Administration Information System for Appeal Compensation Division of the Ministry of Transport and Communications

by

Ms. Viriya Yooktatat

A Final Report of the Three-Credit Course
CS 6998 System Development Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer Information Systems
Assumption University

November, 2001

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Project Title	Administration Information System for Appeal Compensation Division of the Ministry of Transport and Communications
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Project Advisor	Assoc.Prof.Dr. Ouen Pin-ngern
Academic Year	November 18, 2001

The Graduate School of Assumption University has approved this final report of the three-credit course, CS 6998 System Development Project, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer Information Systems.

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ABSTRACT

This system development project mentions about the Administration Information System of the Appeal Compensation Division in the Ministry of Transport and Communications. The Appeal Compensation Division is one of the government sections that take responsibility in helping people get fair compensation if their lands or building are surrendered to the government. The scope of this project is to improve the existing Administrative Information System of the Appeal Compensation Division. The existing function is performed manually and some computerized system, which causes slow performance, loss of information, and difficulty in finding information. The purpose of this project is to replace the existing system and find the best alternative solution of managing the inflow and outflow of documents by using the effective computerization. The existing business functions and data flow diagram are represented to make it easier to understand. The current problems, areas for improvement and user requirements are known by interviewing from the administrator in the Appeal Compensation Division. In the system design section, the data flow diagram of the proposed system is presented to solve the problems happening in the Administration Information System. The database is normalized to generate an effective database. The user-friendly input screen and output report is carefully designed for helping the administrator record all of the necessary information and generate an efficiency reports. After carefully selection, there are three alternative solutions involved in this project, and the best one is selected by using the feasibility analysis matrix. Net present value and pay back analysis is calculated to make it easier in decision-making. The proposed system uses MS. Windows NT in the server and uses MS. Access 2000 as the operating software in the PC client because it is easy to implement, understandable, familiar to the user and have

many applications supporting it. The description of hardware and software is also mentioned. The proposed system is tested to make sure that it works smoothly without any problems and covers all user requirements. The training is done for helping the administrators understand the proposed system so they can generate an effective performance. By this way, the Appeal Compensation Division can present the new system, which develops its organization structure and resources management in order to achieve the highest efficiency and effectiveness.

ACKNOWLEDGEMENTS

The writer is obligated to many individuals who have contributed to the development of this project. First the writer wishes to thank her advisor, Asst.Prof.Dr. Ouen Pin-ngern, who offered many helpful comments and suggestions for the improvement of this project.

She would like to thank Prof.Dr. Srisakdi Charmonman, Air Marshal Dr. Chulit Mesajjee, and all of their faculty members who always give very valueable lectures at the School of Computer Information Systems, Assumption University.

She also offers thanks to Ms. Vipa Tangtong, Mr. Ekasit Kansuwiro, who was information provider for this project. She also thanks Mr. Sittirak Kundirok for his patience.

Special thanks are given to her parents, Mr. Suparak Yooktatat and Ms. Siriporn Yooktatat, who always provide her with power, care, and loving warmth.

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I. INTRODUCTION

1.1 Background of the Project

The Appeal Compensation Division is one part of the Ministry of Transport and Communications, which is charged with the duty and responsibility of the appeal compensation operation and oversees problems related to petitions for both real estate and building.

The system analyst intends to make the process of searching information easier and quicker because now the Appeal Compensation Division gets so many complaints from people about slow performance time. So the system analyst will try to use a computer system to reduce the complexity of the jobs and increase effective performance. The existing system manually performs in the administration section of the Appeal Compensation Division and does not keep all of the necessary details. These are the major causes of slow and ineffective performance. Because of these reasons information analysis by the system analyst must be performed in the Appeal Compensation Division to minimize the problems and reduce performance time.

1.2 Objectives of the Project

The administration is the first section, which receives all of the documents flowing into the Appeal Compensation Division. The aim of this project is to develop the existing computer system and find the best alternative way of managing the inflow and outflow of documents.

The objectives of the project are as follows:

(1) To increase speed in searching information.

(2) To minimize blunders from entering wrong data.

(3) To reduce loss of information.

(4) To make verifying the number of job easier.

(5) To increase convenience in finding information.

(6) To count the number of appellants.

(7) To improve the performance of employees who work for the Appeal Compensation Division.

1.3 Scope of the Project

The administration section of the Appeal Compensation Division is the main part of this division because it distributes all of the works to other sections of the Appeal Compensation Division. At the same time the administration section has to concern itself with the other divisions in the Ministry of Transport and Communications. So the scope of the project is to emphasize improving the existing administration information system that is used in the Appeal Compensation Division of the Ministry of Transport and Communications.

The scopes of the project are as follows:

(1) Show major processes that occur in the administration information system of the Appeal Compensation Division.

(2) Improve the existing system.

(3) Develop the administration information system by using the computer systems.

1.4 Deliverables

This project is intended to generate five major sections as follows:

(1) Project Introduction

(a) Background of the project

(b) Objective

(c) Scope

(d) Deliverables

(e) Project Plan

(2) Description of the existing system

(a) Background of Organization

(b) Existing business functions

(c) Advantages and disadvantages of the existing system

(d) Existing context diagram

(e) Existing system configuration

(3) Description of the proposed new system

(a) Advantages and disadvantages of the proposed system

(b) Hardware and software configuration

(c) Proposed system configuration

(d) Inputs and outputs of the proposed system

(e) Cost and benefit analysis

(f) Security and control

(4) Project Implementation

(a) Project Implementation

(b) Test plan and result

(c) Source code

(5) Conclusions and Recommendations

1.5 Project Plan

The project plan is the estimated time used to perform the project. To present the project plan, the system analyst uses a Gantt Chart to make it easier to understand. The Gantt Chart can be defined as a simple horizontal bar chart that depicts project tasks against a calendar. The Gantt Chart is divided into three phases including:

(1) System Analysis

The system analysis is the first task, which took about 5 weeks. The system analysis phase consists of identifying system objective and scope, studying the existing system, identifying advantages and disadvantages of the existing system, developing context diagram and data flow diagrams and identifying cost and benefit analysis.

(2) System Design

After knowing the system analysis of the Administration Information System, let us examine the further step in system design, which took about 5 weeks. System Design consists of analyzing and distributing process, identifying database design, software design, and input and output design.

(3) System Implementation

After the system analyst has performed the first two phases, it is time to start coding, testing and training. It took about 4 weeks to perform this phase.

The Gantt Chart of the project is shown in Figure 1.1.

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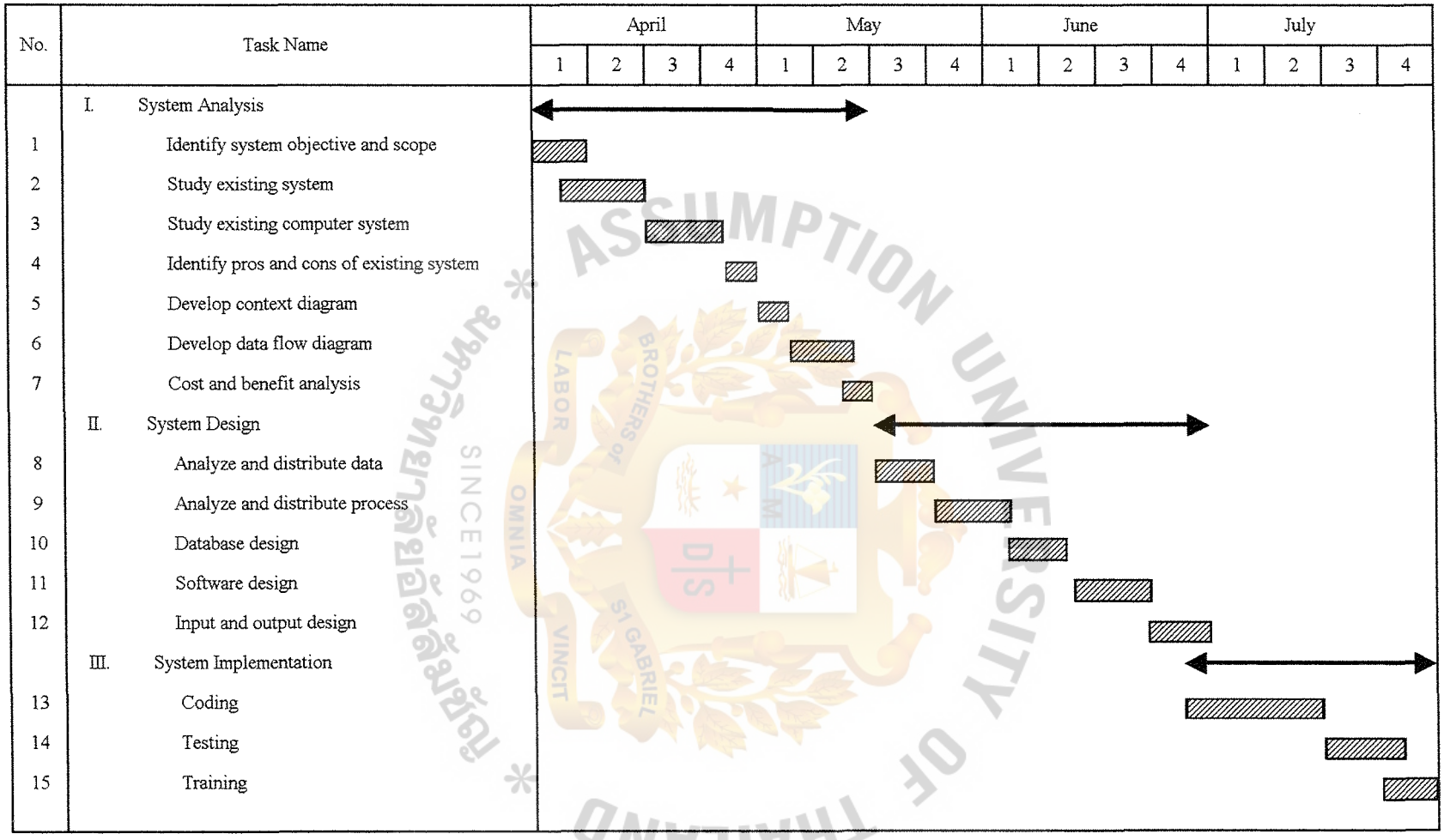

Figure 1.1. Project Plan of the Administration Information System.

II. THE EXISTING SYSTEM

2.1 Background of the Organization

The Ministry of Transport and Communications is one of the government sections which is responsable for the development of national infrastructure related to transportation, communication and meteorology with the objectives of trying to achieve sufficiency, modernity and proper standard. All these qualities must be conductive to the development of national economy and social order. The Ministry's target is to be effective and competitive in the world market.

The Ministry of Transport and Communications consists of both government section and state enterprises as follows:

Government Agencies

(1) Office of the Secretary to the Minister.

(2) Office of the Permanent Secretary.

(3) The Department of Land Transport.

(4) The Department of Aviation.

(5) Harbor Department

(6) The Department of Highways.

(7) The Post and Telegraphs Department.

(8) The Meteorological Department.

(9) Office of the Maritime Promotion Commission.

State Enterprises

(1) Port Authority of Thailand.

(2) State Railway of Thailand.

(3) The Communication Authority of Thailand.

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(4) Airports Authority of Thailand.

(5) The Bangkok Mass Transit Authority.

(6) The Telephone Organization of Thailand.

(7) Express Transportation Organization of Thailand.

(8) The Transport Company Limited.

(9) Thai Maritime Navigation Company Limited.

(10) Thai Airways International Public Company Limited.

(11) Aeronautical Radio of Thailand Limited.

(12) Civil Aviation Training Center.

(13) New Bangkok International Airport Company Limited.

The Appeal Compensation Division is placed in the Office of the Secretary to the Minister. Office of the Secretary to the Minister is charged with the duty and responsibility that coordinates political work and regular work. The office operates on policies of the government and the minister by controlling and following the designated policies and is responsible for overseeing problems related to petition, grievances, anonymous letters as well as observing and following up protests.

The Appeal Compensation Division is responsible for helping people get fair compensation. In the case that people are not satisfied with the primary cost that is set by the committees, they must submit the appellate form to the Appeal Compensation Division within 60 days after receiving an informed document. When people wish to make the appellant, they must submit the appellate form and other necessary documents; for example the title deed to a piece of land, the informed document, the trading cost, map of land, and picture of surrender lands.

The principle of appeal consideration of the Appeal Compensation Division depends on the standard market trading cost of surrender asset, surrender lands position,

and the reason of surrender. The organization structure of the Ministry of Transport and Communications is shown in Figure 2.1.

The objectives of the Appeal Compensation Division are as follows:

(1) To ensure people receive fair compensation due to surrender lands.

(2) To increase the performance of employees who work for the Appeal Compensation Division.

(3) To ensure the appellant receives the highest satisfaction.

(4) To improve efficiency in working.

(5) To give the best consultation without any charge.

(6) To ensure the highest effective performance of employees.

(7) To increase time performance in doing work.

(8) To develop its organizational structure and resources management in order to achieve the highest efficiency and effectiveness.

(9) To meet the timely need of people.

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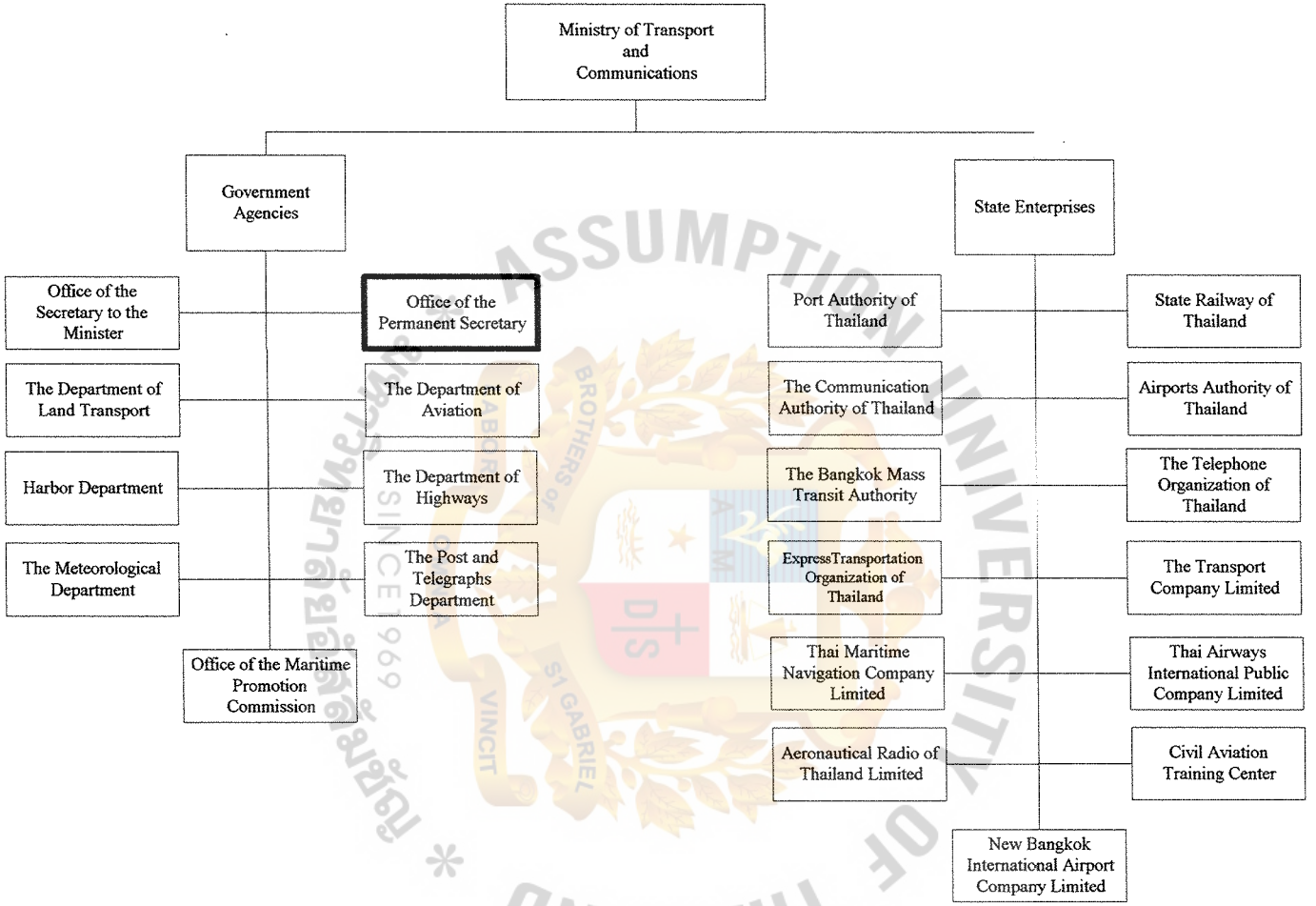

Figure 2.1. Organization Structure of the Ministry of Transport and Communications.

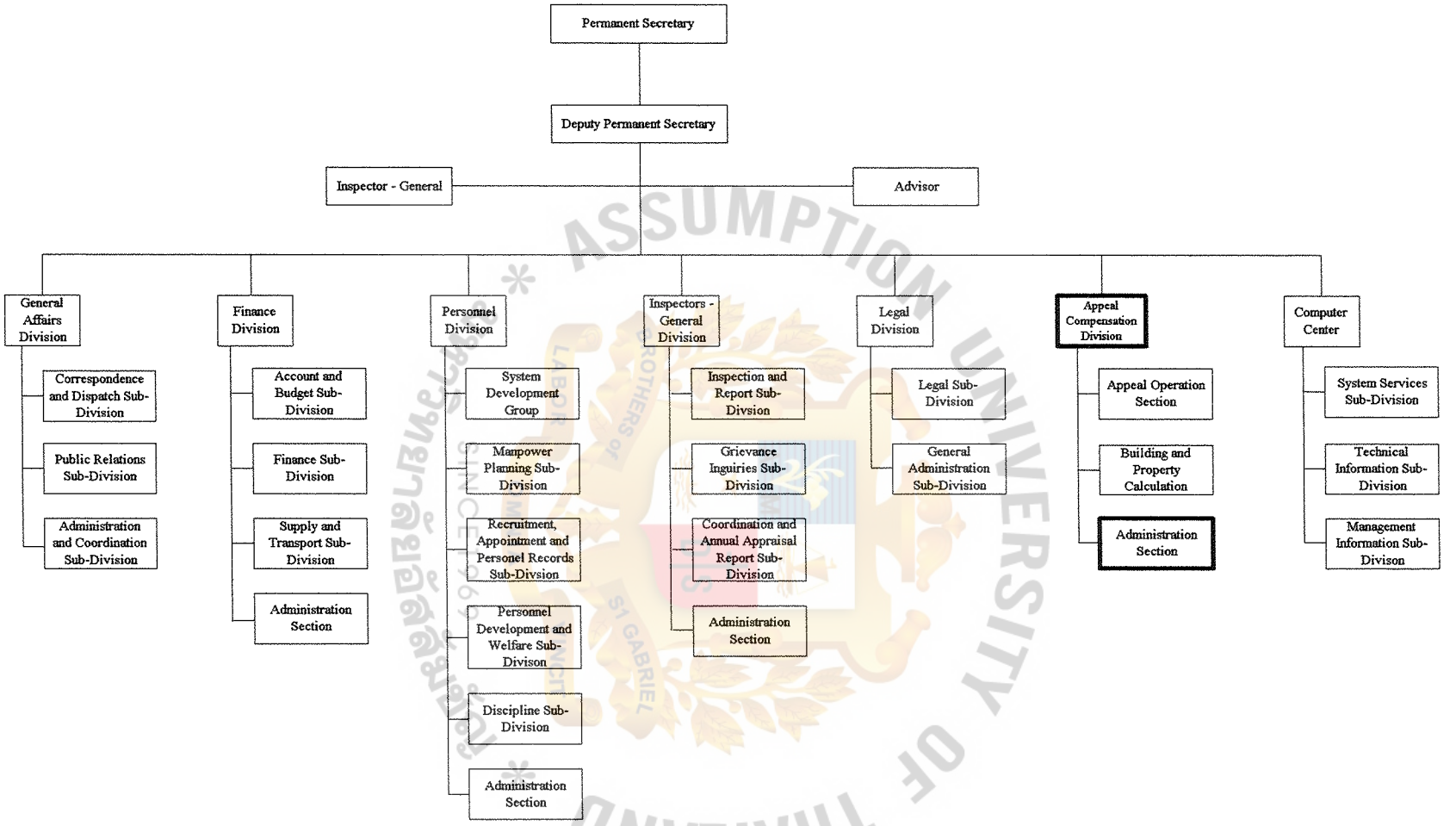

Figure 2.1. Organization Structure of the Ministry of Transport and Communications (Continued).

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2.2 Existing Organization Functions

The Ministry of Transport and Communications empowers the Appeal Compensation Division to have authority on all compensation operations that occur in the Ministry of Transport and Communications. An example is the appeal operation for constructing a public highway, railroad, or transport station.

In conclusion, the Appeal Compensation Division takes the following functions:

(1) To give advice to appellants.

(2) To oversee all problems related to petitions for both real estate and building.

(3) To demolish the remaining buildings after people have surrendered lands to the Ministry of Transport and Communications.

As mentioned earlier, the project focuses on the Administration Information System. The administration section is the main part of in and out flowing documents from other divisions. Some functions of the existing information system in the Appeal Compensation Division are handled by computer systems but many functions are still handled manually. This results in many problems and confusions in daily operation. To make it clearer, the functional decomposition diagram, the context diagram of the existing system, and the data flow diagram of the existing system are shown in Figure 2.2, Figure 2.3, and Figure 2.4 respectively.

The primary functions of the administration section are as follows:

(1) To receive all appeal documents from the appellants.

(2) To distribute the appeal documents to the operation sections.

(3) To send the processed document back to the authorized division which is the owner of that document for further execution.

(4) To prepare the appeal statistics chart.

(5) To generate a report of inflow and outflow documents.

(6) To be the center of most of the information that comes into the Appeal Compensation Division.

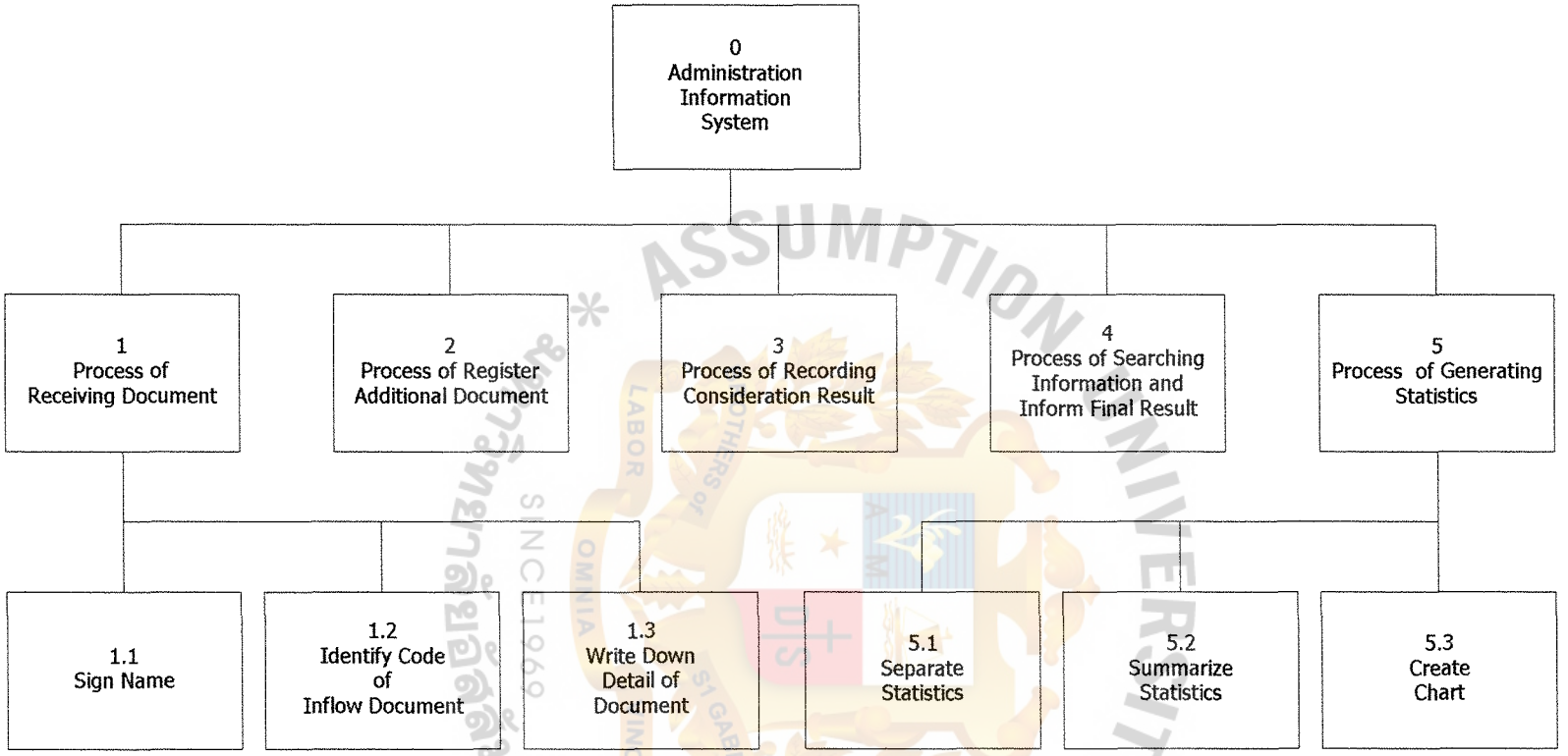

Figure 2.2. Functional Decomposition Diagram.

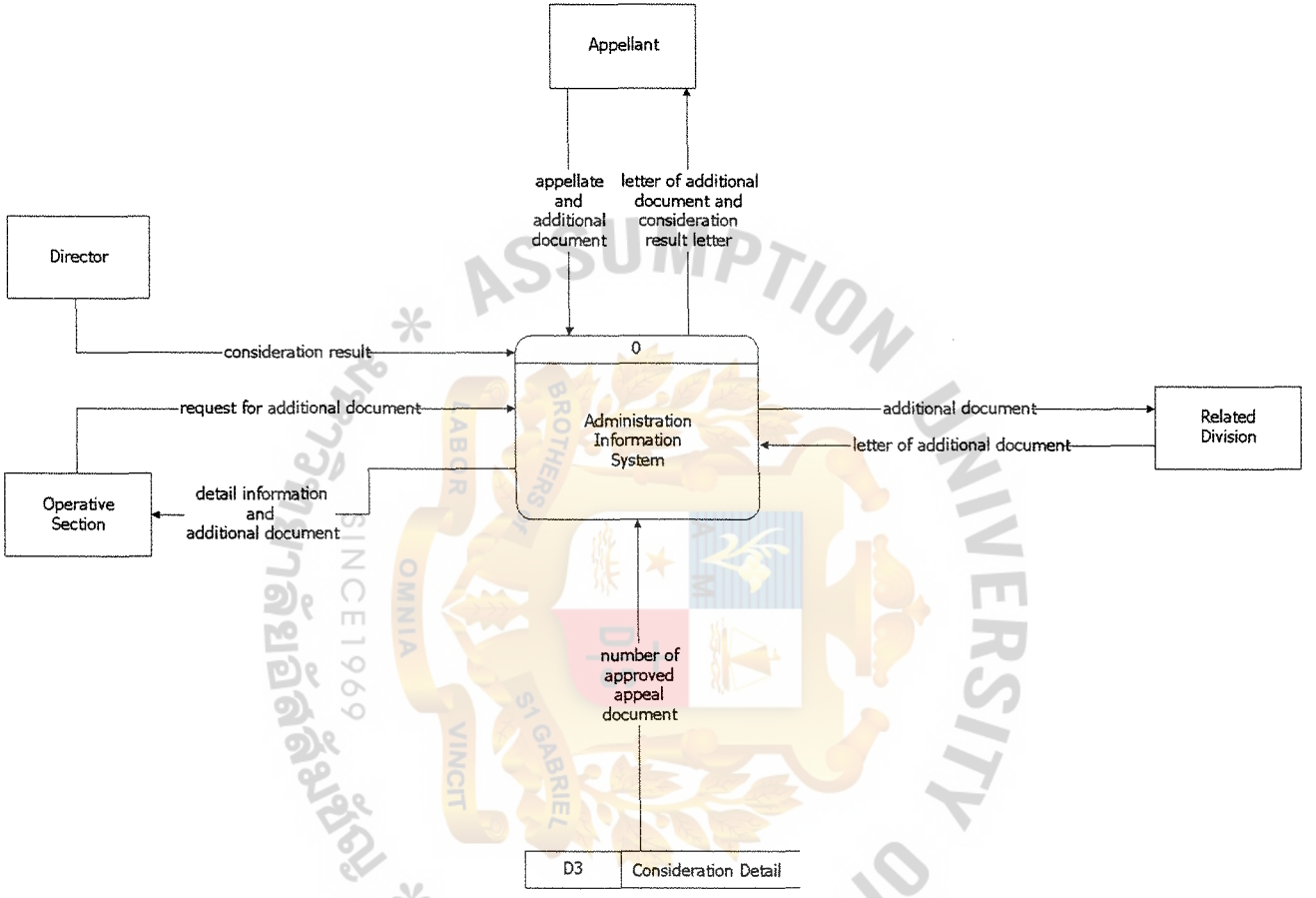

Figure 2.3. Context Diagram for the Existing System.

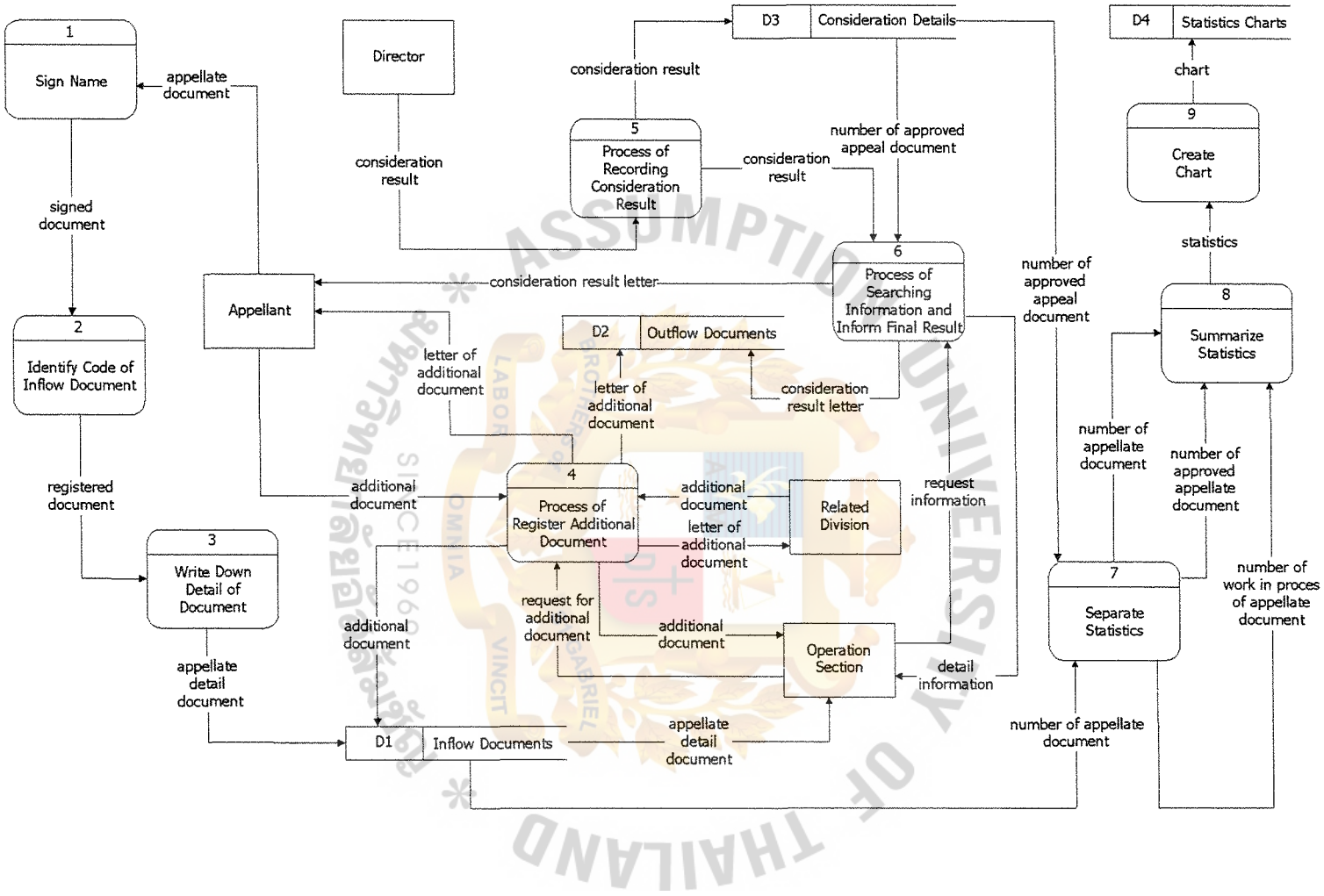

Figure 2.4. Data Flow Diagram for the Existing System.

2.3 Current Problems and Area for Improvement

2.3.1 Current Problem

After knowing the existing business functions of the Appeal Compensation Division, now is a good time to refer to the current problems of this division, which can help the author understand the current situation and find the best solution in solving these problems. The author knows the problems by interviewing with the administrators who work for the Appeal Compensation Division.

The current problems of the Administration Information System of the administration section are as follows:

(1) Slow Time Performance

Because of having a lot of appeal documents flowing in and out of the Appeal Compensation Division, recording it manually can cause slow time performance. The administrator has to spend a large amount of time writing down the information details in the record book. At the same time, the administrator usually complains about the difficulty in finding the information after a period of time.

(2) No Place for Keeping a Lot of Appeal Documents

The administrator usually receives about 150 items of the appeal documents per day. It causes problems in finding a place for keeping lots of documents like that and at the same time the administrators usually receive other documents from other divisions too. The administrators have to keep a lot of Xerox documents as reference information. Because of these reasons there can be problems of no place for keeping a lot of documents in the Appeal Compensation Division.

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(3) Error in Recording Information

The problem of error in recording information is caused by the carelessness of the administrator in recording the information and there is no process for checking the error during record, which can cause the error not to be corrected.

(4) Delay in Transmitting the Document

The administrators have to walk and deliver the document by hand to the operative sections and the other related divisions, so it causes a delay in transmitting the documents.

(5) Loss of Document

When the document is sent to the operative section, there is no process to make sure that the document is sent to the authorized persons. The administrator only puts the documents on the table of the authorized persons. Any one can gain access to the document very easily and the document can easily be lost or misplaced.

2.3.2 Area for Improvement

(1) Data Integrity Controls

The administrators must be sure that all input data is correctly recorded, all transactions are processed without additions or omissions and all output is accurate, and distributed only to the authorized persons to receive it. Programmed processing controls are established to determine when valid data of the appeal documents are lost or unauthorized data is entered in the processing. Output control should be performed as final checks on the accuracy and propriety of the information.

(2) Security Controls

Easy access to the information by unauthorized persons is a primary reason for the difficulty in maintaining data security. Thus, an important thing in achieving a more secure system is to limit unauthorized employees to access the appeal document and other documents in the Appeal Compensation Division.

(3) Document Management Controls

The administrators have to reduce the number of the documents by producing only the necessary document. The author suggests that the administration section should use the scanner to scan for the document and send the file instead of the document to the related division in the Ministry of Transport and Communications. In this way, the cost of the office equipment can be reduced.

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2.4 Advantages and Disadvantages of the Existing System

Now is a good time to mention about the existing computerized system, the Ministry of Transport and Communications uses the centralized architecture. There is a mainframe in the computer center with connections to many terminals (PC) for performing their work. By using this centralized architecture, all the work including the data storage, the business logic, the user interface, and networking to other computers and systems are done on the mainframe. The terminals (PC) are only the output screens, which cannot perform any processes.

The pros of the existing computerized system are as follows:

(1) The mainframe has a very powerful performance.

(2) There is a high security information system.

(3) It is easy to control or manage information because all information is processed in the mainframe.

The cons of the existing computerized system are as follows:

(1) The organization must pay a budget to implement and maintain the existing system.

(2) In the case that the equipment is damaged or out of date, new ones are required to replace it immediately otherwise all systems cannot operate.

(3) It is difficult to find reinforced equipment when the existing one cannot respond to their requirements.

(4) All computerized performances must stop during the process of installing a new mainframe.

(5) The costs of CPU, memory, or hard disk are very expensive so the problem of upgrading can occur.

III. THE PROPOSED SYSTEM

3.1 System Specification (Users' Requirement)

Although the existing system can perform work in the administration section of the Appeal Compensation Division, the user still has many problems because of slow performance, difficulty in finding information and not meeting the true user needs as mentioned already in the prevision section. Because of these reasons, the author intends to reduce the existing problems as much as possible. By bringing all of the good points from the existing system and adding more functions, the proposed system should perform properly.

The user requirement can be specified as follows:

(1) To reduce the time performance for each process.

(2) To minimize the cost of office equipment such as paper, pencils, rubbers, etc.

(3) To produce the efficiency computerized report for daily operation.

(4) To help the user find the required information easily and quickly.

(5) To generate reports which are understandable and easy to use.

(6) To produce a system which is easy to implement and use.

(7) To minimize the possibility in entering incorrect data.

(8) To reduce redundant tasks in some processes.

(9) To be easy to fill in the screen or form.

(10) To receive the report which keeps all of the necessary information.

(11) To implement the use of a user-friendly screen.

After identifying the user's requirements, the author can design the proposed system by using the user requirement as a guideline for solving the existing system, which the administrators deal with.

3.2 System Design

3.2.1 Process Design

After the author has received the required information from all of the previous parts, now the author will mention about the system design. Figure 3.1 shows the functional decomposition diagram of the proposed system. It also shows the context diagram, level o of data flow diagram, level 1 of receiving document process, level 1 of information process, level 1 of procedure record process, level 1 of inquiry process, and level 1 of summary process in Figure 3.2, Figure 3.3, Figure 3.4, Figure 3.5, Figure 3.6, Figure 3.7, and Figure 3.8 consequently.

The following sections will mention about the process design step by step:

(1) Process of Receiving Document: Because there are a lot of documents flowing in and out to the administrator of the Appeal Compensation Division, the process of receiving document is important. The proposed system can help the administrators keep the information more understandable and generate the same standard for recording the inflow document of the Appeal Compensation Division. The Process of Receiving Document consists of the sub-process as follows:

(a) Registered Inflow Document:This process happens when the appellants send the appellate documents to the administrator. After that the administrator will register them and keep the documents in the inflow document.

(b) Identify Code of Inflow Document: This process is done to generate the code of inflow document to make it easier for further reference and make it easier to find the document.

(c) Record Detail of Document: The important details of the document will be kept in the record. After the administrator performs this process, the appellate document will be sent to the operative section for further procedure.

(2) Process of Information: The purpose of this process is to make other related divisions know about the appellant document that flow to the Appeal Compensation Division for performing other procedures such as sending the necessary additional document. The scanner should be used to reduce cost of office equipment such as paper, pencil, and rubber. At the same time, it can reduce the place of keeping document. The Process of Information consists of the following functions:

(a) Create Informed Document: After recording the document, the administrator will create the informed document for sending to the related divisions and keep in the file of outflow document. The administrator will use the scanner to scan the appeal document and send that file to the related division to reduce number of paper.

(b) Generate Letter of Acknowledgement: The administrator has to send the letter to the appellant after receiving the appeal document for making the appellants know that the Appeal Compensation Division has received their appeal documents already.

(c) Register for Additional Document: In the case that the operative section wants any additional document, the administration has to receive that additional document and keep it in the file of inflow document. If the document is not so important, the related section can use scanner instead of sending the paper document.

(3) Process of Procedure Record: After the operative section performs their works, they must send the operative performance to the administrator to record the progress of work. Then the administrators record it in the file and send the summary of operative performance to the director. The director will make the consideration result and send back to the administrator of the Appeal Compensation Division.

(a) Record Operative Performance: The process helps in specifying the performance done by the operative section. If it is the final operative performance, the administrator must send the summary to the director for further procedure.

(b) Record Consideration Result: After the summary was sent to the director, the director will call a meeting to find the final result or to consider the details which will be kept in the file of consideration detail.

(4) Process of Inquiry: In the case that the operative section wants to know any information, this process is implement. The inquiry information includes the consideration detail, the operative performance, and any concerned detail. This process consists of the process of request information, and the process of informative consideration detail.

(a) Request Information: The consideration detail and the operative performance may be asked by the operative section. This process helps to make the operative section receive the necessary information more easily.

(b) Inform Information Result: When the final result is announced by the director, the administrator must inform the related division and the

appellant. For the appellant, the letter is necessary but for the related division, the related division may send the file of consideration result instead of sending by document paper.

(5) Process of Summary: The administrator must prepare the appeal statistics consisting of the number of the approved appeal, work in process of the appeal, the total number of the appeal flowing to the Appeal Compensation Division. This process is done at the end of each month. The administrator also creates the statistics chart. The process of summary consists of the following functions:

(a) Summarize Statistics: The administrator summarizes the number of the appeal document, the work in process of appeal document, and the approved appeal document, then keep them in the file of statistics.

(b) Generate Statistics Chart: For making it easier for reading, the administrator will generate appeal statistics chart. In this way, the authorized persons can know the performance of operative sections.

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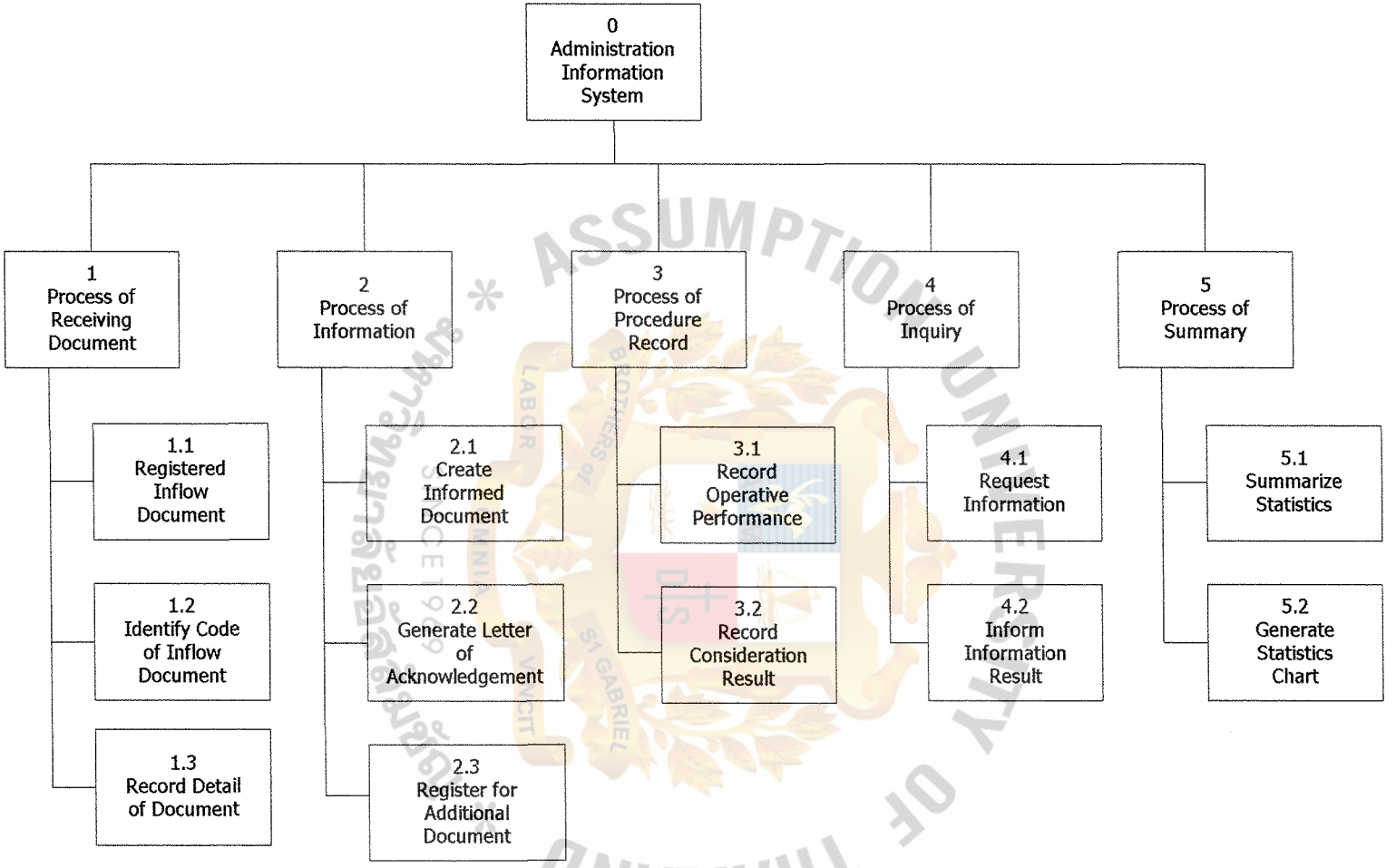

Figure 3.1. Functional Decomposition Diagram of the Proposed System.

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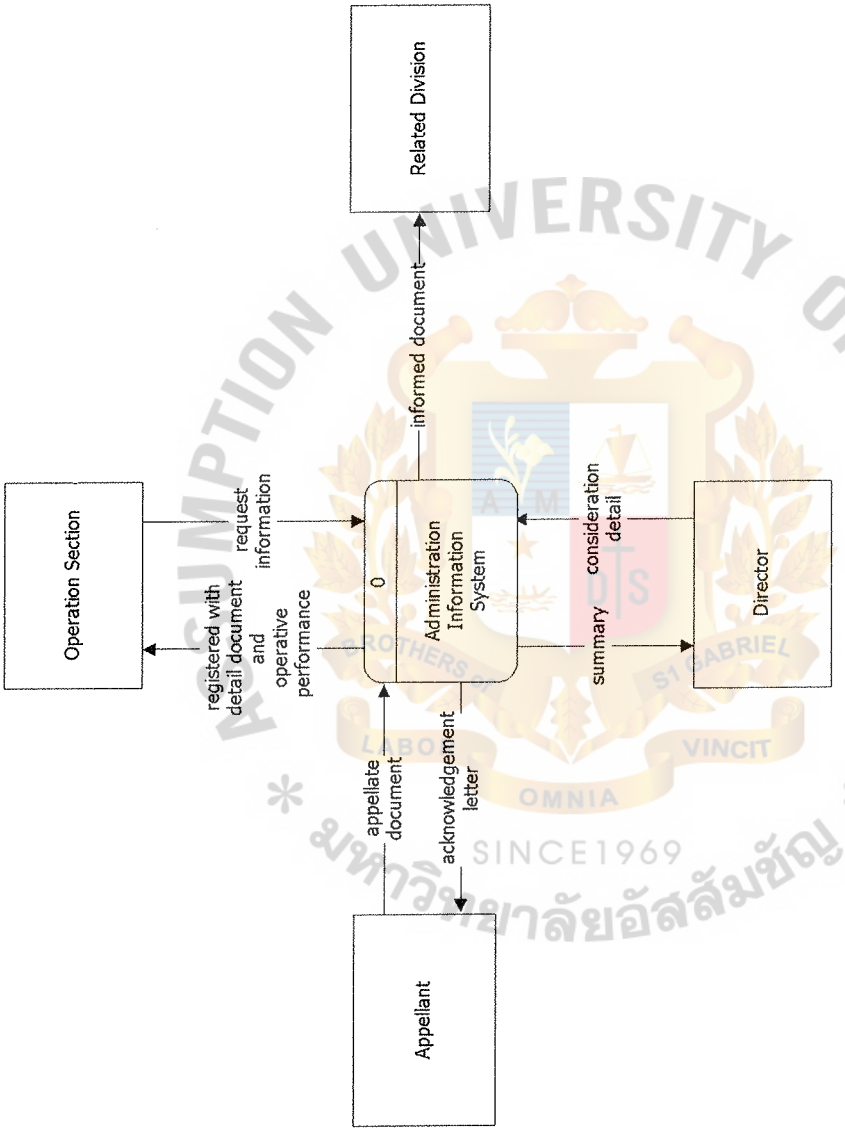

Figure 3.2. Context Diagram of the Administration Information System of Appeal Compensation Division.

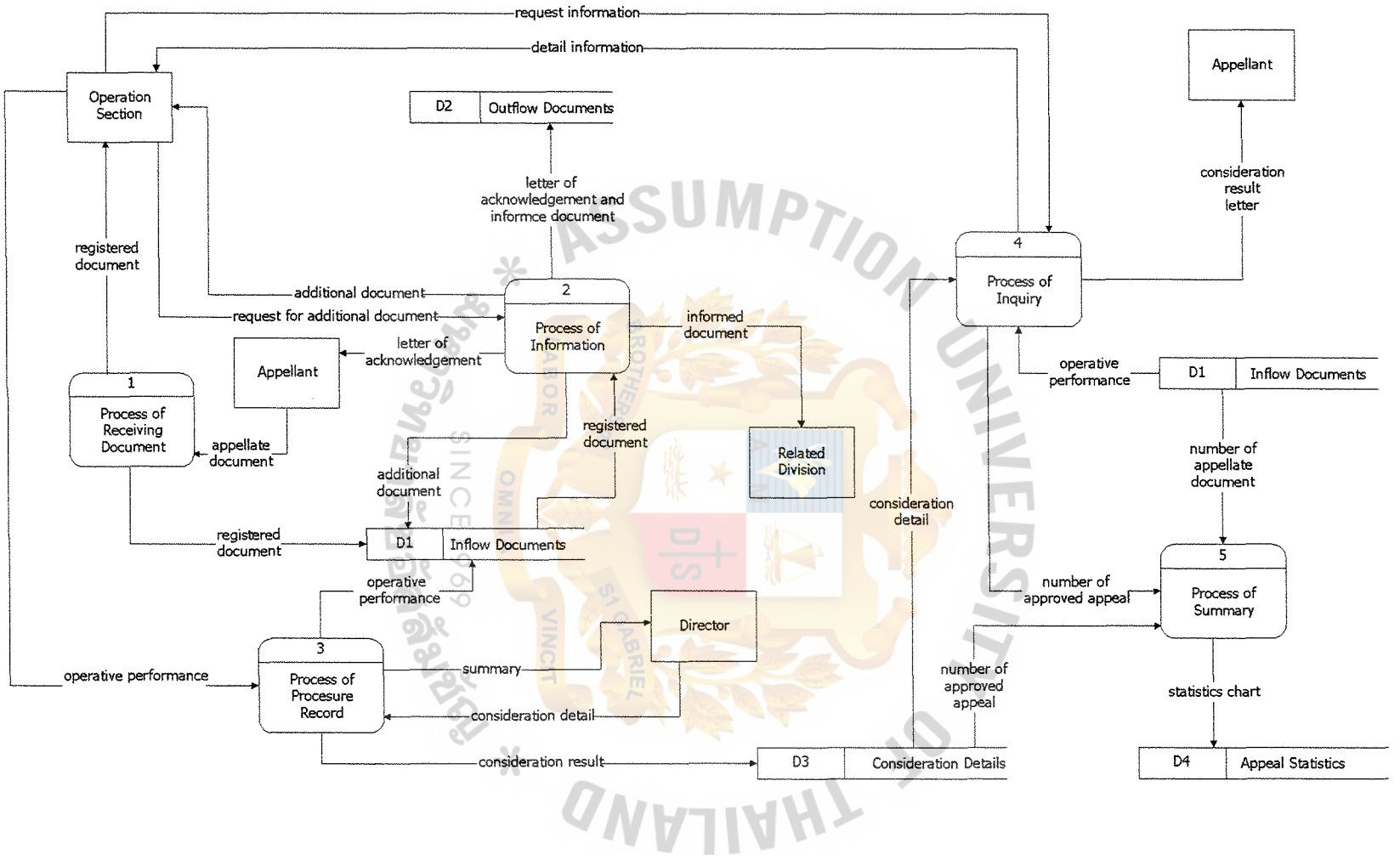

Figure 3.3. Level 0 Data Flow Diagram of the Proposed System.

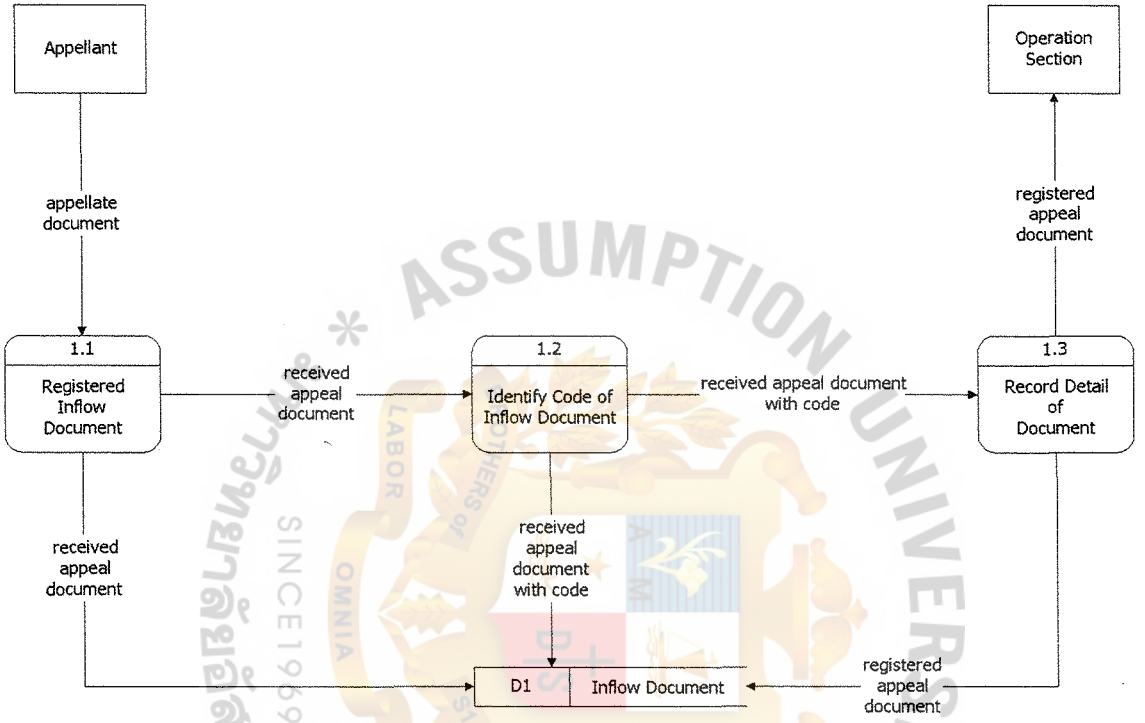

Figure 3.4. Level 1 of Process 1 Process of Receiving Document.

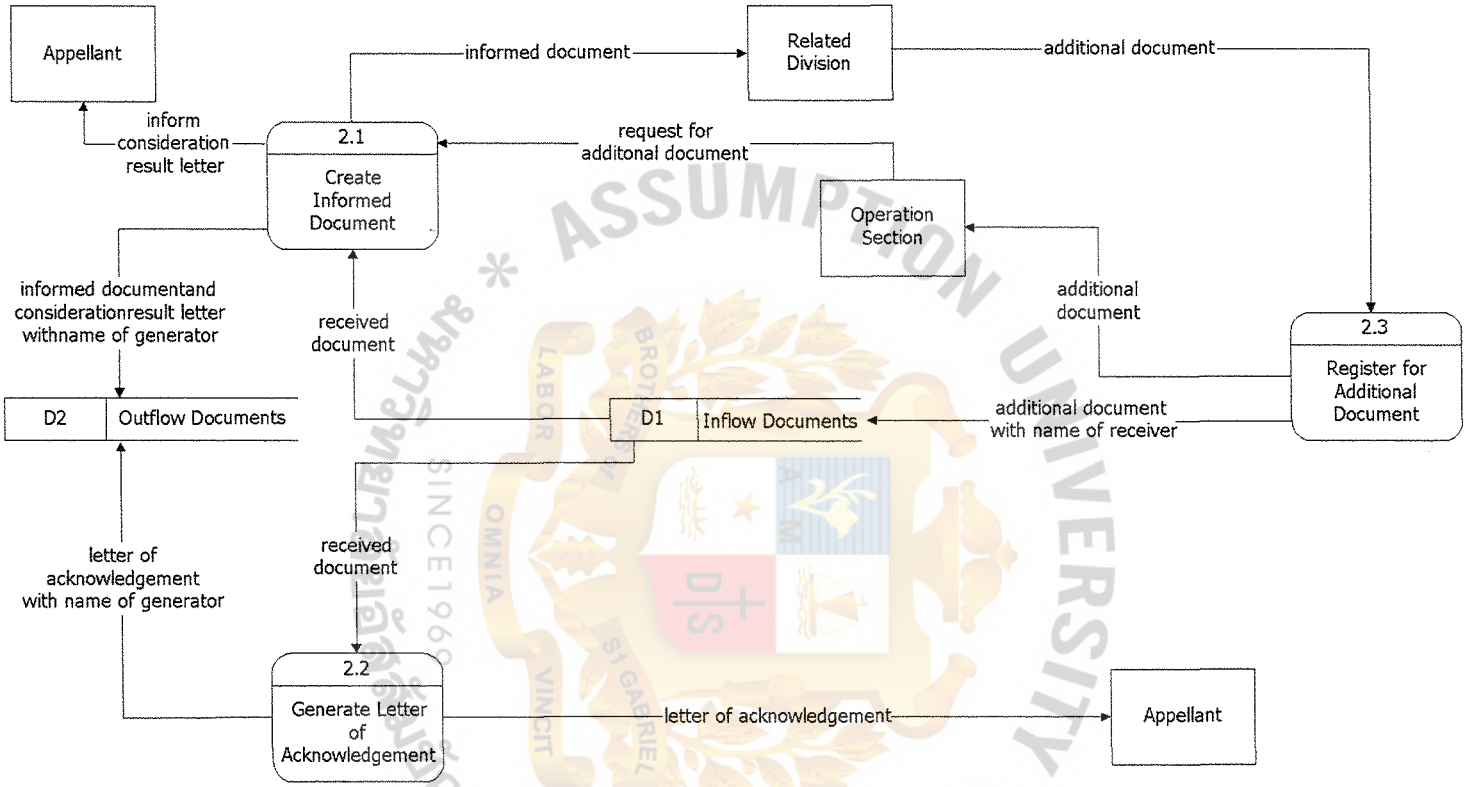

Figure 3.5. Level 1 of Process 2 Process of Information.

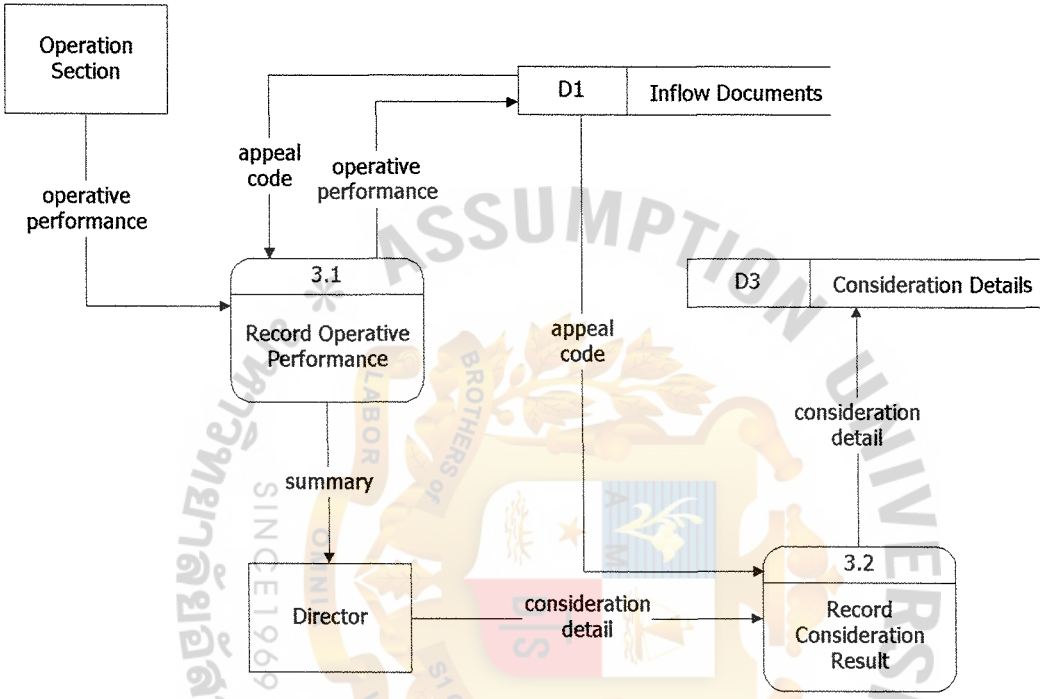

Figure 3.6. Level 1 of Process 3 Process of Procedure Record.

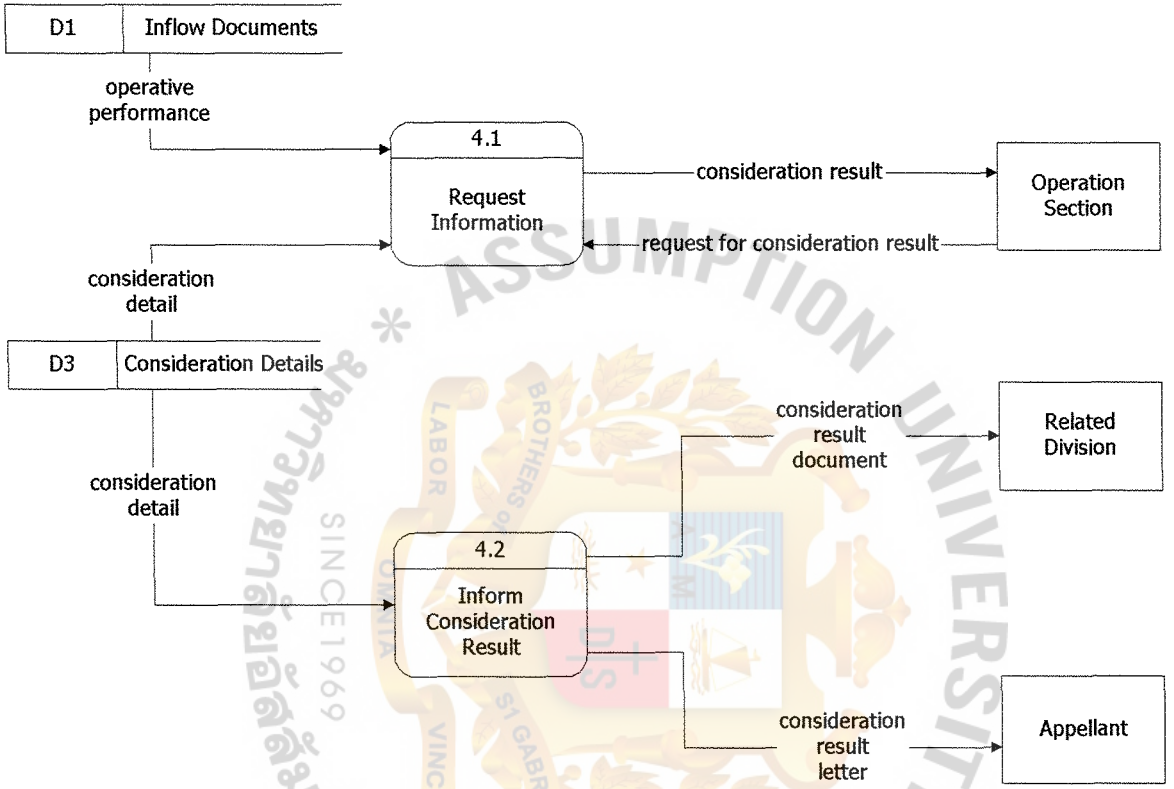

Figure 3.7. Level 1 Process 4 Process of Inquiry.

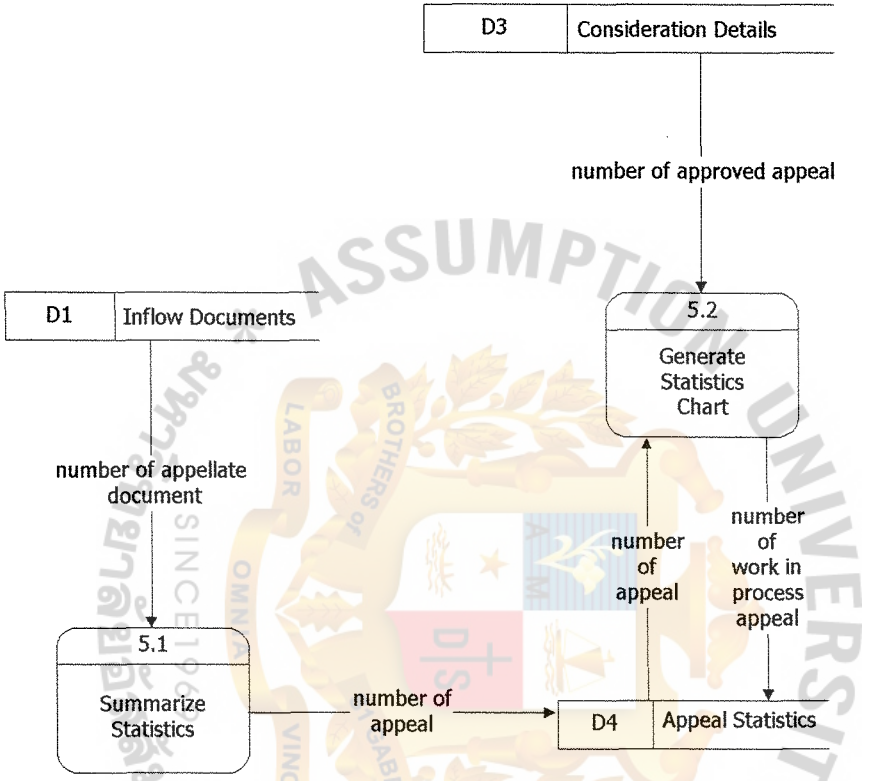

Figure 3.8. Level 1 of Process 5 Process of Summary.

3.2.2 Entity Relationship Diagram (ERD)

To make the presentation look more understandable, the model will be applied as a way of explanation. The author uses data modeling as a technique for defining the requirements for a database. Data Modeling is a technique for organizing and documenting a system's data. Data modeling is sometimes called database modeling because a data model is usually implemented as a database. It is sometimes called information modeling. The actual model is called Entity Relationship Diagram (ERD) because it depicts data in terms of the entities and relationships described by the data.

To present a good database design, the Entity Relationship Diagram should be normalized for helping the author prove that the relational structures are correct, optimal, useful, and manageable. Normalization is defined as a process of simplifying the relationship between data elements in a record. Because of the benefits mentioned above, the relational tables of the Administration Information System of the Appeal Compensation Division of the Ministry of Transport and Communications must be normalized.

The Appeal Compensation Division prepares the normalization base on the following objectives:

(1) The relevant relationships must be presented between entities.

(2) The maintenance of the data can be simplified through updates, insertions, and deletions.

(3) The need for restructuring or reorganizing data should be minimal, when new application requirements arise.

The normalization involves checking each entity for First, Second, and Third Normal Form. For the first normal form, the author must be sure that each row or column have a single value with no repeating values and identify the primary key. For

the second normal form, the author ensures that every non-key column must depend on the primary key. For the third normal form, there are no non-key columns depending on another non-key column.

The following figures show the complete normalization in the third normal form of the administration section of the Appeal Compensation Division of the Ministry of Transport and Communications. Figure 3.9, Figure 3.10, and Figure 3.11 show Context Entity Relationship Diagram, Key-Based Entity Relationship Diagram, and Full-Attribute Entity Relationship Diagram consequently.

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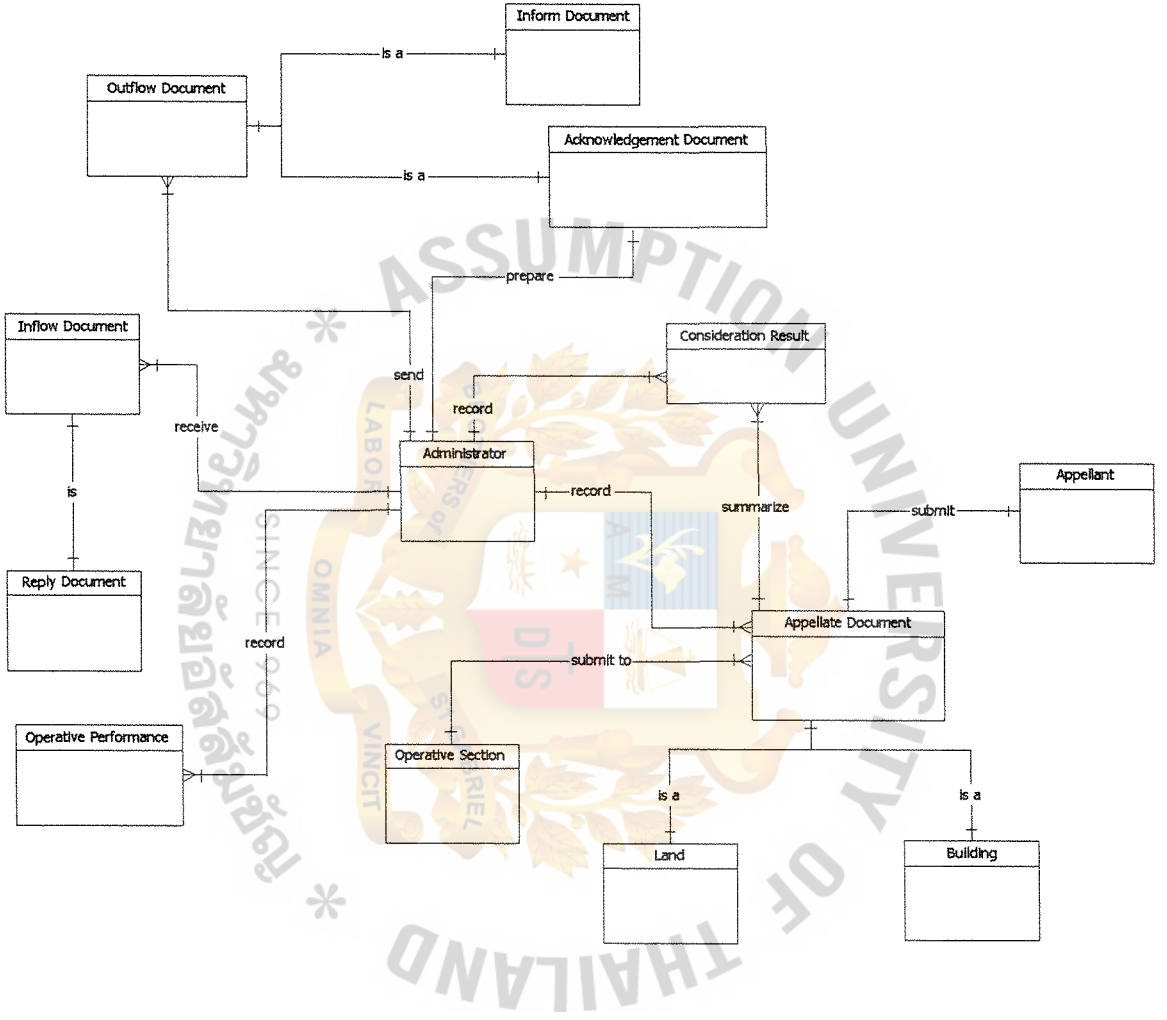

Figure 3.9. Context Entity Relationship Diagram for the Proposed System.

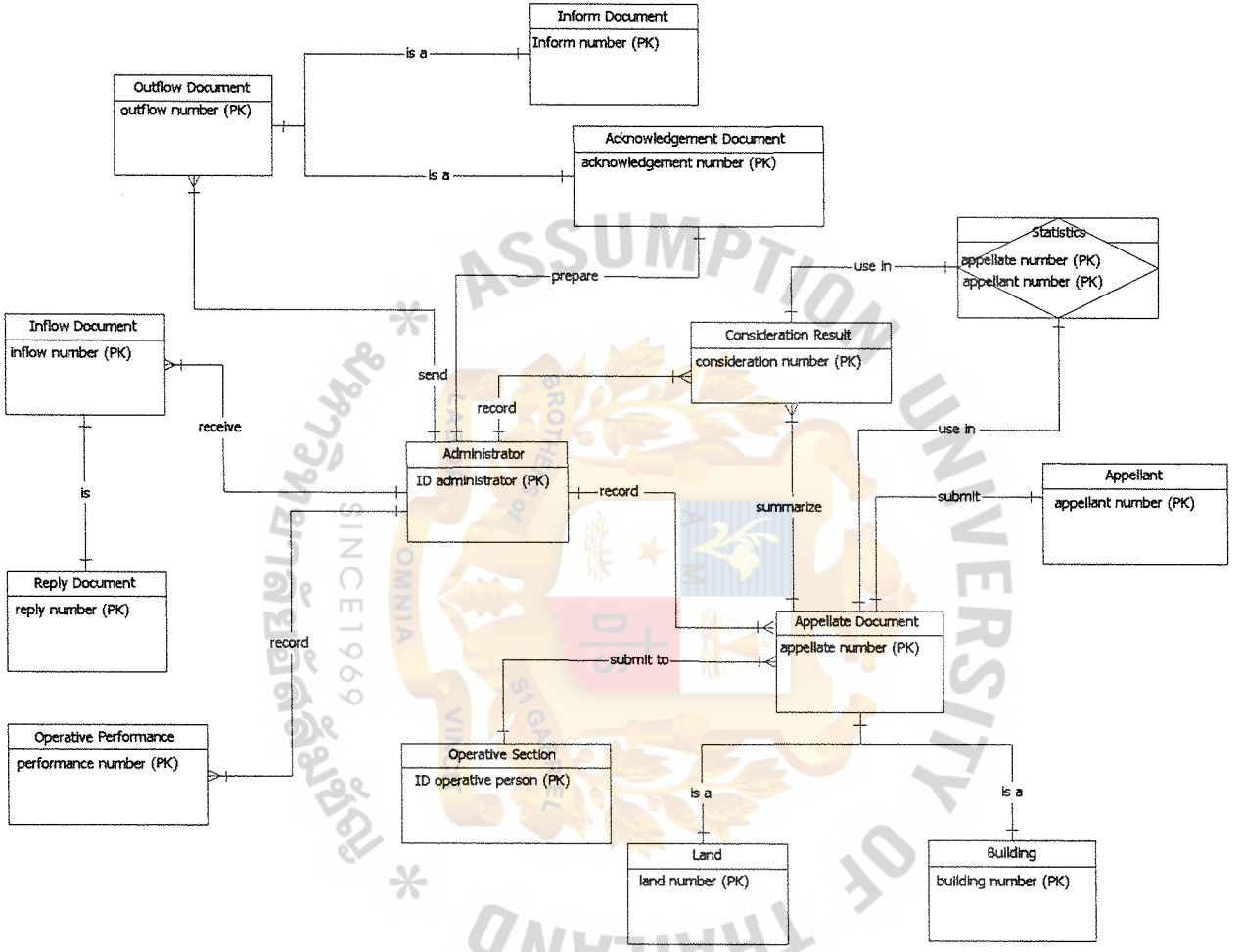

Figure 3.10. Key-Based Entity Relationship Diagram for the Proposed System.

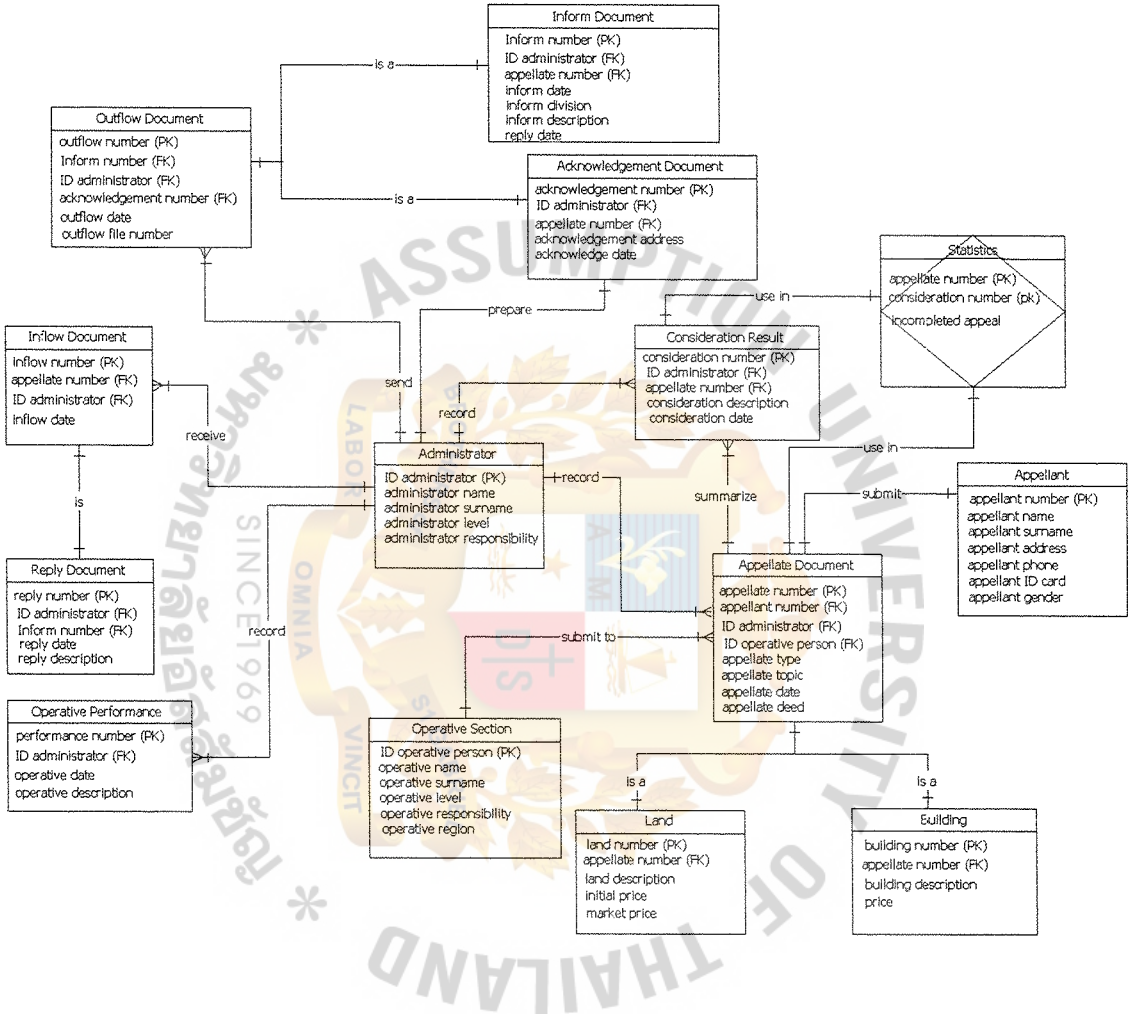

Figure 3.11. Full-attribute Entity Relation Diagram for the Proposed System.

3.2.3 Input Design

The next step of the system design is to design the input screen. The author believes that input starts the flow of data through the system so the input design must be carefully planned and generated in order to cover all of the needed information and converted into usable information. Because of this reason, the author must be careful about the input design. For better understanding, the definition of input design is mentioned. The input design is the process of conceiving and devising methods and devices to enter data into the information system for storage and processing.

The author designs the effective input based on the objectives of effectiveness, accuracy, ease of use, consistency, simplicity, and attractiveness. From the previous section, it helps the author to acknowledge the facts about what is needed as input for the system and also realizes the user requirements.

For generating the input design the author keeps in mind the following techniques:

(1) Use the proper titles, instructions, lines, boxes, captions, formats, spacing, and sequencing.

(2) Data entry is organized from left to right and top to bottom.

(3) Captions and instructions are shown to help the user enter the data in the right place.

(4) The design of input focuses on controlling the amount of input required, controlling errors, and keeping the steps simple.

(5) Only the actual necessary items are captured as input.

After interviewing the administrators as the users, the author designs the following input designs:

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Figure A.1 Password Screen: This screen is used for maintaining the security control in the database system. Only the authorized person can access the data by entering their login and password.

Figure A.2 Main Menu: This screen consists of appeal document, outflow document, information, appellant information, route, and statistics.

Figure A.3 Appeal Document: This screen consists of appellate information, type, operative performance, approval, and main menu.

Figure A.4 Appellate Document: This input screen is used to keep all necessary information of appellate documents such as type, number of attached file, and route number.

Figure A.5 Appeal Type (Land): The administrator must record the detail of surrendered land by using this input screen.

Figure A.6 Appeal Type (Building): The administrator must record the detail of the damaged building in this input screen.

Figure A.7 Operative Performance: This screen is used to identify the detail of performances done by the operative section. The performer's name must be specified.

Figure A.8 Approval: This screen is used when the committee announce the final consideration results.

Figure A.9 Outflow Document: When the administrator wants to submit any document to another division, they use this screen.

Figure A.10 Information: This screen consists of consideration result, informing related division, acknowledgement, and main menu.

Figure A.11 Inform Consideration Result: This screen is used when the consideration result is announced by the committee to inform the appellant about the final result.

Figure A.12 Inform to Related Division: This screen is used when the Appeal Compensation Division wants to inform any information to another division in the Ministry of Transport and Communications.

Figure A.13 Acknowledgement: When the administrator wants to submit the acknowledgement letter to the appellant, the detail of the letter can be defined in this input screen.

Figure A.14 Appellant Information: This screen keeps all of the necessary information about the appellants such as name, surname, address, and telephone number.

Figure A.15 Route: This screen is used to record the route name, which may change when time passes.

Figure A.16 Appeal Statistics: This screen helps the users identify the number of statistics of appeals that flow into the Appeal Compensation Division.

Figure A.17 Consideration Result Appeal Statistics: This screen is used when the operative section wants to know the statistics of consideration result.

Figure A.18 Dividing Appeal Statistics by Route: This screen is used when the user wants to know the number of appeal document flowing in the Appeal Compensation Division for some period of time.

Figure A.19 Dividing Appeal Statistics by Operative Section: When the user wants to know the statistics of appeal by identifying an operative section, this input screen is applied.

Figure A.20 Dividing Appeal Statistics by Type: This screen is used when the user wants to know the statistics of appeal by identifying appeal's type.

3.2.4 Output Design

Because the output design is frequently conducted concurrently with input design, the output design is considered in this part. The administration section usually uses the reports so the Appeal Compensation Division requires output design that should be easy to read and interpret and be acceptable to the system users.

Output design is usually searched every week so the user can easily find the information that flows into the Appeal Compensation Division.

The following items are the objectives in designing output of the Administration Information System:

(1) Design output to serve the intended purpose.

(2) Design output to fit the users.

(3) Deliver the appropriate quality of output.

(4) Assure that the output is where it is needed.

(5) Provide the output on time.

(6) Choose the right output method.

The output design of the Administration Information System consists of the following:

Figure B.1 Appellate Document Report: By using this report, the user will know all of the information of the appeal such as receiving date, appeal type, route number, or authorized operative persons.

Figure B.2 Appeal Type (Land) Report: This report informs all land details which can help the authorized operative persons know its details and can be used in the meeting for considering the final result whether it is approved or not.

Figure B.3 Appeal Type (Building) Report: This report is used to inform all information about surrendered buildings.

Figure B.4 Operative Performance Report: This report can help other persons know the progress of work and makes it easier when other persons have to perform this work when the authorized person is sick or has left the organization.

Figure B.5 Approval Report: This report helps the other unauthorized persons know that which appeal receives approval from the committee.

Figure B.6 Outflow Document: This report can make it easier to know whether any documents are sent from the Appeal Compensation Division.

Figure B.7 Inform to Related Division Report: This report shows the name of divisions that the administrators have informed regarding the consideration result.

Figure B.8 Inform Consideration Result: This report shows whether the administrators inform the final consideration result to the appellant or not and when.

Figure B.9 Acknowledgement Report: This is a letter to inform the appellants to know that the Appeal Compensation Division has received their appeal already.

Figure B.10 Appellant Information Report: This report shows about the detail of appellant, which includes name, surname, address, and telephone number. In this way, it is easier to find about the appellant information when necessary.

Figure B.11 Route Report: The route report is the report which informs the employees that the route number is connected to a certain road i.e. route number 247 =Nakorn Chaisi Road.

Figure B.12 Consideration Result Statistics Report: This report is shown by line chart. It can tell the number of the approved appeal and unapproved appeal.

Figure B.13 Route Appeal Statistics Report: This report is shown by graph. It will show the number of appeal by dividing from route number.

Figure B.14 Operative Section Appeal Statistics Report: This chart can help the boss of the Appeal Compensation Division know which operative section has a lot of appeal work by comparing with other years.

Figure B.15 Appeal Type Statistics Report: This report can show the kind of appeal including land or building within a period of time.

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3.2.5 Candidate Solution

By analyzing the system of business requirements, the author found that there are a lot of alternative ways and multiple candidate solution to design the system of the administration information of the Appeal Compensation Division. However all of the alternative solutions must match with the requirements of the user. The author emphasizes to recommend the best alternative solution for the administrative section of the Appeal Compensation Division.

The candidate solution, which is used to solve the problem of the Administration Information System, is informed as follows:

Candidate Solution 1:

Using MS Window NT class servers, MS Windows 98 for the operating environment. For the server and workstation use Pentium III 866 Mhz and Duron 750 Mhz. Store the database on SQL DBMS.

The advantages of candidate solution 1 are as follows:

(1) Have a lot of applications on operating environment of MS Windows 98.

(2) Easy to find skillful programmers.

(3) Each division can share the same data.

The disadvantage of candidate solution 1 is as follows:

(1) Require some budget for installing.

Candidate Solution 2:

The operation environment in candidate solution 2 uses MS Windows NT class server, and MS Window NT on client. Pentium III 866 Mhz is used in the server and Duron 750 Mhz on client. MS Visual Basic and SQL are used as the software tools needed in the candidate number 2.

The advantages of candidate solution 2 are as follows:

(1) The Ministry of Transport and Communications can get the full capability as the database system.

(2) Perform work quicker.

(3) Good security control.

The disadvantages of candidate solution 2 are as follows:

(1) Difficulty in implementation.

(2) Requires a lot of budget for training end user.

(3) Needs a skillful programmer.

Candidate Solution 3:

MS Windows NT class server and MS Window NT will be used as the operating environment for server and client consequently. Pentium III 866 Mhz is used on the server and Duron 750 Mhz is used on client. It uses SQL on the server section.

The advantages of candidate solution 3 are as follows:

(1) There is no data redundancy in the organization.

(2) The data can be shared within the organization.

The disadvantage of candidate solution 3 is as follows:

(1) Have less application for the operating environment of MS Windows NT.

Table 3.1 shows the comparison of candidate system matrix in the Appeal Compensation Division. Table 3.2 shows user requirement list.

Table 3.1. Candidate System Matrix of Appeal Compensation Division.

Characteristics	Candidate 1	Candidate 2	Candidate 3
Method of Data Processing	Client /Server	Client /Server	Client /Server
Operating Environment	Server: MS Windows NT class server Client: MS Windows 98	Server: MS Windows NT class server Client: MS Window NT	Server: MS Windows NT class server Client: MS Window NT
Server and Workstation	Server: Pentium III 866 Mhz Client: Duron 750 Mhz	Server:Pentium III 866 Mhz Client: Duron 750 Mhz	Server: Pentium III 866 Mhz Client: Duron 750 Mhz
Software Tools Needed	Server: SQL Client: MS Access 2000	Server: SQL Client: MS Visual Basic	Server: SQL Client: MS Visual FoxPro
Output Devices and Implications	Canon LBP 800	Canon LBP 800	Cannon LBP 800
Input Devices and Implications	Keyboard & Mouse	Keyboard & Mouse	Keyboard & Mouse
Storage Devices and Implications	Oracle DBMS	SQL DBMS	DB 2 DBMS

Table 3.2. Users'Requirement Analysis for Three Candidate Solutions.

User Requirement List	Categories	Candidate 1	Candidate 2	Candidate 3
Reduce time performance for each process.	Designed	X	X	X
Minimize the cost of office equipment.	Optional	X	X	X
Produce computerized efficiency report.	Essential	X	X	X
Help user find required information.	Essential	X	X	X
Generate understandable report.	Designed	X	X	X
Implement an easy system.	Optional	X	X	X
Minimize the entering incorrect data.	Essential	X	X	X
Reduce redundant tasks.	Designed	X	X	X
Easy to fill in the screen.	Optional	X	X	X
Keep all necessary information.	Essential	X	X	X
Generate user-friendly screen.	Optional	X	X	X

3.2.6 Advantages and Disadvantages of the Proposed System

After knowing about the alternative solutions, now is a good time to mention about the advantages and disadvantages of the proposed system. Because of quick development of PC such as hardware, software, or network equipment, the existing system should be analyzed. The hardware becomes smaller. There are many applications of software, which are easier to understand by using the technique of GUI (Graphical User Interface). The client/server architecture should be used to replace the centralized architecture. The client/server architecture is suitable for the Ministry of Transport and Communications, which has many divisions in many buildings. Because of different requirements in each division, it is impossible to use the centralized architecture. The problems of managing a lot of work at the same time can cause slow response time.

The client/server architecture can be done in each division independently and finally it can connect together with the same standard without interrupting the work performance of other divisions. In client/server architecture, all of the information in different areas can be shared together. The organization can use and utilize all computers in the most efficient way.

The pros of the proposed computerized system are as follows:

(1) Easy to Find Skillful Programmer.

Currently, there are many competitors in the market so the cost of hardware and equipment for the client/server is not so expensive when comparing with the mainframe. It is easier to find programmers who have experience and familiarity with the client/server architecture more than ones who are familiar with the mainframe that is used in the centralized

architecture. This means that the organization can save costs in hiring skillful programmers and system analysis too.

(2) Resource Utilization

Any divisions in the organization can share the resources and use it in the effective way such as printer, fax, or modem. There is no traffic in the network so the problem of slow time response no longer exists.

(3) Flexibility and Scalability

In client/server architecture, there are many kinds of clients that are suitable for it such as PC, IBM Compatible, or Mac-APPLE Workstation. There are a lot of operating systems that can support it such as MS-DOS, MS-Windows Series, IBM, OS/2, or Apple System-7. Finally there are many application software to support this client/server architecture.

(4) Easy to find equipment

In the case that the existing clients cannot perform their work any more; the organization can find a new one very easily, which is not so expensive like a big computer (mainframe).

(5) Easy to upgrade the program or computer

Because there are many application software and operating systems to support it so there are many alternative ways to develop the existing one to make it perform to the highest efficiency.

The cons of the proposed system are as follows:

(1) Training Cost

This is a new technology in the organization. It is unavoidable to have the training cost to make the programmers understand the process of the proposed system by using client/server architecture so they can perform their

work in an effective way. For the user, the organization has to train them regarding the new PC which includes how to use the new PC, how to input into a new screen design, what they will get from the report. Although the organization has to pay a big budget, the organization can get more profit in the long-run by saving large amounts of cost.

(2) Big Budget for Installation

To replace the existing technology for a new one, the organization must invest in the hardware and equipment, system software and utility, and maintenance so the skillful system analysts and programmers are required. By that way, they can give good suggestions to reduce the cost of installation.

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3.3 Hardware and Software Requirement

After identifying the system design in the previous section, the specification of hardware and software requirement for the proposed system will be mentioned in this section. The hardware and software requirement is presented as follows:

3.3.1 Hardware Requirement

(1) Database File Server:

Model: H.P Net Server E 800

CPU: Pentium III 866 Mhz

RAM: 253 MB ECC

HDD: 20 GB

CD-ROM: 40 X

Monitor: 15"

VGA Card Memory: 8 MB

LAN Card: 10/100 TX

HDD Interface: Dual Channel Ultra-2 SCSI

Keyboard: 108 keys PS/2

(2) PC Client

Model: ATEC Permier 402

CPU: Duron 750 Mhz

RAM: 64 MB

HDD: 10 GB

CD-ROM: 52X

Monitor: 15"

VGA Card Memory: 2X AGP

Keyboard: 108 keys PS/2

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(3) Printer

Model: HP Laser Jet 5000

Dpi: 1200*1200

Speed: 16 pages per minute

Parallel Port

(4) Scanner

Brand: HP Scan Jet 6300 C

Bit: 36

Resolution: 1200*240

Parallel Port / UPS

(5) UPS

Brand: Choloride

Model: Power LAN

Power supply capability (VA): 5000

3.3.2 Software Requirements

(1) Microsoft Windows 98

(2) Microsoft Office 2000

(3) Microsoft Windows NT

Referring back to the previous part, because of ineffective computerized system, most of the functions performed in the Appeal Compensation Division of the Ministry of Transport and Communications are done manually such as sending document, receiving document, and keeping document. Because of these reasons, there are a lot of mistakes happening in the Administration Information System and it brings problems of slow performance, overload job, and inefficiency. Now is a good time to mention about the computerized system. It is not avoidable to mention about the suitable hardware and

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software for the proposed system because it can help the organization receive the efficient performance. The hardware and software requirement is mentioned in the following paragraph.

The data processing of proposed computer system of the Ministry of Transport and Communications is client/server. The server uses SQL as the database and Microsoft Windows NT as the operating system. The proposed system uses Microsoft Windows 98 as the operating system in the personal computer client in this division because it is easy to implement, maintain, have low price, and many applications. Microsoft Access 2000 is used to connect to the server because this program comes with Microsoft Office so it helps the organization save cost. By using Microsoft Access 2000, it is easier for training the users and developing the input and output design.

The protocol of the existing system is TCP/IP (Transmission Control Protocol / Internet Protocol) and the network architecture is a tree configuration. Figure 3.12 shows the Network Configuration of the Existing System. Figure 3.13 shows the Network Configuration of the Proposed System for more understandable.

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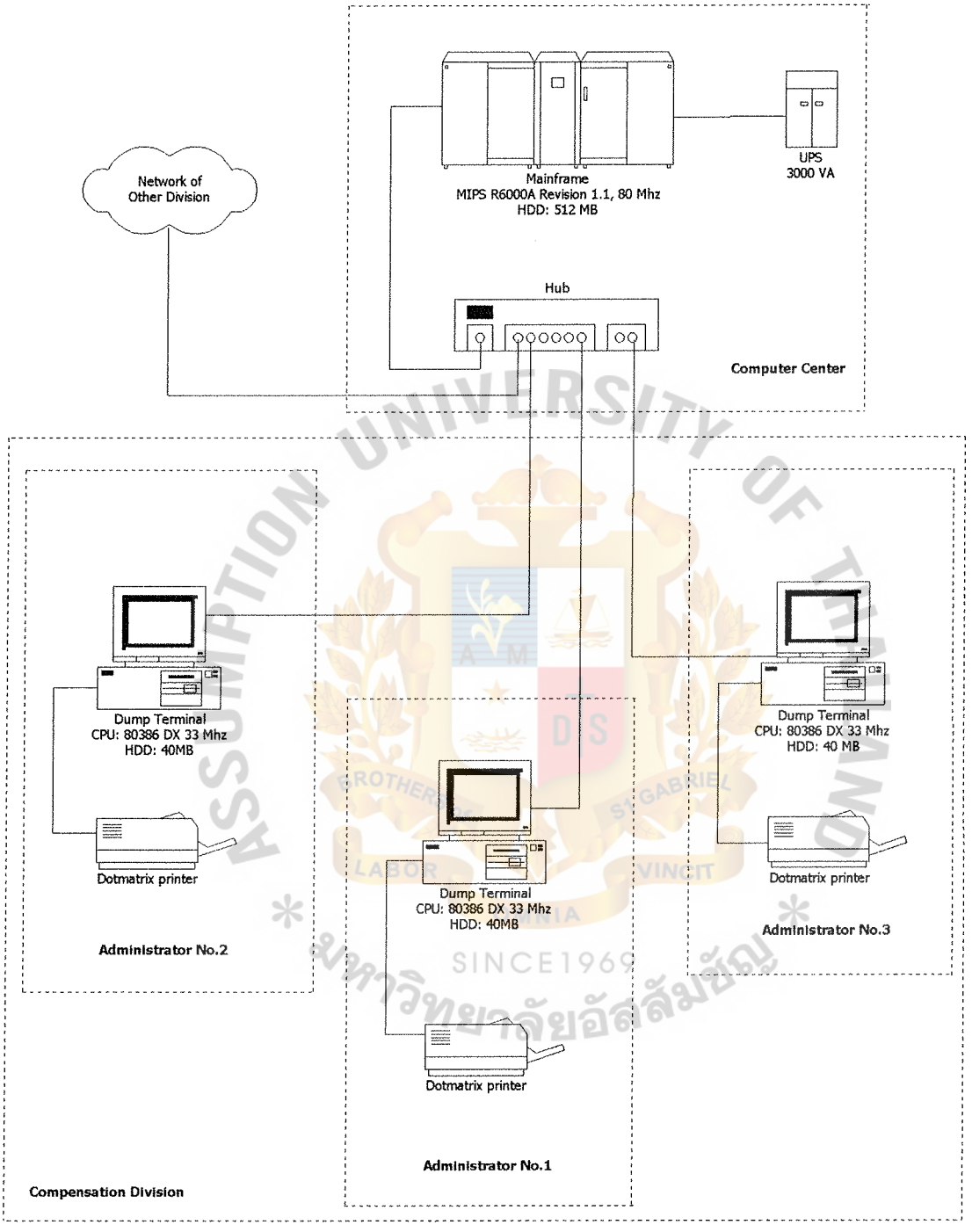

Figure 3.12. Network Configuration of the Existing System.

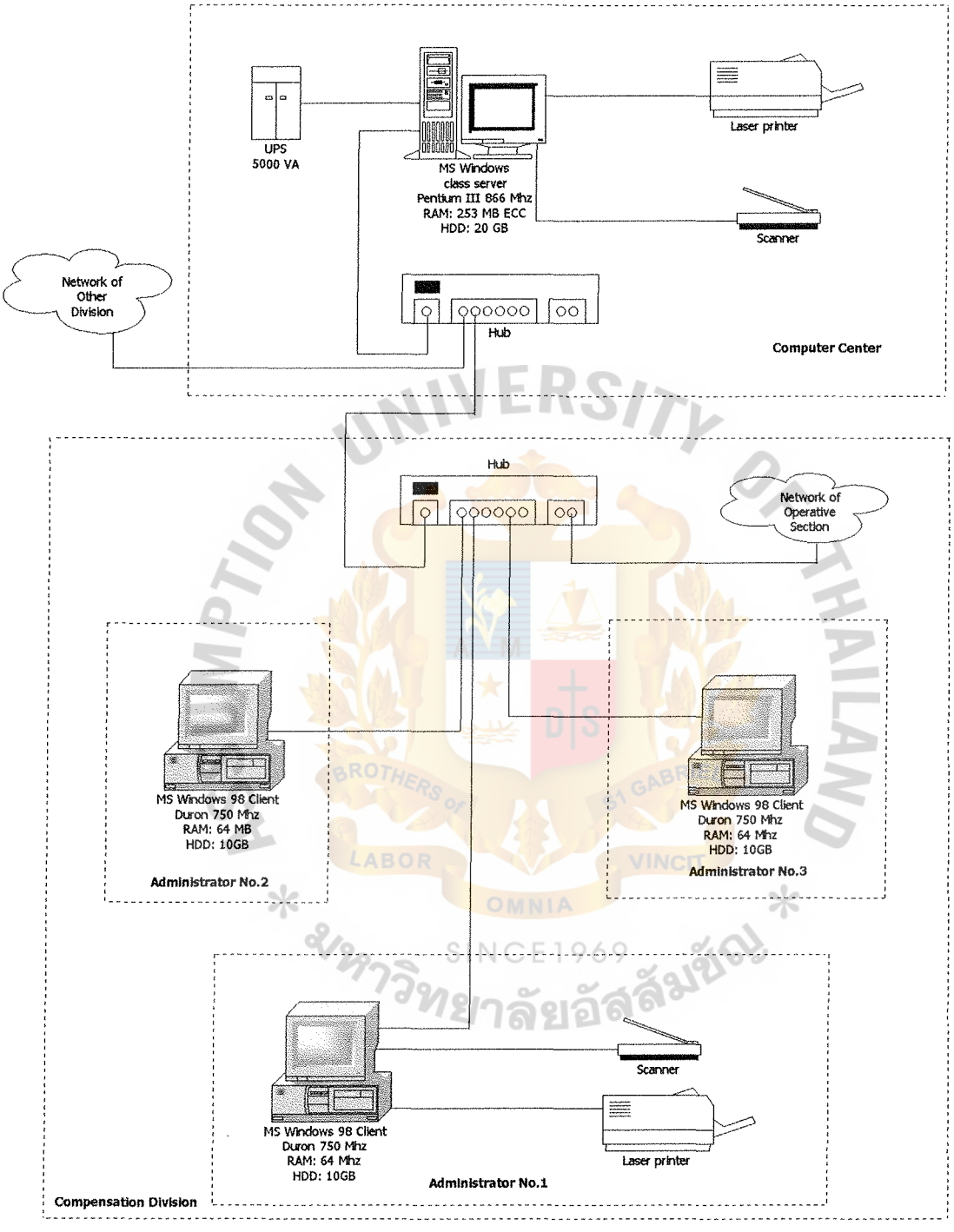

Figure 3.13. Network Configuration of the Proposed System.

3.4 Security and Control

Although the proposed system should perform smoothly under the normal function, the unexpected problems may happen at any time so the system control and security control must be planned ahead as the unexpected problems or mistakes can be reduced as much as possible.

Security is the prevention of or protection against access to information by unauthorized recipients or intentional but unauthorized destruction or alteration of that information. Security may guard against both unintentional as well as deliberate attempts to access sensitive information, in various combinations according to circumstances.

The detail about security and control are mentioned as follows:

(1) The file and programs are secure from unauthorized access.

(2) Keep the copies of data files and programs in a safe place and in such a way that they can be reconstructed if necessary storing file copies at an alternative site, to ensure recovery if the processing site is affected by a natural disaster or sabotage.

(3) Copies of data files should be kept in a safe place when not in use so that the unauthorized persons cannot copy the files or cause damage.

(4) Username and passwords or some equivalent should be used to reject or accept connections to the system or data files.

(5) Scheduling operations so that unusual runs are noticeable.

(6) Controlling output distribution. These outputs should be put in a secure place and only authorized persons can gain access to it.

(7) Defining personnel duties, responsibilities, and access restrictions.

(8) Anti-virus software is installed in all computers for preventing the problems of loss of information and hardware failure. In order to prevent a new coming Anti-virus, the organization should update the anti-virus version every month to make sure that the information will not be lost due to the virus.

(9) Not only take care of the personal computer client and computer server, the network equipment should be maintained to make sure that it works properly. For example, any animals do not destroy the network cable and it has a proper and workable shield.

(10) The user should understand and respect the security policies of the systems they are using because the users are individually accountable for their own behavior.

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3.5 Cost-Benefit Analysis

3.5.1 Benefit Summary

After knowing about the candidate solutions from the previous part already, the cost-benefit analysis will be mentioned in this section. The benefit is the first thing that most people are interested in, the benefit can be divided into two kinds: tangible and intangible benefits.

The intangible benefits of the organization are as follows:

(1) The administrators are more satisfied in doing their job.

(2) The administrator can perform more efficient work from a better understanding of the process in the proposed system.

(3) The organization can provide a better service to the appellants.

(4) The error from entering wrong information should be minimized due to the computerized system.

(5) Less redundancy in performing work can help the administrator generate efficient work.

(6) The administrator can store all of the necessary information in the efficient database.

(7) The administrators can generate better cooperation in performing work.

(8) The proposed system can generate only a few processing errors.

(9) The computerized system can help the administrators reduce the step in performing work.

(10) The proposed system generates better management control.

The tangible benefits of the organization are as follows:

To make it easier for understanding the tangible benefit, the author would like to explain the tangible benefit from the following items.

(1) Reduce the over time cost

The Appeal Compensation Division has three administrators. The salary of the administrators is as followings 7,360 Baht, 13,600, and 15,880 Baht. So the average salary of three administrators is 12,280 Baht. The author assumes that one month has thirty days and the working days are twenty-two days and the lest is the holiday; eight days. For only the salary, the organization must pay 558 Baht per day. The administrators perform their works for eight hours per day, so the organization pays 69.77 Baht per hour to the administrators of the Appeal Compensation Division as their salary.

The average overtime is 95 Baht per hour. In one day, the administrators may have to do the overtime at least 3 hours per day. There are 22 working days but the administrators usually do the overtime for only 15 days. It means that the organization has to pay 95*3*15 = 4,275 Baht as the overtime cost on the working day. How about Saturday and Sunday, the average overtime cost of these days is 350 Baht per day so the organization must pay 350*8 = 2,800 Baht. It means that the total overtime cost is 4,275+2,800 = 7,075 Baht per month. For one year, the organization must pay 84,900 Baht as overtime cost.

The author would like to compare between the salary and the overtime cost in percentages. The cost of salary and overtime is equal to the sum of the monthly salary and the overtime cost which is equal to 43,915 Baht or 100 percent. The monthly salary comes from the 100 divided by 43,915 and multiplied by 36,840 as their salary. The percentage of the salary is equal to 83.89%. By computing in the same way, the percentage of the overtime cost

is equal to 16.11%. It means that the organization has to pay a lot of money for overtime cost.

The proposed system can help the administrators perform their work quicker, so the administrators do not need to work in the holidays or after working hours. In this way, the organization does not need to pay any overtime expenses any more. In the best case, the organization may shift one administrator to another area that has overloading of jobs.

(2) Reduce the cost of record books, pencils and liquid-paper.

The office equipment is only the approximate cost because it is difficult to tell the exact amount. Currently, the administrators have to use record books, pencils, and liquid paper. The cost of each record book is equal to 120 Baht. The administrators have to use about 12 record books per month. It means that the cost of record books is equal to 120*12 = 1,440 Baht. The cost of pencils and liquid paper is approximately 600 Baht per month. Their total cost is equal to 1,440+600 = 2,040 Baht per month. For one year the organization has to pay 24,480 Baht as the extra cost.

In the proposed system, the administrators need not have to use the record books any more and they also use less pencils and liquid paper. The cost of saving for pencil and liquid paper is approximately 420 Baht per month. For one month the organization will pay for the office equipment only about 180 Baht. In one year the organization can save 420*12 =5,040 Baht.

(3) Use less paper in performing work

The cost of paper is about 130 Baht per ream and the administrator usually uses 8 reams per month. It means that the organization has to pay 130*8 = 1,040 Baht per month for the paper. Within one year, the organization must pay approximately 1,040*12 = 12,480 Baht.

In the proposed system, the scanner is used so the cost of paper can be reduced. The administrators will use only three reams of paper per month. The organization can save about 650 Baht per month or 650*12 = 7,800 Baht per year.

3.5.2 Cost Summary

After knowing about the cost saving, the author would like to mention about the development cost of the proposed system, which includes the server computer, the PC client, and its software. The author has already mentioned the three candidates of the proposed system in the previous part already. For better understanding, the costs of candidate 1, candidate 2, and candidate 3 are shown in Table 3.3, Table 3.4, and Table 3.5 respectively.

In the proposed system, the training cost must be involved in helping the administrators understand the new system and perform work more efficiently. The training cost for candidate 1, candidate 2, and candidate 3 are 4,000 Baht, 8,000 Baht, and 6,000 Baht respectively. The annual operation and maintenance cost is the expense that the organization may have to pay within a year for helping the proposed system work without any problems with the highest efficiency. The operation and maintenance expense is expected to increase 10% per year. In the first year, this cost is about 30,000 Baht for candidate solutions 1,40,000 Baht for candidate solution 2, and 50,000 Baht for candidate solution 3.

To make it easy to understand, the comparison between the cost of the existing and the cost of the proposed system is presented in Table 3.6 and the benefit of the proposed system is shown in Table 3.7.

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Table 3.3. Cost Summary for the Candidate Solution1, Baht.

Cost Items	Unit	Cost per unit	Total Cost
DEVELOPMENT COSTS Personnel:			
System Analysts	3 months	15,000.00	45,000.00
Programmer	3 months	12,000.00	36,000.00
New Hardware & Software:			
Database File Server	1 unit	161,013.00	161,013.00
Client Computer	3 units	28,491.00	85,473.00
UPS, 5000 VA	1 unit	88,600.00	88,600.00
Laser Printer	1 unit	58,400.00	58,400.00
Scanner	1 unit	12,350.00	12,350.00
MS.Windows 98	1 unit	8,690.00	8,690.00
MS.Office 2000	1 unit	18,320.00	18,320.00
HUB	1 unit	21,000.00	21,000.00
Expenses:			
Training	2 weeks	-	4,000.00
Total Development Costs:			538,846.00

PROJECTED ANNUAL OPERATING COSTS (First Year) Personnel:			
Programmer	2 months	12,000.00	24,000.00
Expenses:			
Operating Expense	_	_	30,000.00
Total Project Annual Costs:			54,000.00

Table 3.4. Cost Summary for the Candidate Solution 2, Baht.

Cost Items	Unit	Cost per unit	Total Cost
DEVELOPMENT COSTS Personnel:			
System Analysts	4 months	15,000.00	60,000.00
Programmer	4 months	12,000.00	48,000.00
New Hardware & Software:			
Database File Server	1 unit	161,013.00	161,013.00
Client Computer	3 units	28,491.00	85,473.00
UPS, 5000 VA	1 unit	88,600.00	88,600.00
Laser Printer	1 unit	58,400.00	58,400.00
Scanner	1 unit	12,350.00	12,350.00
MS. Windows NT	1 unit	41,960.00	41,960.00
MS. Visual Basic	1 unit	55,370.00	55,370.00
HUB	1 unit	21,000.00	21,000.00
Expenses:			
Training	1 month	_	8,000.00
Total Development Costs:			640,166.00

PROJECTED ANNUAL OPERATING COSTS (First Year) Personnel:			
Programmer	3 months	12,000.00	36,000.00
Expenses:			
Operating Expense	_	_	40,000.00
Total Project Annual Costs:			76,000.00

Table 3.5. Cost Summary for the Candidate Solution 3, Baht.

Cost Items	Unit	Cost per unit	Total Cost
DEVELOPMENT COSTS Personnel:			
System Analysts	4 months	15,000.00	60,000.00
Programmer	4 months	12,000.00	48,000.00
New Hardware & Software:			
Database File Server	1 unit	161,013.00	161,013.00
Client Computer	3 units	28,491.00	85,473.00
UPS, 5000 VA	1 unit	88,600.00	88,600.00
Laser Printer	1 unit	58,400.00	58,400.00
Scanner	1 unit	12,350.00	12,350.00
MS. Windows NT	1 unit	41,960.00	41,960.00
MS. Vitual FoxPro	1 unit	23,000.00	23,000.00
HUB	1 unit	21,000.00	21,000.00
Expenses:			
Training	3 weeks	_	6,000.00
Total Development Costs:			605,796.00

PROJECTED ANNUAL OPERATING COSTS (First Year) Personnel:			
Programmer	3 months	12,000.00	36,000.00
Expenses:			
Operating Expense	_	_	50,000.00
Total Project Annual Costs:			86,000.00

Table 3.6. Comparison the Operating Cost between the Existing System and the Proposed System, Baht.

Cost Items	Existing System	Proposed System
Salary	36,840.00 per month	29,430.00 per month
Overtime Expense	7,075.00 per month	-
Office equipment	2,040.00 per month	180.00 per month
Paper document	1,040.00 per month	390.00 per month

Table 3.7. Benefit Summary for the Proposed System, Baht.

Type of Benefit	Amount
Salary cost saving	7,410.00 per month
Overtime cost saving	7,075.00 per month
Office equipment cost saving	1,860.00 per month
Paper document cost saving	650.00 per month

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3.5.3 Payback Analysis

For making the best decision from this three candidate solutions, the technique of payback analysis should be implemented. The payback analysis helps the author determine if and when an investment will pay back for itself. In technical terms, the payback analysis determines how much time will lapse before accrued benefits over take accrued and continuing costs. This period of time is called the payback period.

The formula for calculating the payback analysis is as follows:

Formula $P = I / (1-T) * R$

Note P = Payback Period

I = Investment

T = Corporate tax rate (use 12%)

R = Annual saving by investment

The value of money is worth less when time passes so it is necessary to adjust the cost and benefit flowing in the organization for the time value of money. In this project, the discount rate is equal to 12%, the operating and maintenance is increased by 10% per year, and the benefit derived from the operation of the new system is increased by 10% per year too. The development cost of candidate solution 1 is 538,846 Baht, candidate solution 2 is 640,166 Baht, and candidate solution 3 is 605,796 Baht. The operating and maintenance cost of candidate solution 1, candidate solution 2, and candidate solution 3 are 54,000 Baht, 76,000 Baht, and 86,000 Baht respectively. The benefits derived from the operation of three candidate solutions are equal to 360,940 Baht.

The payback analysis of each candidate solutions are presented as follows:

Candidate Solution 1:

$$P = 538,846 / [(1-0.12) * 360,940]$$
$$= 538,846 / (0.88 * 360,940)$$
$$= 538,846 / 317,627$$
$$= 1.7$$

From the payback analysis calculation, the candidate solution 1 uses approximately 1 year and 7 months to reimburse the development cost.

Candidate Solution 2:

$$P = 640,166 / [(1-0.12) * 360,940]$$
$$= 640,166 / (0.88 * 360,940)$$
$$= 640,166 / 317,627$$
$$= 2$$

From the payback analysis calculation, the candidate solution 2 uses approximately 2 years to reimburse the development cost.

Candidate Solution 3:

$$P = 605,796 / [(1-0.12) * 360,940]$$
$$= 605,796 / (0.88 * 360,940)$$
$$= 605,796 / 317,627$$
$$= 1.9$$

From the payback analysis calculation, the candidate solution 3 uses approximately 1 year and 9 months to reimburse the development cost.

Table 3.8, Table 3.9, and Table 3.10 present the payback analysis for candidate solution 1, candidate solution 2, and candidate solution 3 respectively. To help the presentation become clearer the graph of three candidates is shown in Figure 3.14 to Figure 3.16.

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Table 3.8. Payback Analysis for Candidate Solution 1, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	-538,846					
Operating & maintenance Cost:		-54,000	-59,400	-65,340	-71,874	-79,061
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjusted to present value):	-538,846	-48,222	-47,342	-46,522	-45,712	-44,828
Cumulative time-adjusted costs over lifetime:	-538,846	-587,068	-634,410	-680,932	-726,644	-771,472
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefits (adjusted to present value)	0	322,319	316,436	310,957	305,541	299,632
Cumulative lifetime-adjusted benefits over lifetime:	0	322,319	638,756	949,713	1,255,254	1,554,886
Cumulative lifetime-adjusted cost + benefit:	-538,846	-264,749	4,346	268,781	528,610	783,415

Table 3.9. Payback Analysis for Candidate Solution 2, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	-640,166					
Operating & maintenance Cost:		-76,000	-83,600	-91,960	-101,156	-111,272
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjusted to present value):	-640,166	-67,868	-66,629	-65,476	-64,335	-63,091
Cumulative time-adjusted costs over lifetime:	-640,166	-708,034	-774,663	-840,139	-904,474	-967,565
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefits (adjusted to present value)	0	322,319	316,436	310,957	305,541	299,632
Cumulative lifetime-adjusted benefits over lifetime:	0	322,319	638,756	949,713	1,255,254	1,554,886
Cumulative lifetime-adjusted cost + benefit:	-640,166	-385,715	-135,908	109,574	350,780	587,322

Table 3.10. Payback Analysis for Candidate Solution 3, Baht.

Cost Items	Years					
	0	1	2	3	4	5
Development Cost:	-605,796					
Operating & maintenance Cost:		-86,000	-94,600	-104,060	-114,466	-125,913
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted costs (adjusted to present value):	-605,796	-76,798	-75,396	-74,091	-72,800	-71,392
Cumulative time-adjusted costs over lifetime:	-605,796	-682,594	-757,990	-832,081	-904,881	-976,274
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567
Time-adjusted benefits (adjusted to present value)	0	322,319	316,436	310,957	305,541	299,632
Cumulative lifetime-adjusted benefits over lifetime:	0	322,319	638,756	949,713	1,255,254	1,554,886
Cumulative lifetime-adjusted cost + benefit:	-605,796	-360,275	-119,235	117,632	350,373	578,613

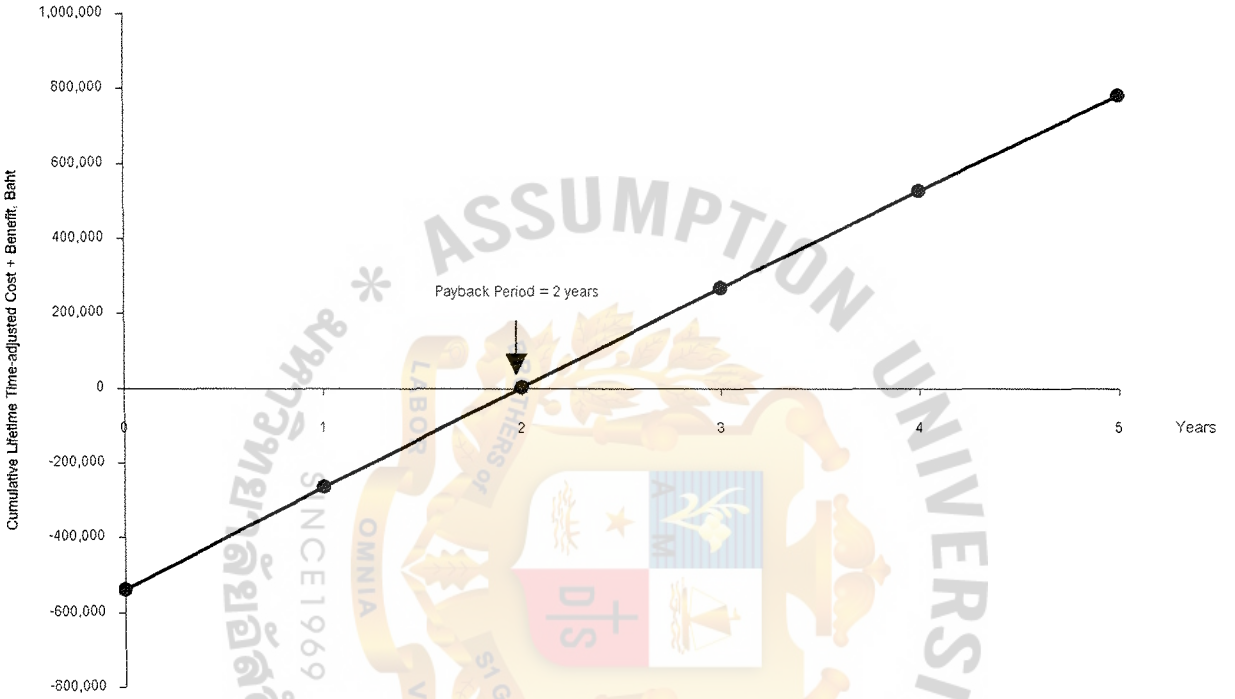

Figure 3.14. Payback Analysis for Candidate Solution 1.

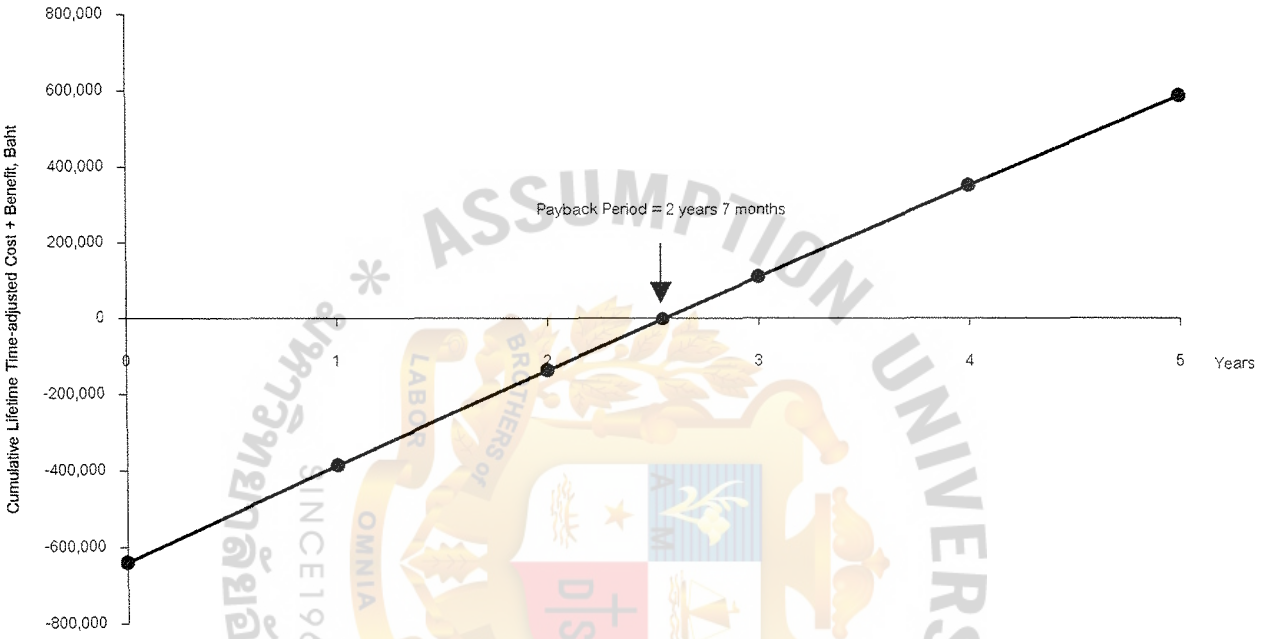

Figure 3.15. Payback Analysis for Candidate Solution 2.

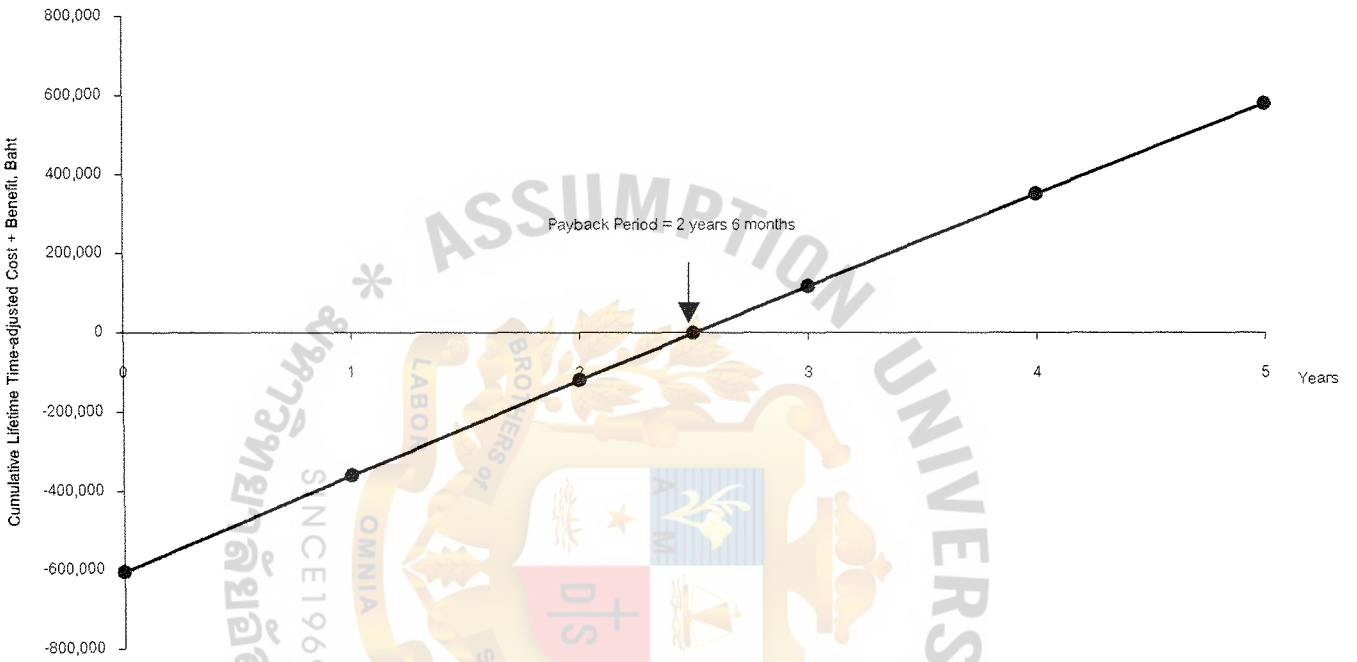

Figure 3.16. Payback Analysis for Candidate Solution 3.

3.5.4 Net Present Value

In this part the calculation of the net present value is shown for helping the authorized decision maker determine the best candidate solution. The costs and benefits have to be adjusted to the present money values. The discount rate is 12%. The difference between total present values of the costs and the present values of the benefits is presented as the net present value of each candidate solutions. If the outcome is positive, the investment is good. If the outcome is negative, the investment is bad. The highest of net present value is the best alternative for investment.

Table 3.11 shows the net present value of candidate solution 1. The present value of costs is 771,472 Baht and the total present value of benefits is 1,554,886 Baht so the net present value of this candidate is equal to 783,415 Baht.

Table 3.12 shows the net present value of candidate solution 2. The present value of costs is 967,565 Baht and total present value of benefits is 1,554,886 Baht so the net present value of this candidate is equal to 587,322 Baht.

Table 3.13 shows the net present value of candidate solution 3. The present value of costs is 976,274 Baht and total present value of benefits is 1,554,886 Baht so the net present value of this candidate is equal to 578,613 Baht.

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Table 3.11. Net Present Value Analysis for Candidate Solution 1, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Development cost:	-538,846						
Operating & maintenance Cost:		-54,000	-59,400	-65,340	-71,874	-79,061	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-538,846	-48,222	-47,342	-46,522	-45,712	-44,828	
Total present value of lifetime costs:							-771,472
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual benefits:	0	322,319	316,436	310,957	305,541	299,632	
Total present value of lifetime benefits:							1,554,886
Net present value of this alternative:							783,415

Table 3.12. Net Present Value Analysis for Candidate Solution 2, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Development cost:	-640,166						
Operating & maintenance Cost:		-76,000	-83,600	-91,960	-101,156	-111,272	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-640,166	-67,868	-66,629	-65,476	-64,335	-63,091	
Total present value of lifetime costs:							-967,565
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual benefits:	0	322,319	316,436	310,957	305,541	299,632	
Total present value of lifetime benefits:							1,554,886
Net present value of this alternative:							587,322

Table 3.13. Net Present Value Analysis for Candidate Solution 3, Baht.

Cost Items	Years						
	0	1	2	3	4	5	Total
Development cost:	-605,796						
Operating & maintenance Cost:		-86,000	-94,600	-104,060	-114,466	-125,913	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual costs:	-605,796	-76,798	-75,396	-74,091	-72,800	-71,392	
Total present value of lifetime costs:							-976,274
Benefits derived from operation of new system:	0	360,940	397,034	436,737	480,411	528,452	
Discount factors for 12%	1.000	0.893	0.797	0.712	0.636	0.567	
Present value of annual benefits:	0	322,319	316,436	310,957	305,541	299,632	
Total present value of lifetime benefits:							1,554,886
Net present value of this alternative:							578,613

3.5.5 Feasibility Analysis of Alternative Solution

After knowing all of the necessary information from the previous sections already, now is a time to present the Feasibility Analysis of Candidate Solutions by using Feasibility Analysis Matrix. The feasibility criteria with the rank of the candidate systems are presented in Table 3.14.

The following four categories of feasibility criteria are used in the Appeal Compensation Division of the Ministry of Transport and Communications.

(1) Operation Feasibility:

Operation Feasibility asks if the system will work when it is developed and installed. It concentrated on the feeling of users whether they like it or not.

(2) Technical Feasibility:

Technical Feasibility emphasizes whether a specific technical solution and the availability of technical resources support the solution.

(3) Schedule Feasibility:

Schedule Feasibility concerns whether the deadlines of the project is timely and desirable.

(4) Economic Feasibility:

Economic Feasibility measures the cost-effectiveness of the project. The system analyst must weight the cost and benefit of each candidate solution.

By using the feasibility analysis matrix, we can depict the candidate solution 1 as the best one because this candidate gets the highest score on the technical, schedule, and economic feasibility sections together with the highest net present value as mentioned earlier in the previous part so candidate solution 1 is used in the proposed system.

Table 3.14. Feasibility Analysis Matrix for the Three Candidate Solutions.

Feasibility Criteria	Weight	Candidate 1	Candidate 2	Candidate 3
Operational Feasibility	30%	Fully supports the requirement of the administrator's function. Score: 90	Fully supports the requirement of the administrator's function. Score: 90	Fully supports the requirement of the administrator's function. Score: 90
Technical Feasibility	30%	Go ahead with microsoft corp. technology. It has many applications to support. It is easy to use by the administrator. Score: 90	Need a skillful programmer to develop the program by using MS. Visual Basic. It may need some period of time to develop this program. Score: 80	It is difficult to implement because the user is not familiar with MS. Visual FoxPro. MS. Windows NT has less application to support it. Score: 70
Economic Feasibility Cost to develop: Payback period : Net present value:	30%	 538,846 Baht. 24 months 783,415 Baht. Score: 90	 640,166 Bht. 31 months 587,322 Baht. Score: 80	 605,796 Bht. 30 months 578,613 Baht. Score: 70
Schedule Feasibility	10%	4 months Score: 90	5 months Score: 80	5 months Score: 80
Ranking	100%	90	83	77

3.5.6 System Cost Analysis

(1) Cost of the Existing System

Table 3.15. The Existing System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Typewriter 1 unit @ 17,000	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
Calcagator 3 units @ 1,000	600.00	600.00	600.00	600.00	600.00
Total Fixed Cost	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00
Operating Cost					
Salary	442,080.00	486,288.00	534,916.80	588,408.48	647,249.33
Overtime expense	84,900.00	89,145.00	93,602.25	98,282.36	103,196.48
Paper	12,480.00	13,104.00	13,759.20	14,447.16	15,169.52
Office Equipment	24,480.00	25,704.00	26,989.20	28,338.66	29,755.59
Operating Expense	90,000.00	94,500.00	99,225.00	104,186.25	109,395.56
Maintenance Expense	99,000.00	103,950.00	109,147.50	114,604.88	120,335.12
Utility	22,500.00	23,625.00	24,806.25	26,046.56	27,348.89
Total Operating Cost	775,440.00	836,316.00	902,446.20	974,314.35	1,052,450.49
Total Existing System Cost	779,440.00	840,316.00	906,446.20	978,314.35	1,056,450.49

Table 3.16. Five Years Accumulated Existing System Cost, Baht.

Year	Total Existing System Cost	Accumulated Cost
1	779,440.00	779,440.00
2	840,316.00	1,619,756.00
3	906,446.20	2,526,202.20
4	978,314.35	3,504,516.55
5	1,056,450.49	4,560,967.04
Total	4,560,967.04	-

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(2) Cost of the Proposed System

Table 3.17. The Proposed System Cost Analysis, Baht.

Cost Items	Years				
	1	2	3	4	5
Fixed Cost					
Server Computer 1 unit @ 161,013	32,202.60	32,202.60	32,202.30	32,202.60	32,202.60
PC 3 units @ 28,491	17,094.60	17,094.60	17,094.60	17,094.60	17,094.60
UPS, 5000 VA 1 unit @ 88,600	17,720.00	17,720.00	17,720.00	17,720.00	17,720.00
Printer 1 unit @ 58,400	11,680.00	11,680.00	11,680.00	11,680.00	11,680.00
Scanner 1 unit @ 12,350	2,470.00	2,470.00	2,470.00	2,470.00	2,470.00
HUB 1 unit @ 21,000	4,200.00	4,200.00	4,200.00	4,200.00	4,200.00
Software Cost	5,402.00	5,402.00	5,402.00	5,402.00	5,402.00
User Training	4,000.00	-	-	-	-
Documentation	60,000.00	-	-	-	-
Testing	95,000.00	-	-	-	-
Consulting Service	150,000.00	-	-	-	-
Installation	120,000.00	-	-	-	-
Programer's Salary	60,000.00	-	-	-	-
System Analysis 's Salary	45,000.00	-	-	-	-
Total Fixed Cost	624,769.20	90,769.20	90,768.90	90,769.20	90,769.20
Operating Cost					
Salary	353,160.00	388,476.00	427,323.60	470,055.96	517,061.56
Paper	4,680.00	4,914.00	5,159.70	5,417.69	5,688.57
Office Equipment	2,160.00	2,268.00	2,381.40	2,500.47	2,625.49
Operating Expense	30,000.00	31,500.00	33,075.00	34,728.75	36,465.19
Maintenance Expense	17,000.00	17,850.00	18,742.50	19,679.63	20,663.61
Utility	7,500.00	7,875.00	8,268.75	8,682.19	9,116.30
Total Operating Cost	414,500.00	452,883.00	494,950.95	541,064.68	591,620.71
Total Proposed System Cost	1,039,269.20	543,652.20	585,719.85	631,833.88	682,389.91

Table 3.18. Five Years Accumulated Proposed System Cost, Baht.

Year	Total Proposed System Cost	Accumulated Cost
1	1,039,269.20	1,039,269.20
2	543,652.20	1,582,921.40
3	585,720.15	2,168,641.55
4	631,833.88	2,800,475.43
5	682,389.91	3,482,865.34
Total	3,482,865.34	-

(3) The Comparison of the System Costs between that of the Existing System and that of the Proposed System.

Table 3.19. Comparison of the System Costs, Baht.

Year	Accumulated Existing Cost	Accumulated Proposed Cost
1	779,440.00	1,039,269.20
2	1,619,756.00	1,582,921.40
3	2,526,202.20	2,168,641.55
4	3,504,516.55	2,800,475.43
5	4,560,967.04	3,482,865.34

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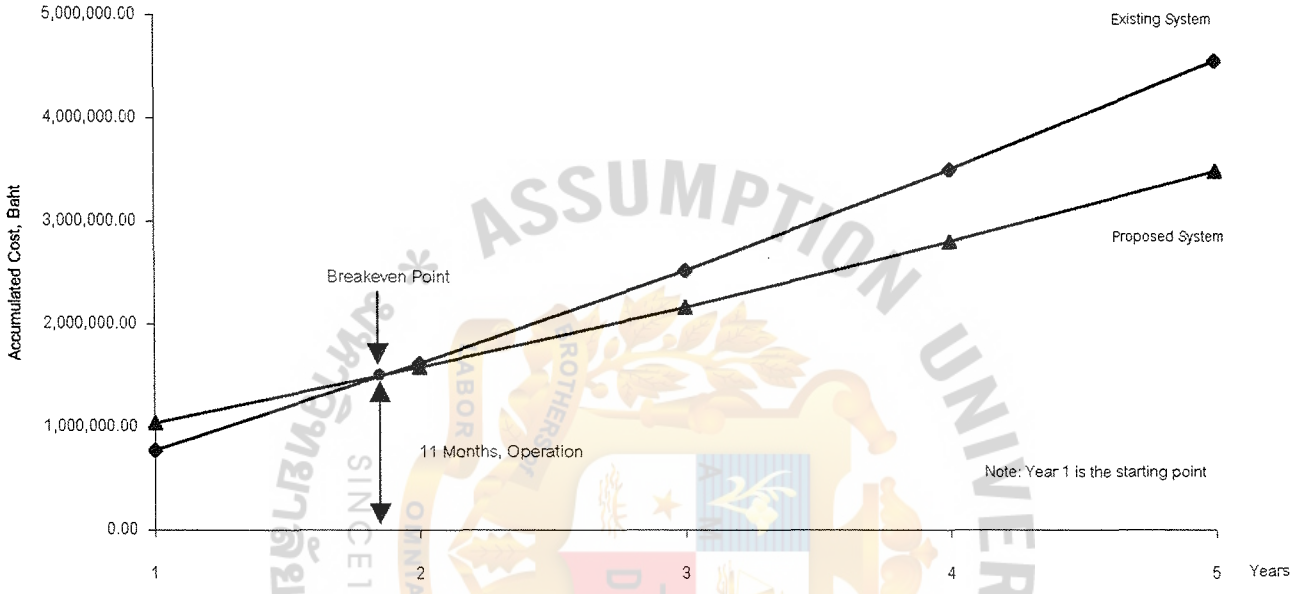

Figure 3.17. Graphical Demonstration of the Breakeven Point.

IV. PROJECT IMPLEMENTATION

4.1 Overview of Project Implementation

System implementation is a very important part because it constructs and delivers the final system into the real operation, as show in the Gantt Chart (Figure 1.1). By definition, the system implementation is the construction of the new system and the delivery of that system into production or day-to-day operation. In this project, the typical activities are implemented.

(1) System Analysis

The actions to be taken in this phase can provide better understanding of problems. The current system should be learnt to expand the understanding of scope and purpose. After that analyzing each process in the existing system should be done to determine whether any process is necessary for repeating and the problems of each process can be picked out. By doing that way, the cause and effects can be noticed very easily. The information from interviewing the administrators in the Appeal Compensation Division can help to reveal the current problems faced during performance of their work. The area for improvement can be pointed out.

(2) System Design

The activities performed in this phase include the evaluation of alternative solution that is suitable for the purposed system. The data flow diagram of the proposed system should be drawn to make it clearer for understanding. The database is normalized so the data attributes are grouped to form stable, flexible, and adaptive entities. To design input and output specifications, the researcher needs to work closely with the administrator as

end-user because the administrators are familiar with the input and output, the designers will get their valuable ideas and suggestions.

Only the necessary report will be printed out otherwise it will be displayed on the computer screen. The format of output should easily be readable and understandable.

(3) Hardware and Software Requirements

The server uses MS Windows NT class server as the operation system. The PC client uses Duron 750 Mhz CPU,64 MB RAM, 10 GB HDD, 52X CD-ROM, 15" monitor, and 2X AGP as VGA card memory. The software requirement is MS Windows 98 which is used in the operation system because it is easy to implement, maintain, has low price, and has many applications.

(4) System Test

The system should be tested to make sure that the new system could perform effectively. The test data should be generated to make sure that all designs are workable in the real situation. Perform Tests are performed to check whether the system can work correctly and timely.

(5) Training System User

The administrators as users should be trained before the proposed system is used in the real situation. By preparing the training, the administrator can better understand the proposed system and perform their work more efficiently and smoothly. Training can be performed as group training for saving time and cost. The user manual should be distributed to the user as a guideline for them. All users must be involved in the training section to receive the same understanding, and practice in the same way.

(6) Documentation

The documentation is the recording of facts and specifications for the proposed system. Because the documentation can be built during any activities and include many important details information, this document should be kept and maintained for future use when it is necessary.

4.2 Test Plan

Testing is done throughout systems development, not just at the end. Although testing is tedious, it is an essential series of steps that help assure the quality of the eventual system. It is far less disruptive to test beforehand than to have a poorly tested system fail after installation.

The testing procedure is summarized as follows:

(1) Creating Test Data

If we could test each decision on an isolated basis, testing in general would not be too difficult. However, the decisions in the system do not occur in isolation. It has to put the test data together in such a way that they test every possible combination of values. A vast number of test data transactions will be required if we are to test the system fully.

(2) System Integration Test

After the system is complete, we perform the system integration test, which is intended to expose any defects before the system is delivered to the user. If defects are uncovered, we must fix them and then perform the system integration test before moving on to the next step.

(3) Acceptance Test

After completing the system integration test, we perform the acceptance test, which verifies to the user that the system does what it is

supposed to do. The acceptance test should establish that all functions promised in the acceptance criteria of the problem specification have been delivered and that such considerations as turnaround and response time are adequate.

(4) Parallel Operation

For the final system test, parallel operation, we run the new system concurrently with the old, feeding both with the same real data. We compare the outputs from the old and the new system, and if at any time there is a discrepancy, we investigate to see if there is a problem in the new system. However, we should not automatically assure that the new system is at fault; it is not unheard of for a new system to expose a longstanding defect in an old one.

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V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From the cost and benefit analysis, the proposed system has 3,482,865 Baht as the five years accumulated proposed system cost. The payback period is in approximately 2 years.

The data flow diagram shows the workflow diagrams of the existing system and the proposed system. All of the repeating processes are removed to make it easier to implement and understand. The database is normalized to generate the feasibility entity and is easier to restructure.

The hardware and software requirements of the proposed system are also mentioned because it can help the organization receive the highest efficiency performance. MS Access 2000 is used as the operating system in the PC client. MS Access 2000 has many applications to support so it is easy to implement, maintain, has low price, and many applications. At the same time, the organization can save costs because this program comes together with Microsoft Office 98, and users are familiar with this program.

The benefits derived from this proposed system are as follows:

(1) After using the proposed system, the administrators can perform their work quicker, generate useful reports, and search information more easier. At the same time, place used in keeping documents is no longer needed.

(2) The organization can save a lot of budget because the amount of paper, office equipment, and overtime costs are reduced.

(3) The appellants receive more satisfaction because they know the consideration result quicker.

The database is designed and normalized to meet the third normal form. Input and output designs are created to cooperate with the user's requirements, and keep all necessary information in a good format. The proposed system is also developed for the security and control policy. The test is also performed to make sure that the proposed system can be done in the real situation.

Table 5.1. Degree of Achievement of the Proposed System.

Process	Existing System	Proposed System
Generated Report	20 minutes	5 minutes
Data Entry Process	15 minutes	8 minutes
Inquiry Process	30 minutes	7 minutes
Modify Information	15 minutes	8 minutes
Printing Process	5 minutes	5 minutes
Total	1 hour. 25 minutes	33 minutes

The descriptions of time performance in each process are as follows:

(1) Generated Report: By using the effective computerized system, the author gets the reports that contain all the necessary information without having to search back from many record books. The administrators can save 15 minutes for the process of generating report.

(2) Data Entry Process: The proposed computerized system helps the administrators to easily enter data because of the good layout screen. The data entry process can be performed in only 8 minutes.

(3) Inquiry Process: Because the information is kept in the computerized system the administrators use less time in finding the requested information asked by the operative section. The existing system uses 30 minutes while the proposed system uses only 7 minutes.

(4) Modify Information: Some information may have to be modified after a period of time. By using a proposed system, all information is kept in the database and can be modified very easily. The proposed system saves 7 minutes for the process of modifing information.

(5) Printing Process: The time used for printing the document is the same between the existing system and the proposed system.

5.2 Recommendations

After implementing the effective computerized system in the administration section, it is a good idea to expand it to the operative sections. In this way, all operations in the Appeal Compensation Division can be performed more quickly. To make it become usable, the administration of other divisions should analyze the computerized system too.

However the system should be tested after it has been in operation for a period of time in the following areas:

(1) Whether the proposed system still keeps all necessary information after a period of time.

(2) Compare the proposed amount of the proceeded appeal statistics with the existing system.

(3) A suitable design of both input screen and output report should reduce the time of entering and finding information and lead to the higher time performance of administration section.

APPENDIX A

INPUT DESIGN

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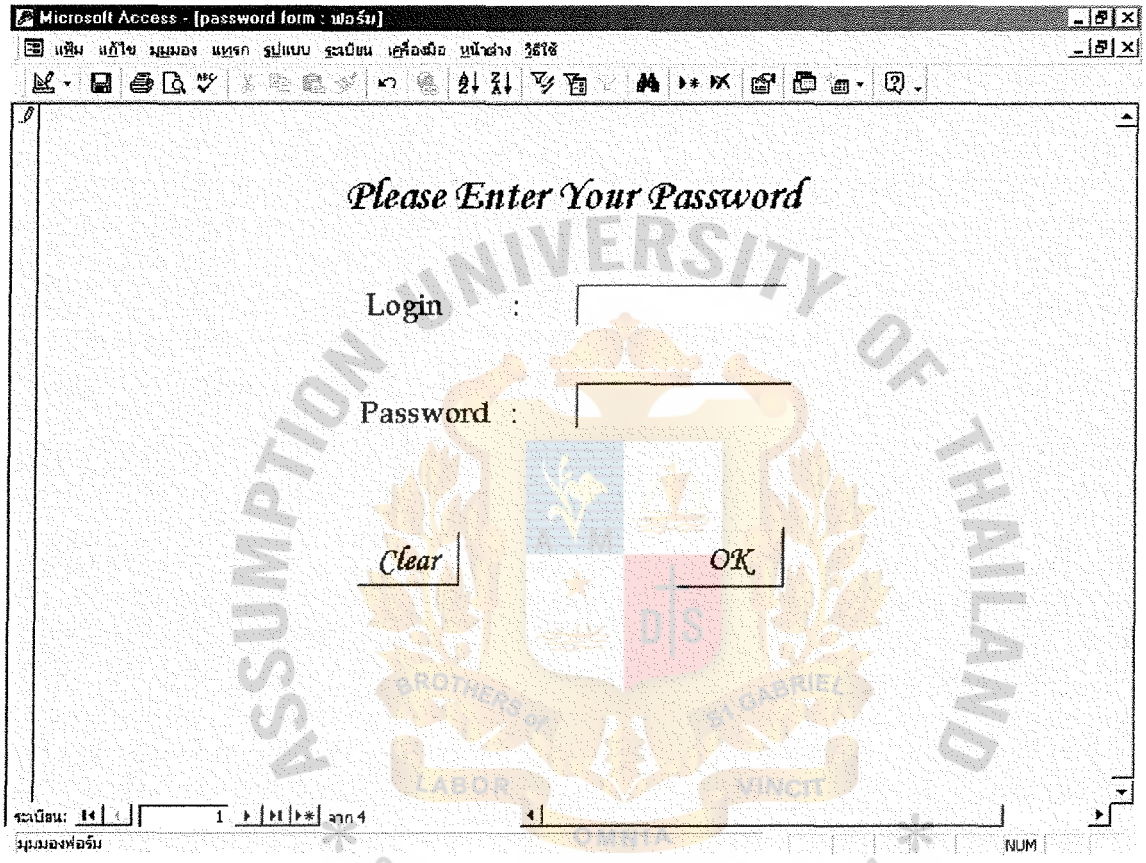

Figure A.1. Password Screen.

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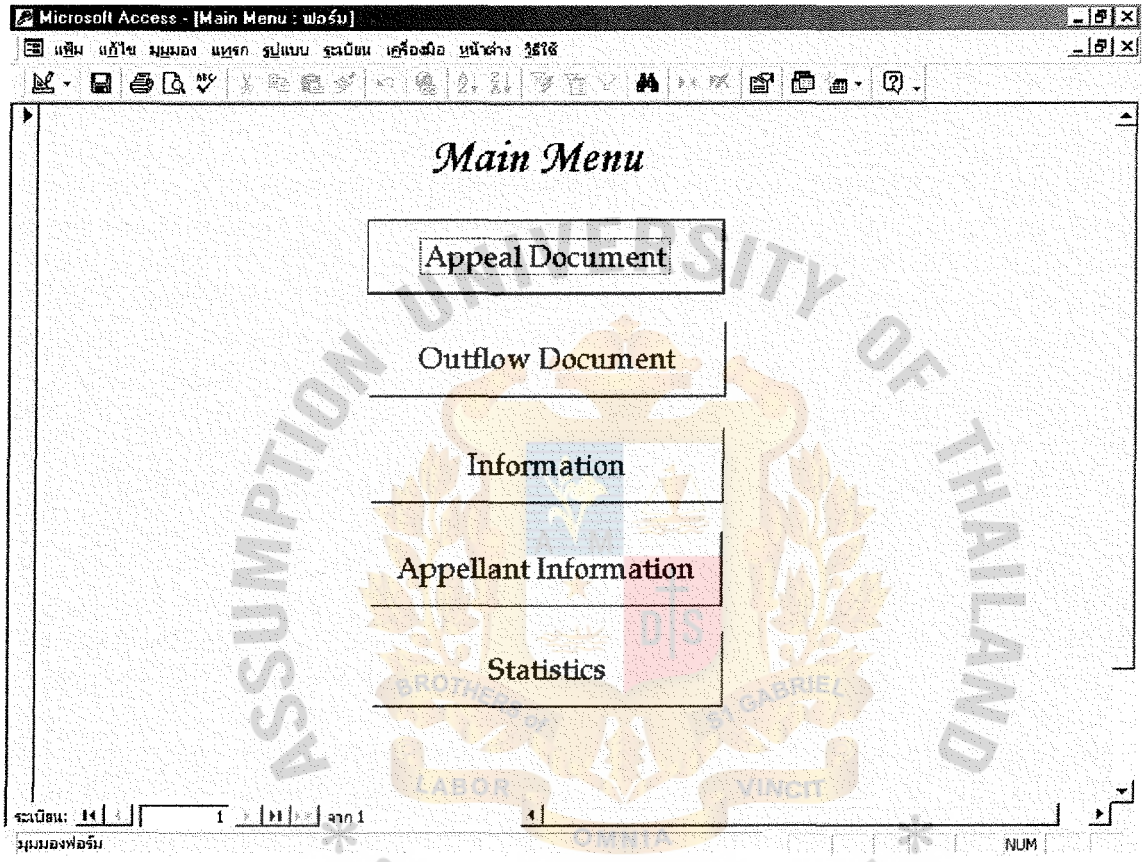

Figure A.2. Main Menu Screen.

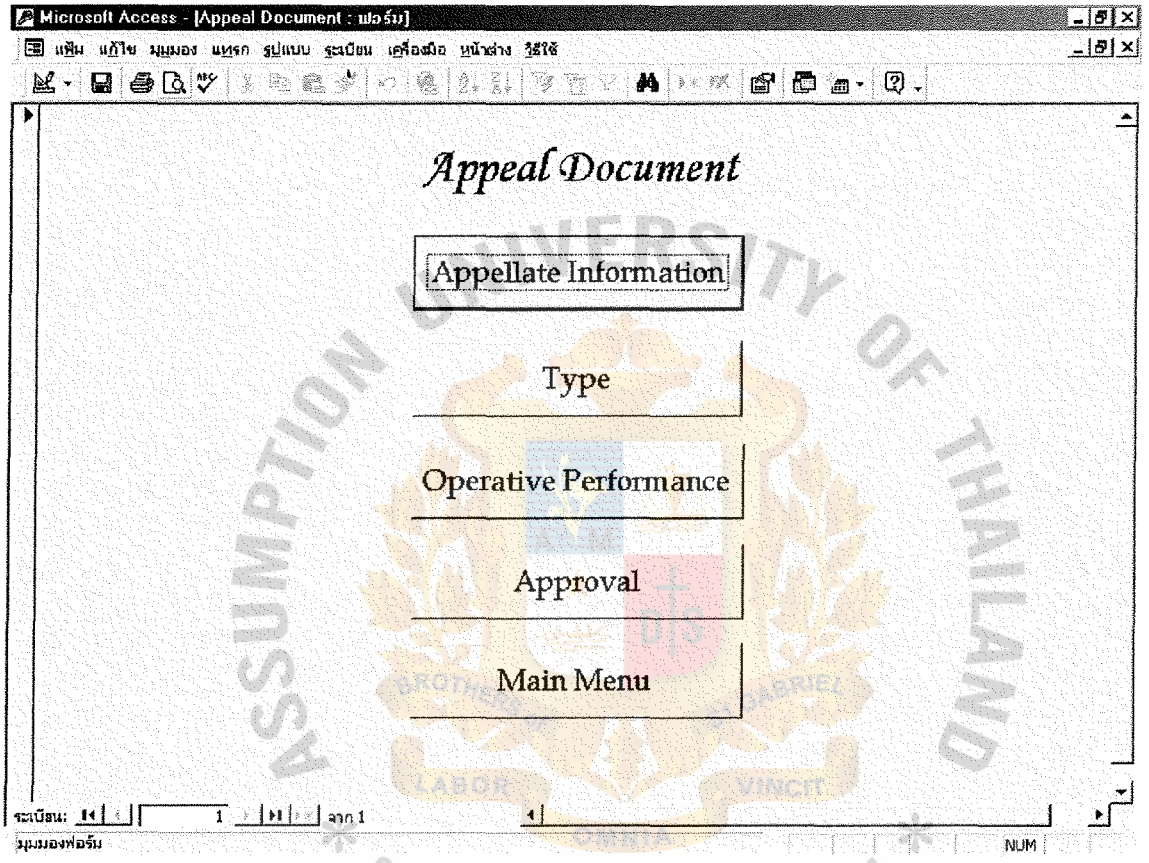

Figure A.3. Appeal Document Screen.

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SINCE1969
มหาวิทยาลัยอัสสัมชัญ

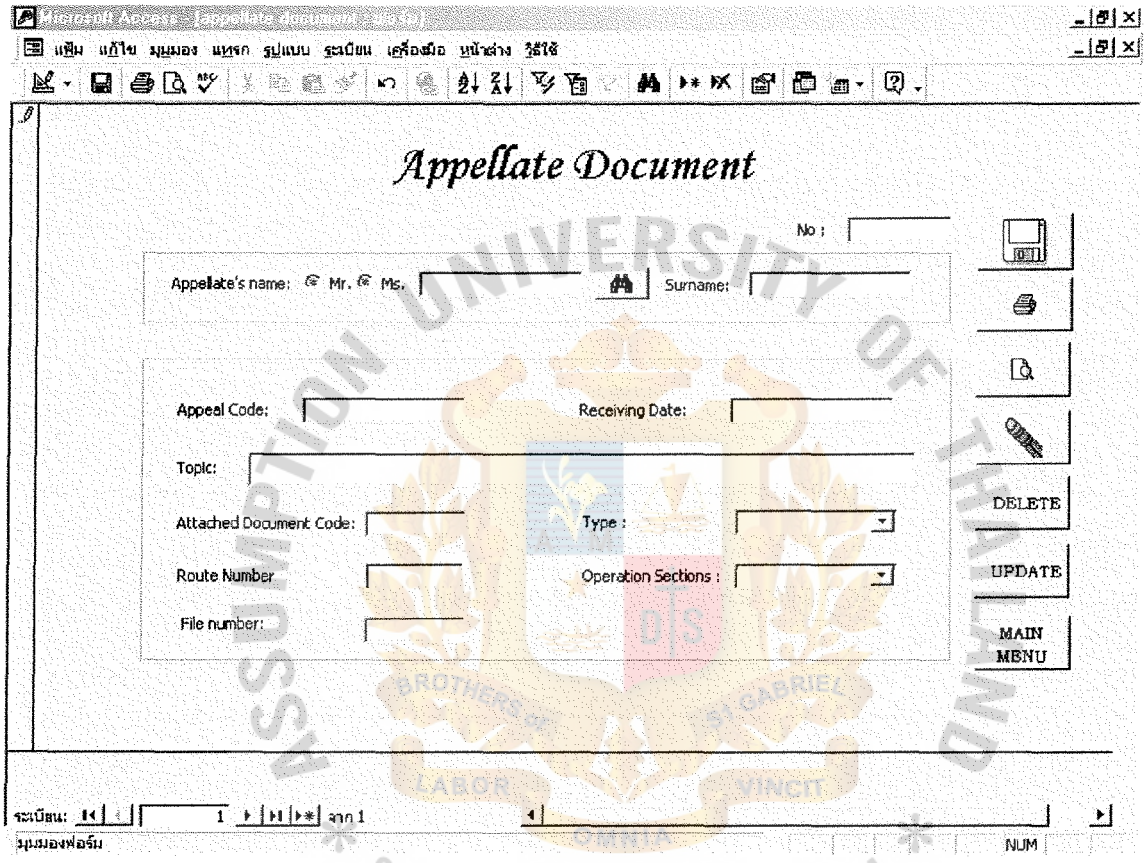

Figure A.4. Appellate Document Screen.

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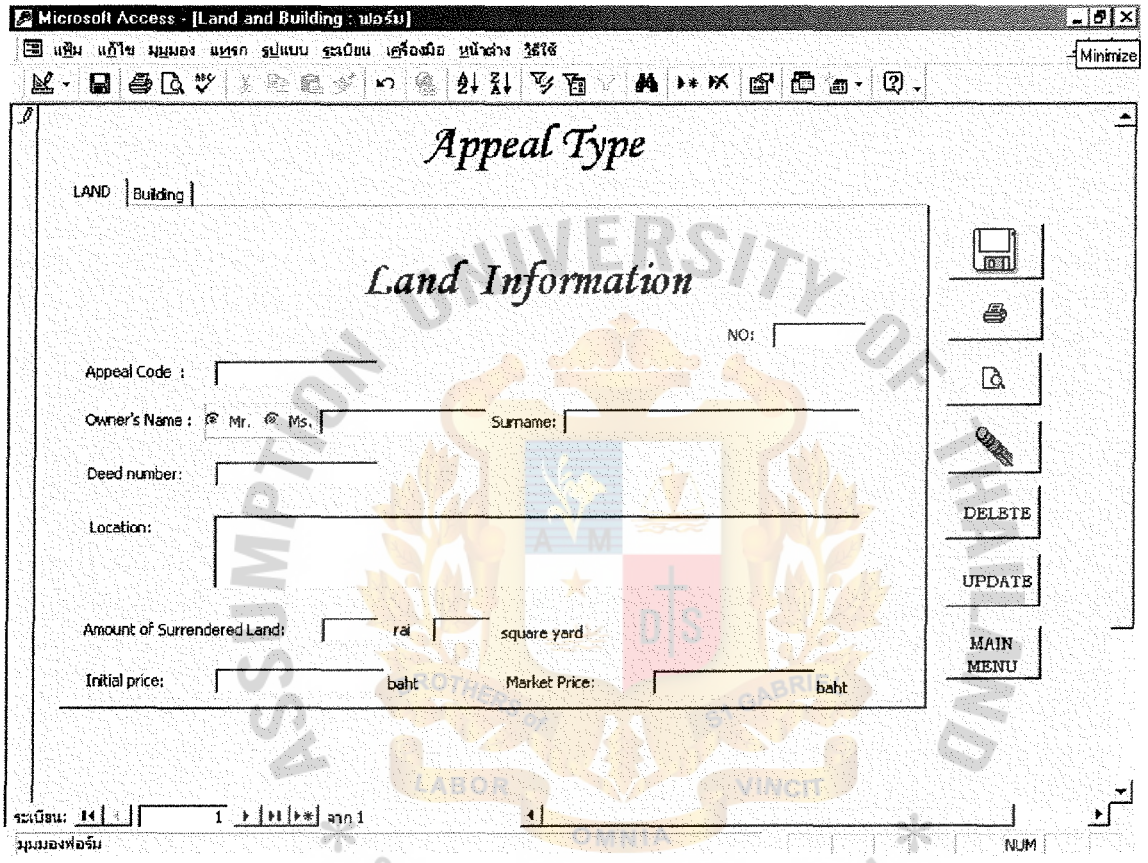

Figure A.5. Appeal Type (Land) Screen.

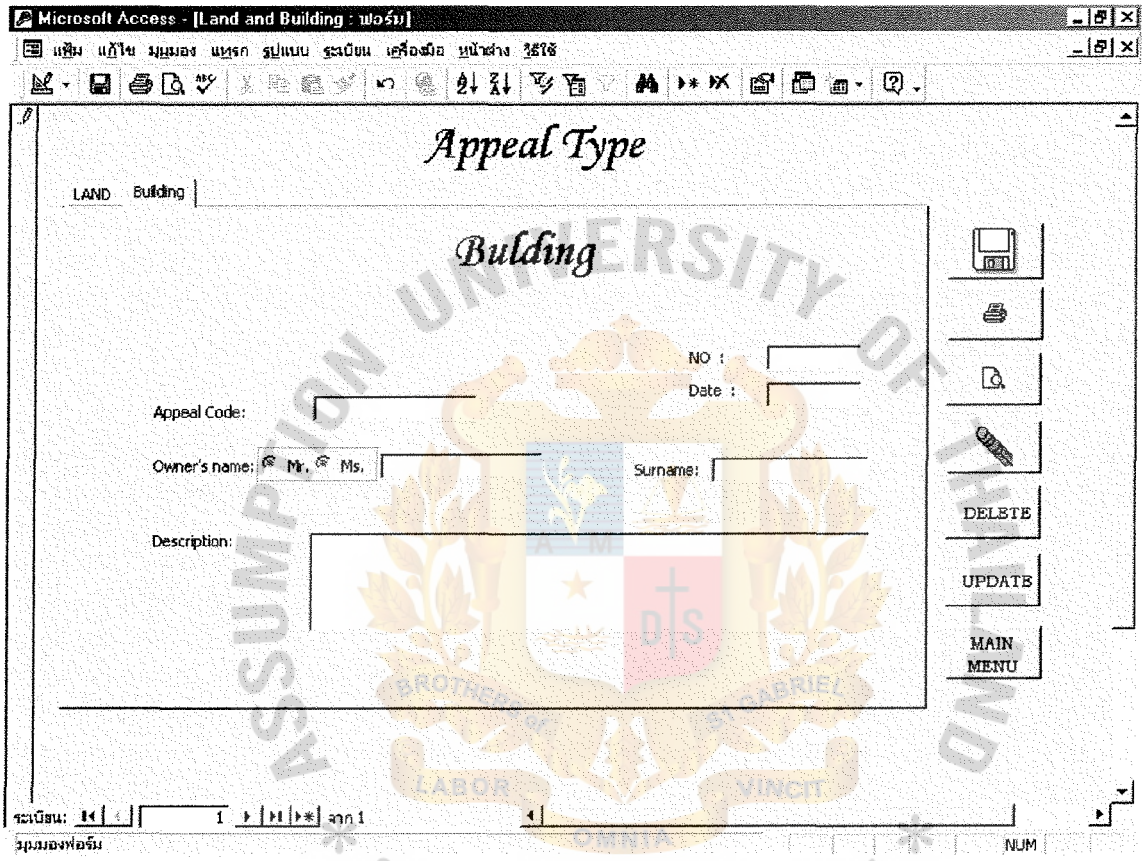

Figure A.6. Appeal Type (Building) Screen.

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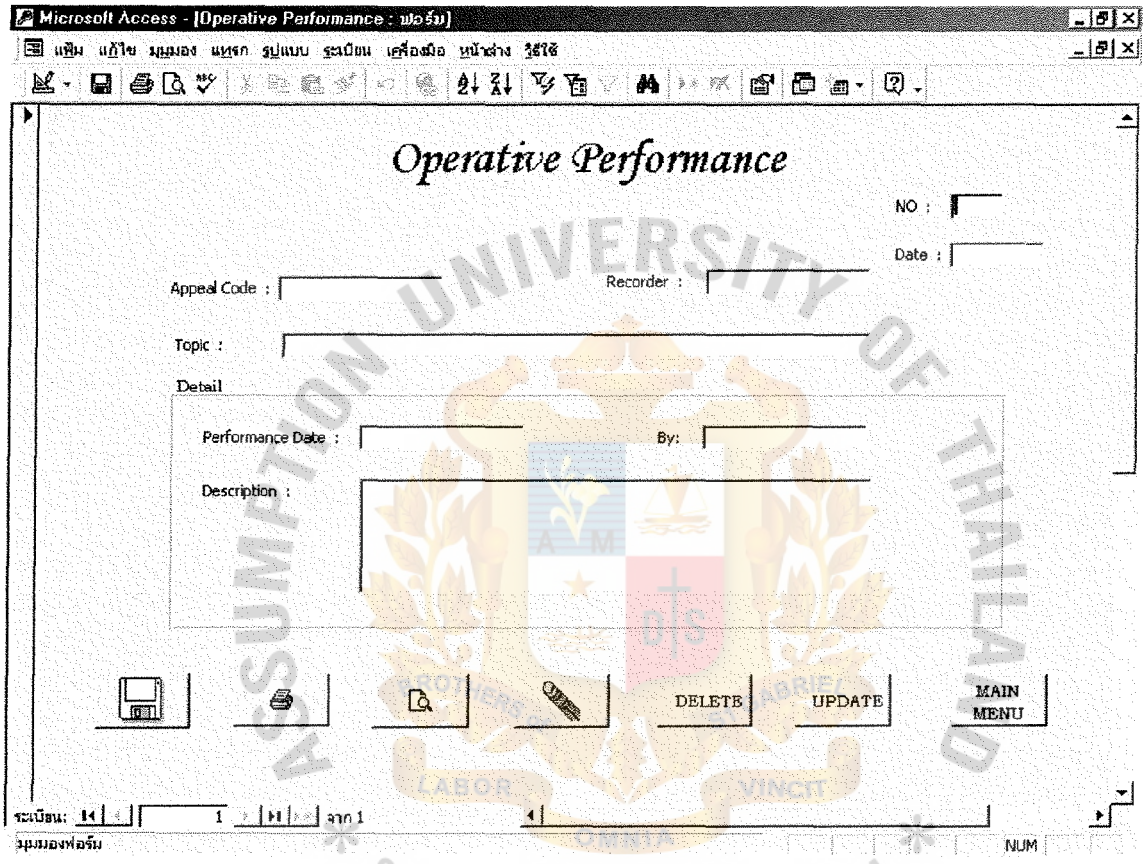

Figure A.7. Operative Performance Screen.

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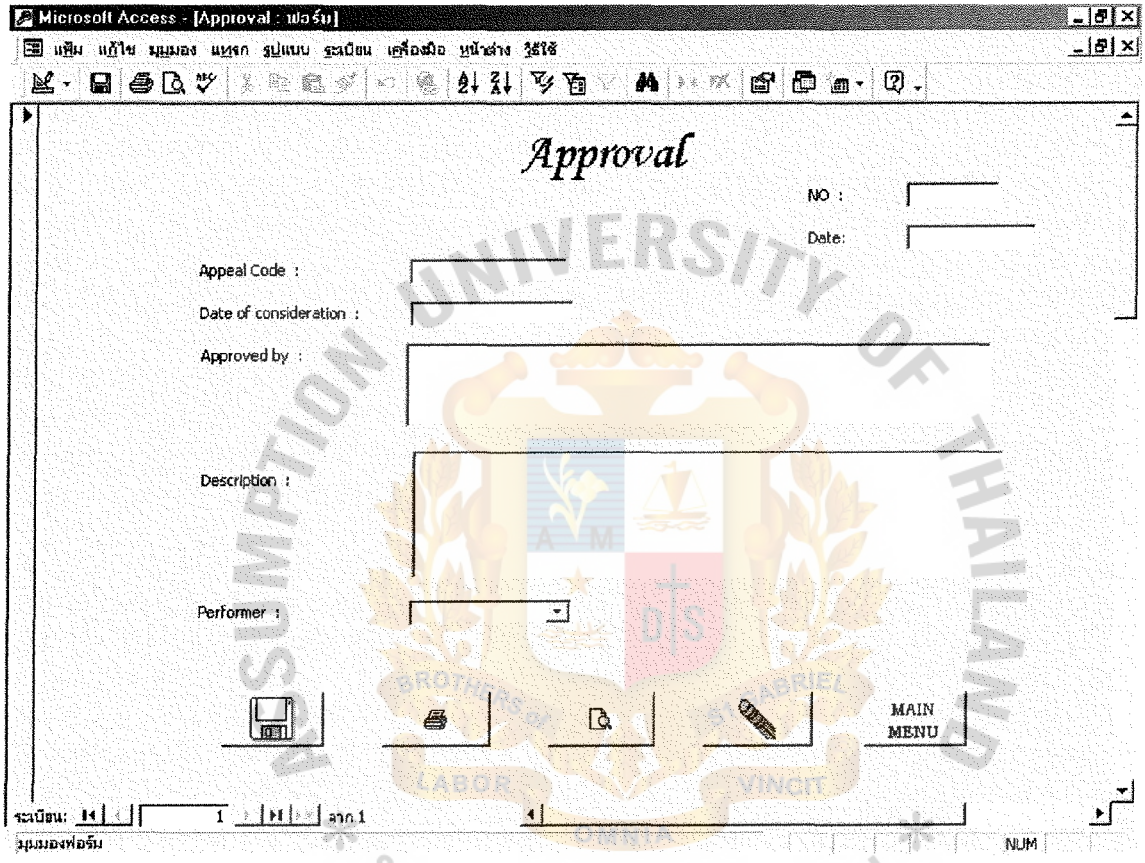

Figure A.8. Approval Screen.

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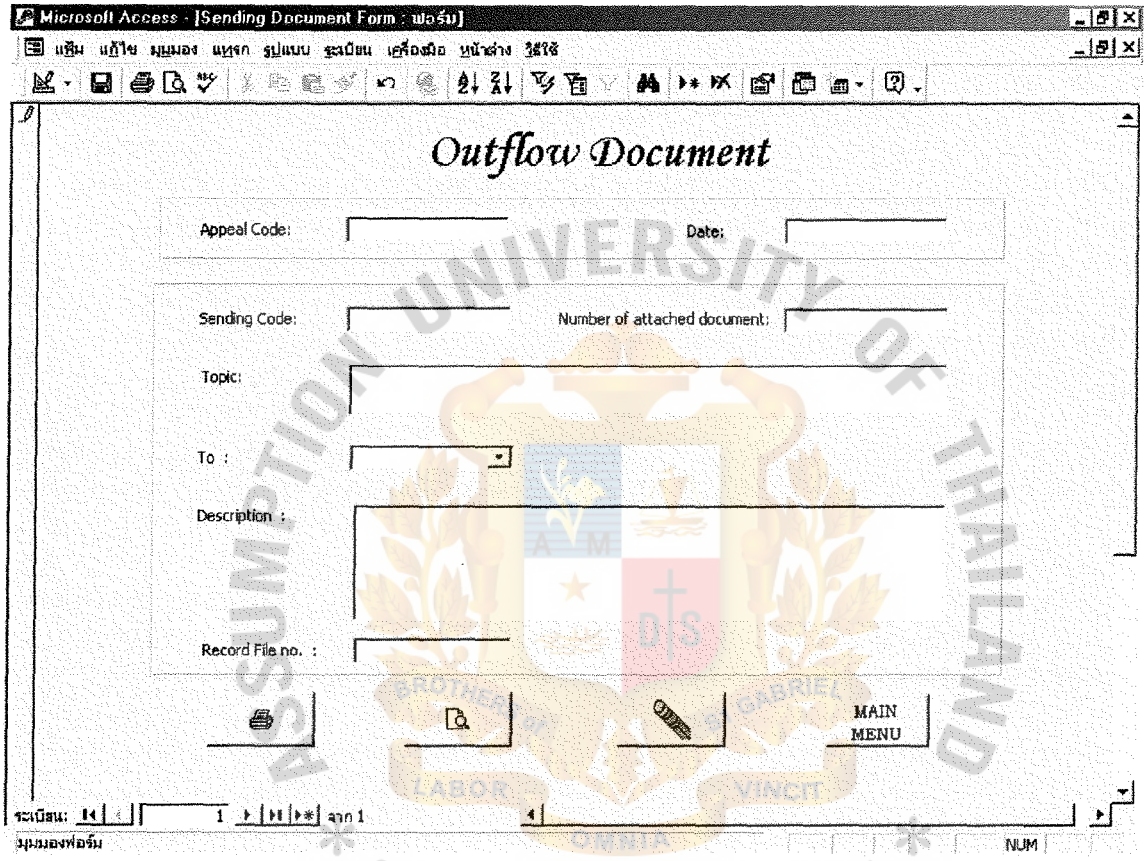

Figure A.9. Outflow Document Screen.

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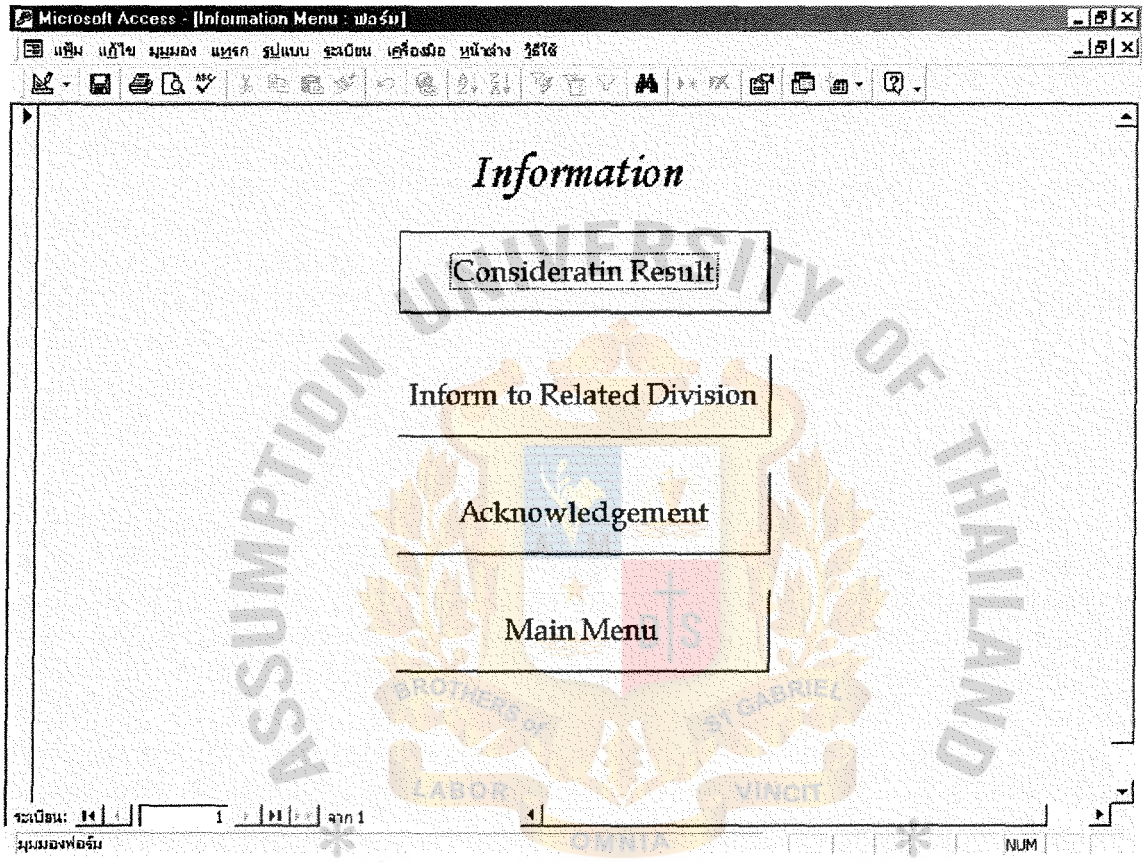

Figure A.10. Information Screen.

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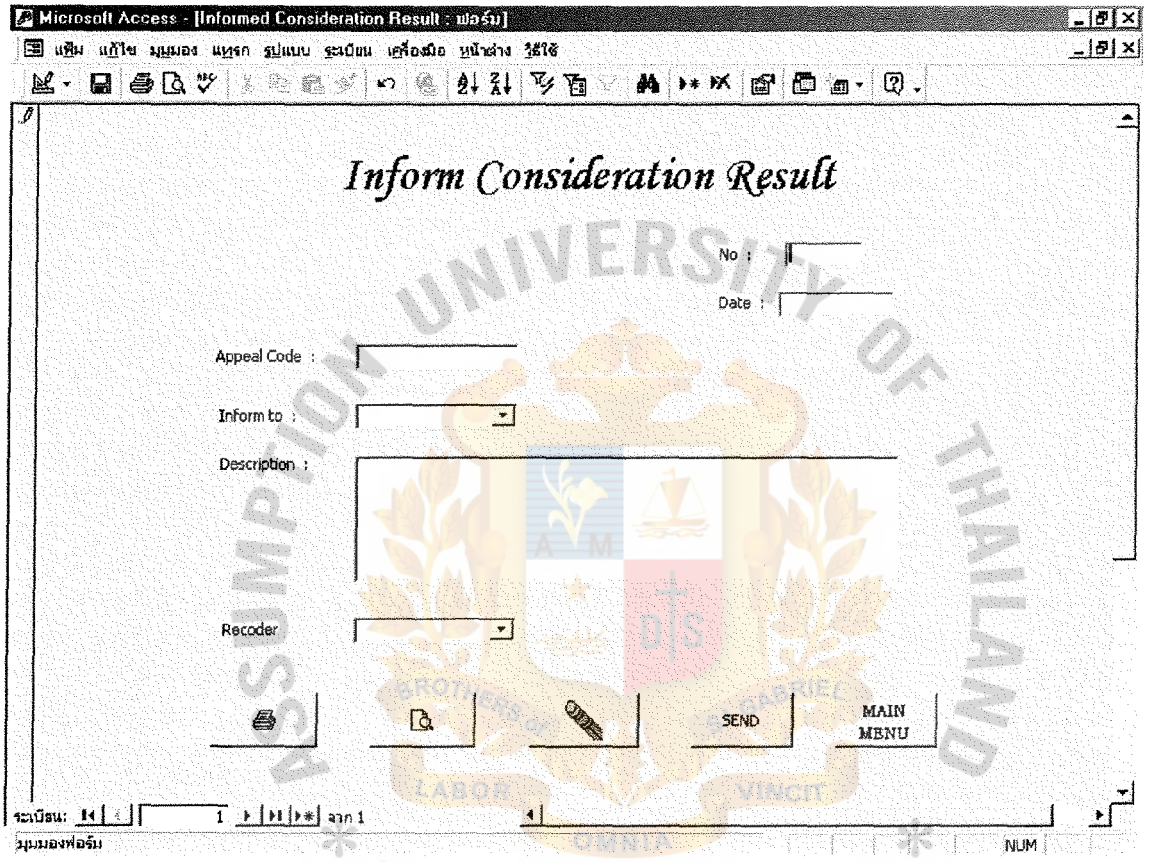

Figure A.11. Inform Consideration Result Screen.

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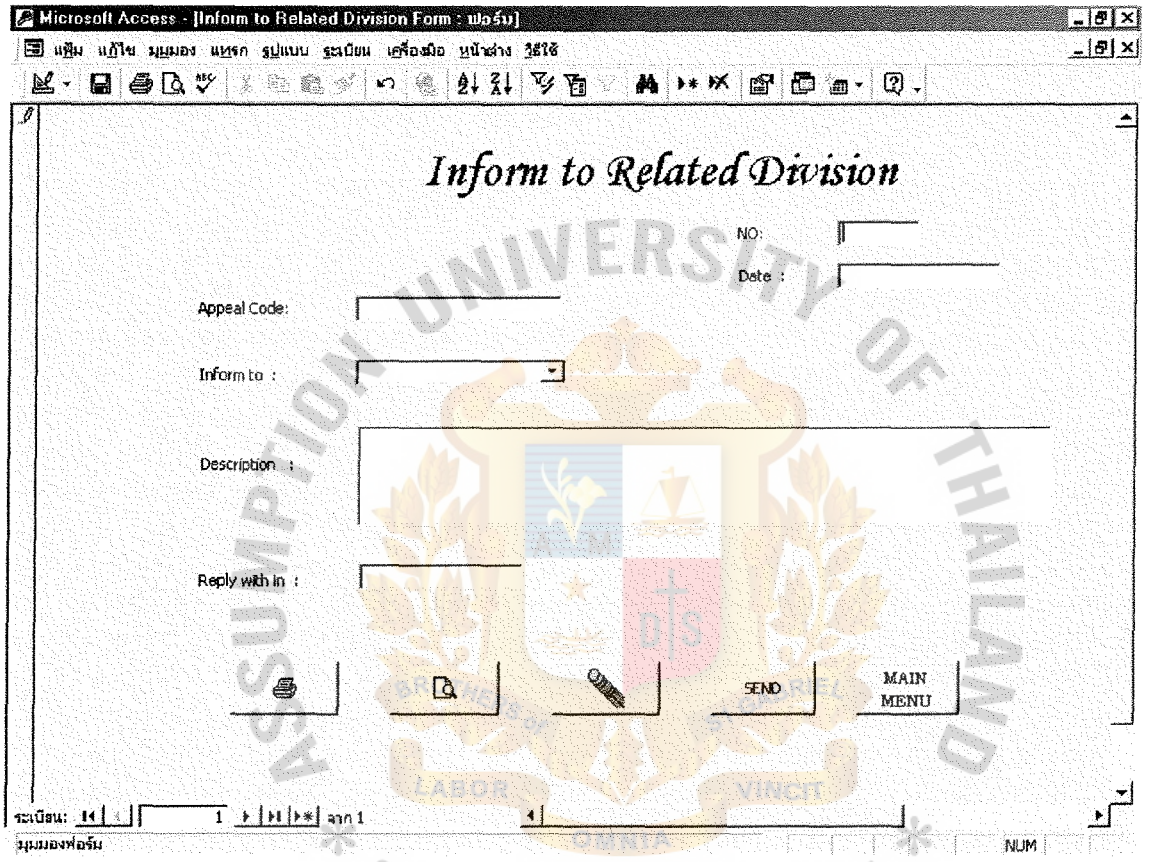

Figure A.12. Inform to Related Division Screen.

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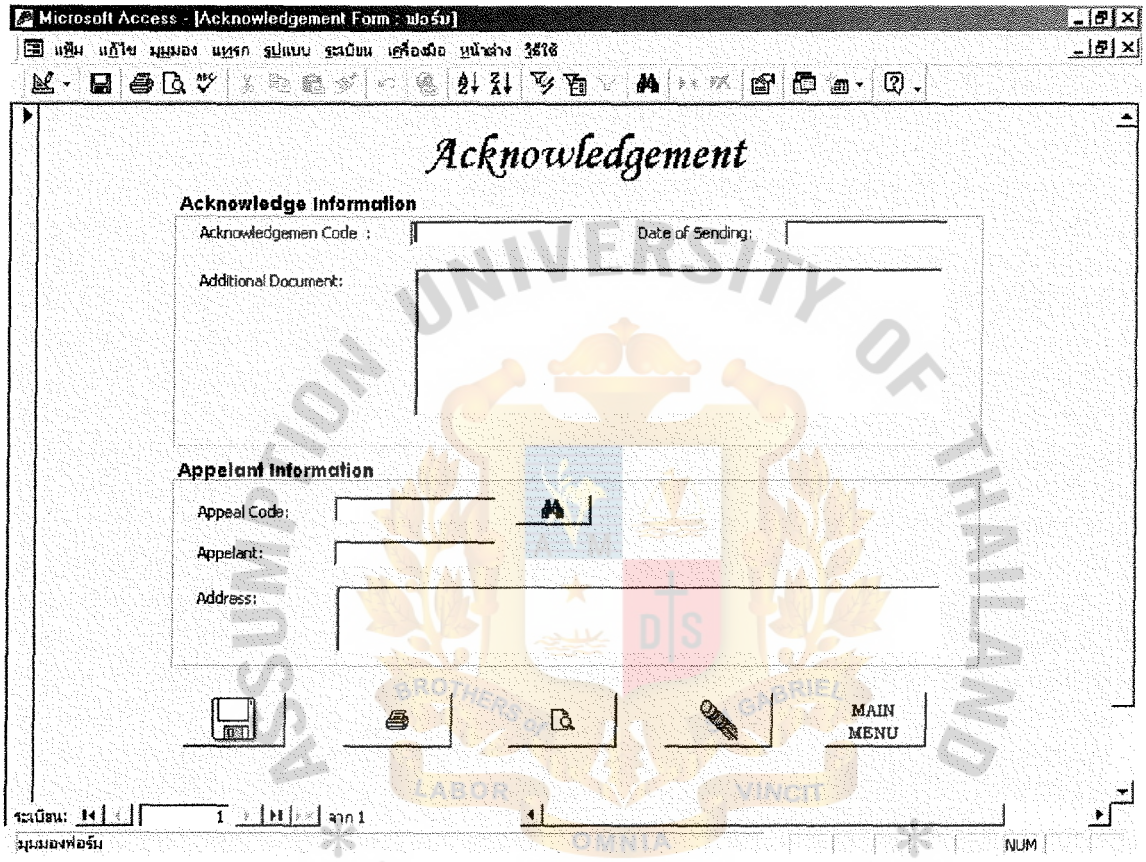

Figure A.13. Acknowledgement Screen.

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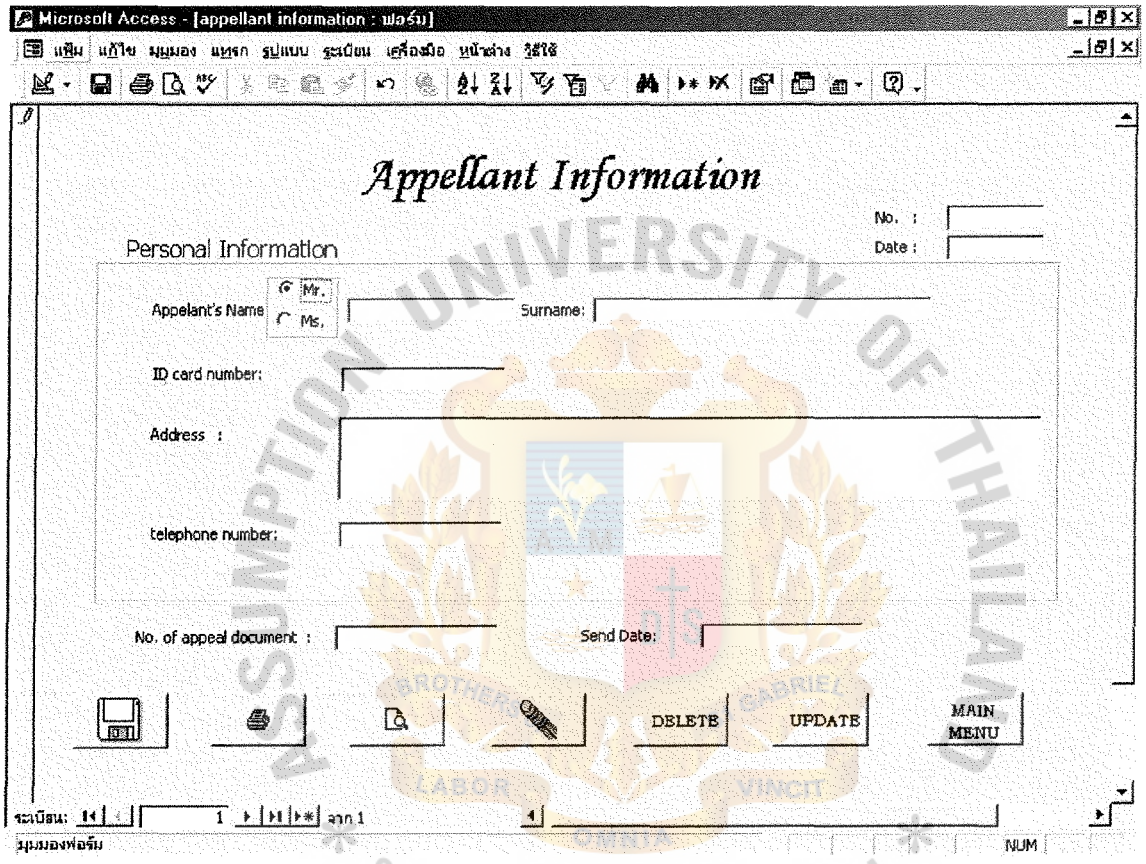

Figure A.14. Appellant Information Screen.

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BROTHER GABRIEL
LABOR OMNIA VINCIT
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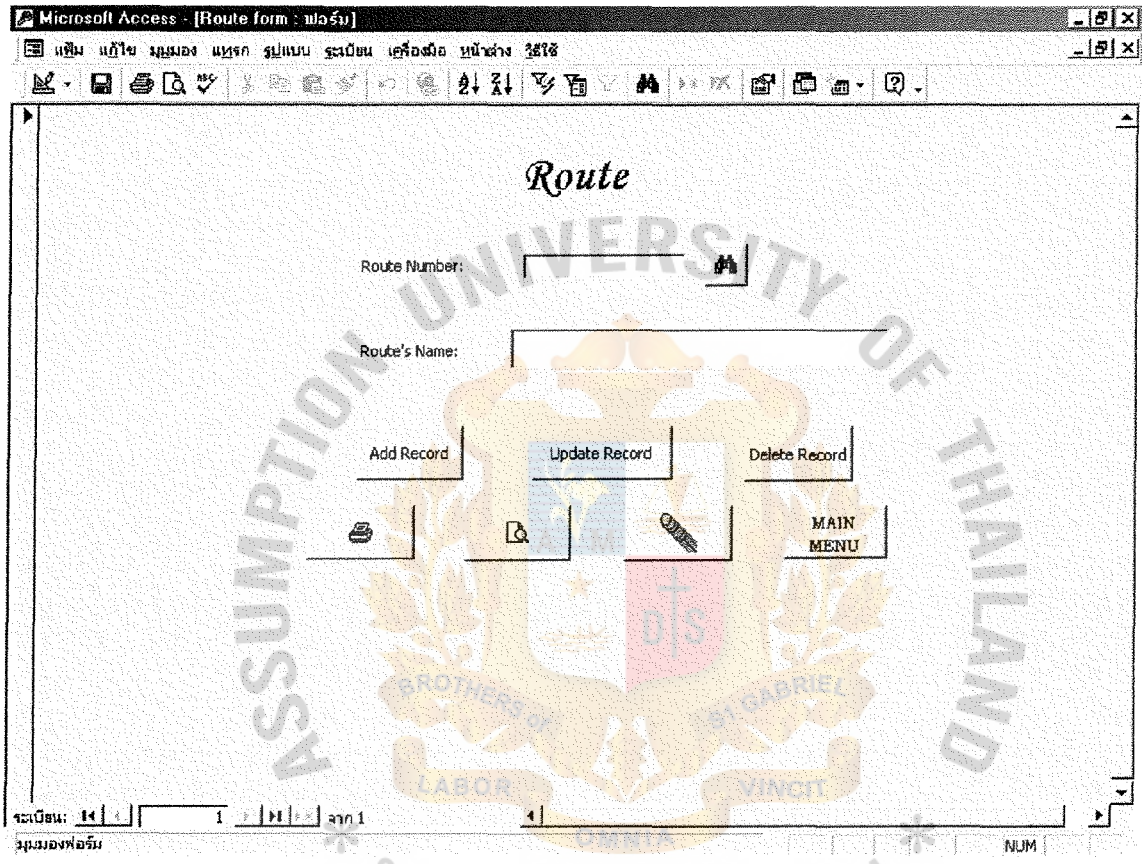

Figure A.15. Route Screen.

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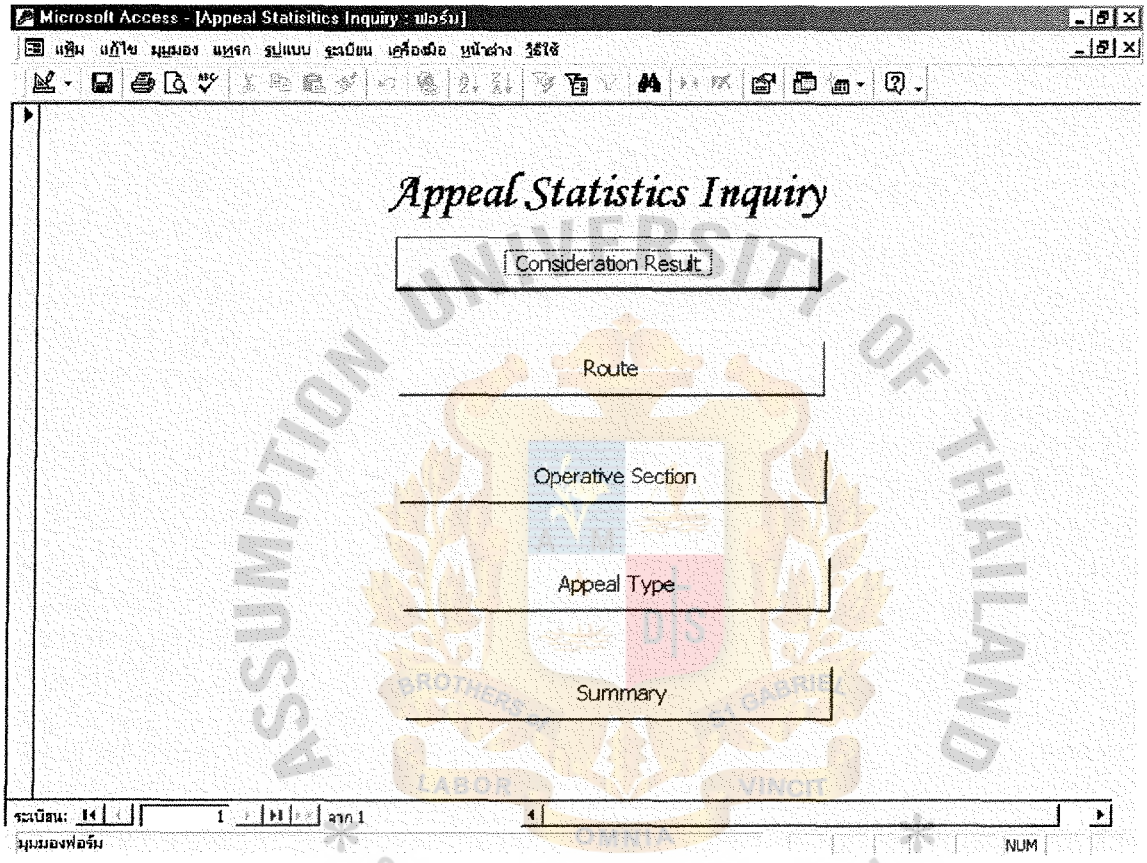

Figure A.16. Appeal Statistics Screen.

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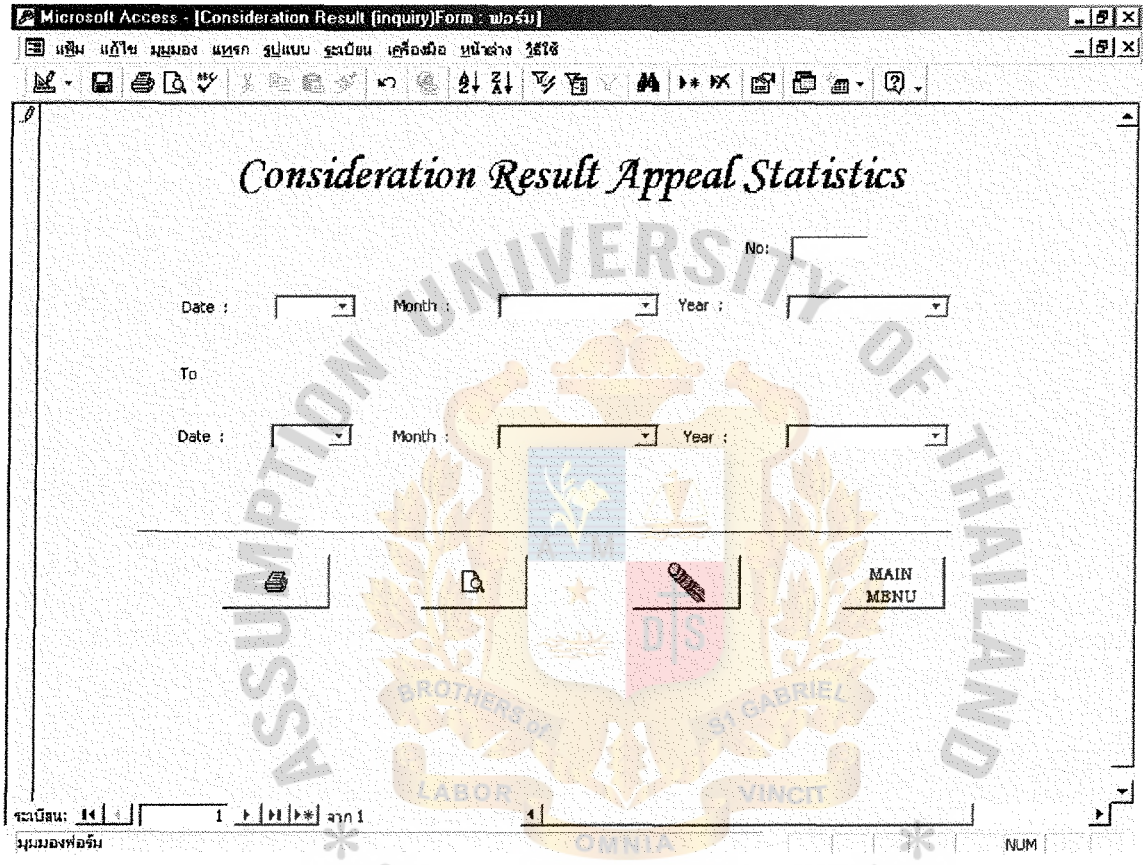

Figure A.17. Consideration Result Appeal Statistics.

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มหาวิทยาลัยอัสสัมชัญ

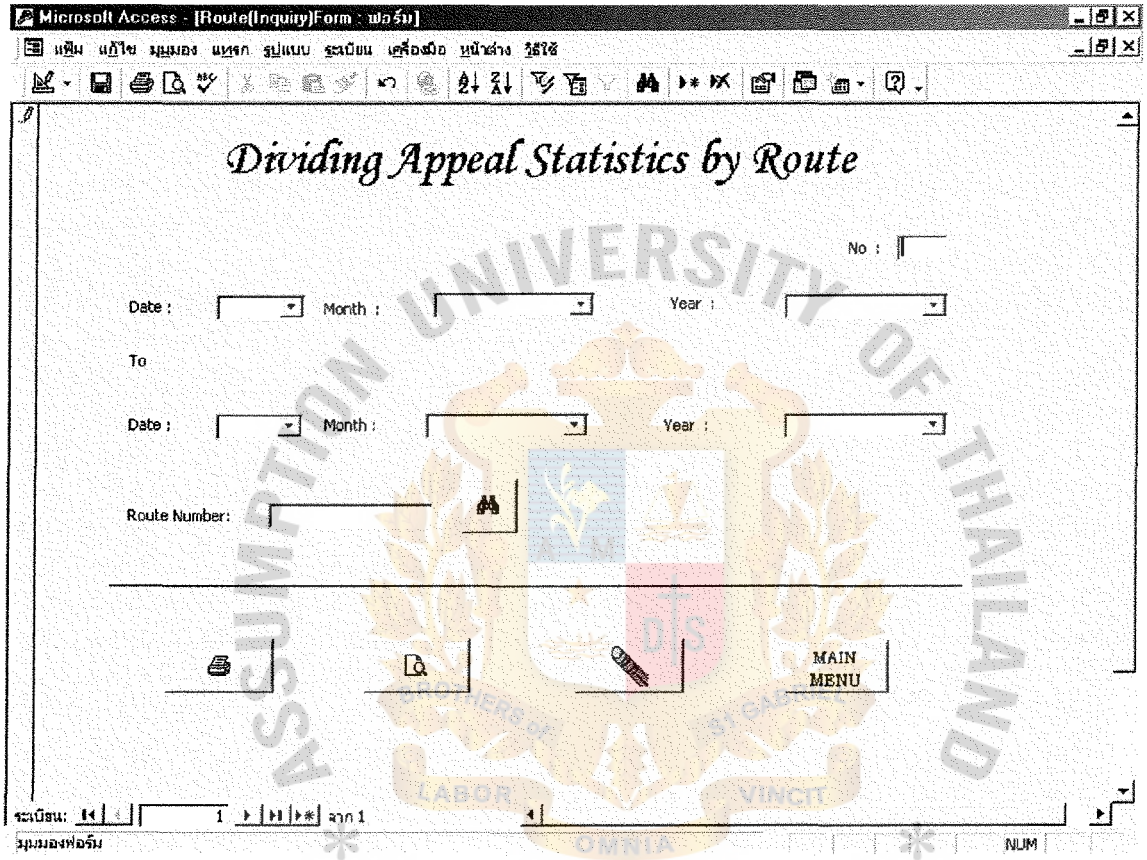

Figure A.18. Dividing Appeal Statistics by Route.

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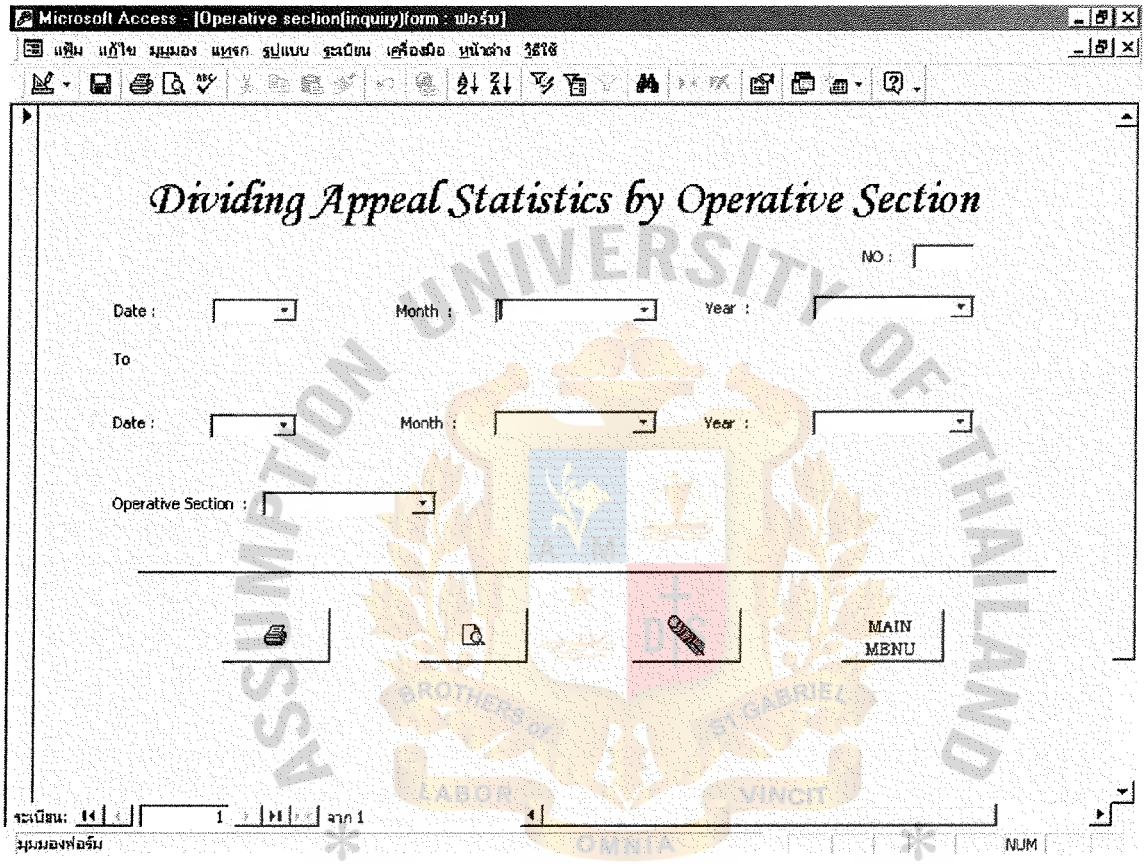

Figure A.19. Dividing Appeal Statistics by Operative Section.

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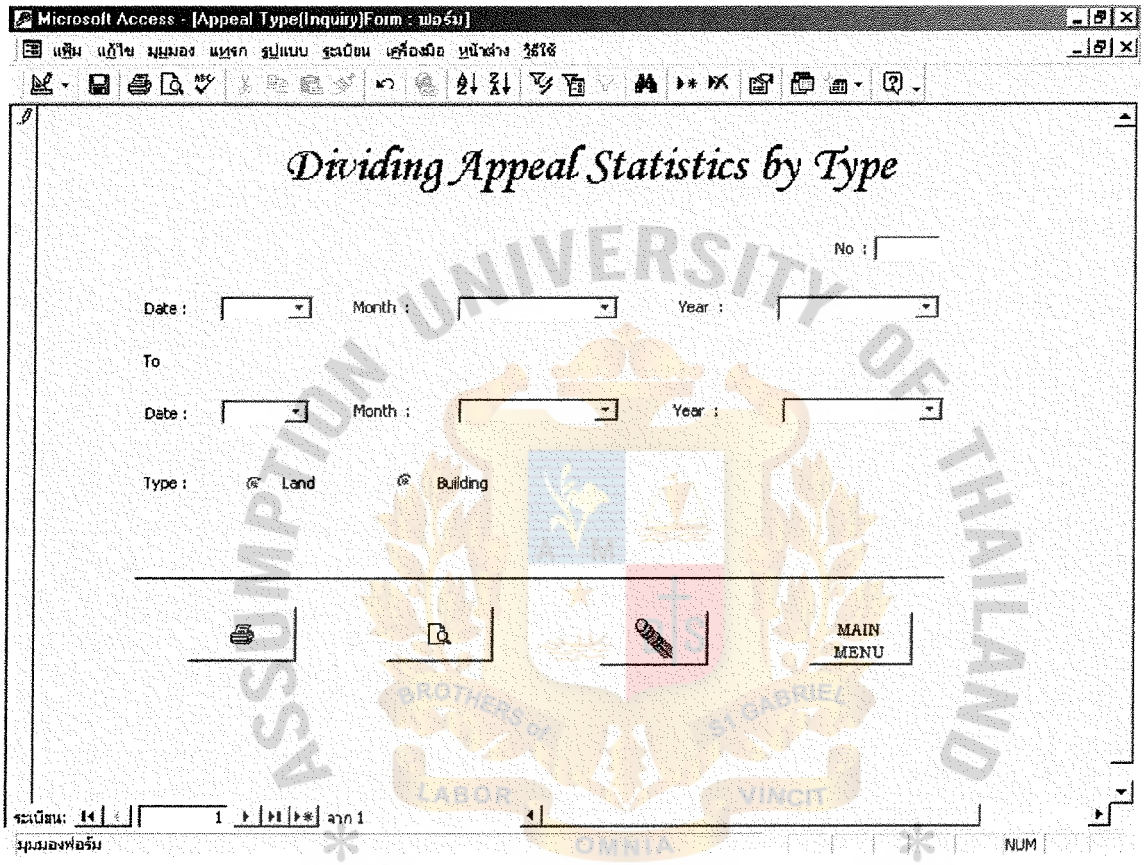

Figure A.20. Dividing Appeal Statistics by Type.

APPENDIX B

REPORT DESIGN

ASSUMPTION UNIVERSITY OF THAILAND
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Appeal Organization

Appellate Document Report

Administration System Page:1

Compensation Division Date:1/31/2001

Appeal Code	Date	Topic	Type	Route number	Operative Section	File No.	Sender
CD2001/125	1/2/2001	Ask for more price-	Building	425	4	54	Siriporn
CD2001/547	1/2/2001	Ask for more price-	Land	754	2	24	Surairat
CD2001/785	1/2/2001	Ask for more price-	Land	754	2	24	Siriporn
CD2001/829	3/1/2001	Ask for more price-	Building	425	4	54	Surairak
CD2001/829	3/1/2001	Ask for more price-	Land	754	2	24	Surairat
CD2001/829	1/3/2001	Ask for more price-	Land	246	1	12	Siriporn
CD2001/829	1/3/2001	Ask for more price-	Land	246	1	12	Surairak
CD2001/829	1/3/2001	Ask for more price-	Building	246	1	12	Siriporn
CD2001/829	1/3/2001	Ask for more price-	Land	754	2	24	Siriporn

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Figure B.1. Appellate Document Report.

Appeal Organization

Appeal Type (Land) Report

Administration System

Page:1

Compensation Division

Date:1/31/2001

Land No.	Appeall Code	Deed No.	Location	Amount of Land	Initial Price	Requested Price	Recoder
L2550	CD2001/1456	4561472	Sukapibarn opposite with market town	42 square yard	450,000	620,000	Vipa
L2551	CD2001/4789	4789526	Parjeanburi near bangnaprung	12 rai 9 square yard	126,000	250,000	Vipa
L2552	CD2001/7896	9865492	Mahachai garden park in the town.	14 square yard	45,000	65,000	Vipa
L2553	CD2001/4589	3512842	Samutsakorn near center park.	1 rai 10 square yard	859,000	1,200,000	Siriporn
L2554	CD2001/7892	5487215	Supana Resort in Ratrumkaew	12 square yard	12,000	24,000	Siriporn
L2555	CD2001/8932	9351721	Pinkround-Nakornchaise Road near Putamonton	2 rai 12 square yard	57,000	64,000	Vipa
L2556	CD2001/8382	1374291	Bangkapi Road near the Mall Departmentstore	50 square yard	503,000	580,000	Vipa
L2557	CD2001/9953	2432932	Sukumvit71 Road near Bangkok Bank	15 square yard	53,000	75,000	Siriporn
L2558	CD2001/8961	3452781	Krongsan Center Park	75 square yard	157,000	250,000	Vipa

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Figure B.2. Appeal Type (Land) Report.

Appeal Organization

Appeal Type (Building) Report

Administration System

Page:1

Compensation Division

Date:1/31/2001

Building No.	Appeal Code	Description	Initial Price	Requested Price	Recoder
B2456	CD2001/4523	Concret house with a big garden built for 12 years.	450,000	500,000	Siriporn
B2457	CD2001/7895	Twin house built for 7 years at route number 329 near center market.	245,000	250,000	Vipa
B2458	CD2001/7525	House built for 20 years and have to demolish about 50% of a house.	750,000	800,000	Vipa
B2459	CD2001/2145	Concret house built for 5 years surround by a wooden fence.	250,000	450,000	Siriporn
B2460	CD2001/6521	House built for 2 years with a big pond.	450,000	480,000	Vipa
B2461	CD2001/6872	Twin house built for 3 years in the Garden Village near Senakarin road.	129,000	200,000	Siriporn
B2462	CD2001/5421	House with a small garden built for 5 years have to demolish about 20%.	543,000	650,000	Vipa
B2463	CD2001/4251	Apartment house with a lot of facility built for 7 years.	1,800,000	2,000,000	Siriporn
B2464	CD2001/6321	House built for 20 years have to demolish about 60% of the house.	240,000	300,000	Siriporn

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Figure B.3. Appeal Type (Building) Report.

Appeal Organization

Operative Performance Report

Administration System Page:1

Compensation Division Date:1/31/2001

Appeal Code	Date	Description	Operative Name	Recoder
CD2001/1245	1/9/2001	Contact to appeallant and ask for additional documents	Tamma	Vipa
	1/15/2001	Receive the additioal document with consists of ID Card and the title deed of land	Tamma	Vipa
CD2001/5789	1/10/2001	Contact to appellant to ask for additional document which consists of map of surrendered land , and ID Cai	Somsri	Siriporn
	1/22/2001	Receive all of the requested additional document	Somsri	Siriporn
	1/24/2001	Prepare a survey form	Somsri	Siriporn
	1/29/2001	Survey at the surface of land	Somsri	Siriporn
CD2001/6753	1/11/2001	Prepare a survey form	Pongsak	Vipa
	1/17/2001	Survey at the surface of land	Pongsak	Vipa
	1/29/2001	Submit the summary to the committees	Pongsak	Vipa

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Figure B.4. Operative Performance Report.

Appeal Organization

Approval Report

Administration System Page:1

Compensation Division Date:1/31/2001

Appeal Code	Date	Description	Approved By	Recoder
CD2001/4578	1/12/2001	Approved the surrender land from 150,000 to 180,000 b because the different between market price and the surrendered land price.	Mr. Airirak Tammadi Mr. Saload Tamari Mr. Suvid Sritarmo	Siriporn
CD2001/7548	1/14/2001	Approved the surrender building from 12,000 to 15,000 because the support information.	Mr. Saload Tamari Mr. Airpirak Tammadi Mr. Suvid Sritarma	Siriporn
CD2001/5321	1/19/2001	Unapproved the appeal document because the suppor information is not enough.	Mr. Saload Tamari Mr. Suvid Sritamo Mr. Thondi Parkpum	Siriporn

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Figure B.5. Approval Report.

Appeal Organization

Outflow Document Report

Administration System Page:1

Compensation Division Date:1/31/2001

Date	Sending Code	Appeal Code	Receiver	Description	Recoder
1/15/2001	SD 3521	CD2001/1524	General Affairs Division	Inform the result of appeal consideration.	Siriporn
1/15/2001	SD3522	CD2001/1631	Finance Division	To request payment of money for Mr. Montee Pungsutigerl	Siriporn
1/15/2001	SD3523	CD2001/1761	General Affairs Division	Explain about the appeal of Ms. Kung Puntavasin.	Siriporn
1/15/2001	SD3524	CD2001/1781	Finance Division	Request the advance payment of meeting.	Vipa
1/15/2001	SD3525	CD2001/1792	General Affairs Division	To make a clear understanding about the appeal consider	Siriporn
1/16/2001	SD3526	CD2001/1892	Finance Division	Request for the prepaid expense paid by Ms. Sukanya Na	Vipa
1/16/2001	SD3527	CD2001/1972	Legal Division	Please return the appeal information no. CD2001/1972.	Vipa
1/16/2001	SD3528	CD2001/1723	General Affairs Division	Inform the result consideration of Ms. Pong Tumma.	Vipa
1/16/2001	SD3529	CD2001/6531	General Affairs Division	Explain about the appeal consideration no. CD2001/6531.	Siriporn

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Figure B.6. Outflow Document Report.

Appeal Organization

Inform to Related Division Report

Administration System Page:1

Compensation Division Date:1/31/2001

Inform Code	Date	Inform To	From	Receiver	Sender
IC001131	1/3/2001	General Affairs Division	Compensation Division	Pataraporm	Siriporn
IC001132	1/3/2001	Legal Division	Compensation Division	Naiyana	Surairat
IC001133	1/3/2001	General Affairs Division	Compensation Division	Pataraporm	Siriporn
IC001134	1/3/2001	General Affairs Division	Compensation Division	Pataraporm	Surairak
IC001135	1/4/2001	General Affairs Division	Compensation Division	Pataraporm	Surairat
IC001136	1/4/2001	Legal Division	Compensation Division	Naiyana	Siriporn
IC001137	1/4/2001	Legal Division	Compensation Division	Naiyana	Surairak
IC001138	1/4/2001	General Affairs Division	Compensation Division	Pataraporm	Siriporn
IC001139	1/4/2001	General Affairs Division	Compensation Division	Pataraporm	Siriporn

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Figure B.7. Inform to Related Division Report.

Appeal Organization

Inform Consideration Result Report

Administration System Page:1

Compensation Division Date:1/31/2001

Inform No.	Date	Inform To	Description	Sender
IN1230	1/5/2001	Mr. Suchart Chaiyarm	Approved appeal	Siriporn
IN1231	1/5/2001	Ms.Virairat Roadjana	Approved appeal	Surairat
IN1232	1/6/2001	Ms.Pavida Namjaitai	Approved appeal	Siriporn
IN1233	1/8/2001	Mr.Kundirok Sittirak	Unapproved appeal	Surairak
IN1234	1/8/2001	Mr. Tongsuck Chungasa	Approved appeal	Surairat
IN1235	1/9/2001	Ms. Laor Bunpasok	Approved appeal	Siriporn
IN1236	1/9/2001	Mr.Somchai Kongsing	Approved appeal	Surairak
IN1237	1/9/2001	Ms. Ranorm Pisuit	Approved appeal	Siriporn
IN1238	1/9/2001	Mr. Sip Nudot	Approved appeal	Siriporn

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Figure B.8. Inform Consideration Result Report.

Appeal Organization

Acknowledgement Report

Administration System

Page:1

Compensation Division

Date:31/01/2001

Date	Appeal Code	Additional Document	Receiving Date	Sender
1/12/2001	CD2001/2458	ID Card The title of the surrendered land	1/5/2001	Siriporn
1/12/2001	CD2001/4586	_	1/10/2001	Siriporn
1/13/2001	CD2001/7858	ID Card Picture of the surrendered land	1/10/2001	Surairak
1/17/2001	CD2001/4785	Map of land	1/15/2001	Siriporn
1/18/2001	CD2001/5582	ID Card	1/15/2001	Surairak
1/18/2001	CD2001/3356	_	1/15/2001	Siriporn
1/20/2001	CD2001/2542	Picture of the surrendered land	1/15/2001	Siriporn

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Figure B.9. Acknowledgement Report.

Appeal Organization

Appellant Information Report

Administration System Page:1

Compensation Division Date:1/31/2001

Name	Surname	ID Card No.	Address	Telephone No.	Recoder
Mr. Tongyu	Chumkasa	4 2012 01254 35 8	1028 Huatai PunPin Suratani Province	(077) 548635	Siriporn
Ms. Lao	Bunpasop	9 3102 04532 45 4	1704 Huatai PunPin Suratani Province	(077) 321566	Vipa
Mr. Aue	Sumnutsa	5 2145 40525 48 2	164 Huatai PunPin Suratani Province	(077) 458315	Siriporn
Mr. Somchai	Kongsin	8 6458 02156 45 3	9813 Vaipadu Mearn Suratani Province	(077) 215621	Vipa
Ms. Benjar	Tongjean	4 3154 25161 25 1	303 Huatai PunPin Suratani Province	(077) 215425	Surairat
Mr. Ranong	Pisuit	5 1245 12458 12 5	925 Srivichai Punpin Suratani Province	(077) 514663	Siriporn
Mr. Sin	Vongsing	6 1246 34165 25 4	213 PinkroundNakornChaisi Bangkok	(02) 2436351	Surairak
Ms. Taptim	Bunma	6 3142 34521 25 3	7585 Meang ChongTai Chainart Province	(056) 540789	Vipa
Mr. Viroat	Ainkring	9 2635 53114 25 5	56 Vatana Krongyai Nontaburi Province	(02) 4582542	Siriporn

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Figure B.10. Appellant Information Report.

Appeal Organization

Route Report

Administration System Page:1

Compensation Division Date:1/31/2001

Route Number	Route Name	Note
31	Meanburi-Rumruka-Jumnoi	
36	Saraburi-Kaukard	
304	Krongtun-Lardkabung	
338	Lopburi	
343	Puket	
352	Pitsanuloak	
355	Autai-Pache	
402	Nongknuhow	
1058	Talor-Nayound	
1084	Yak Putamonton II	
1769	Kronglung-Krongjai	
2321	Dindang-Rungsit	
3041	Tangradup Romkround	
3053	Wai Pakoke	
3056	Kanu-Kownlead	
3079	Janvatana Road	

Print by: Vipa Tangtong

Figure B.11. Route Report.

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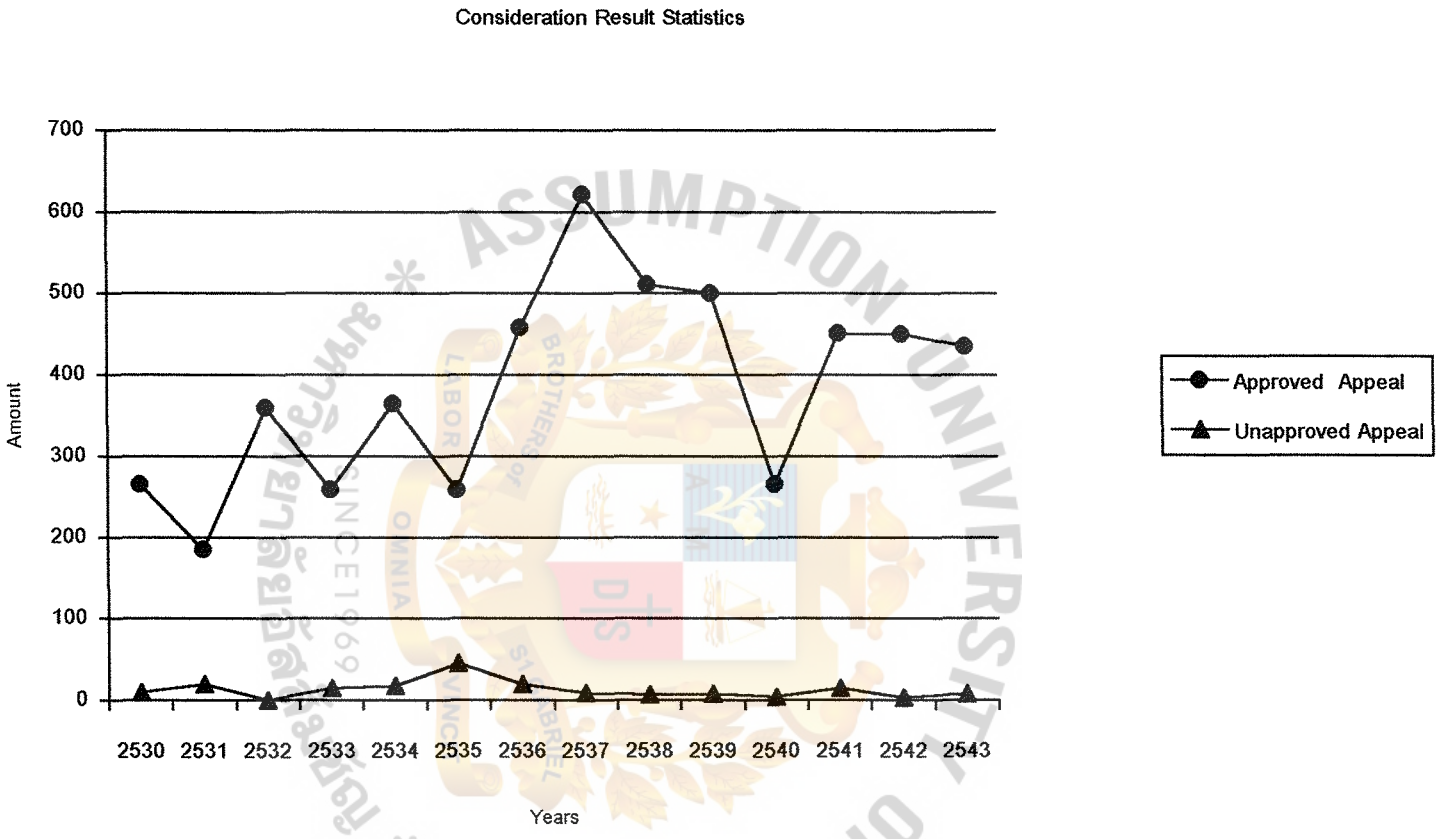

Figure B.12. Consideration Result Statistics Report.

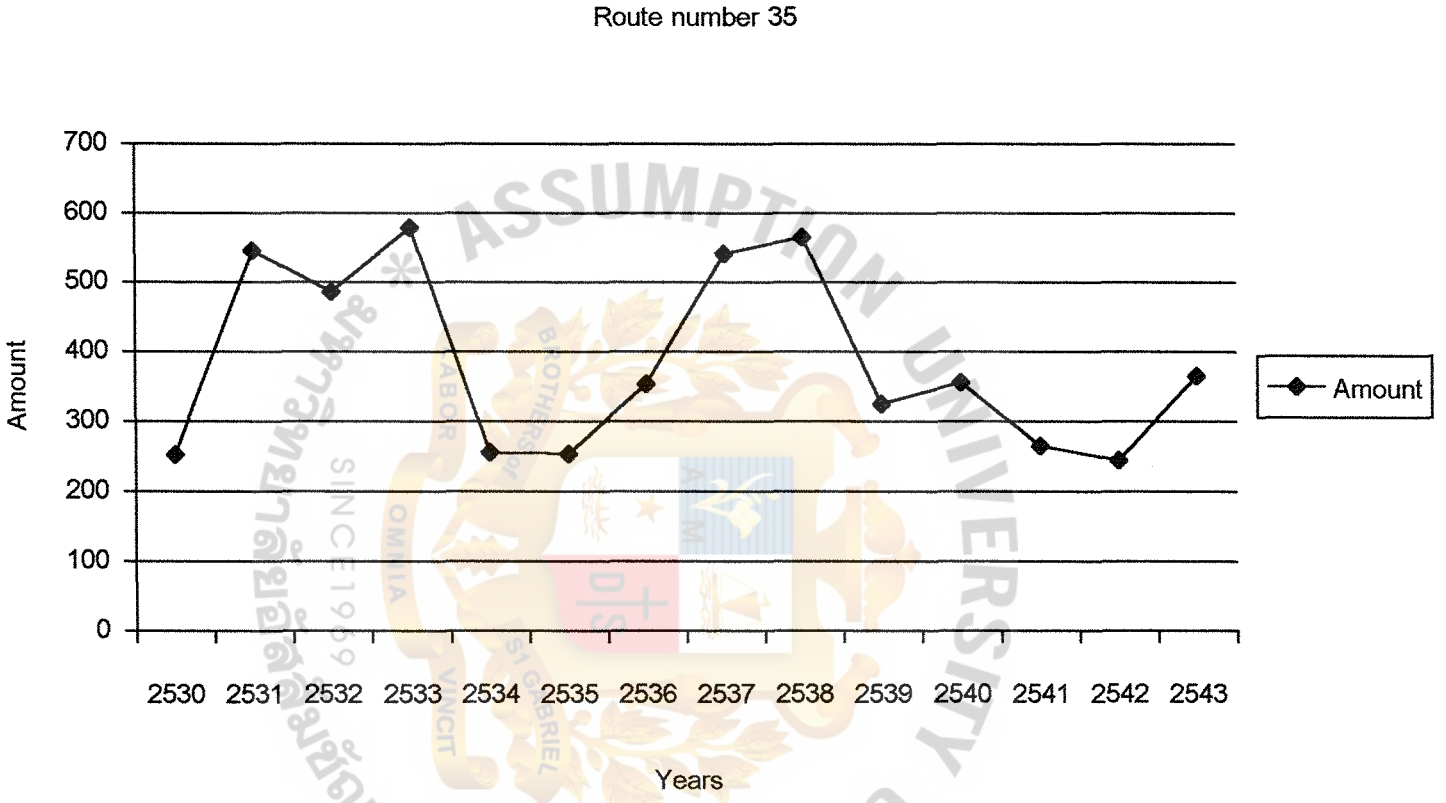

Figure B.13. Route Appeal Statistics Report.

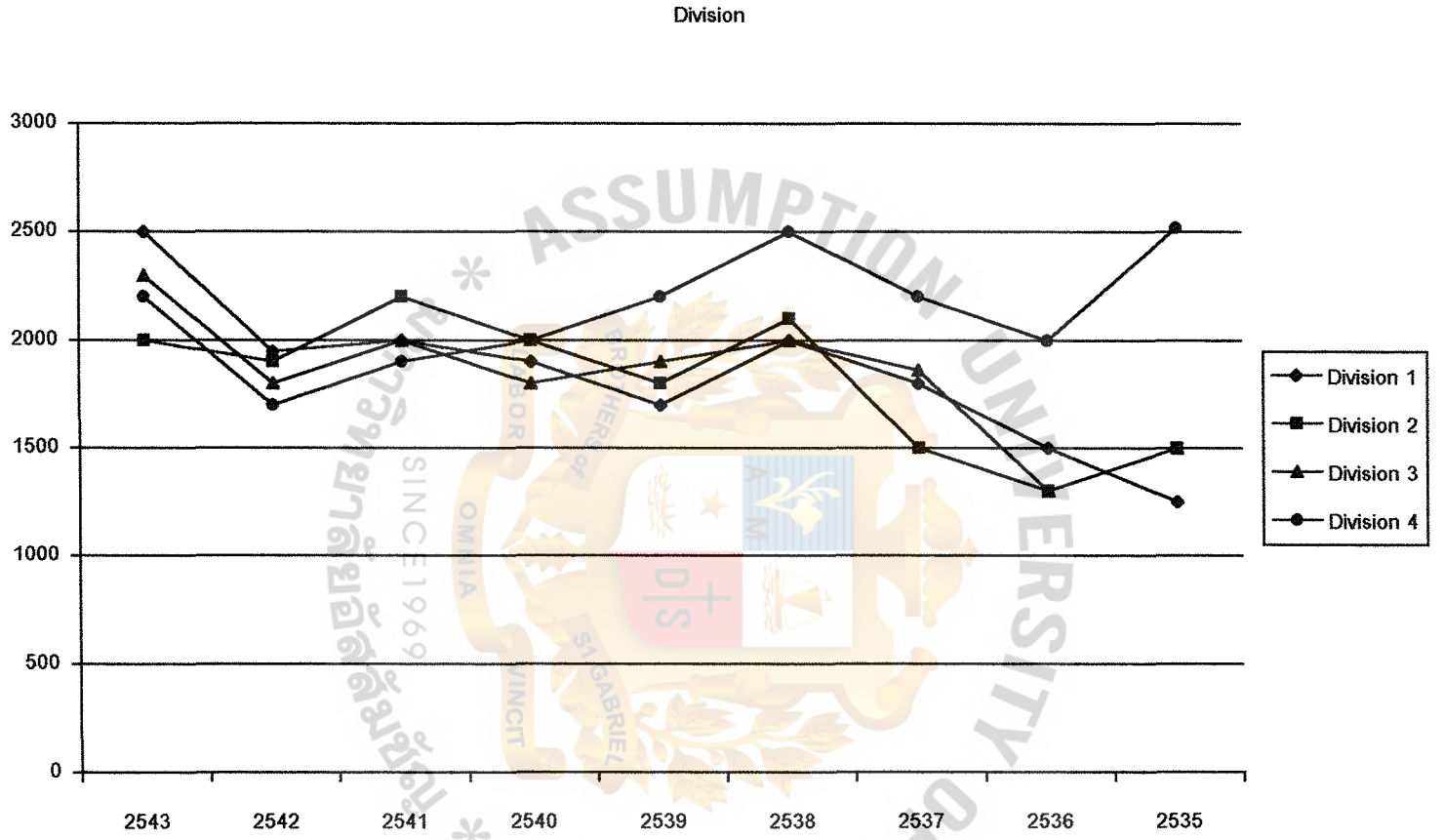

Figure B.14. Operative Section Appeal Statistics Report.

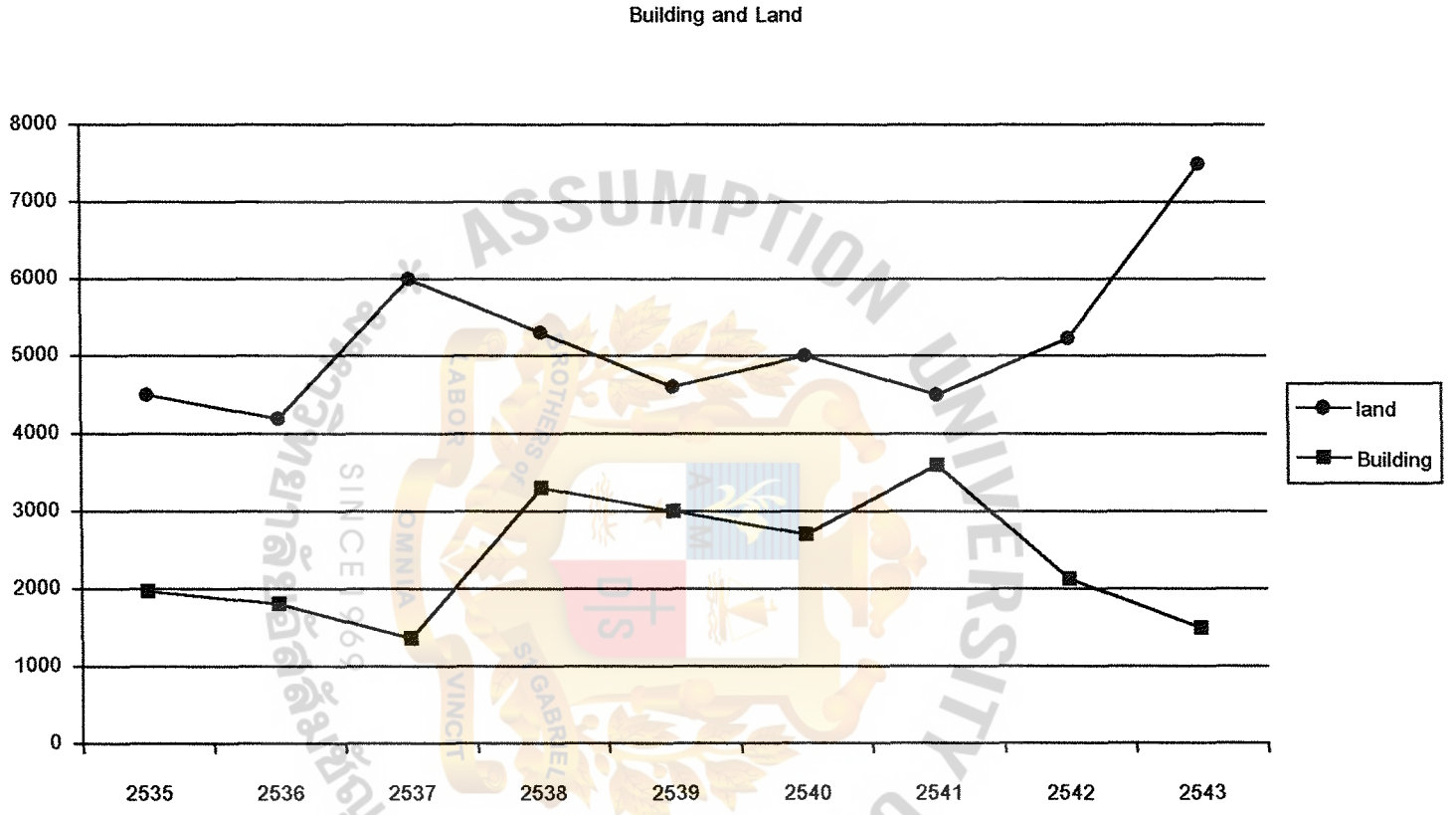

Figure B.15. Appeal Type Statistics Report.

APPENDIX C

DATABASE DESIGN

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Administration Information System's Database

Table C.1. Appellant.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Appellant number	Text	Y	Y	-	-	Primary key
Appellant name	Text	-	-	-	-	Attribute
Appellant surname	Text	-	-	-	-	Attribute
Appellant address	Text	-	-	-	-	Attribute
Appellant phone	Int(15)	-	-	-	-	Attribute
Appellant ID card	Int(10)	-	Y	-	-	Attribute
Appellant gender	Text	-	-	-	-	Attribute

Table C.2. Appellate Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Appellate number	Text	Y	Y	-	-	Primary key
Appellant number	Text	-	Y	-	-	Foreign Key
ID administrator	Text	-	Y	-	-	Foreign Key
ID operative person	Text	-	Y	-	-	Foreign Key
Appellate type	Text	-	-	-	-	Attribute
Appellate topic	Text	-	-	-	-	Attribute
Appellate date	Date/time	-	-	-	mm/dd /yy	Attribute
Appellate deed	Text	-	Y	-	-	Attribute

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Table C.3. Consideration Result.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Consideration number	Text	Y	Y	-	-	Primary key
ID administrator	Text	-	Y	-	-	Foreign Key
Appellate number	Text	-	Y	-	-	Foreign Key
Consideration description	Text	-	-	-	-	Attribute
Consideration date	Date/time	-	-	-	-	Attribute

Table C.4. Statistics.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Appellate number	Text	Y	-	-	-	Primary key
Consideration number	text	Y	-	-	-	Primary key
Incomplete appeal	Int(15)	-	-	-	-	Attribute

Table C.5. Building.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Building number	Text	Y	Y	-	-	Primary key
Appellate number	Text	-	Y	-	-	Foreign Key
Building description	Text	-	-	-	-	Attribute
Price	Int(30)	-	-	-	-	Attribute

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Table C.6. Land.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Land number	Text	Y	Y	-	-	Primary key
Appellate number	Text	-	Y	-	-	Foreign Key
Land description	Text	-	-	-	-	Attribute
Initial price	Int(30)	-	-	-	-	Attribute
Market price	Int(30)	-	-	-	-	Attribute

Table C.7. Operative Section.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
ID operative person	Text	Y	Y	-	-	Primary key
Operative name	Text	-	-	-	-	Attribute
Operative surname	Text	-	-	-	-	Attribute
Operative level	Text	-	-	-	-	Attribute
Operative responsibility	Text	-	-	-	-	Attribute
Operative region	Text	-	-	-	-	Attribute

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Table C.8. Administrator.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
ID administrator	Text	Y	Y	-	-	Primary key
Administrator name	Text	-	-	-	-	Attribute
Administrator surname	Text	-	-	-	-	Attribute
Administrator level	Text	-	-	-	-	Attribute
Administrator responsibility	Text	-	-	-	-	Attribute

Table C.9. Acknowledgement Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Acknowledgement number	Text	Y	Y	-	-	Primary key
ID administrator	Text	-	Y	-	-	Foreign Key
Appellate number	Text	-	Y	-	-	Foreign Key
Acknowledgement address	text	-	-	-	-	Attribute
Acknowledgement date	Date/time	-	-	-	mm/dd /yy	Attribute

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Table C.10. Inform Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Inform number	Text	Y	Y	-	-	Primary key
ID administrator	Text	-	Y	-	-	Foreign Key
Appellate number	Text	-	Y	-	-	Foreign Key
Inform date	Date/time	-	-	-	-	Attribute
Inform division	Text	-	-	-	-	Attribute
Inform description	Text	-	-	-	-	Attribute
Reply date	Date/time	-	-	-	-	Attribute

Table C.11. Outflow Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Outflow number	Text	Y	Y	-	-	Primary key
Inform number	Text	-	Y	-	-	Foreign Key
ID administrator	Text	-	Y	-	-	Foreign Key
Acknowledgement number	Text	-	Y	-	-	Foreign Key
Outflow date	Text	-	-	-	-	Attribute
Outflow file	Text	-	-	-	-	Attribute

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Table C 12. Inflow Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Inflow number	Text	Y	Y	-	-	Primary key
Appellate number	Text	-	Y	-	-	Foreign Key
ID administrator	Text	-	Y	-	-	Foreign Key
Inflow date	Date/time	-	-	-	-	Attribute

Table C 13. Reply Document.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Reply number	Text	Y	Y	-	-	Primary key
ID administrator	Text	-	Y	-	-	Foreign Key
Inform number	Text	-	Y	-	-	Foreign Key
Reply date	Date/time	-	-	-	mm/dd /yy	Attribute
Reply description	Text	-	-	-	-	Attribute

Table C 14. Operative Performance.

Field Name	Field Type	Index	Unique	Null able	Check	Key Type
Performance number	Text	Y	Y	-	-	Primary key
ID administrator	Text	-	Y	-	-	Foreign Key
Operative date	Date/time	-	-	-	-	Attribute
Operative description	Text	-	-	-	-	Attribute

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APPENDIX D

STRUCTURE CHART

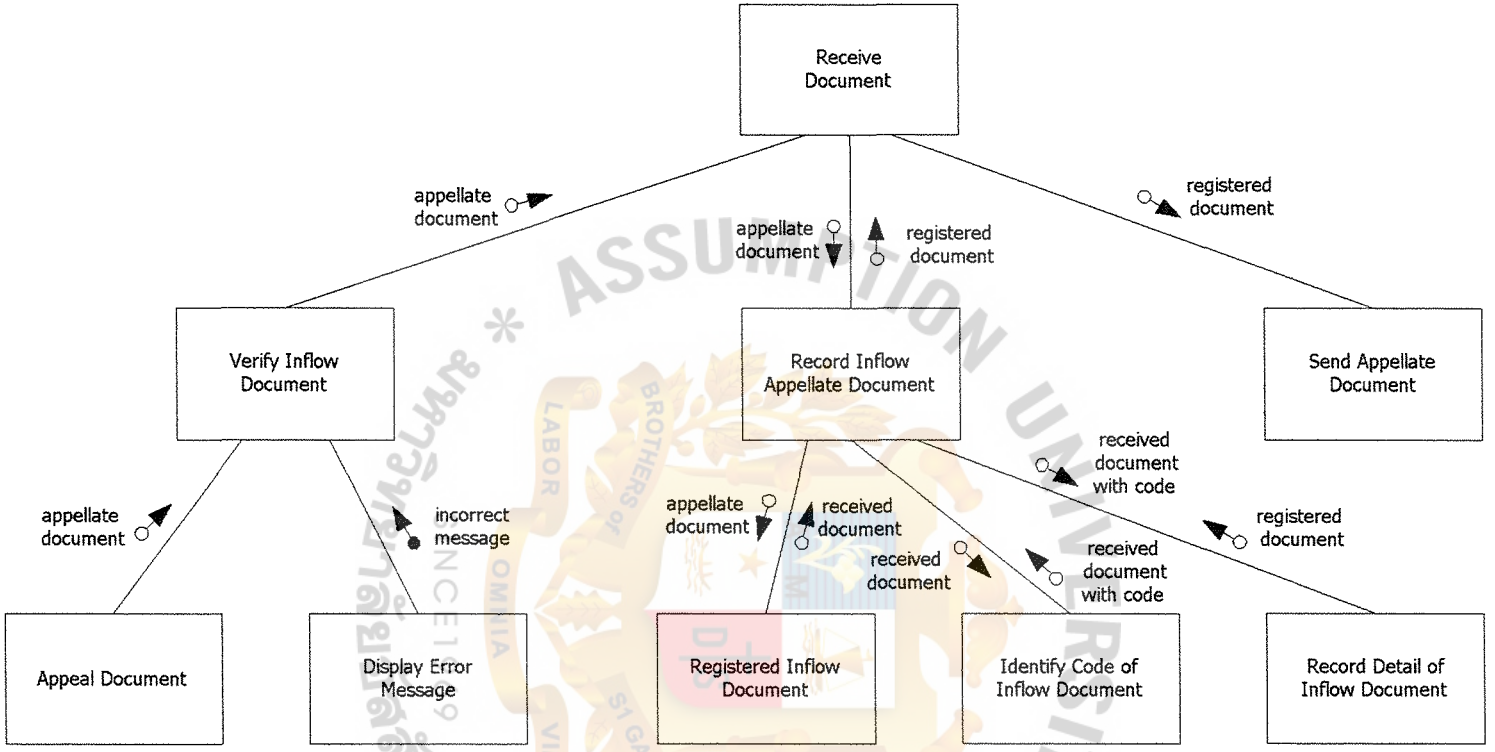

Figure D.1. Structure Chart of Receiving Document Process.

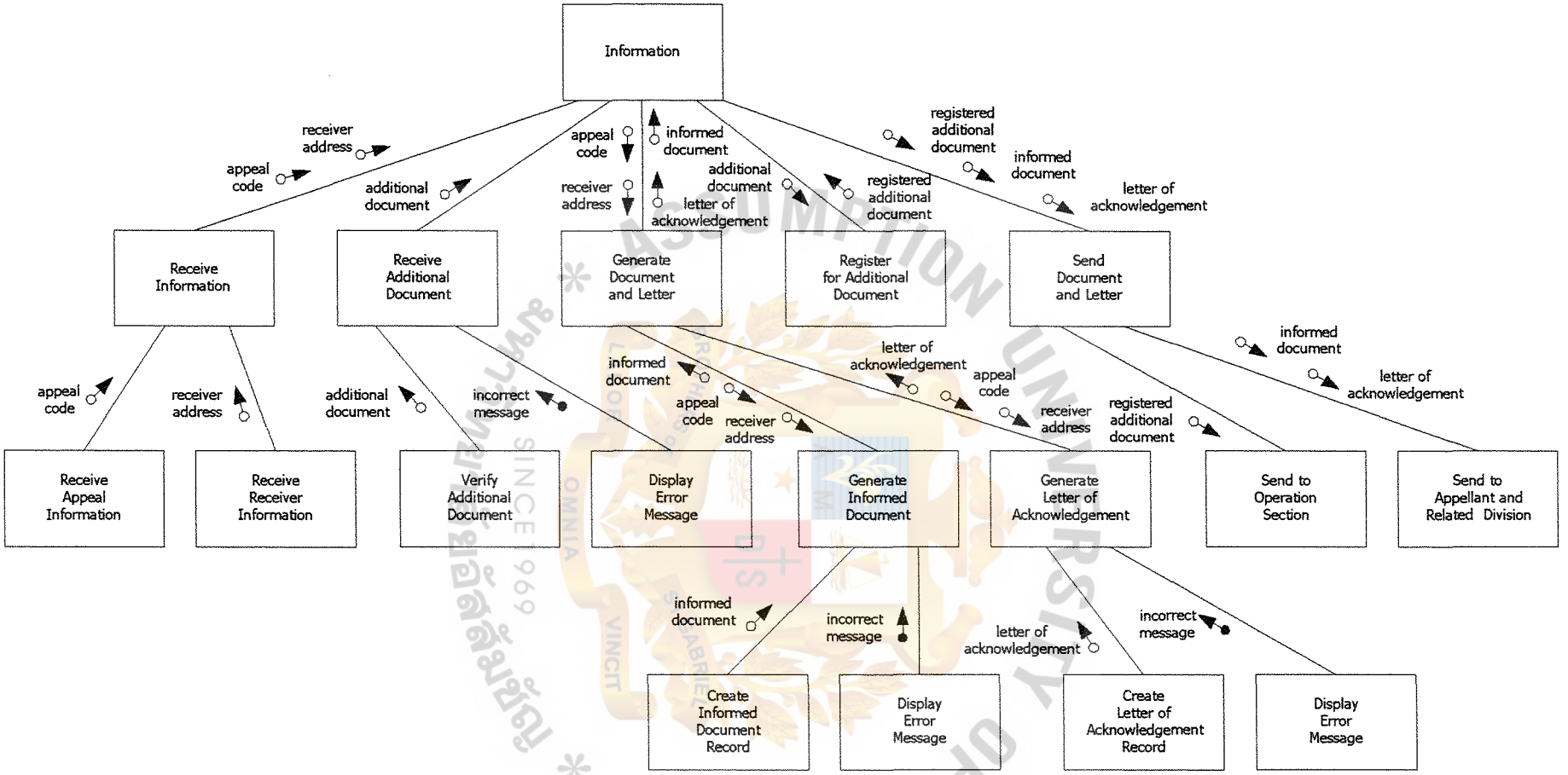

Figure D.2. Structure Chart of Information Process.

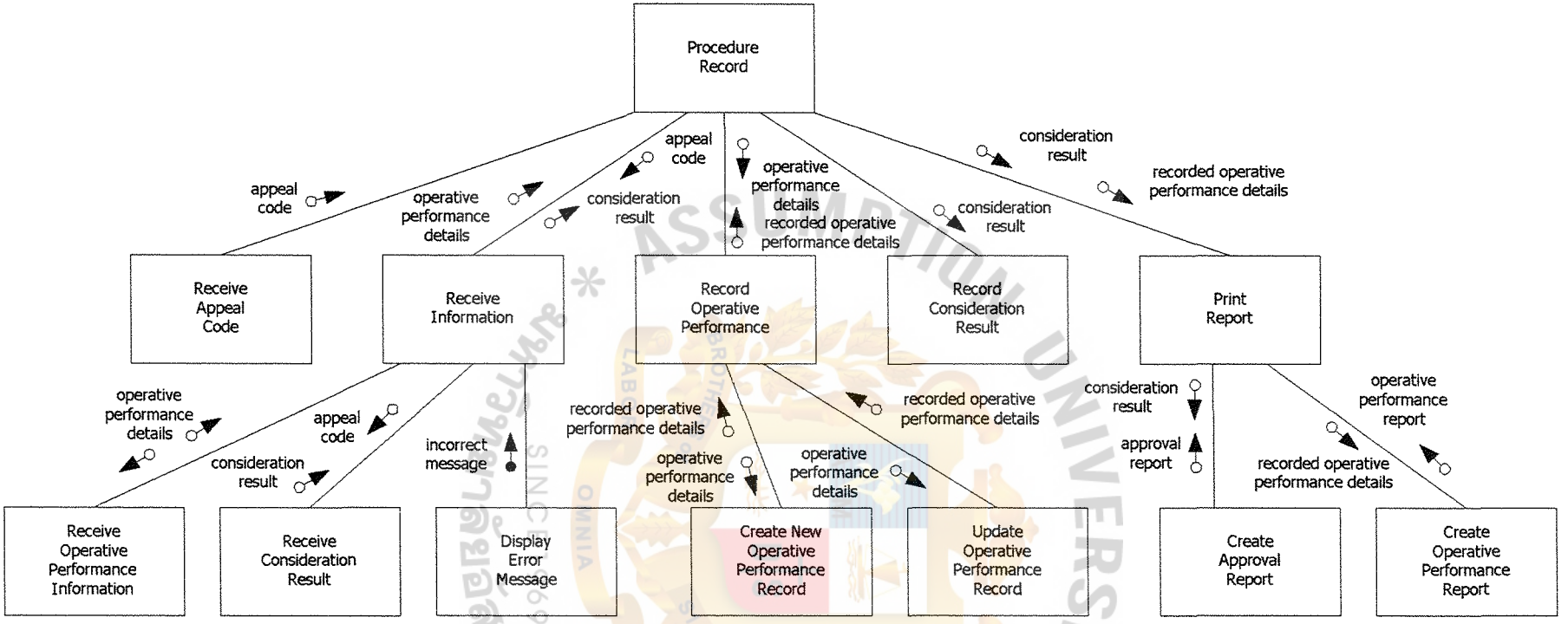

Figure D.3. Structure Chart of Procedure Record Process.

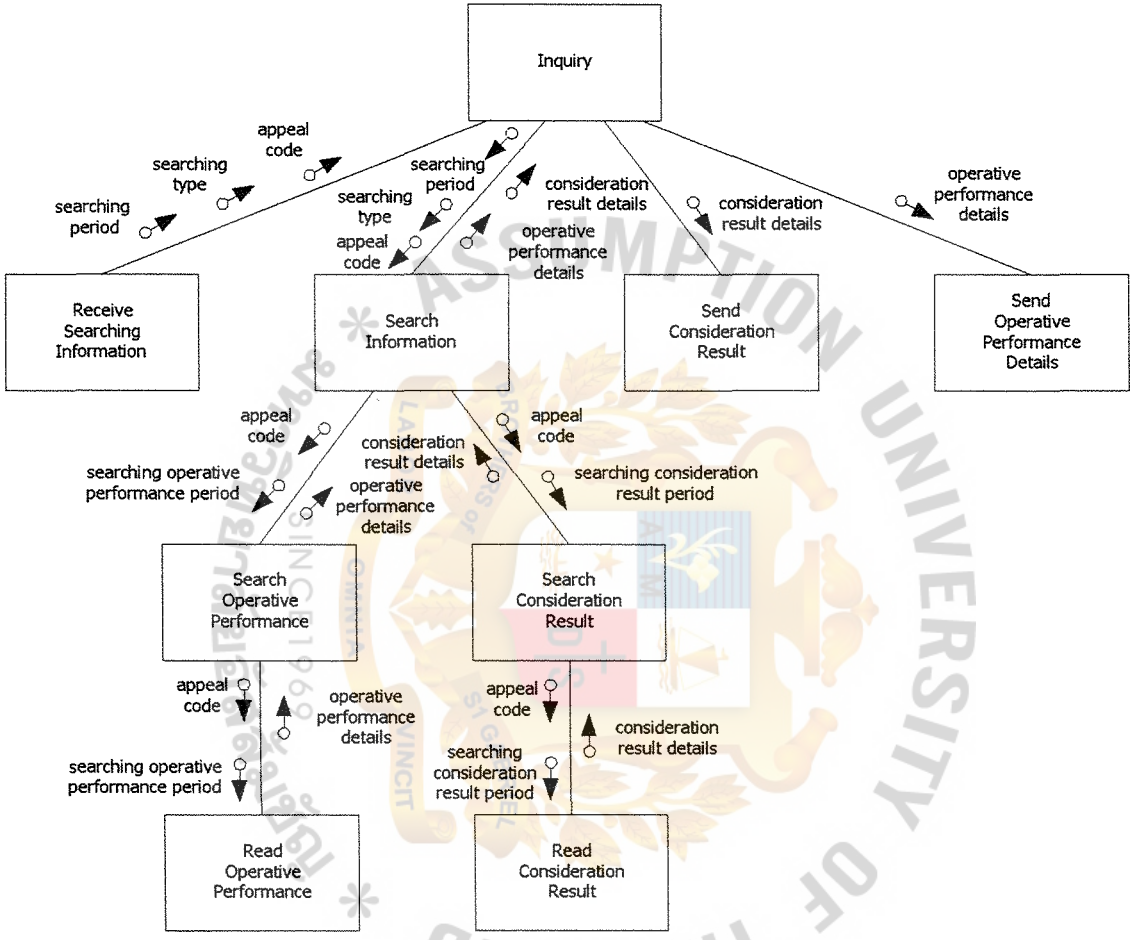

Figure D.4. Structure Chart of Inquiry Process.

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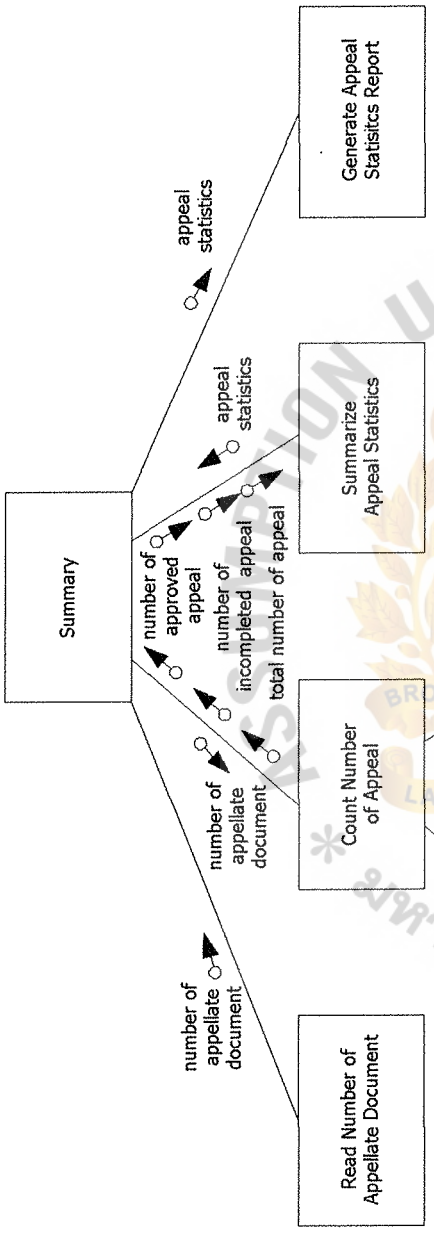

Figure D.5. Structure Chart of Summary Process.

APPENDIX E

PROCESS SPECIFICATION

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PROCESS SPECIFICATION

Module Name: Receiving document process.

Function: To receive the appeal document into the administration information system.

Input: Appellate document.

Output: Registered document.

Process:

```
Begin
    Get inflow document from the appellant;
    Input inflow document into the system;
    If inflow document is valid then
        Create a new record for appeal document;
        Get registration number;
        Get code of appeal;
        Input detail of appeal document on record;
        Send appeal document to operative section;
    Else
        Display error message on screen;
    End if;
End;
```

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Module Name: Information process.

Function: To inform the necessary information to the related section such as operative section, appellant, and related division.

Input: Appeal code, receiver address, and additional document.

Output: Registered addition document, informed document, and letter of acknowledgement.

Process:

```
Begin
    Get appeal code from operation section;
    Input appeal code into the system;
    Get receiver name from operation section;
    Find receiver address from the appellant table;
    Get kind of document from operation section;
    Input kind of document;
        Case
            Kind of document = informed document;
                If informed document is valid then
                    Create informed document record;
                    Send to related division;
                Else
                    Display error message;
                End if;
            Kind of document = acknowledgement letter;
                If letter of acknowledgement is valid then
                    Create letter of acknowledgement record;
```

```
                Print letter of acknowledgement;
            Else
                Display error message;
            End if;
        Kind of document = additional document;
            If additional document is valid then
                Put register number on additional document;
                Send to operation section;
            Else
                Display error message;
            End if;
    End if;
End case;
End;
```

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Module Name: Procedure record process

Function: To record consideration result and operative performance which come from the operation section and director into the system.

Input: Appeal code, kind of information.

Output: Approval report, operative performance report.

Process:

```
Begin
    Get appeal code;
    Input appeal code into the system;
    If appeal code is valid then
        Input kind of information into the system;
        Do case;
            Kind of information = operative performance information;
                If operative performance information is not found then
                    Create a new operative performance record;
                    Input new operative performance details into the system;
                Else
                    Read operative performance from inflow tables;
                    Input operative performance details into the system;
                End if;
            Kind of information = consideration result;
                Input consideration result into the consideration details table;
        End case;
        If print report is needed then
            Input kind of report;
```

```
                Do case
                    Kind of report = approval report;
                        Input appeal period;
                        Print approval report;
                    Kind of report = operative performance report;
                        Input appeal period;
                        Print operative performance report;
                End case;
            Else
                Display the approval report on screen;
                Or display operative performance report on screen;
            End if;
        Else
            Display error message;
        End if;
End
```

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Module Name: Inquiry process.

Function: To search the progress of operative performance and consideration result from the inflow document and consideration details table.

Input: Appeal code, searching period, and searching type.

Output: Consideration result details, operative performance details.

Process:

```
Begin
    Get appeal code from operative section;
    Input appeal code into the system;
    Get searching type of appeal document;
    Input searching type into the system;
    Get searching period of appeal document.
    Input searching period into the system;
    Do case
        Searching type = operative performance;
            Read operative performance details from inflow document table;
            Send operative performance details to the requested section;
        Searching type = consideration result;
            Read consideration result from consideration result table;
            Send consideration result to the requested section;
    End case;
End;
```

Module Name: Summary process.

Function: To summary the number of incompleted appeal, approved appeal, and total number of appeal for generating the appeal statistics report.

Input: Number of appellate document.

Output: Appeal statistics.

Process:

Begin

Do while no more appellate document;

Read appellate document from the inflow document table;

If appeal document is incompleted appeal then

Add appeal document in the number of incompleted appeal;

Count number of incompleted appeal;

Else

Add appeal document in the number of approved appeal;

Count number of approved appeal;

End if;

Add number of incompleted appeal and number of approved appeal;

Create appeal statistics report;

Print appeal statistics report;

End;

APPENDIX F

DATA DICTIONARY

ASSUMPTION UNIVERSITY OF THAILAND
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DATA DICTIONARY

Table F.1. Data Dictionary for the Process Model.

Object name	Meaning
Acknowledgement letter	The administration sends the letter to the appellants to inform them that the Appeal Compensation Division has received their appeal document already.
Additional document	The additional document is the document that is sent by the related division.
Administration information system	The primary system takes care of the flowing in and out of the document to the Appeal Compensation Division.
Administrator's name	The name of the administrator who takes responsible for an appeal document.
Administrators file	This is the file keeping the information of the administrator who works in the Appeal Compensation Division.
Appellant	Person who sends the appellant document to the Appeal Compensation Division.
Appellate document	The administrator receives the appellate document such as the title deed to a piece of land, the informed document, the trading cost, and picture of surrender lands.
Consideration detail	The consideration detail is the final result that is proved by the committee.
Consideration details file	This is the file keeping the consideration results of the appeal announced by the committee.
Consideration result	The result of the appeal consideration approved by the director.
Consideration result document	This is the file sent to the related divisions to inform them about the result of consideration.
Consideration result letter	The letter is sent to the appellant to inform them about the result of consideration.

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Table F.1. Data Dictionary for the Process Model (Continued).

Object name	Meaning
Create informed document	The informed document is the document that is sent to the related division to inform them of the inflowing appeal document and send any necessary information to the Appeal Compensation Division.
Detail information	The detail of the appeal document is sent to the operative sections.
Directors	The committees who give the consideration result for each appeal.
Generate letter of acknowledgement	The letter of acknowledgement is the letter that is sent to the appellant. In this way, the appellant can know that the appeal document has been submitted to the Appeal Compensation Division.
Generate statistics chart	The administrator generates the chart for helping the authorized persons aware of their performances.
Identify code of inflow document	All of the documents sent to the administration section must have an identification code to make it easier to find after a period of time.
Inflow document	This is the document flowing in to the Appeal Compensation Division.
Inflow documents file	This is the file keeping the document flowing in the Appeal Compensation Division.
Inform consideration detail	The consideration detail must be informed to the related divisions and the appellant.
Informed document	The informed document is the document sent to the related division so the related divisions can send the necessary information to the Appeal Compensation Division.
Letter of acknowledgement	This is the letter sent to the appellant after the administrator receives the appellate document.
Notification document	This is the document that informs about the result of consideration.

Table F.1. Data Dictionary for the Process Model (Continued).

Object name	Meaning
Number of appeal	This is the total number of appeals after passing the process of summarizing statistics.
Number of appellant	The total number of the appeal documents flowing in the Appeal Compensation Division.
Number of appellate document	The total number of the appeal documents flowing in the Appeal Compensation Division.
Number of approved appeal	This is the number of the appeal document that is proved by the directors.
Number of work in process appeal	The incomplete appeal document.
Number of work in process appeal	The work in process appeal document.
Operative performance	The operative performance is the work being done by the operative sections.
Operative sections	One of the sections in the Appeal Compensation Division that performs the operating function.
Outflow document	This is the document flowing out from the Appeal Compensation Division.
Outflow documents file	This is the file keeping the document flowing out from the Compensation Division.
Process of information	The purpose of this process is to inform other related divisions about the appeal documents flowing in the Appeal Compensation Division.
Process of inquiry	This process helps the operative sections receive the necessary information.
Process of procedure record	This process will record about the operative performance and the consideration result coming from the director.

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Table F.1. Data Dictionary for the Process Model (Continued).

Object name	Meaning
Process of receiving document	This process is performed when the appellant sends the appellate document to the Appeal Compensation Division. It is the first process of the administration section. This process consists of register inflow document, identification code of inflow document, and record detail of document.
Process of summary	The summation of the number of appeal document is generated by the administrator in this process.
Received appeal document with code	The document with its code to make it easier to refer back.
Received document	This is the document that is received by the administrator of the Appeal Compensation Division.
Record consideration result	After the director having the meeting and given the consideration result, the administrator must record it in the file.
Record detail of document	The important designed detail of information must be recorded in the file of inflow document.
Record operative performance	The purpose of this function is to make the authorized persons know about the progress of work.
Register for additional document	All of the additional documents have to be registered by the administrator.
Registered document	This is the document that is registered by the administrator. It is submitted to the operative section.
Registered inflow document	This process is done to make sure that the appeal document has been sent to the administrative section already.
Related divisions	Any division helping the Appeal Compensation Division perform its work such as providing the necessary additional documents or giving a comment.
Request for additional document	The operative section may request for the additional document for further procedure.

Table F.1. Data Dictionary for the Process Model (Continued).

Object name	Meaning
Request for consideration result	The operative section can send the request for consideration result to the administrator.
Request information process	The purpose of this process is to make the authorized persons receive the necessary information.
Request information	This is the information that is asked by the operative section.
Statistics chart	The chart of the number of the appeal, the number of approved appeal, and the number of work in process of appeal.
Statistics file	This is the file keeping the statistics of the appeal such as the total number of the appeal, the work in process of the appeal, and the approved appeal.
Summarize statistics	The administrator must summarize the number of the appeal document flowing in to the Appeal Compensation Division at the end of each month.
Summary	The summary is the operative performance report written by the authorized persons in the operative sections.

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Table F.2. Data Dictionary for Entity Relationship Diagram.

Object name	Meaning
Acknowledgement	The acknowledgement is an entity that keeps information of the letter of acknowledgement sent to an appellant for him/her to know that the Appeal Compensation Division has received his/her appellant document.
Acknowledgement address	The address for sending the acknowledgement letter.
Acknowledgement code	The code of acknowledgement letter.
Acknowledgement date	The date of sending acknowledgement letter.
Administrator	Administrator is an entity that identifies information of the administrators who work for the Appeal Compensation Division.
Administrator code	The code of administrator of the Appeal Compensation Division.
Administrator level	The level of the administrator.
Administrator name	The name of administrator in the Appeal Compensation Division.
Administrator responsibility	Identify the responsibility of each administrator in the Appeal Compensation Division.
Administrator surname	The surname of the administrator.
Appellant	Appellant is an entity that keeps information of the appellant who has sent an appeal to the Appeal Compensation Division.
Appellant address	The address of the appellant.
Appellant gender	The status of the appellant.
Appellant ID	The number of ID card of the appellant.
Appellant name	The name of the appellant.
Appellant phone	A telephone number of the appellant.

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Table F.2. Data Dictionary for Entity Relationship Diagram (Continued).

Object name	Meaning
Appellant surname	The surname of the appellant.
Appellate code	The code of the appellate document.
Appellate date	The date of submitting the appellate document.
Appellate deed	The number of the deed of the appellate document.
Appellate document	This is an entity that identifies about the detail of appeal documents to make it easier go refer back.
Appellate file	The keeping file of the appellate document.
Appellate type	The type of the appellate document.
Building	The building is an entity that keeps information of damaged building cause from the government order.
Building code	The code of building.
Building description	The information details of the building.
Building initial price	The amount of money received from the government section at the first time.
Committee's name	The name of the committee member who are involved in the meeting.
Completed appeal statistics	The number of approved appeals.
Consideration code	The code of consideration.
Consideration date	The date of recording consideration result.
Consideration result	The consideration result is an entity that keeps information of the result of consideration which is approved by the committees.
Inflow code	The code of the inflow document.

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Table F.2. Data Dictionary for Entity Relationship Diagram (Continued).

Object name	Meaning
Inflow date	The date of the inflow document.
Inflow document	The inflow document is an entity that keeps information of the documents flowing into the Appeal Compensation Division.
Inflow file number	The name of the file keeping the inflow document.
Inform code	The code of inform document.
Inform date	The date of inform document.
Inform description	The description of the inform document.
Inform division	The sending division of inform document.
Inform document	The inform document an the entity that keeps information which is sent to other divisions of the Appeal Compensation Division.
Land	The land is an entity that keeps information of surrendered land. It can help the operative authorized persons know its details.
Land code	The code of land.
Land description	The detail information of the surrendered land.
Land initial price	The amount of money given by the government section at the first time.
Market price	The amount of money trading in the real market.
Operative code	The code of operative performance.
Operative date	The date of recording the operative performance.
Operative description	The description of operative performance.
Operative level	The level of the operative person.

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Table F.2. Data Dictionary for Entity Relationship Diagram (Continued).

Object name	Meaning
Operative name	The name of operative person.
Operative performance	The operative performance is an entity that keeps the detail of the progress of work performed by the authorized persons.
Operative responsibility	The responsibility of the operative person.
Operative section	The operative section is an entity that identifies about the authorized persons who work in the Appeal Compensation Division.
Operative surname	The surname of the operative person.
Outflow code	The code of the outflow document.
Outflow date	The date of sending the outflow document.
Outflow document	The outflow document is an entity which keeps information of the outflow of document flowing out from the Appeal Compensation Division.
Outflow file number	The number of the file keeping the outflow document.
Receiver	The name of divisions that receive the outflow document.
Region	This is the region that the operative person takes responsibility for.
Reply code	The code of reply document.
Reply date	The date of reply document.
Reply description	The description of the reply document.
Reply document	The reply document is an entity that keeps information of reply document which come from other divisions.
Sender	The name of the division sending the inflow document to the Appeal Compensation Division.

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Table F.2. Data Dictionary for Entity Relationship Diagram (Continued).

Object name	Meaning
Statistics	The statistics is an entity that keeps information of the incompleted appeal, approved appeal, and inflow appeal.
Work in process appeal statistics	The number of incompleted appeals.

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BIBLIOGRAPHY

English References

1. Avison, D.E. Information Systems Development: A Database Approach, 2nd Edition. Oxford: Blackwell Scientific Publications, 1992.

2. Gibson, Glenn A. Computer Systems Concepts and Design, 3rd Edition. NJ: Prentice-Hall, Inc., 1991.

3. Greer, Tyson. Understanding Intranets. Redmond: Microsoft Press, 1998.

4. Illingworth, Valerie. Dictionary of Computing, 2nd Edition. New York: Oxford Science Publications, 1986.

5. Kosiur, David. Understanding Electronic Commerce. Washington: Microsoft Press, 1997.

6. Kroenke, David M. and Kathleen A. Dolan. Database Processing: Fundamentals, Design, Implementation, 3rd Edition. Chicago: SRA, 1990.

7. Parker, Sybil P. McGraw-Hill Dictionary of Computers, McGraw-Hill International Editions. New York: McGraw-Hill Book Company, 1986.

8. Senn, James A. Analysis and Design of Information Systems, 2nd Edition. New York: McGraw-Hill Publishing Company, 1998.

9. Shelly, Gary B. Systems Analysis and Design, International Student Edition. Boston: Boyd and Fraser Publishing Company, 1991.

10. Trepper, Charles. E-Commerce Strategies. USA: Microsoft Press, 2000.

11. Whitten, Jeffrey L. and Lonnie D. Bentley. System Analysis and Design Methods, 4th Edition. Irwin/McGraw-Hill Company, Inc., 1998.

Thai Referenceso

1. ประชา ตระการศิลป์. การพัฒนาระบบงานไคลเอนต์/เซิร์ฟเวอร์. กรุงเทพมหานคร: ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ, 2543.

2. อำไพ พรประเสริฐสกุล. การวิเคราะห์และออกแบบระบบ. กรุงเทพมหานคร: ศูนย์เทคโนโลยีอิเล็กทรอนิกส์และคอมพิวเตอร์แห่งชาติ, 2544.

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