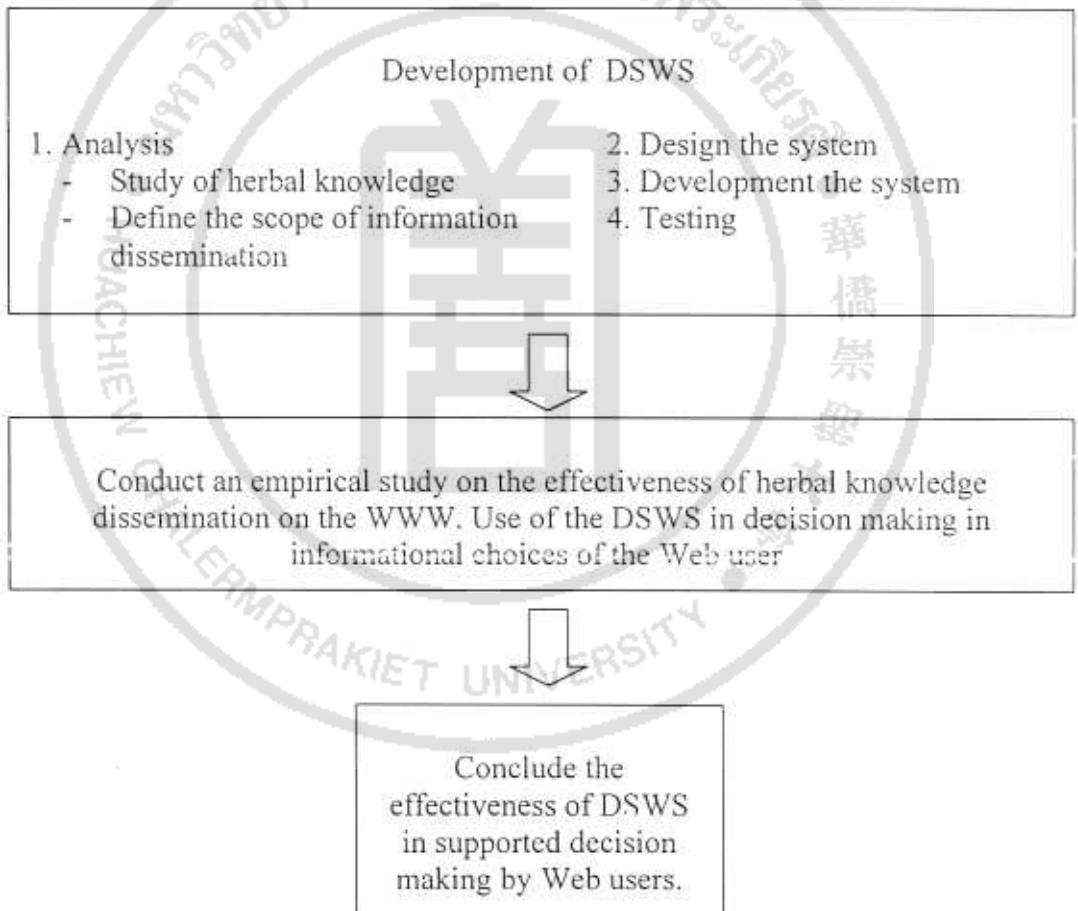


Chapter III

Research Methodology

This research can be classified as experimental research which designs an information dissemination model in the information technology lab, and then constructs an empirical study of the model. The research framework can be described as follows:

3.1 Framework



3.2 Tools

3.1.1 Web pages

Web pages of Thai herb for primary healthcare have been developed using HTML and Java script. The web has been approved as an integral part of knowledge provision by the Pharmacist of the Government Pharmaceutical Organization.

3.1.2 The DSWS

The DSWS is a web system for dissemination of herbal information for primary healthcare. It has been developed as web-based expert system which uses an expert system component as decision model to increase the effectiveness of information dissemination on the WWW. The expert system has been built using Jess5.0 and integrated to the WWW using Java programming. Then HTML and Java script were used to create interface functions for users. The system has been developed in four steps as follows:

1) Analysis

In this step, we defined the scope of information to be disseminated. Only data of herbs for primary healthcare were used. The data was limited to 61 herbs used for treatments of five groups of symptoms and diseases.

2) Design

In this step, we designed a system architecture which composed of three components; web pages, expert system and CGI program.

3) Development

The development step has been divided into three stages: expert system development, web pages development, and CGI development.

1. Expert system development task consists of three stages: knowledge acquisition, knowledge representation, and programming.

- *Knowledge acquisition.* Knowledge and information about herbs for primary health care were acquired from textbooks and an expert in the field.

- *Knowledge analysis and representation.* The knowledge was analyzed with a decision tree, then transferred as rules, which are combined into a set of rules.
- *Programing.* The sets of rules are kept in a knowledge base. The DSWS has five knowledge bases, which are based on groups of symptoms and disease that can be treated by herbs for primary health care.

2. *Web pages development* is a task in constructing the herbal details pages and system interface. These have been developed by HTML program.

3. *Common Gateway Interface development* is a task in putting an expert system into web technology. The DSWS was integrated with an architecture of half Jess language scripts using Java program providing customer commands and APIs (Application Programming Interface). The Java program has been developed as servlet architecture.

4. *Installation.* The three components of the system have been installed on a web server. The Microsoft Internet Information Service (IIS) server and the servlet engine is Jrun3.1 (Professional Evaluation version).

4) Testing

The system was tested by the developer and an herbal expert who is a pharmacist working with a Government Pharmaceutical Organization prior to the use as our research tool.

3.2.3 Questionnaire

There are two sets of questionnaire. The first one is used for evaluating the effectiveness of the general Thai herb for primary healthcare web pages and another one is used for evaluating the effectiveness of the DSWS. Both questionnaires were based on decision supporting factors which have two parts.

Part 1: this part was designed to collect information about experiences on the WWW system and the herbal knowledge of population. The experience of the population was designed with a 3-scale rating (weak, moderate, and strong).

Part 2: This part was concerned with decision supporting factors in the DSWS. It has been divided into four topics: 1) effectiveness of the system in

information finding, 2) effectiveness of the system in the decision process, 3) decision support system features containing, and 4) system trustfulness. This part was designed with a 5-scale rating for the population to express their opinions; 1 = very weak, 2 = weak, 3 = moderate, 4 = strong and 5 = very strong.

Scores in part 2 can be used to explain the effectiveness and the characteristic of the systems by averaging the scores which define the meaning as follows:

1 – 1.5	very weak
1.6 – 2.5	weak
2.6 – 3.5	moderate
3.6 – 4.5	strong
4.6 – 5	very strong

The questionnaires were tested by two methods;

1) Content validity testing to verify the wording of each question. The questionnaire has been tested by eight people (10 % of the population). Some questions were unclear, and were subsequently reviewed and retested.

2) Reliability testing for the rating scale questionnaire (r_{tt}) used the formula as follows. The questionnaire was tested by eight people (10 % of the population) with a reliability of 0.9.

$$r_{tt} = 1 - \frac{MS_{error}}{MS_{ind}}$$

Where MS_{error} = Sum Squares error (SS_{error}) / $(n-1)(k-1)$

MS_{ind} = Sum Squares individual (SS_{ind})/ $n-1$

n = Number of samples

k = Number of questions

3.3 Population

The population for the research consisted of general web users. The population was independently sampled. The samples who answered the questionnaire to evaluate the general WWW consisted of sixty-nine persons. The samples who answer the questionnaire to evaluate the DSWS consisted of seventy-two persons. The number of samples were assigned based on the formula of Krejcie and Morgan with confidence level at 95 percent and maximum error of the estimate not over 11 percent. The two population groups have an estimated error of 11 percent.

The number of samples = $P(1-P)Z^2/e^2$

Where P = sample proportion

Z = level of confidence level

e = maximum error of the estimate

3.4 Data Collection

The questionnaires were attached to the systems on the Internet. Seventy-two copies of the questionnaire were answered for the DSWS evaluation, and sixty-nine copies for the general WWW evaluation.

3.5 Data Analysis

The data will be analyzed using three statistical methods; Mean, Z-Test and Chi-square Test.

- 5.1 Researchers calculated the Mean to summarize the characteristics of the systems on each topic.
- 5.2 Z-Test has been used for hypothesis testing. The effectiveness of DSWS and that of the general herbal web pages were not different.
- 5.3 Chi-square test has been used in order to study effectiveness in the level of herbal knowledge and the level of WWW familiarity of samples in expressing their opinions of the DSWS effectiveness.