

CHAPTER 6

DISCUSSION & CONCLUSION

"At first people refuse to believe that a strange new thing can be done, then they begin to hope it can't be done. They hope it can't be done because it means seeing the garden in a whole new way. Then they see it can be done. Then it is done and all the world wonders why it was not done centuries before"

Frances Hodgson Burnett

6.0 Discussion and Conclusion

6.1 Introduction

This chapter summarizes the problems encountered, features, limitations and weaknesses during the research study and the development of the system, MediX. Future enhancements, further research, contributions to society are also discussed in the respective sections. Finally, a conclusion is given at the end of this chapter that summarizes this dissertation.

6.2 Problems Encountered

Problems were encountered during the research study and the development of the system. They are as listed below.

6.2.1 During the Research Study

i) Lack of Details on the Ratio of Medical Expertise

Numerous attempts were made to get the number of medical expertise in Malaysia, but to no avail. The ratio of general practitioner to patient, ratio of medical expertise to patient, ratio of medical expertise to area (i.e. urban and rural), ratio of medical expertise to government/private hospital/clinic and etc. were not provided by the respective organizations. Due to that, a literature could not be written on it. In addition, the comparisons of the various ratios could not be made. It is hoped that in future, the relevant organizations would be more co-operative to the research done by local institutions.

ii) Lack of Response from the Medical Centres

At the initial phase of the study, survey questionnaires were carried out. Survey questionnaires pertaining to the project were mailed out to thirty-six hospitals and clinics in Malaysia. Of these, only fifteen or 41.7% of the medical centres responded. This clearly shows that the local medical centres were not supportive at the initial phase of the requirements gathering. Thus, it is hoped that full support and co-operation would be given to a researcher in the near future.

iii) Time Consuming

Interviews were conducted at three hospitals in the Klang Valley and one in Ipoh (i.e. a total of 40%), out of the ten medical centres that were selected initially. Conducting the interviews was a time consuming process and it demanded a lot of patience as interviews were always rescheduled. Nevertheless, interviews should not be taken lightly as interviews provide a better perception to the scope of the project.

iv) Confidentiality of Data

Some of the data required for the study could not be provided by the hospital administrative. Only names of the medical expertise in their respective departments were given. Age, number of operations performed and the consultation fees of the respective medical expertise were not given due to confidentiality. Due to that, certain analysis such as on the specialists' age and number of operations performed could not be carried out for this project. Nevertheless, the main analysis on the expertise could still be performed.

6.2.2 During the System Development

i) Integration of Tools

Much of the time was consumed during the development of MediX. As this system uses different tools, a thorough understanding was needed to integrate all of them. The tools used for the development were the Microsoft Visual Basic 6.0 (program coding), Microsoft Access 97 (database implementation), Seagate Crystal Reports 6.0 (report generation), Macromedia Flash 3.0 (interface design) and Intercooled Stata Ver. 6.0 (statistical analysis). This was a real challenge, as a proper algorithm was needed for all of the tools to be integrated in Microsoft Visual Basic running under the Windows 95 operating system. However, the problem was resolved with evident of the successful integration of the tools.

ii) Reference Books

The statistical package, Intercooled Stata was used for the statistical computing of the system as it has many features, which were described in detail in chapter 2. However, books on Stata were unavailable at the local bookstores. Nevertheless, as the software was purchased with the complete documentation set; i.e., Getting Started with Stata, Stata User's Guide and the 4-volume Stata 6.0 Reference Manual sets, the problem was resolved. Moreover, a senior software engineer at the Stata Corporation was also contacted through email for guidance.

6.3 Features of the System

Among the primary features of the system include:

- Expertise tracking with immediate status information for all of the medical expertise in the medical centres (which is in the database) with access to the full details of the respective medical expertise.
- Standard reports can be selected from menus by using a mouse or the keyboard to move the cursor to an area and the user can select an option. If the user prefers to view the information graphically, this too, can be accomplished with the mouse or the keyboard. This enhances the productivity of the staff as the reports can be printed immediately whenever it is needed.
- The selection of the analysis function at the menu bar for the statistical package, Stata is easy with only a single mouse click with no technical computer jargon. This significant feature is very much helpful to an inexperienced administrative staff.
- Several query functions permit the user to browse the records searched via a graphical user interface with a single mouse click. Therefore, any user can query the system for information.
- The manner in which MediX has been developed and implemented takes maximum advantage of the intuitive and easy-to-use interface. The screens have been designed to be easy to use and understand yet fast to work with. These screens are designed for use by health care administrators, physicians, nurses and general users who have little experience with computers. Therefore, the users will not be intimidated by the system.

Furthermore, there are a number of distinct features that can be found in the newly developed system compared to the existing systems that were described in chapter two. Among them include:

- any user can query the system for information by entering the required data via an easy-to-use interface. For example, a user can choose his/her desired specialist by entering the required data in the text boxes (such as male or female specialist for a specific treatment, or to locate a specialist in the government/private hospital/clinic, and etc.).
- a user is not required to enter any wild card sign to perform a 'sounds like' search as the system automatically checks the database for any words typed in the text boxes. However, this will give a broader listing of the search. A user, then, can narrow the search by entering the correct data in the text boxes.
- a user, too, can enter the name of a symptom in the text box provided. The system will display all of the specialists available in that field.

6.4 Limitations and Weaknesses

There are a few limitations and weaknesses of the MediX system. They are as addressed below.

6.4.1 Limitations

i) Data Transfer

Currently, the data from the Microsoft Access 97 is exported to the data file of Stata. A Stat/Transfer program is needed to convert the Access database to the

data file of Stata. Stat/Transfer is an associated program that converts datasets (i.e. reads and writes data) between formats, including Access, dBase, Excel, Lotus, S-Plus, SAS, SPSS, SYSTAT and Stata formats plus ODBC formats [StataCorp. 1999]. It is designed to simplify the transfer of statistical data between different programs. Due to the time constraint, the Stat/Transfer program could not be purchased. Therefore, the database is exported to Stata at each time it is updated as Stata does not recognize the *.mdb extension.

ii) Search Function

The search function of the medical expertise is only based on the specialty, symptom and government/private hospitals/clinics at the user section. Therefore, it limits a user from searching by a certain medical centre and location, which are not available currently. However, this can be resolved when enhancements are done in future for the system.

6.4.2 Weaknesses

i) Statistics

An administrative staff should be given training beforehand at the functions of Stata to enable him/her to perform the needed analysis. Generally, an experienced person with a background of statistics would perform better at the analysis module.

ii) Security Features

Presently, an administrative staff is required to enter the user name and password before given access to the administration section. As can be noted, this is not secure enough to safeguard the integrity of the database. More security features need to be undertaken for a foolproof identification.

6.5 Future Enhancements and Further Research

6.5.1 Future Enhancements

The outcomes of the system evaluation that was conducted on actual users were identified. The main aim is to improve the MediX as intended by the evaluators. Some of the suggestions for future enhancements are discussed below.

- More information pertaining to the respective medical expertise need to be included such as the age, consultation fees, number of operations performed and etc.
- The search function should be extended by performing a search to a certain medical centre and location.
- A transfer program needs to be purchased in order to convert the Access database.
- Malay language could be incorporated in the system so a wide range of users can access the system.
- A web-based system whereby anyone can access the details of the medical expertise at anywhere and at any time.

6.5.2 Areas of Further Research

There are a number of issues that remain to be tackled which will be the foundation for further research, including:

- ensuring that the system works efficiently when thousands of medical expertise and medical centres are incorporated in the database.
- integration of MediX with other systems such as clinical system, medical record system or a patient history system, and etc.
- ensuring the integrity of the medical specialists' information (e.g. the specialists' credentials) by taking certain security measures.

6.6 Contributions to Society

The contributions of the project to society as seen from the perspective of developers, medical community and general users (i.e. the lay public) are discussed in the following sections.

i) Developer's point of view:

MediX demonstrates the successful integration of multiple tools into a single system. It includes a statistical, reporting, database, authoring and programming packages. Therefore, this system is complete with all of the necessary functions and features. In short, proper algorithms must be formulated in order to incorporate various tools within a single system.

ii) Medical community's point of view:

MediX provides a one-stop centre for health care administrators to maintain the records of the expertise at various departments and medical centres. It also enables health care administrators to readily identify, understand and analyze expertise quickly without volumes of paper reports (the "paper handling" of information can be unbearably slow!). This provides issue-oriented information that supports better communications and co-ordination for tighter control, timely intervention and informed decision-making [Uchello, 1995]. Continuous evaluation and keeping track of the medical expertise helps the health care management and administrators make greater use of MediX in examining the alternative options for improving the delivery of health care services to the general population.

Information is provided, in appropriate detail, to two levels of users. At the first level, it provides top-level management staff the necessary details of the medical expertise in their medical centres. It includes reports of various analyses of the expertise whereby the management is able to monitor and foresee the number of expertise in their respective and other hospitals or clinics. At level two, the MediX provides information to administrative staff who is engaged in recording and analysis of data. They can access data for ad hoc report generation for the top-level management staff in a fraction of time.

It can be concluded that, MediX is a tool for recording, reporting and analyzing data on medical expertise. In addition, it is a tool for decision-making for the top-level management and health care administrative staff at medical centres.

iii) User's (i.e. the lay public's) point of view:

MediX is a system to seek for information on a desired medical expertise. The raw data is processed into summary-level information that is easily accessible through a user-friendly interface. An easy-to-use query facility, which does not require knowledge of query language, is available if the user needs to examine key information from multiple viewpoints. Therefore, people from all walks of life can use this system. In short, MediX assists users in their search for information by providing details of the medical expertise.

6.7 Conclusion

Things are changing rapidly in medical centres. Management of health care, the Internet and technological advances has made an incredible impact on the access to medical information. Therefore, information technology breakthroughs hold great potential if properly harnessed. As Bangert et al. state "*technology is a tool for doing work*" [Bangert et al., 1999]. This is because, if people are not trained adequately and the work processes are not radically changed, work will be encumbered and people frustrated. What are needed are systems which reduce the information burden and allow rapid entry and retrieval of records, rapid reporting and analysis as well as easy and timely access to current information.

This project presents a prototype system that keeps track of the medical expertise. In addition, it demonstrates how different tools are integrated in a single application. The prototype system can be accessed by all levels of users. This system caters to the needs of the health care management and administrative staff, physicians, nurses as well as the public.

Health care administrators can access a wide range of reports and graphic displays showing status of medical expertise in their respective specialties. Reports that are generated automatically with a single mouse-click are instantaneous. Therefore, instead of asking for certain pieces of information and waiting two or three days for someone to come back with a response, the health care administrators can see the information from the system and ask directly for a response. Moreover, the print functions for reports as well as the analysis functions eliminate manual tracking, recording and analysis of data, hence, contributes to the improvement in the management of medical expertise.

Furthermore, MediX assists users (i.e. lay public) in their search for information by providing details of the medical expertise. A general user who needs to seek information from different angles can query the system as it is simple to learn and easy to use. Thus, the system demonstrates an improved access to information and higher customer satisfaction from the survey that was conducted.

Apart from that, MediX also demonstrates the successful integration of various tools in a single system. Statistical, reporting, database and authoring tools are integrated in a programming package running under an operating system. Thus, this system has a complete set of functions that can be carried out on the raw data.

In short, MediX keeps track of the status, accesses to records, generate reports and analyzes data on medical expertise in various specialties. Thus, it improves functional effectiveness and efficiency of the respective medical centre whereby the tedious job of the health care administrative staff becomes easier [Uchello, 1995]. It is hoped that MediX will provide a basis for health care planning

and an opportunity for improved delivery of health care services to the people of Malaysia.