# CHAPTER 3

# METHODOLOGY

## 3.1 Introduction

This chapter describes the important aspects of the design and methodology of the research adopted in the study. After considering the nature of the research, the objectives, the research questions, the constraints and limitations, the scope of the research and other circumstances, the researcher felt that the survey method is the most appropriate to be adopted, based on reasons described in later sections.

## 3.2 Definitions

The following definitions are used in this study:

**Information professionals** in this study refer to those individuals who have obtained their under-graduate or post-graduate qualifications through formal education programme in library and information studies or information science from a local or foreign institution of higher learning. Stueart (1993) regards **information professionals** as an encompassing term to describe individuals who are required to think conceptually, to reason logically, and to utilise both knowledge and advancing technologies to address the information needs of society systematically.

The terms information professional, knowledge worker, knowledge professional, knowledge manpower or information worker are used interchangeably in this study. Information technologists are also information professionals. The name is sometimes interchangeable because information professionals are also handling ICT tools, therefore the title information technologist is used. The information technologist's job involves hardware, software, systems, and information and their skills are more toward

these areas. If they work in libraries or information units, they are placed at the Information Systems department to handle the organisation's systems.

A **knowledge worker** is an information literate person who internalises information and creates value by applying knowledge (Norsaidatul *et al.*, 1999). Brooking (1999) refers to a **knowledge worker** as an employee who uses knowledge and wisdom in the place of work.

For the purpose of this study, the definition of competency incorporates the three components of knowledge, skills and attitudes or personal qualities. Griffiths and King (1986) provide an operational definition for competency as a generic knowledge, skill or attitude of a person that is related to effective behaviours as demonstrated by performance.

**Knowledge** here means having information about, knowing, understanding, being acquainted with, being aware of, having experience of, or being familiar with something, someone or how to do something. It is the understanding of, or information about a subject, which has been obtained by experience or study, and which is either in a person's mind or possessed by people generally (Griffiths and King, 1986).

**Skills** are the ability to use one's knowledge effectively (Griffiths and King, 1986).

**Competency** is the ability to do something to a level that is acceptable. It is directly related to performance, effectiveness of performance, and the value of the performed work. The capacity to develop competencies is derived from education, training and experience (Rehman *et al.*, 1998b). The Public Service Commission of Canada defines **competencies** as the general descriptions of the abilities necessary to perform successfully in areas specified. Competency profiles synthesise skills, knowledge, attributes and values, and express performance requirements in behavioural terms ( Abell and Oxbrow, 2001).

A **personal quality** is a characteristic or feature of someone or something. Goulding *et al.* (1999a) define the term "personal qualities" as personal attributes, values, traits and attitudes.

The **MSC** is the geographical area of 15 kilometres wide and 50 kilometres long, that starts from the Kuala Lumpur City Centre to the Kuala Lumpur International Airport. It is known officially as the Multimedia Super Corridor (Multimedia Development Corporation, 2002a).

**MSC status companies** are those companies with the status conferred by the MDC. These companies have met the criteria set out under their guidelines for such status. The three criteria are: (a) they are a provider or heavy user of multimedia products and services, (b) they employ a minimum of 15% of knowledge workers in their workforce, and (c) they are expected to provide explanations and practical plans on how they will transfer technology or contribute to the development of the MSC (Multimedia Development Corporation, 1999a).

In this study, the MSC status companies also match the criteria of knowledge-based industries. According to Brooking (1999:10), knowledge-based industries are those where the added value of the employees is the knowledge they possess, that can be transferred from one situation to another. These include:

1. All forms of engineering organisations.
2. All forms of research laboratories.
3. All forms of consulting houses.
4. All forms of marketing organisations.
5. All forms of sales organisations.
6. All forms of software organisations.
7. All forms of organisations that work on a "project basis," such as lawyers.

8. All forms of recruiters and head-hunters.

Therefore, the term "knowledge-based companies" is sometimes mentioned, which refers to the MSC status companies.

### 3.3 Research Design

This study is explorative and descriptive in nature. According to Sekaran (2000: 123), an exploratory study is performed when a researcher has little knowledge about the situation or has no information on how similar problems or research issues have been solved in the past. A descriptive study as noted by Dane (1990:236) "*attempts to define or measure a particular phenomena, normally by estimating the strength or intensity of a behaviour or the relationship between two behaviours.*"

To achieve the objectives of this study, the researcher considered the appropriateness of using the quantitative method. The main method of collecting data was the quantitative method, that was, using questionnaire as the instrument. The interview, which was a qualitative method, also played a role in this study. The interview was done in the initial stage of the study to explore background information and to help with the development of the instrument. Breakwell (2000:239) mentioned that interviews can be done at any stage in a research process. It can be done in the initial phases to identify areas for more detailed explorations or it can be done once findings have been compiled to check whether the interpretations of other data makes sense to the sample which was involved.

Patton (1990:187) mentioned that combination of methodologies strengthened a research design. Qualitative and quantitative research provides complementary types of information. Furthermore, the strength and weakness of qualitative and quantitative research can complement each other (Davies, 1997; Neuman, 2000:122.).

According to Denscombe (1998:173), the distinction between qualitative and quantitative research relates to the treatment of data, rather than the research methods as such. Qualitative research tends to be associated with descriptions, words as the unit of analysis, small-scale studies, holistic perspective, researcher involvement and an emergent research design. Quantitative research on the other hand tends to be associated with analysis and numbers as the unit of analysis, large-scale studies, a specific focus, researcher detachment, and predetermined research design.

Davies (1997) states that qualitative research provides an opportunity to "*get close to the data,*" to see and hear respondents express their thoughts in their own words. This provides an opportunity to draw insights and explanations from the respondents themselves, rather than having to predetermine areas of response or study importance. Patton (1990:14) remarks that qualitative methodologies provide avenues that can lead to the discovery of deeper levels of meanings. It also produces a wealth of detailed information about a much smaller number of people and cases.

While qualitative research provides in-depth, non-numerical information, quantitative research focuses more on numerical or statistical data (Davies, 1997; Gorman and Clayton, 1997). Fitzpatrick *et al.* (1998:29) define the quantitative technique as counting, scaling, and abstract reasoning. Quantitative methods focus on the strict quantification of observations (data) and more often incorporate large-scale sampling procedures and the use of statistical tests to study group averages and variables (Kopala and Suzuki, eds. 1999:50).

Quantitative research differs from qualitative research in the following ways: (a) the data is usually gathered using more structured research instruments; (b) the results provide less detail on behaviour, attitude and motivation and are based on larger sample

sizes that are representative of the population; and (c) the research can usually be replicated or repeated and the analysis of the results can be more objective.

There are many advantages of a quantitative approach. One of them is that it is possible to measure the responses and reactions of many informants to a confined set of questions, thus assisting comparison and statistical aggregations of the data. As noted by Patton (1990:14), "*this gives a broad, generalisable set of findings presented succinctly and parsimoniously.*"

As discussed earlier, the "triangulation method" mixes qualitative and quantitative styles of research and data (Neuman, 2000:125). The triangulation method is ideally used where both qualitative (through observations and interviews) and quantitative (through descriptive methods) are adopted. The reason given by Gorman and Clayton (1997) and Fitzpatrick *et al.* (1998:29) is that when two or more methods are employed, the researcher is able to address different aspects of the same research questions, thus, broadening the dimension of the study. This improves the quality of the research and conclusions drawn are more likely to be correct and acceptable.

The "triangulation method" or a "multimethod" study may include following-up a quantitative study with some interviews or field observations to support or come out with statistical findings or both. The philosophy behind the multimethod approach, or triangulation method, is that the systematic synthesis of different methods will compensate for inherent weaknesses of the individual methods (Punch, 1998:246; Kopala and Suzuki, eds., 1999:50).

In the triangulation method the credibility of the findings is enhanced by comparing data obtained from different sources or from different investigations or different methods of collecting data. If such comparisons show what the findings hold, then one can have more confidence in their interpretation (Wilson and Hammond, 2000:280).

Triangulation is more of a direct check on the validity of observations by cross-checking them with other sources of data. If a researcher's conclusion is supported by data from other sources, then we can be more confident of its validity. Triangulation can involve comparing data on the same behaviour from different researchers (as in reliability checks in more structured observation) who may possibly adopt different roles in the field. Alternatively, it can involve comparing data produced by different methods, for example, observational data can be compared with interview data, or it can involve comparing data from different times, sub-settings or subjects (Sapsford and Jupp, eds., 1996:91). However, in this study, the qualitative method only applied only at the stage of preparing the questionnaire instruments and not to clarify results from the survey.

In this study, a survey research method was adopted to address the research questions. Survey research is a method of collecting data in which a specifically defined group of individuals are asked to answer a number of identified questions (Baker, 1999:201). As noted by Davies (1997), survey research is the most common form of quantitative research. It is a systematic collection of information from respondents through the use of questionnaires. The instrument used in this study is the questionnaire. The questionnaire is noted to be useful in gathering descriptive data and answering research questions. After examining the objective and research questions, it was decided that using the survey method to collect the data through questionnaires and interviews was more appropriate for this study.

In order to do the research, the researcher followed the steps as mentioned below:

1. Identification and approval of the research topic.
2. An extensive literature review in the field of information science, and library and information studies was carried out. The literature was reviewed and analysed to

obtain an overview and identify the issues surrounding these concepts:

a. Definitions of information professionals.

b. Shortage of knowledge workers.

c. Employability skills.

d. Definitions of competencies.

e. Competencies for information professionals.

f. Personality traits of information professionals.

g. Roles for future information professionals.

3. Interviews and discussions with Professors at the Monash University and the RMIT University in Australia on the issues related to the topic of research.

4. A set of structured questionnaire was developed covering a diversity of competencies, skills and personal qualities needed for information professionals.

5. The draft of the questionnaire was pre-tested on a few colleagues to test its face validity.

3. Visited 18 MSC status companies and interviewed their Chief Executives Officers or the persons responsible for the overall management of these companies. The questionnaire was given to them for pre-testing and face validation. The interview also explored the opinion of the company.

7. Minor modifications were made on the contents and wordings in the questionnaire.

8. The questionnaire was sent for validation to five experts in the field to obtain their professional judgments on its validity.

9. Approval of the final questionnaire was obtained from the supervisor.

10. The questionnaire was sent for pilot study to 30 MSC status companies.

11. Upon receiving feedback from the pilot study, minor alterations were made to

the questionnaire.

12. The questionnaire was sent for actual study to 360 companies of the MCS status companies located throughout the country.
13. The data from the questionnaire received was coded, keyed-in and analysed to answer the research questions.

These steps are further explained in the following sections.

### 3.4 Population

The population for the study comprises the MSC status companies in Malaysia, as listed in the Multimedia Development Corporation web site at http://www.mdc.com.my/partner/index.html. There were 360 companies ($N$ = 360) granted MSC status at the time the questionnaire was distributed. The Chief Executive Officer, Senior Manager, or the Human Resource Manager in the companies were selected to answer and complete the questionnaire because they were assumed to be involved with the decision-making and having a company-wide responsibility in the company.

For the interview session, 5% (or $n$ = 18) senior officers or Chief Executive Officers of the companies were interviewed to obtain the qualitative data. Each company represented the categories of the MSC status companies to get an overall picture of the companies.

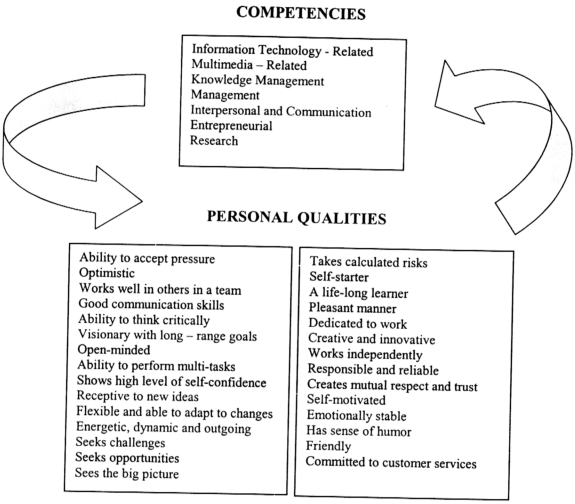
### 3.5 Data Collection Method

Survey data is usually obtained by means of a questionnaire, a series of pre-determined questions that can be either self-administered, administered by mail, or asked through interviews (Burns, 2000a:571). As noted earlier, a survey research

method was adopted to address the research questions. As indicated by Hair *et al.* (2000), a survey research method is the research procedure for collecting large amounts of raw data using questions and answer formats. Survey research is used to access people's thoughts, opinions, and feelings (Shaughnessy *et al.*, 2000:146). In this survey method, a structured questionnaire was designed and distributed to respondents with the aim of eliciting specific information from the population.

In order to generate a list of suitable personal qualities from which the employer could select, a review 60 works appointment advertisement columns of IT-based companies from 20 issues of local newspapers (such as The Star and New Straits Times) was made. The main personal qualities required by employers (such as works well with others in a team, ability to accept pressure, works independently, self-motivated, and dedicated to work) were extracted and noted. An illustration of a competency concept model is shown in Figure 3.1.

Figure 3.1
Competency Concept Model




### 3.6 The Questionnaire

As mentioned earlier, the research instrument in this survey research was the questionnaire. The main objective of the questionnaire was to elicit as much information from the respondents by incurring the least amount of work for each respondent in completing the questionnaire. According to Shaughnessy *et al.* (2000: 135), a questionnaire, when constructed and used properly, is a powerful scientific instrument for measuring different variables. This is supported by Sapsford and Jupp,

eds. (1996:102) who consider a questionnaire as a highly structured method of data collection.

According to Neuman (2000:251), "*a good questionnaire forms an integrated whole, the researcher weaves questions together so they flow smoothly.*" The appearance and arrangement of the questionnaire are also important. A well-planned and carefully formulated questionnaire increases the response rate and assists the analysis and summarisation of the collected data (Burns, 2000b:574). Thus, a researcher must design each question on the questionnaire carefully to ensure that it is clear, direct and understandable to the target population (Hult, 1996:67). Neuman (2000:264) further warned that a researcher must be careful with the wording, and must avoid emotional, lengthy and double-barrel questions.

A questionnaire has its advantages. As agreed by Sapsford and Jupp, eds. (1996), Fife-Schaw (2000b), and Neuman (2000), the questionnaire is less expensive, easier and quicker for respondents to answer. One disadvantage however, as indicated by most researchers, is the low rate of response.

### 3.6.1 Questionnaire Design

An extensive literature review, preliminary interviews with potential respondents, and discussions with experts provide a multitude of possible questionnaires items. The researcher had conducted an extensive literature review to familiarise herself with the conceptual foundations as well as major issues on competencies in the field.

A structured questionnaire was developed, covering a wide range of competencies and personal qualities potentially needed for information professionals working in the MSC status companies. Items listed on the questionnaire were based on an analysis of skills, competencies and personal qualities discussed in the literature, on objectives

listed in the Information Studies syllabi, Competencies for Special Librarians of the 21st Century as reported by Marshall *et al.* (1996), reports of the Secretary's Commission on Achieving Necessary Skills (2000), and questionnaires designed by other researchers such as by Mohamad Fauzan (1997), and Goulding *et al.* (1999a), in the related areas of research.

Garrod (1998) mentioned that today's information professional working in an electronic environment requires a balanced combination of knowledge, skills, personal attitudes and experience. Broad areas of knowledge, skills, competencies and personal qualities were identified from various sources, to develop the questions. At least seven major competencies and aspects on personal quality were raised. They were then categorised under headings of information technology, multimedia, knowledge management, management, interpersonal and communications, entrepreneurial, research, and personal qualities.

Information technology – related competencies had 13 variables. They were: (1) knowledge of basic computer technology; (2) skills of using application software like word processing, desktop publishing, spreadsheet, graphics and presentation software; (3) knowledge of operating computer peripherals; (4) ability to handle major operating systems; (5) ability to use programming languages; (6) ability to manage networked-based application including network design, implementing and supporting LAN/WAN; (7) skills in using Internet technologies like the Internet/Intranet/Extranet; (8) abilities to design and maintain a web-site; (9) abilities to design and develop database management systems; (10) skills of using project management tools; (11) skills of using commercially available artificial intelligence (AI) tools for business applications; (12) skills in system maintenance, operating, installing and testing of systems; and (13) abilities to repair and trouble-shoot computers.

Multimedia – related competencies had eight variables. They were: (1) knowledge of scripting; (2) knowledge of content management and development; (3) creative skills and use of graphic software; (4) multimedia programming and authoring; (5) digital image recording and processing; (6) 3D modeling and animating; (7) music composing, synthesising and effects; and (8) knowledge of copyright laws.

Knowledge management had five variables. They were: (1) abilities to acquire, retrieve, analyse and disseminate knowledge using IT tools; (2) abilities to organise and codify information sources; (3) ability to manage value-added information for strategic decision-making; (4) ability to package specialised information products for company's use; and (5) ability to give advise on the use of internal and external knowledge resources.

Management skills had eight variables. They were: (1) has leadership skills; (2) has strategic planning skills; (3) has organisational skills; (4) has time management skills; (5) has supervisory skills; (6) has training skills; (7) ability to solve problems; and (8) ability to make fast decisions.

Interpersonal and communication skills had 11 variables. They were: (1) speaks English proficiently; (2) writes English competently; (3) speaks Bahasa Malaysia proficiently; (3) writes Bahasa Malaysia competently; (5) ability to do technical writing; (6) speaks one or more foreign languages (e.g, French, German, Arabic); (7) ability to do public relations work; (8) shows good presentation skills; (9) has consultation skills; (10) has good influencing skills; and (11) has negotiation skills.

Entrepreneurial skills had seven variables. They were: (1) knowledge and understanding of global business issues; (2) ability to commercialise innovations; (3) abilities to market and promote products and services; (4) knowledge of cyberpreneurship (e.g., e-commerce, e-government, e-finance); (5) has business

analysis skills; (6) knowledge of financing and budgeting; and (7) knowledge of business administration.

Research skills had seven variables. They were: (1) knowledge of research methodology; (2) ability to do research for the company; (3) ability to do statistical analysis; (4) ability to interpret data; and (5) ability to communicate research findings.

Personal qualities had 29 variables. Among them were: (1) ability to accept pressure; (2) shows high level of self-confidence; (3) seeks challenges; (4) sees the big picture; (5) takes calculated risk; (6) self–starter; (7) pleasant manner; and (8) self-motivated.

### 3.6.2 Contents of the Questionnaire

The questionnaire consisted of 10 pages in six sections. It included interval-scaled items, close-ended questions and one open-ended question. The questionnaire commenced with a definition of an information professional as a person who is involved in information or content-related work, such as planning, creating, acquiring, evaluating, analysing, synthesising, organising, coordinating, controlling, processing, storing, retrieving and disseminating information in an organisation. The definition of competencies was given as the knowledge, skills and attitudes that were necessary to perform work tasks successfully.

Every item was constructed to represent each variable. Variables were represented by a series of statements that required response on an interval scale. Fifty-seven competency statements and 29 personal quality variables required of information professionals were outlined in Section A through Section E and a seven-point interval scale where 1 was marked "not important at all," 7 was marked "most important" and N/A for "not applicable," was used to measure the scale. Section F asked about the company's background using the nominal and ordinal scales.

In order to respond to questions in Section A through Section E, respondents were asked to indicate the level of importance of the competencies and personal qualities of information professionals required by the companies. Respondents were asked to circle the number that best described their opinion on the importance of the competencies and personal qualities. The numbers ranged from 1 for "not important at all" to 7 for "most important." If the statement did not apply to their company, they were asked to circle "NA" for not applicable.

Section A was labelled "Information Technology-related Competencies" and listed 13 statements or variables concerning information technology-related competencies. The variables included statements on knowledge, skills and abilities on various aspects related to information technology that were required of information professionals working in such companies. Section B was labelled "Multimedia-related Competencies" and listed eight competency statements related to skills and knowledge on multimedia work, such as knowledge of content management and development, creative skills and use of graphic software, multimedia programming and authoring, 3D modeling and animating. Section C was labelled "Knowledge Management Competencies" and consisted of five competency statements related to knowledge management, for example, abilities to acquire, retrieve, analyse, and disseminate knowledge using IT tools; abilities to organise and codify information sources, and ability to manage value-added information for strategic decision-making.

Section D was labelled "Other Supporting Competencies" and consisted of four sub-sections, labelled "Management Skills," "Interpersonal and Communication Skills," "Entrepreneurial Skills," and "Research Skills." There were eight variables under Management Skills, eleven variables under Interpersonal and Communication Skills, seven variables under Entrepreneurial Skills and five variables under Research Skills.

The personality traits of information professionals were labelled as "Personal Qualities" in Section E of the questionnaire. There were 29 personality traits itemised in this section. Among them were: (a) ability to accept pressure, (b) works well with others in a team, (c) open-minded, (d) energetic, dynamic and outgoing, (e) creative and innovative, (f) responsible and reliable, and (g) emotionally stable. This section ended with an open-ended question asking respondents to fill in with their own suggestions if there were other skills, knowledge and personal qualities that were not included in the list that were considered essential.

The last section, Section F was labelled "Company Background." It consisted of items framed as checklists, close-ended questions, and open-ended questions. This section included questions on types of company sectors, major shareholders of company, venture status of the company, the date the company received its MSC status, number of information professionals in the company, and whether there was a post in existence responsible for the overall management of information in the company.

Interval variables were selected for Section A to Section E because the researcher felt that they were the most appropriate scales to be used in the questionnaire. Furthermore, interval variables have all the properties of nominal and ordinal variables. Descombe (1998:179) mentioned that the ranking was proportionate and that allowed for direct contrast and comparison. Interval variables have one additional property as well, that was; the distances between the attributes were meaningful. As noted by Bernard (2000:43) "*interval variables involve true quantitative measurement.*"

After the questionnaire was developed, it was tested for its focus, reliability, face validity, content validity, brevity, and clarity. A pre-test was given to a selected group of lecturers and librarians.

### 3.6.3 Pre-test

Pre-testing is an important phase of survey research. No survey can be trusted unless the researcher is sure the respondents understood the instrument and provided appropriate responses. Hult (1996:67) advised that "*questions should be pre-tested so that the initial responses can be reviewed and the questions revised to eliminate any ambiguity prior to their use in the actual study.*" The pre-test is carried out before a real study of participants by giving a draft of the instrument to a relatively small group of people. Dane (1990:127) stated that pre-test allows the researcher to fine-tune the instrument, meaning that, the researcher was only trying to test the measures he/she would use.

In this study, the proposed survey instrument was first pre-tested with five colleagues from the Faculty of Information Studies of Universiti Teknologi MARA (UiTM) and five librarians from UiTM. The participants in the pre-test were encouraged to offer comments and criticisms regarding the questionnaire's length, the clarity of the questions, the variables offered, and the wordings used. After receiving feedback from the pre-test participants, the instrument was revised based on their comments and suggestions. They commented that some of the variables' statements were quite lengthy and suggested to shorten them. One participant who was an expert in multimedia had helped to refine the wordings for all the variables under the main section on multimedia-related competencies. The pre-test exercise was also carried out with the 18 respondents from the MSC status companies while the interview session was carried out with them.

### 3.6.4 Interviews

In the earlier stage of the study, interviews and discussions were conducted with a few professors locally and overseas to collect qualitative data. This qualitative method of data collection was carried out when discussions were held in April 2000 between the researcher and Professor David Arnott, the Dean of the Information Management and Systems at the Monash University in Australia and Associate Professor Barry McIntyre of the RMIT University in Melbourne, Australia. Both professors were selected for the interview because of their wide knowledge in the field of information management. The interview was an unstructured one. Issues on competencies and personal qualities that information professionals should have were discussed. Competencies issues that were mentioned and discussed were information technology-related, multimedia-related, knowledge management, interpersonal and communication, management, and research. Issues on personal qualities required of information professionals were also discussed. A lot of background information was obtained through the discussions. The discussions were of utmost importance in helping the researcher focus on the scope of the study. It also helped the researcher to refine her research questions and focus on the topic of the research. The competencies of information professionals were identified from the information gathered during the interview. Without any doubt, these interviews contributed to the refinement of the research and helped placed this research in perspective.

Personal interviews were also carried out with the Chief Executive Officers or Senior Managers in 18 selected companies from all categories of respondents to shed light on some of the key research questions discussed earlier. As experts in the general field of corporate IT, the participants were asked to address the questions of competencies and personal qualities of information professionals working in their

companies. The draft instrument was shown to these participants as a pre-test to find out whether the questions were relevant to the companies. The respondents said that the questions worked well with their companies and this increased the researcher's confidence on the design and content of the instrument.

The interviews were intended to investigate the main objective of the study, that was to identify the competencies and personal qualities of information professionals working in the MSC status companies. It was also intended to validate the instrument and assess the extent of ideas presented within the questionnaire. This process provided a basis for face validity as they were considered the "experts" to assess the relevance of the issues. At the same time, the interview was designed to explore the opinions of the respondents. Some of the data from the interviews were noted and later collated in the section of Management Skills, Interpersonal Skills and Entrepreneurial Skills sections of the instrument. Interviews were conducted on site using a sample of 18 companies representing different categories. The interviews lasted between one to one and a half hours. In all the interviews, the Chief Executive Officers or their representatives were very cooperative and helpful.

Upon visiting the companies, the researcher gained some insights about the companies' background and their staff. At the end of the interviews, the researcher was able to gather a more definite and stronger theoretical background of the current research. The importance of competencies as the main contextual variable for this study was confirmed.

In this study, post interview was not conducted because the quantitative data is already sufficient to answer the research questions. The information personnel already working in the MSC status companies were not interviewed because the objective of the study was to investigate the employer's requirement on the key competencies and

personal qualities of information professionals working in their companies. Therefore, it was not necessary to interview the information professionals because they did not belong to the category of respondents to be interviewed.

### 3.6.5 Validation

To ensure that the measures developed in the instrument were reasonably appropriate, the instrument was tested for its validity and reliability. Validity addresses the issue of whether what we tried to measure was actually measured. Face validity is the weakest form of validity. It is concerned with the degree to which a measurement "looks like" it has measured what it is supposed to measure (McDaniel and Gates, 1996). Validity assesses whether the test measures what it claims to measure (Sapsford and Jupp, eds., 1996; Burns, 2000b:360). Validity concerns the extent to which an indicator accurately measures the concept (Fielding and Gilbert, 2000:11). Bernard (2000:46) refers to validity as the accuracy and trustworthiness of instruments, data, and the findings in research. According to Bernard (2000:46), in research, nothing is more important than validity.

According to Sapsford (1999:139), face validity is a measure that looks on the face of it, as if it should be a valid one. Establishing face validity involves simply looking at the operational indicators of a concept and deciding whether or not, on the face, the indicators make sense. The indicators may be items on the test of knowledge and ability or others. Content validity is achieved when an instrument has appropriate content for measuring a complex concept or construct (Bernard, 2000:49).

In this study, the thorough study and review of existing literature during the development of the questionnaire helped ensure adequate content validity. After the pre-test, the questionnaire was revised and sent to selected experts in the area to check

on the validity of the instrument. These experts were able to validate the instrument for face and content validity before conducting the pilot study as they were considered the "experts" to evaluate the appropriateness of the issues.

The experts selected were the Chief Knowledge Officer of the Multimedia Development Corporation, the Head of the Client Services from the Multimedia Development Corporation, a multimedia developer from MIMOS, a professor from the International Islamic University, a professor from UiTM, and a Deputy Dean from UiTM. They were chosen based on their sound knowledge in this field, as they would have the insight to judge the relevance of this study. Inputs and suggestions from the panel of experts were highly encouraged. The researcher felt that the input of ideas from the experts was very important and they had played an important role in contributing to the success of the design of the instrument.

### 3.6.6 Pilot Study

It is important to conduct a pilot study in order to try out the techniques and instrument in advance before running the full-scale study. Barrett (2000:32) noted that a pilot test should be carried out using a smaller group of subjects who have similar characteristics to those of the subjects who will be used in the real study. .

To test the practicality of obtaining data under real situation, a pilot study was undertaken in September 2000 by distributing the questionnaire to 30 MSC status companies that represented different categories of involvement. The categories were: (a) Computer/System security; (b) Consultancy; (c) Content development; (d) Education/Training/Consultancy; (e) Hardware/Electronics; (f) Internet-based business; (g) Production /Postproduction/Animation; (h) Software development; (i) System integration; and (j) Telecommunications/Networking. Fifteen companies returned the

completed questionnaire. The objective of the pilot study was to ensure that respondents understood the instructions, the questions asked, and that the instrument used was reliable and appropriate to the area being researched.

As soon as all the respondents had returned the questionnaire, their input, comments, views and ideas were used to improve and upgrade the level of reliability of the instrument. The instrument was revised and improved. As De Vaus (1991:105) mentioned, "*good questionnaires do not just happen, they involve careful thinking, numerous drafts, thorough evaluation and extensive testing.*" Creating the right questionnaires requires both hard work and creativity (McDaniel and Gates, 1996).

### 3.6.7 Empirical Survey

Data collected in this survey used a direct mail survey. A self-administered questionnaire was mailed to a total population of ($N$ = 360) MSC status companies located throughout the whole country. Hair *et al.* (2000) mentioned that the advantage of mail survey is that it is cheaper but it suffers from a low response rate from respondents. Shaughnessy *et al.* (2000:158) noted that although mail surveys are quick and convenient, they might have the problem of response bias when individuals fail to complete and return the survey.

The questionnaire with a cover letter explaining the aims of the study was mailed out on 2nd January 2001 and respondents were given one month to reply. The cover letter was addressed to the Chief Executive Officer or Human Resource Manager or Senior Manager who have a company-wide responsibility. After the due date, the researcher has made follow-up phone calls to companies which did not respond. Those companies that claimed they did not receive the questionnaire were mailed another copy of the questionnaire. They were given two weeks to reply and return the questionnaire.

There were a few cases where companies claimed they did not receive the second mail, and again a third copy was sent to them. It took three months for the researcher to complete the follow-up. After numerous follow-ups, finally on the 30th April 2001 the researcher stopped collecting the data. The total response rate for this study was 35% or 125 responses. This was the trend that Shaughnessy *et al.* (2000:159) saw, who mentioned that the typical return of mail survey was only around 30%.

During the process of following-up the respondents, the researcher had gone through sweet and bitter experiences when asking for cooperation from respondents. Some respondents showed high cooperation, portrayed good interpersonal and communication skills, were helpful and friendly; while there were a few respondents who were very unwilling to assist and replied in an arrogant manner. Without them realising, the variables on personal qualities in the questionnaire were being tested on the respondents themselves and their attitude was reflected from the way they interacted with the researcher. However, this was not part of the study.

### 3.6.8 Reliability Test

To ensure that the measures developed in the instrument were appropriate, the instrument was tested for its reliability. The reliability test was earlier done based on the data of the pilot study and later done on the data of the actual study. Reliability refers to dependability or consistency. According to Burns (2000b:336), reliability is dependability, stability, consistency, predictability, and accuracy. Reliability is the stability of the measures that yielded constant results through repeated measurement (Sapsford, 1999:15). Reliability concerns the consistency of the measurement (Sapsford and Jupp, ed., 1996:88; Black, 1999:195; Fielding and Gilbert, 2000:11; Rudestam and Newton, 2001:82). It suggests that the same thing is being repeated or

recurred under the identical or very similar conditions (Neuman, 2000:164). Reliability is the degree to which measures are free from random error and therefore provide consistent data. The fewer errors there are, the more reliable the observations are, so that a measurement that is free from error is a correct measure (Mc Daniel and Gates, 1996).

The method of measuring reliability in this study is the internal consistency method. The internal reliability of each item in the questionnaire was tested statistically by using Cronbach's alpha technique using the Statistical Package for Social Science (SPSS). As mentioned by Black (1999:286), Cronbach's alpha is used to provide a reliability coefficient to indicate the level of internal consistency of the instrument or of a homogeneous section of an instrument.

During the design of the questionnaire of this study, some of the variables, features and scales in the questionnaire were adapted from questionnaires of other researchers. Due to this, it was necessary to test its reliability to see whether the variables produced consistent results. Even if the questionnaire used a well-validated measure, it was always best to check for the inter-item consistency reliability of the variables.

Cronbach's alpha is a reliability coefficient that reflects how well the items in a set are positively correlated to one another. The higher the correlations are between the items, the greater is the internal consistency. Hammond (2000a:186) states that:

> "The basic principle in deciding on whether a test is reliable is to remember that the reliability coefficient is a measure of the proportion of overlapping of "true" and "observed" variance. Thus, a test with a reliability of 0.7 means that 30% of its variance is residual and irrelevant; a reliability of 0.6 suggests a test in which 40% of its variance is made up of errors."

The reliability of a test was dependent on the number of items in the test. Provided the items were of sufficient quality, the more items there were, the greater the reliability

was. In other words, the more indicators there were, the more accurate our estimate of the "true" score was (Hammond, 2000a:186).

A researcher will normally choose the test with the highest quoted reliability. A test with a reliability of +0.90 is better than one with a reliability of +0.80 (Burns, 2000b:344). Reliabilities less than 0.60 were generally considered to be poor, those in the range of 0.70, to be acceptable, and those over 0.80, to be good. The closer the reliability coefficient gets to 1.0, the better it is, meaning, the internal consistency reliability is higher (Sekaran, 2000:312). On the other hand, a reliability of zero would mean that the scale is totally useless and the different statements in the scale did not measure the same variables. The results of Cronbach's alpha for each of the categorical variables in the questionnaire are provided in the analysis of questionnaire data in Chapter 4.

A more acceptable and sophisticated way of determining the structure of a test or scale in terms of its sub-groupings of items (factors) is to submit it to factor analysis (Burns, 2000b:349). In this study, factor analysis was also performed to give more efficiency in the analysis of data.

### 3.7 Data Analysis

A variety of statistical analyses were conducted to analyse the data. A combination of descriptive statistics, factor analysis, mean ranking, one-way analysis of variance (ANOVA), independent-samples $t$ test, and Spearman's rho correlation coefficient were used in the analysis of this study. The responses made to each statement and question in the questionnaire were coded and the data was entered into a statistical software, Statistical Package for Social Science (SPSS) Version 10.0 for data analysis.

### 3.7.1 Factor Analysis

Factor analysis technique was used in this study to reduce the data to a more manageable set. Factor analysis was run on all the 29 items in Section E of the personal quality variables. The principle components method of factor analysis followed by varimax orthogonal rotation was utilised.

Factor analysis is a very complex statistical procedure which is correlational in nature and can determine the commonalities among a set of measures (Mayer and Sutton, 1996:46). According to Hjelle and Ziegler (1992:269), "*factor analysis is a statistical tool for summarising and simplifying sets of variables, reducing a relatively large set of variables to a relatively small set of variables, personality trait dimensions or factors.*" Frankfort-Nachmias and Nachmias (1996:471) mentioned factor analysis as a statistical technique that is useful for constructing multiple-items scales where each scale represents a dimension of a highly abstract construct. Cloninger (1996:232) stated that factor analysis is used to eliminate redundancy.

Mayer and Sutton (1996:48) stated that this procedure is very useful because it reduces the complexity of a given set of measures by showing which measures are more or less synonymous with one another. When measures group together, it is inferred that there is an underlying variable that accounts for the clustering. This underlying variable is referred to as a factor. Hjelle and Ziegler (1992:268) listed the procedural steps in carrying out a typical factor analysis that was also followed by the researcher in this study. The steps that were performed were (a) collecting measures from a large number of subjects on each number of variables, (b) inter-correlating all variables, (c) extracting factors from correlation matrix, (d) determining the factor loading of the item measures on the factors, and (e) interpreting and naming the factors.

A researcher begins conducting factor analysis with a number of items believed to be measuring a single construct. The indicators should be measured preferably at the interval and ratio scale (Neuman, 2000:502). The results of a factor analysis are presented as "factor loadings" which were like correlations: the loading of the factor as a whole (squared) is the proportion of overall variance explained, and the loadings of individual items are their contribution to the factor (Sapsford, 1999:201). The first stage of factoring a correlation matrix is called principle components analysis. During this process, the statistical software will construct as many components as there were original variables. The first component will intercorrelate variables to form a single component accounting for as much as possible of the variance. The second component is constructed to account for as much as possible of what was left over, and the third to account for as much as possible of what is not explained by the first two, and so on (Sapsford, 1999:201). The second stage is called factor rotation. Factor rotation used the varimax orthogonal rotation process, which improves the interpretability of the data. Rotation transforms the initial graphic matrix into one that was easier to interpret by rotating the axes, usually at right angles to each other.

There are two main methods of deciding how many factors to extract. One method is simply to extract all the factors which have an eigenvalue greater than 1.0. Eigenvalue is a term to connote the amount of variance accounted for by a factor. The second is known as scree test, which is a graph of percentage of variance explained and takes as a cutting point, the point at which the slope appears to be changing and after that the line evens out and became virtually straight. In practice, we should probably compromise, look at the loadings of the variables on the second and third components, and decide which combination is likely to be most interpretable (Sapsford, 1999:202).

### 3.7.2 Descriptive and Inferential Statistical Analysis

Descriptive statistics allows researchers to summarise large quantities of data using measures that are easily understood (Burns, 2000b:43). In this study, descriptive statistics was used for analysing data and the results were presented in table format. Frequencies, percentiles, means and standard deviations were calculated.

The normality assumption of the survey data was tested to determine the statistical technique to use. The one-way analysis of variance (ANOVA) and the independent-samples *t* test were employed in this study to test group mean difference for significance. ANOVA and *t* test are two different ways of testing mean differences. ANOVA has the advantage in that it can compare more than two groups of samples, while *t* test are limited to two groups. ANOVA is a hypothesis testing procedure used to determine if mean difference exists among more than two groups of samples. Samples chosen from a population are likely to differ simply due to sampling error. They will have slightly different means and standard deviations. The purpose of ANOVA is to decide simply whether the differences between groups are simply due to chance (sampling error) or whether there are systematic effects that have caused scores in one group to be different from scores in other groups (Burns, 2000b:294).

These tests were measured at the values of 0.05 level of significance. In this study, when the results are reported significant at 0.05 level, it means the following:

1. Results like these were due to chance factors only 5 in 100 times.
2. There was a 95% chance that the sample results were due to chance factors alone, but reflected the population accurately.
3. The odds of such results based on chance alone were 0.05 or 5%.
4. One can be 95% confident that the results were due to real relationship in the population, not chance factors (Neuman, 2000:338).

A two-tailed test at 95 % confident level was used to detect the differences in means between these groups. If the two-tail significance level is equal or less than 0.05, the null hypothesis was rejected. A value equal or smaller than 0.05 was regarded as significant.

Following the ANOVA, a post hoc test using the Duncan Multiple Range Test was undertaken. Sekaran (2000:406) noted that:

> "When significant mean differences among the groups are indicated by the F statistic, there is no way of knowing from the ANOVA results alone as to where they lie. That is, whether the significant difference is between groups A and B, or between B and C, and so on."

For this purpose, the Duncan Multiple Range Test was performed, "*to determine among which groups the true differences lie*" (Sekaran, 2000:406).

The Spearman' s rho correlation coefficient statistical tests were used to determine and to measure the strength of relationships between two categorical variables. In this study, analyses of correlation using the Spearman's rho coefficient of correlation were applied because some of the variables (based on mean score) being correlated were not normally distributed. Hammond (2000b:378), mentioned that if the variables are not normally distributed, it may be appropriate to use a non-parametric correlation coefficient, which is the Spearman's rho. According to Shaughnessy *et al.* (2000:129), a correlation "*assesses the extent to which two variables covary; the correlation coefficient is a quantitative index of the direction and magnitude of this relationship.*" The direction of a correlation coefficient can be negative or positive. The magnitude of a correlation coefficient ranges from -1.0 for a perfect negative relationship to +1.0 for a perfect positive relationship, while a correlation coefficient of 0.00 indicates no relationship (Cohen and Swerdlick, 1999:131). In this study, the magnitude or degree of a correlation coefficient ranged in absolute values from 0.0 to 1.00.

## 3.8 Conclusion

This chapter examined the major issues involved in selecting a research methodology and design, the population selected, the questionnaire design and its contents, and the various processes in gathering data. The researcher's experience throughout the whole process of gathering data was also mentioned. The analyses of data that include the use of descriptive and inferential statistics were also explained. Details of the data analysis and results are presented in Chapter 4.