CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methods used for MCMT development. Research methodology is a set of procedures or methods used to conduct research. There are two types of research methodologies. These two types of methodologies are qualitative methodologies and quantitative methodologies. Both methodologies will be used during the MCMT development phase. Qualitative research involves the use of qualitative data such as interviews, direct observations, survey and analysis of documents and material. Questionnaire and documents review are the research method used for developing MCMT prototype application. These research methods are important to gather information such as users’ preferences, opinions and suggestions. The Iterative and Incremental development process model is used in the development of MCMT prototype application.

3.2 Research Methods

There are various methods in collecting information or more precisely data gathering. It can be carried out by searching the related topic literatures, white papers, technical papers, marketing reports, conferences proceedings, product data sheets, product brochures, web pages, project focus groups, conducting interviews with experienced personnel, distributing questionnaire, or even communicate to people. The research
methods used for this dissertation purpose are the review of literatures and books from the Internet, unstructured interview and data gathering by distributing questionnaires. It is important to know the consumers’ experiences and personal preferences and by doing these will definitely contribute greatly to the development of MCMT prototype application.

3.2.1 Document Reviews Method

Document reviews could be reviewing the electronic documents or printed documents. For example, reviewing documents, reports from the web or other pieces of written information for content and themes. The reviewing process is where and when the sticky notes were placed, writes on or even attached to other reading materials to the copies that was read to make the document reviews more comprehensive and easier for references. All these are useful sources for the content of this dissertation. Those documents or reports are published based on the study of current markets and trendings. The findings or the results from this research method can be easily quantified and analyzed later.

3.2.2 Unstructured Interview

Unstructured interviews have been used in this research to gain a general understanding of the requirements from the hypermarket operators’ point of view on this development of MCMT prototype application. An informal discussion with the hypermarket representatives has been done by allowing the discussion to be open. The reasons to choose unstructured interviews for this research because unstructured interview are flexible, simple, informal and time saving when preparing for the interview. In addition, unstructured interviews allow spontaneity to the interviews and
these discussions can sail to upcoming enquiries easily. Interviewer also has the freedom to change some questions or the sequence of the questions according to the responses or reactions from the interviewees when having the face-to-face discussions.

### 3.2.3 Questionnaire Method

A questionnaire is defined as a form that people fill out, used to obtain demographic and views and interests of those questioned (Brehob 2001). Questionnaire is used in this research to elicit information and to get feedback from hypermarket consumers. Questionnaire encompassed of a series of questions for the purpose of gathering data or information from potentially a large number of respondents. One of the advantages of questionnaire over other types of data gathering methods is that it is inexpensive and does not require as much effort from the questioner as compared to face-to-face survey or tele-conversation type of survey. These are the steps taken to design a questionnaire for this dissertation purpose:

1) Objectives of the survey are defined

2) Determined the sampling group

3) Designed the questionnaire by creating the questions

4) Administered the questionnaire

5) Results interpretations

Questions are designed to gather either qualitative or quantitative data. Qualitative questions are designed with more care and required well administration and
The aim of this questionnaire survey is to understand the hypermarket consumers’ requirements in Malaysia. The results and information gained from this questionnaire can help in designing the MCMT prototype application. This can ensure consumers’ satisfaction and meet their requirements after adopting the proposed MCMT application.

The advantages of questionnaire are information can be gathered from a group of selected people and the responses are gathered in a standardized way. Besides that, the questionnaire method is used to study various aspects like consumers’ options, their attitudes and beliefs. These aspects are useful before developing MCMT prototype application.

3.2.3.1 Questionnaire Design

A well-designed questionnaire is important, the clarity and the language use to construct the questionnaire must be taken well care. This is because the purpose of the clear and concise questionnaire helped to get best responses from the potential respondents. To improve the responses gathered at the end, a guide to the design of the questionnaire (Burgess 2001) was referred in the process of getting the questioned done in a efficient manner. The following section basically will be explaining the questionnaire design in details. It will be started with introduction page stating the purpose and objectives of the designed questionnaire followed by types of
questions asked, the layout and the sequence of the questions asked. A sample of questionnaire designed can be found in Appendix D.

### 3.2.3.2 Introduction Page

The questionnaire survey form started with an introduction page that defined the objective of the questionnaire. The objective of the questionnaire was to gather the information from the potential respondents for their users’ habits and preferences on the development of MCMT. Before the respondents actually taking part in the questionnaire survey, there was an brief introductory section for them to understand the background and purpose of this particular questionnaire and make the participants aware of the information will be kept confidential and would not be used for any profitable activities or against them, followed by some definitions of what mobile technology, content management and hypermarket environment is.

### 3.2.3.3 Questions

In designing the questions, it is important and needed to be careful that the questions would not lead the respondents into ambiguity, confusion and vagueness. The wording of the questions designed has to be clear, neat and consistent. In the questionnaire, there were eleven questions altogether. The type of questions designed was a mixture of close-ended questions and open-ended questions. Respondents were required to select either one or more answers he or she thought were appropriate for closed-ended questions asked in the questionnaire. Respondents were welcomed to comment or give their suggestions for open-ended questions. Single and multiple response were used by inserting the text “please check all that apply” to provide the respondents the liberty to tick as many boxes as they thought were applicable. The
other approach was using the rated responses likes scales from 1-5, 1 being strong disagree and 5 being strongly agree.

3.2.3.4 Layout
Layout is rather important, the questions and answer choices should be laid out attractively, neatly and avoided the lengthy questions that most probably would deter respondents. Besides, the logical sequence was important too, the questions that related to similar areas were group together to keep the flow through the questionnaire logical and simple (Burgess 2001).

3.2.3.5 Questionnaire Distribution
The survey questionnaires were distributed to respondents to complete manually. As 100 respondents were invited to complete the questionnaire. These questionnaire were distributed to the public or the consumers at the hypermarkets in Malaysia randomly. 94 out of 100 respondents have completed and returned the questionnaire. Not all the questionnaires distributed to respondents returned with full participation, some of them refused to join reason being they didn’t show their interest on this topic of survey, they had limited time allocated for this survey, they had limited knowledge of this researched topic and there were no rewards earned upon completion of the survey questionnaire.

The objective for this questionnaire survey is to understand the consumers’s opinions and their requirements. The results and information gained from this questionnaire can help in designing the MCMT prototype application. This can ensure satisfactionn
to the consumers and meet their requirements after delivering the prototype application.

3.3 Software Development Methodology

Software development methodology is referring to the documented collection of guidelines, procedures and standards intended to ensure the development of quality application systems that meet the users’ requirements in an efficient manner. The system development methodology involves a series of operations and procedures that are used to develop an application or system. In this section, the type of development process model to be used for the MCMT development will be discussed. Many process models are described in the software engineering literature (Sommerwille 2001). There are several types of development methodologies either liner or iterative which are best suited to specific kinds of Information Technology (IT) projects will be discussed here. They are Spiral Model, Rapid Application Development, Waterfall Model, Phased Development Model (Iterative and Incremental Development) and etc.

3.3.1 Spiral Model

This is a combination of liner and iterative type of software development methodology. It is focusing more on risk assessment as it provides the opportunity to evaluate the risk and weigh consideration of a particular project continuation throughout the life cycle. It traverses four basic quadrants, firstly determine the objectives, alternatives and constraints of the interation, evaluate the alternatives, identify and resolve the risks. Next, to develop and verify deliverables from the iteration and lastly plan the next iteration. Usually it begins the cycle with
identification of the stakeholders and ends with reviews and commitment (Boehm 2000).

### 3.3.2 Rapid Application Development

This is an iterative type of software development methodologies with its objective to deliver a quality system quickest possible at a relatively low investment cost. It usually provides the ability to change the information system design according to the users’ demands. Generally, it produces significant saving in terms of time and human effort and of course money as mentioned earlier. It involves iterative development and the construction of prototypes. RAD approaches may entail compromises in functionality and performance in exchange for enabling faster development and facilitating application maintenance (James Martin 1991).

### 3.3.3 Waterfall Model

Waterfall model is a type of linear software development methodology, basically a project will be divided into sequential phases that are emphasized on planning, project scheduling, budgeting and the implementation. The orderly sequence of development phases is to ensure the adequacy of documentation and design reviews that help to increase the quality, reliability, and maintainability of the developed software (Royce 1970).

### 3.3.4 Iterative and Incremental Development Model

Iterative and Incremental Development Model is also known as Phased Development Model. Iterative and incremental development model is a combination of linear and iterative approach. This was made by Mr. Harlen Mills of IBM in late seventies. It
started with defining software concept, requirements analysis, architectural design by using the Waterfall approach followed by interactive prototyping which culminates in installation of the final prototype. This is appropriate for large projects where requirements were not well understood due to changing of expectation, external changes, budget changes or changing of technology rapidly.

3.4 MCMT Prototype Application Development Model

Choosing the right application development model could help in ensuring the success of an application development project. The system methodology that has been chosen to develop MCMT is the Iterative and Incremental development model. It is more manageable as opposed to traditional waterfall model. This approach is broken down into two development phases, the incremental and iteration. At incremental phase, it is where the software specification, design and implementation are broken into serial of increment which are developed in sequence. Each iteration is consisting of requirements collection, analysis and design, implementation and testing phase and result in the release of an executable subset of the final product.

Incremental and iterative model is an application development method used in MCMT. The model is an iterative approach that begins by developing basic requirements, building small simple prototypes, evaluating those prototypes and then expanding into refined requirements until deliverable application prototype is created.
The MCMT development model is divided into eight main phases as shown in Figure 3.1 below, they are the requirements study and planning, the system analysis and design follow by implementation and deployment.

After the implementation, the users are required to test and evaluate the system iteratively, modification will be made based on the inputs or feedbacks from the users whenever there are new functional capabilities are added by the control of version release in order to improve the functionalities of the application.

The reason to choose this model as development process model is that this model provides iterative enhancement to develop an application incrementally. The iteration will ease the analysis of partial implementation and making sure that users’ feedback are solicited and analysed accordingly as each iteration is consisting of requirements collection, analysis and design phase, implementation and testing phase until it is fully tested and convert into executable application.
3.5 Summary

This chapter discussed about the research method used in the development of MCMT. Documents review and distribution of questionnaire have been used as data collection research instruments. The Incremental and Iterative model has been selected as the software methodology for development of MCMT due to it does provide a number of advantages as stated below:

- It helps to mitigate integration and architectural risks as earlier as it could.
- It allows delivery of a series of implementations that are more complete by stages and convert it to executable more quickly by incremental releases.
- Gradual implementation is capable to monitor incremental changes, easier for problem isolation and make adjustment to avoid the negative impact.
- Early potential exists for exploiting knowledge gained will be as later increments for application improvements.