general directions:

- Setting up LAN network to supplement host computers and servers to assist department office and division in management activities

- Connecting network on a large scale

- Computerizing speciality system: management of documents, files, personnel, finance, assets,…; building a website for speciality operation

- Setting up application programs for the management of health activities in the department: yearly plan, plan of capital investment, health aids, health work permit, disease prevention activities, medical examination and treatment activities, medicine management, health program,...

- Setting up (or coordinating with other organizations to set up) application programs for public use: health information site, system of health service

- Training to improve staffs/officers' information technology skills

- Recruiting information technology experts/ specialists

Chapter 3 Information System Model for Management Activities in Phu Tho Department of Public Health

3.1. Objective and Requirement of Information System

Computerizing comprehensively national administrative management as well as speciality activities in the Department of Public Health for the purpose of:

- Improving the quality and effectiveness of national administrative management as well as speciality activities

- Providing accurate and timely information to meet the requirement of directors, managers, and specialists

- Providing information and public services related to health activities in the websites to meet the need of individuals and organizations.

- Improving staffs' skills of applying and using information technology tools. At the same time, improving management ability as well as knowledge in the domain of health management. These efforts are expected to make a breakthrough in information processing, therefore assisting directors, specialists, and officers in handling their works.

- Phu Tho Department of Public Health is a key factor in implementing the project for computerization of national administrative management in Phu Tho Province.

3.2. Setting Up and Implementing Information System

In order to accomplish the above objectives, Phu Tho Department of Public Health will carry out the works as follows:

- Supplementing/Upgrading, expanding and completing information technology infrastructure, especially setting up local area network (LAN) in the department. This LAN network ensures the information exchange between director and functional divisions and health centers. It also ensures the information exchange among professional offices, divisions, health centers. LAN network will be: (1) connected to provincial and district health centers in Phu Tho Province; (2) connected to network of Provincial People's Committee and integrating data center for the purpose of exchanging information with administrative management offices/divisions/departments in Phu Tho Province; (3) connected to Ministry of Public Health information system; (4) connected to public network so as to provide information and public services for individuals and organizations in Phu Tho Province

- Setting up a complete information system. It is considered as a part of entire province's information system and operated on a network. This network includes module components (application software, databases) that integrated together.

- Setting up an health information center in the department for the purpose of: (1) collecting and storing all information types related to planning and investment works as the requirements of using objects (directors, managers, researchers, organizations, individuals, businesses,…); (2) providing health information and public services for individuals and organizations in Phu Tho Province.

- Opening information technology courses frequently in order to: (1) provide qualified specialists and staffs to assist in implementing as well as applying

information technology effectively; (2) improve the work's efficiency when staffs need to work in a very different way comparing with traditional one (every information will be exchanged through network, and information process will be taken place on the network as well)

3.3. Information System Composition

Information system in Phu Tho Department of Public Health needs to perform the following functions: (1) managing effectively incoming and outgoing documents; (2) processing documents and handle matters by using computer network effectively; (3) assisting in director's decision making process as well as staffs' technical works; (4) processing and synthesizing periodic reports scientifically, systematically, and quickly; (5) Storing and providing information related to health activities accurately, completely and timely in order to meet the need of information exploitation; (6) managing the internal operations.

Phu Tho Department of Public Health information system includes module components that are integrated and associated together. These module components are operated on the LAN network for the purpose of improving the effectiveness of the management, research activities, and technical activities of all divisions and individuals in the department. Specifically, Phu Tho Department of Public Health information system includes application programs and databases (of each module component) that are integrated, synthesized and associated together through only one center – information center of the department. However, in order to integrate module components, it is required to:

- Unify operation model of information system

- Standardize the processes of information exchange as well as the content of exchanged information between module components and external information systems, especially the office of Provincial People's committee.

- Synchronize and integrate databases

- Define method and tools to set up and develop module components of information system

  Information system in Department of Public Health needs to be set up and developed basing on technical infrastructure and modern technology in order to ensure:

- Speciality: Information system must be conformable to regulations and principles of management processes in Department of Public Health

- Modernity: Information system need to be set up basing on advanced information technology in order to avoid the backwardness in the near future

- System expansibility and developable capability: databases have to be designed to meet the current management need as well as be expansible in the future. During the process of reforming administrative management, due to the unstableness of administrative system, there will be a considerable change related to administrative formalities. Therefore, the information system must have the capability of expanding new functions as well as the capability of developing, adapting and upgrading applications in accordance with expansion in work scale, database storing capacity, and number of person joining in the system.

- Efficiency: information system needs to be capable of storing a great number of data, managing structured as well as unstructured data (for instance document content, director's opinion), and finally capable of providing information accurately, completely and quickly.

- Safeness, security, and reliability: the system has to be designed to ensure smooth operation, minimize technical breakdown/hardware and software bug, and prevent data errors and information theft. Moreover, data also needs to be backed up frequently.

- High integration: connecting and exchanging information easily with externality, especially information system of Provincial People's Committee and integrating data center, then connect to the network of government and relevant networks.

- Ease of use: information system must have friendly interface which is designed on unified module interface.

Basing on organizational and management works as well as health related activities, the content needs to be computerized in the Phu Tho Department of Public Health can be categorized as the following blocks:

- Information for daily activities

- Information for internal management

- Information for management

(1) Information for daily activities: including application programs, websites, interfaces which are designed to assist directors and officers in performing their daily works. Therefore, the major content of this block is to computerize information process

related to daily works, especially the information exchange during process will be carried out through network. Block of information for daily activities is integrated and connected to the block of management information for the purpose of data exploitation and exchange.

Basically, the block of information for daily activities of all departments/organizations in Phu Tho Province has the same information processes and data structure which must be integrated, connected together into a unique system.

(2) Information for internal management: including application programs, databases which are used for the purpose of computerizing internal management activities. This is considered as one part in the process of administrative reform process.

(3) Information for management: including the system of databases and application programs which is designed for the purpose of collecting, processing, storing, and providing information as well as performing information process to assist directors in making decision, divisions and officers in performing the works.

The block of information for management includes databases of information for general management (they have the same system model as databases of other departments/organizations, and those databases allows staff to exchange information) and databases of information for specialistic management (these databases contain specific and professional information related to a particular field in a particular department/division/organization).

Similar to the block of information for daily activities, the establishment and implementation of databases of information for general management need to be complied with general rules and regulations.

3.4. Information System Model in Phu Tho Department of Public Health

Basing on functions, tasks as well as organization related to management activities, Information System in Phu Tho Department of Public Health will be set up as the model shown in the Figure 2:
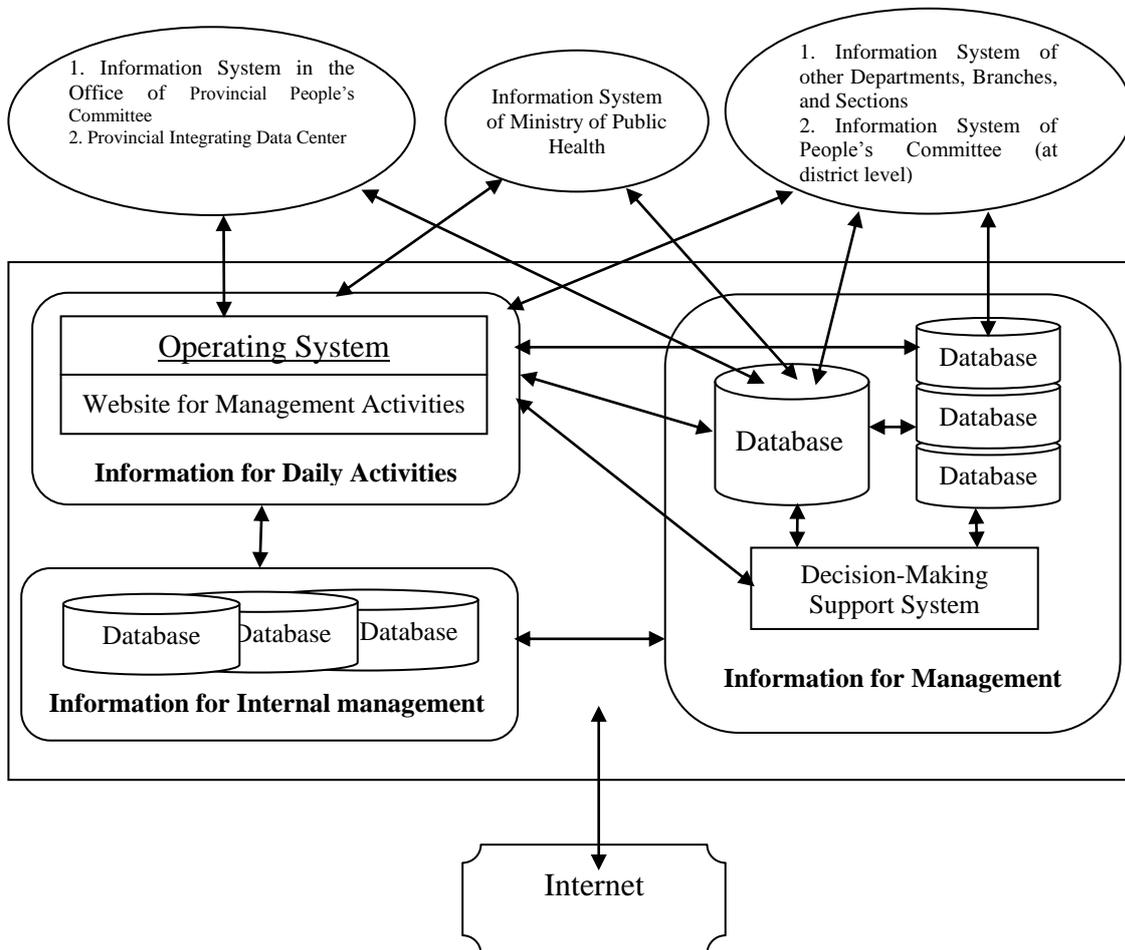

Figure 2. Information System in Phu Tho Department of Public Health

3.4.1. Information for Daily Activities

3.4.1.1. Operating System

Operating System is one component in information system, which supports for operation and management activities in Phu Tho Department of Public Health. Operating system is set up for the purpose of creating the environment for information exchange among internal units/divisions or between Department of Public Health and external organizations (especially Provincial People's Committee). On the other words, the main functions of operating system is to assist staff comprehensively in: (1) managing and checking official dispatches, incoming and outgoing documents; (2) processing documents; performing quick report mode; (3) performing internal information exchange; (4) exchanging information with external organizations and individuals; (5) exchanging e-mail; (6) making plan and schedule for leadership and divisions; (7) making schedule to manage and distribute cars and ambulances. In short, Department of Public Health's operation will be performed and managed through information processing and information exchange. This information processing and exchange will be performed on the network.

The operating system need to follow general standards of data as well as process of information exchange in order to be easier to connect and exchange information with the operating system in Provincial People's Committee, Ministry of Public Health, and relevant organizations.

Operating System performs the following main functions:

- Managing incoming and outgoing documents, sending documents to and receiving documents from internal divisions as well as external individuals or organizations

- Processing incoming documents and promulgating outgoing documents via LAN network

- Managing and supporting for online quick report process; providing timely and accurate information for the leadership's management. Quick report is considered as a special form of incoming/outgoing document.

- Forming the system of email exchange

- Making working schedule for leadership, divisions, and functional office

- Making schedule of ambulance use

- Support for the work of saving and storing files

Comparing to the operating system of Provincial People's Council and Provincial People's Committee, operating system of Phu Tho Department of Public Health is smaller in size and more simple in structure. Therefore, there are differences in details, but it basically follows operating system model of Provincial People's Council and Provincial People's Committee.

In order to set up operating system, it is necessary to:

- Set up the model of operating system, which is suitable to the operation of Phu Tho Department of Public Health in order to computerize its activities as well as establish the process of information exchange among departments, divisions, and individual.

- Basing on the established model, standardizing information content and relevant information process, then setting up the file of design analysis for system details

- Set up or purchase operating system that provides functions as the file of design analysis.

- Connect to and integrate with operating system of Provincial People's Committee, Ministry of Public Health, and other external organizations.

3.4.1.2. Website for Management Activities

Website for management activities is an interface on the Internet, using and connecting to the data sources in order to:

- Meet the information needs related to organization, personnel,…

- Receive and answer queries related to health issues.

Phu Tho Department of Public Health website includes:

- Main page: comprising general information, website introduction information, functions, and exploitable content

- Page of normative documents related to the law of organization, personnel, and apparatus of government.

- Page of professional information related to personnel organization, and governmental build

- Page of news, magazine, and documentary

- Page of common information: providing consultative information, question and answer related to speciality

Website will be operated basing on the foundation of general database, including:

- Data that exploited from module components of Department of Public Health information system, such as: operating system, socioeconomic database, documents of normative law, specialistic databases,…

- Data that updated directly from other sources such as books, newspapers and magazines, internet,…

3.4.2. Information for Internal Management

Block of information for internal management focuses on setting up databases that are used for the purpose of computerizing internal management activities. There are two main databases in this block: database of finance and accounting management; database of property management.

3.4.2.1. Database of Finance and Accounting Management

Finance and accounting database is designed for the purpose of computerizing management activities as well as monitoring financial operations in Phu Tho Department of Public Health basing on accounting operations that is promulgated by government.

There are some functions of finance and accounting management, including: general accounting, cash accounting, bank deposit accounting, warehouse accounts, fixed assets accounting, debt accounting, and wage accounting.

In order to set up database of finance and accounting management, it is necessary to:

- Survey and analyze information contents as well as professional process of finance and accounting activities.

- Design specifically data model, functions for collecting and exploiting information, and process of data processing on the network among divisions and individuals.

- Upgrade/set up and implement finance and accounting database; connect to relevant components of information system as well as with financial department information system to exchange information (collecting, providing, processing, sending reports).

- Update data frequently and continuously for the purpose of issuing financial reports accurately and sufficiently.

Expected efficiency and result:

- Finance and accounting database software is expected to implement in administrative division

- Data related to health works is updated frequently and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions such as information search, statistics, summarization of tables and figures. Beside, it is expected that finance and accounting database would assist in making periodic report according to the standardized forms.

3.4.2.2. Database of Property Management

Property management is considered as one of the most important parts in the field of administrative management. The process of public property management includes: (1) entering data related to equipments, materials, and new assets; (2) managing the usage, maintenance, and repair of equipments as well as assets; (3)

assessing assets' use value and remaining value; (4) liquidating assets; (5) making the list of unused and liquidated assets.

In Phu Tho Department of Public Health, due to the assets' features (large quantity, variety of types, and different characteristics) as well as the frequent change (purchase, repair, and liquidation), therefore property management is complicated and difficult, especially in the following works: (1) storing public property information, especially information that needs to be updated periodically on the usage/maintenance/repair; (2) finding and searching information; (3) summarizing information according to the different dimensions and different sections; (4) making financial reports related to public assets.

Database of property management is designed for the purpose of computerizing property management activities in order to:

- Collect, update, and store systematically structured data related to property (for instance, new data, use process' data, liquidation data, especially economic value data and use value data)

- Set up general information as well as property statistics basing on existed data (such as property list, detailed book of property, property use situation, property depreciation,...)

- Provide information for the purpose of searching according to the criteria.

- Provide software that is user-friendly, convenient. This software can make reports and forms automatically as designed.

Database of property management must be able to integrate with database of finance and accounting management, database of personnel management as well as operating system. It must be able to perform the following main functions: (1) updating information such as asset purchase and exchange, process of asset usage, asset liquidation; (2) calculating property depreciation; (3) making property card; (4) searching information related to property; (5) making general reports and property statistics.

Expected efficiency and result:

- Database of property management is implemented in division of finance and accounting

- Data related to property is updated frequently, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of property management would assist in making periodic report according to the standardized forms.

3.4.3. Information for Management

Information for management includes the system of databases and application programs that is designed for the purpose of collecting, processing, storing, and providing information as well as performing information process to assist directors in making decision, divisions and officers in performing the works. In this block, there are some databases that has connection and information exchange with external

organizations, called database of information for general management. The other databases contain specific characteristics of particular department and particular division, called database of information for specialistic management.

3.4.3.1. Database of Information for General Management

3.4.3.1.1. Database of Normative Law Document

Guidelines, policies, law, and law documents (generally called normative law documents) are used as principles for operation, management as well as decision making at all leadership levels. However, normative law documents also need to be disseminated broadly. Therefore, database of normative law document is considered as an indispensible component of information system in Phu Tho Department of Public Health.

Database of normative law document is designed for the purpose of collecting, storing, managing, and providing documents of normative law. These documents then are used to meet the need of exploitation, search, and quotation (in order to assist in supporting decision making, checking and supervising law enforcement). Besides, it is necessary to update frequently documents of normative law which drawn up and promulgated by Department of Public Health for the purpose of exploiting information as well as reporting to Provincial People's Committee.

Database of normative law document will include:

- Documents of normative law is drawn up and promulgated by Phu Tho Department of Public Health during the process of management

- Documents of normative law promulgated by organizations of Central Government (Party, Parliament, government, ministries, departments), Ministry of Public Health, provincial authorities (Provincial Committee of the Party, People's Council, Provincial People's Committee, departments, sections).

- Books, electronic newspapers and magazines related to documents of normative law (electronic library).

In order to set up and implement the database of normative law documents, it is necessary to:

- Set up a database of normative law documents, and then it will be connected to external databases for data exchange and supplementation.

- Set up the website of normative law documents (public website), one part of Department of Public Health website.

- Collect, classify, and process data in order to update into database of normative law documents.

3.4.3.1.2. Database of Personnel Management

Database of personnel management is set up or bought basing on system of information portfolio, management criteria, summarized report system. Database of personnel management will perform the following functions: (1) updating and managing staff files accurately, closely, and systematically; (2) updating and managing employment history; (3) managing salary regulations (along with database of finance and accounting); (4) processing and summarizing reports, providing staff statistics; (5) providing information for users' need of search.

In order to set up this database, Department of Public Health need to: (1) standardize information (such as: management criteria, forms for general report, statistics); (2) build the model and analyze the model design; (3) set up or purchase software of database for personnel management; (4) install and implement the software; (5) integrate with external databases of personnel management as well as relevant module component in the Phu Tho Department of Public Health information system.

Expected efficiency and result:

- Database of personnel management is implemented in division of finance and accounting and must be integrated with database of personnel management as well as other relevant components of information system

- Data related to personnel is stored in databases, updated frequently, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of personnel management would assist in making periodic report according to the standardized forms.

3.4.3.2. Database of Information for Specialistic Management

3.4.3.2.1. Database of Health Planning and Plan Implementation

Currently, the management of health plan is mainly performed on books, records, and documents, Microsoft Excel or Word file is seldom used to assist staff in management activities. Therefore, it is difficult to monitor closely the process of

implementing department's plans. As known, the specific characteristic of the planning is divisions or units first make the plan basing on the instruction documents, development strategies, and data of previous plans; and then send to Department in order to summarize as well as balance; finally, it is submitted to Provincial People's Committee. During this process, divisions or units' plan has to be adjusted in order to be accordant with economic development plan of the entire Phu Tho Province. After being approved by Provincial People's Committee, Department of Public Health will be responsible for making schedule for implementation as well as monitoring closely implementation process (original plan can be adjusted or supplemented during the implementation process if necessary). Therefore, it is quite difficult to store all initial data, approved/adjusted/supplemented data, and actual data (from periodic reports).

Database of health planning and plan implementation is designed for the following purposes: (1) storing bases for the planning: instruction documents, data of socioeconomic target, actual data comparing to the data of previous plan...; (2) storing data of plan history (around 10 years); (3) managing annual plan as well as long-term plan; (4) managing the plan of investment and development, including the plan of civil engineering, and plan of capital for local health investment and development; (5) monitoring the process of planning; (6) adjusting and supplementing details in the original plan; (7) monitoring the plan implementation through reports from divisions within Department of Public Health; (8) assessing the implementation of approved in divisions; (9) making yearly/5 year/10 year statistical data.

After setting up the database of health planning and plan implementation, it is expected to bring the following results: (1) The implementation of the software in divisions within Department of Public Health will help to improve management ability; (2) Data related to health plan will be stored in database, updated frequently, and transferred via the network. This transfer need to be complied with the rules of data security and safety; (3) Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of health planning and plan implementation would assist in making periodic report according to the standardized forms; (4) Staff and officers will be trained in order to maintain, operate, and develop system; (5) Staff in division will be trained to use system.

3.4.3.2.2. Database of Health Equipment Management

Health equipment management is considered as one of the most important parts in the management activities because health equipment is related closely to treatment and prevention system. Currently, Phu Tho Department of Public Health includes 15 divisions and 14 health centers; therefore, there is a large amount of equipment need to be managed. So far, there has been no software assisting staff in health equipment management. The process of health equipment management includes: (1) entering data related to new equipment; (2) managing equipment usage, maintenance, and repairs; (3) assessing equipment's use value and remaining value.

In Phu Tho Department of Public Health, due to the equipment management's features (large quantity, variety of types, and different characteristics) as well as the

frequent change (purchase, repair, and liquidation), therefore equipment management is complicated and difficult, especially in the following works: (1) storing information of each equipment, especially information that needs to be updated periodically on the usage/maintenance/repairs; (2) finding and searching information; (3) summarizing information basing on different dimensions and different sections; (4) making financial reports related to public assets.

For the purpose of computerizing health equipment management, designed database must be able to perform the following main functions: (1) updating information such as equipment purchase and exchange, process of equipment usage, equipment liquidation; (2) calculating equipment depreciation; (3) making equipment card; (4) searching information related to equipment; (5) making general reports and equipment statistics.

Expected results:

- The program of equipment management is implemented in division of finance and accounting in order to assist directly management activities as well as exploitation activities.

- Data related to equipment is frequently updated, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of health equipment management would assist in making periodic report according to the standardized forms.

3.4.3.2.3. Database of Disease Prevention Management

Currently, the management of disease prevention is mainly performed on books, records, and documents, Microsoft Excel or Word file is seldom used to assist staff in management activities. Therefore, it is difficult to monitor closely information related to disease prevention activities.

Setting up database of disease prevention management in 13 health centers is expected to provide fully information for leadership in order to direct the implementation of target programs, such as: vaccination, bronchocele prevention, paludism prevention, tuberculosis prevention, dermatosis prevention, mental health program, trachoma prevention, family planning program, and so on.

For the purpose of computerizing disease prevention management, designed database must be able to: (1) store medicine portfolio that used for epidemic disease prevention as mentioned in target programs; (2) update information as well as advanced technology for disease prevention activities; (3) manage pharmaceutical products in order to be able to maximize the use efficiency; (4) manage chemical, vaccine, biological products, sterilization products,…; (5) be able to exchange information with the information system of treatment management; (6) manage and plan medical providence; (7) collect information related to infectious epidemic; (8) map distribution of infectious epidemic; (9) search and find information.

Expected results:

- The software is implemented in prevention center, and then piloted in several health divisions that are under the management of provincial prevention center

- Data related to disease prevention activities is frequently updated, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of disease prevention management would assist in making periodic report according to the standardized forms.

- Staff and officers will be trained in order to maintain, operate, and develop system

- Staff in division will be trained to use system.

3.4.3.2.4. Database of Disease Treatment Management

Currently, the management of disease treatment in hospitals, health centers is mainly performed on books, records, and documents, Microsoft Excel or Word file is seldom used to assist staff in management activities. Therefore, it is difficult to monitor closely information related to disease treatment activities.

Setting up database of disease treatment management in hospitals, and health centers is expected to provide fully information for leadership in order to closely direct the performance of treatment activities.

For the purpose of computerizing disease treatment management, designed database must be able to: (1) manage the list of hospitals as well as health examination and treatment centers; (2) manage case-record and monitor treatment process; (3) manage treatment map according to disease type; (4) categorize case-record according

to therapeutic field; (5) exchange information with information system of disease prevention management; (6) manage research activities; (7) search and find information.

Expected results:

- The software is implemented in provincial hospitals and general hospitals, then pilot in several health centers.

- Data related to treatment activities is frequently updated, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of disease treatment management would assist in making periodic report according to the standardized forms.

- Staff and officers will be trained in order to maintain, operate, and develop system

- Staff in divisions will be trained to use system.

3.4.3.2.5. Database of Health Aid Management

Currently, the management of health aid is mainly performed on books, records, and documents, Microsoft Excel or Word file is seldom used to assist staff in management activities. Therefore, it is difficult to monitor closely information related to health aid activities.

Setting up the database of health aid management is expected to assist leadership in managing sources of health aid for the purpose of defining investment strategy as well as improving the effectiveness of current aid sources usage.

For the purpose of computerizing heath aid management, designed database must be able to: (1) manage the list of aid organizations as well as divisions that aid absorption; (2) manage sources of health aid from hospitals, health centers, health prevention center, pharmaceutical and cosmetic test center, and medical schools; (3) manage the allocation of aid sources to maximize the usage effectiveness; (4) assess the usage effectiveness of aid sources; (5) search and find information.

Expected results:

- The software is implemented in provincial hospitals and general hospitals, then pilot in several health centers.

- Data related to forms of health aid is frequently updated, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of health aid management would assist in making periodic report according to the standardized forms.

- Staff and officers will be trained in order to maintain, operate, and develop system

- Staff in divisions will be trained to use system.

3.4.3.2.6. Database of Manufacture and Business Operation Management

Currently, the management of manufacture and business operation related to health field is mainly performed on books, records, and documents, Microsoft Excel or Word file is seldom used to assist staff in management activities. Therefore, it is difficult to monitor closely information related to manufacture and business operations.

Setting up the database of manufacture and business operation management is expected to assist leadership in managing medicine supply as well as disease prevention activities

For the purpose of computerizing manufacture and business operation management, designed database must be able to: (1) manage the application files of enterprises; (2) manage medicine portfolio and medicine brands; (3) manage the quality of medicines supplied by enterprises; (4) monitor business operations of enterprises through report system after application is approved; (5) support for store, search, and find information.

Expected results:

- The software is implemented in department of overall planning, and department of pharmaceutical management.

- Data related to manufacture and business operations is frequently updated, and transferred via the network. This transfer need to be complied with the rules of data security and safety.

- Supporting effectively and quickly for performing functions (such as information search, statistics, summarization of tables and figures). Besides, it is expected that database of manufacture and business operation management would assist in making periodic report according to the standardized forms.

- Staff and officers will be trained in order to maintain, operate, and develop system

- Staff in divisions will be trained to use system.

3.4.3.2.7. Database of Summarized Information for Management Activities

Regarding to the management activities in the Phu Tho Department of Public Health, not only each division within the department set up its own professional database, it is also necessary to set up a database of summarized information, which mostly consists of socioeconomic target data and reports related to health management field. The main function of this database is to provide summarized information, which is synthesized from detailed data and information of specialistic databases as well as other external information sources. This summarized information is expected to assist leadership in making decisions, and senior officers in preparing information for leadership decision-making and reports to higher authorities. Specifically, database of summarized information takes the responsibility for collecting, storing, processing, and managing the summarized information related to every domain of department operations, including direction and management activities, health activities, finance and accounting operation, etc…

As mentioned above, database of summarized information includes target data, orientations, plans, judgments, assessments, and conclusions related to the development as well as the implementation of health programs and activities in the given period of time and stages. This summarized information is collected from health operations or databases of health management through integrated modules between database of summarized information and specialistic databases. Database of summarized information is connected to operating system, other databases, and other applications of Department of Public Health information system. Besides, it is also connected to

People's Provincial Committee network and Ministry of Public Health information system.

Chapter 4 Data Analysis on the Information System

Implementation

As mentioned, the purpose of this study is to describe the model of information system applied in Phu Tho Department of Public Health. After designing the system, in order to ensure the success of information system implementation in Phu Tho Department of Public Health, it is necessary to conduct surveys for the purpose of checking the current situation of information technology infrastructure as well as the level and ability of staff and officers.

4.1. Data Sources

Firstly, in order to examine the current situation of information technology infrastructure, a survey was delivered to all divisions in Phu Tho Department of Public Health, hospitals, and health centers in Phu Tho province. These divisions, hospitals, and health centers were asked to provide statistics related to the number of computers, intranet availability, internet connection, and transmission line network.

Secondly, for the purpose of examining the level of information technology use, a questionnaire was delivered directly to 1335 staff and officers in all divisions, hospitals and health centers in Phu Tho province. This survey consists of three parts. In the part one, participants were required to provide information related to web page's establishment of divisions, departments, hospitals, and health centers that they are working for. If there is a web page, they are then asked to describe more detail about the content as well as information displayed on the interface. In the part two, participants

provided information related to their level of using computer, applications, and software, their ability to exploit information on the internet, as well as their trained needs. After finishing part 2, participants were required to fill in their personal information in the third part of the survey.

A total of 1335 questionnaires were delivered to all staff and officers in all divisions of Phu Tho Department of Public Health, all hospitals, and health centers in Phu Tho Province.

4.2. Data Analysis and Results

The examination of the current situation of information technology infrastructure was conducted at all divisions in Phu Tho Department of Public Health, hospitals, and health centers in Phu Tho province. The result is shown in the table 1:

Table 1. Current Situation of Information Technology Infrastructure in Phu Tho

Department of Public Health

Unit	The Number of Computers	Intranet (Yes/No)	Internet Connection (Yes/No)	The Number of Transmission Line Types			
				Modem	ADLS	Leased	Other
Department's Office	15	No	Yes	10	x	0	0
Preventive Medicine Center	10	No	Yes	02	x	0	0
Provincial General Hospital	30	Yes	Yes	30	x	0	0
Thanh Son Health Center	20	Yes	Yes	20	x	0	0
Center of Forensic Examination	5	No	No	0	0	0	0
Health Centers in 13 towns	47	No	Yes	20	x	0	0

Medical Stations	25	No	No	0	0	0	0
Others	246						
Total	373		x	x	x	0	x

According to the above table, information technology infrastructure in Phu Tho Province has developed over the past ten years. Currently, all divisions (within Phu Tho Department of Public Health), hospitals, and health centers are equipped with computers (totally 373 computers). Only in communes, due to the small scale as well as financial difficulties, there is about 8% of health stations equipped computer system. Regarding to the network system, thanks to the rapid development of telecommunications line in Vietnam, therefore, health branch is able to exploit this for performing health operations. Specifically, up to early of this year, an estimated 50% divisions/centers/organizations directly under Phu Tho Department of Public Health and 0.05 % health stations set up LAN network and high-speed internet connection. Regarding to the transmission line network, a small number of health units have their own transmission line (make up 2%); more than 70% divisions/centers/organizations use ADSL; and some others are still access Internet by Dial-up. In short, information need is increasing rapidly, so it is essential to apply information technology in administrative management as well as information exchange in the Phu Tho Department of Public Health. Specifically, applying information technology or setting up information system basing on computer network for management activities is expected to overcome the difficulties or shortcomings as well as improve the efficiency of management activities in Phu Tho Department of Public Health.

After examining the current situation of information technology infrastructure in Phu Tho Department of Public Health, a survey of web page availability as well as staff and officers' information technology level was conducted. The overall result is shown in the table 2 as below:

Table 2. Web Page Availability and Staff and Officers' Information Technology Level

Unit	Web Page Availability	The Number of Staff and Officers	Among them		
			The Number of Basically Trained Staff and Officers	The Number of Staff and Officers Who Used Internet for Information Exploitation	Trainnig Need
Department's Office	0	75	48	3	24
Preventive Medicine Center	0	129	18	3	108
Center of Pharmaceutical and Cosmetic Test	0	24	15	2	7
Reproductive Health Center	0	57	3	0	54
Center of Health Education and Communication	0	15	0	0	15
Provincial General Hospital	0	405	157	0	248
Sanatorium and Rehabilitation Hospital	0	24	3	0	21
Others	0	606	104	0	502
Total	**0**	**1335**	**348**	**8**	**979**

In order to make the results more clear, the below figure illustrates the staff and officers' level of information technology in different divisions, units, and organizations:
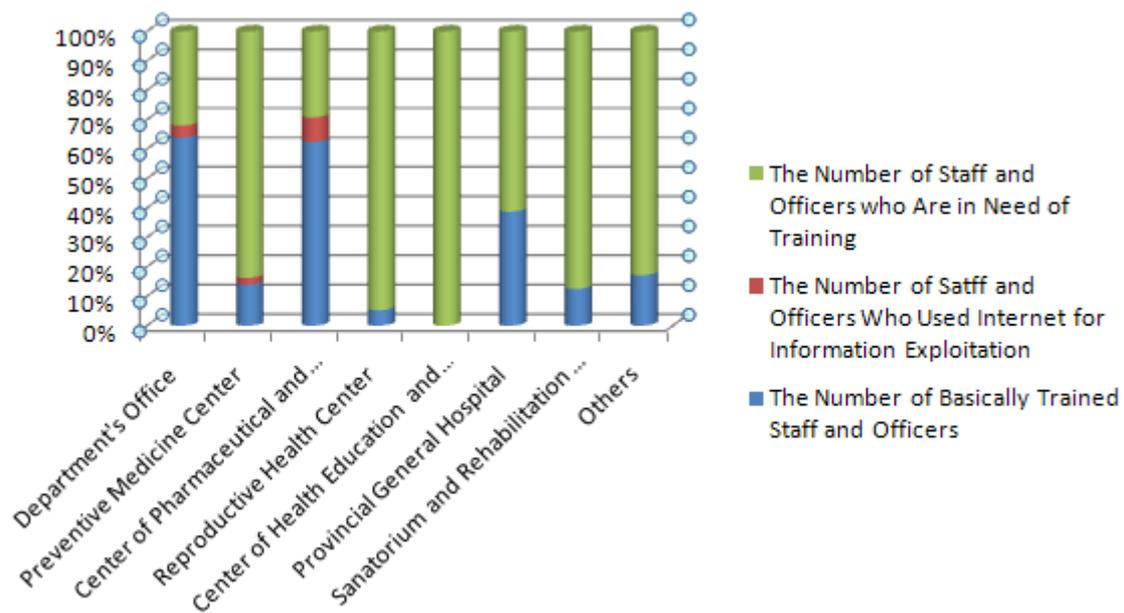
Figure 3. Staff and Officers' Level of Information Technology in Different Divisions,

Units, and Organizations

The result from the survey shows that, currently, all divisions/centers/ organizations directly under Phu Tho Department of Public Health have not set up webpage yet (including management divisions). Therefore, they will face difficulties in exchanging information with citizens as well as performing the public services.

Regarding to the information technology level of staff and officers, the result shows that their level is unequal. There is approximately 65% staff and officers in provincial units/divisions/centers/organizations are able to use computer, 85% staff/officers in towns/communes units have not approached technology yet. Moreover, most of staff and officers who can use computer and technology hold more than one office, but do not have professional certificates, even managers or directors of those divisions and units.

Chapter 5 Conclusion

5.1. Research Conclusion

The purpose of this study is to describe the information system applied in Phu Tho Department of Public Health as well as examine the possibility of its implementation. As discussed, informational activities or information exchange (incoming and outgoing information) in Phu Tho Department of Public Health are currently in the form of documents. For the purpose of computerizing information exchange activities as well as other administrative management, information system is designed and expected to implement in the department. This information system includes module components operated on the LAN network. Each module component consists of application programs and databases that are integrated and associated together through only one center − information center. Information system applied in Phu Tho Department of Public Health is expected to ensure the following characteristics: speciality; modernity; system expansibility and developable capability; efficiency; safeness, security and reliability; high integration; and ease of use.

As shown in the figure 2, in the model of information system, the content (information) needs to be computerized in the Phu Tho Department of Public Health can be categorized into three blocks: (1) Information for daily activities: including application programs, websites, and interfaces (operating system, website for management activities). The major content of this block is to computerize information process related to daily works, especially the information exchange during process will be carried out through the network.; (2) Information for internal management: including

application programs and databases (database of finance and accounting management, database of property management) that are designed in order to computerize internal management activities; (3) Information for management: including the system of databases and application programs (databases of information for general management, databases of information for specialistic management) that are designed for the purpose of collecting, processing, storing, and providing information as well as performing information process.

After designing information system, in order to ensure the effectiveness of its implementation, a survey on the current situation of information technology infrastructure and a questionnaire on webpage availability as well as staff/officers' information technology level were conducted. Regarding to the current situation of information technology infrastructure in Phu Tho Department of Public Health, the result show that although all divisions, hospitals, and health centers are equipped computer system, but just 50% of them set up LAN network and high-speed internet connection. Generally, Phu Tho Department of Public Health can take advantage of this infrastructure to set up information system effectively and successfully. At the same time, the process of setting up information system also is a chance for department to improve the current information technology as well as its operations, especially improve information exchange activities and management activities. Regarding to the webpage availability, the result shows that currently no divisions and units directly under Phu Tho Department of Public Health have designed its own webpage yet. This is considered as the main reason for limitations of information exchange as well as public

service implementation and development. Therefore setting up information system means that those units must have a website for interaction with citizen. The main functions of this website are to provide information and improve the efficiency of management activities. In terms of staff and officers' information technology level, it is shown that many staff and can use computer but few exploited information via the internet or use technology applications. However, due to the development of information technology as well as practical requirement, most of them are in need of training. Those statistics create a foundation for implementing a given system effectively and successfully.

In a word, this study describes an information system as to how Phu Tho Department of Public Health might use to improve administrative activities as well as management activities for the purpose of improving its operation efficiency. Moreover, by conduction surveys, this study shows the possibility of implementing this information system effectively and successfully.

5.2. Contribution and Implication

The goal of this study is to describe the information system applied in Phu Tho Department of Public Health and examine the possibility of its implementation. This study is expected to bring some contributions for research as well as implications for practice. First of all, it confirmed the importance and the application of information system in the management activities. This study presented an information system model for the purpose of computerizing administrative management as well as health activities. Second, other health organizations/divisions can apply the model to improve

management activities and information exchange. The model provides insights on how to develop a system, the components of the system as well as their functions. Third, this study showed the importance of management activities' and information exchange's computerization process; hence leadership of organizations need to have preparations for setting up information system. For instance:

- Building and developing information technology infrastructure in order to create a foundation for setting up information system

- Training staff/officers/expert to exploit information as well as operate system

5.3. Limitation and Future Research Suggestion

Before concluding, several limitations of current study should be mentioned. An optimized model such as the information system model presented here, always presents a simplification from reality, and, thus has its natural limits that define the valid range of application to instances and situations.

To begin, the information system model in this study is designed for the particular object – Phu Tho Department of Public Health, therefore, this information system must be conformable to the department's needs as well as specific characteristics (related to health activities). Moreover, in order to prepare for information system implementation, surveys were conducted in Phu Tho Department of Public Health basing on its current situations. Hence, this system can not be applied in other field, other departments or organizations, but just for reference. In other words, this study may not representative of all fields and all organizations.

Besides, this study used surveys to examine the possibility of system implementation; however, the data is analyzed in a simple way, so the result may not be remarked accurately and detailed.

In order to make good this study's limitations as well as develop it, there are several future research directions that will further an understanding of the presented information system as well as its implementation.

First, future researches can apply the presented information system model in other fields for the purpose of improving the efficiency of management activities.

Second, future researchers also may use different methodologies such as focus group, interview experts, etc… to develop and expand the presented system.

Third, further researches might consider developing survey as well as analysis method for better understanding of the collected data.

References

[1] Barnett, G.O, Winickoff R, Dorsey JL, Morgan MM, Lurie RS., 1979, "Quality Assurance through Automated Monitoring and Concurrent Feedback Using Computer- base Medical Information System", Med. Care, vol. 16(11), pp. 926-70.

[2] Barretto, S., Warren, J., Goodchild, A., 2003, "Linking Guidelines to Electronic Healthcare Records Design for Improved Chronic Disease Management", AMIA Proc.

[3] Bates, D.W., Ebell, M., Gotlieb, E., Zapp, J., Mullins, H.C., 2007, "A Proposal for Electronic Medical Records in U.S. Promary Care", J Am Med Inform Assoc, vol. 10(1), pp. 1-10.

[4] Berlcon Research .FLOSS – Free/Libre and Open Source software: Survey and Study, 2005.

[5] Carnall D., 2000, "Medical Software's Free Future", BMJ, 312 (7267).

[6] Ellis, D.J., 2003, "Academic and Commercial Development of Open Source Applications in International Health Informatics - Opposite Sides of the same Coin", IOS Press, Amsterdam.

[7] Ferranti, J.M., Musser, R.C., Kawamoto, K., and Hammond, W.E., 2006, "The Clinical Document Architecture and the Continuity of Care Record: A Critical Analysis", J Am Med Inform Assoc.

[8] http://medinet.hohiminhcity.gov.vn

[9] http://sweden.gov.se/health

[10]   http://www.interfaceware.com

[11]   http://www.pmi.org/info/PP OPM3ExcGuide.pdf

[12]   http://www.ruleworks.co.uk

[13]   Huang, E. W., Hsiao, S.H., and Liou, D.M., 2003, "Design and Implementation of a Web-based HL7 Message Generation and Validation System", Int J Med Inform, vol. 70, pp. 49-58.

[14]   IOM, 2003, "Key Capabilities of an Electronics Health Record System: Letter Report", Intitutite of Medicine.

[15]   McDonal, C.J., Schadow, G., et al., 2003, "Open Source Software in Medical Informatics - Why, How and What", Int J Med Inform, vol. 69(2-3), pp. 175-84.

[16]   Nguyen, H.P., Nguyen, M.A., and Hoang, H.A., 2008, "Electronic Case-Record", Medical Publisher.

[17]   Tran, T., Kim, H.S., Kim, H.H., and Cho, H., 2006, "An Efficient Algorithm for HL7 Message Parsing", Transaction of KIEE, vol. 55(6), pp. 274-278.

[18]   Tung Tran, 2008, "A development of Integrated Personal Health Record System to support Continuity of Card in Vietnam", Thesis for the Degree of Ph..D. of Medical Sciences, Department of Medical Informatics, the Gradual School, Kyungpook National University, Korea.

[19]   Yakel, T.R., 2005, "How the Open Source Development can Improve Medical Software", IOS Press Amsterdam.