CHAPTER 3
Research Methodology

3.1 Introduction

Research methodology is a guideline for application development. It provides an overview of the methodology flow and the research methods to be used to achieve the aims of the research. The purpose of using research methodology is to solve the research problem or problems and achieve the aims of research (Dawson, 2002).

This research aims to develop an integrated health care computer application to manage the entire patient information such as medical history, consultation history, treatments history and patient appointment etc. Therefore, the objectives focuses into analyzing the previous studies and the current systems use in the health care, then design and develop an integrated health care system for managing the patient information and tracking the patient information history. In addition, provide very secure and sturdy communication between patients and physicians.

This chapter highlights several points started by chapter introduction, the research strategies, data collection and highlights of the research respondents, the plan of data collection and emphasizes on the data analysis framework, and finally focuses on the way of system development.

3.2 Research Strategy

The concept of this research strategy comes from analyzing the literature review that proved the current health care information system is not completely comprehensive and each researcher focused only in part of the health care information system and there is a lack of the integrated health care systems that can fulfil the patient’s need for medical information.
So, this research aims to provide a proper academic solution through following the research methodology structure. Therefore, this chapter starts by research strategy, which is describing the way of implementing the research study.

Hence, the adopted research strategy is presenting the finding from analyzing the previous studies in chapter two and supports the result by adopting case study from the real live, which is typically observing the characteristics of the research respondents, how they are doing their work, because the adopted strategy is proving the credibility results of analyzing the previous studies.

Therefore, the research respondents should be staff member in a hospital who uses a health care management system and patients in hospital for medication purpose, because the staff member they are daily use the current health care system and they are familiar with the system environment. So these people absolutely know about the limitation and /or problem in the current health care system. Conversely the patients may have suggestions which could helps to enhance the quality of health care especially with the aim of all the health cares are targeting to deliver a very good health services to the patients.

However, the reason of using such strategy is for achieving the problem statement of this research needs to study and analyze the finding from the literature review and the current health care system, which is requiring the implementation of empirical research. So using a case study is approaching facilitates for this research and drive to probe deeply into a health care responses through interviewing the respondents in both hospitals (UH and HUKM). The interview was by asking the respondents several open questions, those questions are arranged in sequence started by the current system use in the hospital and then the respondent’s suggestions about the new system, then the respondent’s answers written as notes under each question asked.
3.3 Data Collection

Once the research strategy has been adopted, the next step, method of Data collection is required, which is containing description of the research sample (respondents) and the sample technique, and then the data collection technique (interview and observation).

In this research data collection is from two public hospitals (UH and HUKM), because those hospitals are big, public and daily hundreds of patients come to the hospital for medication. So definitely the management of hospital they are facing problems for managing the patient information and managing the patient appointment. In addition, they are using non integrated health care system for managing the patient information. Furthermore, these hospitals are academic hospital, which have a good environment to conduct such academic research.

3.3.1 Data Collection Techniques

Data collection is a technique, that allows researcher to systematically collect information about the study population (people objects, phenomena etc) and the setting in which they occur (Biggam, 2008).

Likewise, collection data in this research goes through the interview because the individual interview is straightforward to get the information from the respondents (doctor, nurse and patient) and this research needs to meet the respondents individually and ask them closely about the problems they are facing from using the current system. Moreover, observing them, how they are doing their work to probe deeply and to analyze intensely the process of managing the patient information.
3.3.2 Data Collection Tools

Many data collection tools can be used for collecting data; they are either interview or observation based. Therefore, the tools used for each technique differ.

Below is description of some the data collection tools used in this research:

i. Interview schedule: which means scheduling the respondents in check list, first is doctor then nurse then patient and arranging the list of interview questions in sequence and the answer of each question is written under each question (see Appendix A).

ii. Observation: which is observing the participants, how they are doing their works and writing down the process as it is appears in (UH and HUKM) case studies.

3.4 Research Sample and Respondent

In this research, the respondents are group of people (doctor, nurse and patient) from public hospitals (UH and HUKM) (Table 3.1) and respondents sample chose randomly because that data needed for this research is looked in the standpoint of each sample about the current system use in the hospital.

<table>
<thead>
<tr>
<th></th>
<th>HUKM</th>
<th>UH</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Nurse</td>
<td>1 Nurse (Dr assistance)</td>
<td>1 Nurse (senior)</td>
<td>3</td>
</tr>
<tr>
<td>Patient</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3.1 Research Respondent
3.5 Plan of Data Collection

Disposing plan for collecting data is a very important step before starting collecting data. It helps for getting the correct data. The researcher has to have very clear plan for data collection and decides on the type of study needed. The data collection techniques and sampling methods are needed because the following reasons:

1) To ensure that all needed information are going to be collected.

2) To avoid collecting unnecessary data, the data collection plan includes the following:
   i. Type and number of data collection tools are needed.
   ii. Categories and number of data collecting personnel (doctors, nurses, patients etc).
   iii. Duration and content of data collection.
   iv. Schedule for data collection (Selection of personnel, preparation of tools, starting date, closing date and time for each study phrase etc.)

Hence, the adopted strategy, increased the reliability of collected data and enhance credibility of the research, where the data for the study were collected from different public hospitals in Malaysia (University hospital -UH and Hospital University Kebangsaan Malaysia - HUKM) after getting the respective approvals from the management of UH and HUKM for conducting the interviews and the observations. The interviews and observations were timed during the appointed times at different dates. In UH, the interview was conducted with a senior nurse for about one hour. In addition, three patients in UH chosen randomly were also interviewed. In HUKM, the interview was also done with one nurse alone and another nurse with doctor assistance. In addition, one doctor and two patients who were chosen randomly were also interviewed.
Observations were carried out both in HUKM and UH for one hour each. The observations were focused on the staff nurses, when they were on duty registering new patients, and managing the appointments between the patients and the doctors. In addition, attention was also focused on patients themselves - how they follow the steps to get the appointment with the doctor and how they confirm the appointment and meet the doctor.

3.6 Framework for Data Analysis

After disclosing the proposition of collecting data, next is explaining the method of analyzing the collected data by breaking down the collected data from interview into easily identified groups as it is appear in (appendix a) UH and HUKM group, and then identifying subset in each group (Doctors, Nurses and Patients) and then organizing the questions of each subset into two parts. The first part is about the current health care use and the second part is suggestions about the new system. (Figure 3.1) illustrates the adopted analysis approach.

![Figure 3.1 Framework of data analysis](image-url)
3.7 System Development

System development is the methodology of developing a system based on measures and rules. In addition, developing a system is implemented as a set of steps or phases. The reason for organizing the methodology of development is to ensure that nothing is ignored in the process of solving a problem such as developing an information system (Davis and Yen, 1998).

In this research, developing an integrated health care management system using waterfall method, which works cascading from step to step like series waterfalls and the good feature of this method is that there are feedbacks between the steps (See Figure 3.1).

![Waterfall method](adapted from Davis and Yen, 1998)

i. Problem definition: This step initially identifies the problem and why the health care needs a system.

ii. Analyzes the problem: This step determines exactly what must be done to solve the problem and identifying all the points that’s my have influence on the system.
iii. System Design: which means determining how the problem will be solved and implementing how the system will look. On the other hand means identifying and designing the system database and the system interface.

iv. System Development: This stage moves from the logical to the physical processes, converted to manual procedures or a computer program which means using the programming language that will be used for developing the system. In this research the following programming languages will be used for developing the system,

a. Apex Oracle,
b. Oracle PL/SQL,
c. SQL,
d. HTML and
e. Java Script.

v. Testing: After the system has been developed it should be ready for testing. Testing stage is testing all the system function and checks the system validation. This stage is very important because it’s providing feedback to the developer.

vi. System implementation: This stage is continuation of the system development based on the feedback.

vii. Maintenance: It is the final stage, where the system functioning is kept at an acceptable level.
3.8 Conclusion

The research strategy of this research adopts analyzing the previous studies and supports the results by a case study from the real live and collecting data through interview and observation. The reason of using such this strategy is because of this research considered on the analysis results of literature review, which needs to be supported by data from the real live such a case study and then comparing and analyzing the finding. Moreover, this chapter covers the methodology of developing a system, which is the waterfall method, because this method works cascading from step to step like series waterfalls and the good feature of this method is that there are feedbacks between the steps.

3.9 Summary

The first part of this chapter is the research strategy that describes the way of implementing the research study, and then covering collecting data method which contains data collection technique and data collection tools, then presenting overview about the research sample and participants, then the plan of data collection. Once the data is collected, the next part is presenting the framework of data analysis and finally is the methodology of system development. The next chapter is presenting the case study and the collected data.