CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter will describe the sample, instrumentation, data collection, and data analysis of the study.

The investigation in this research concerns the Chinese and Malaysian engineers for their preferences in sentence-types and the frequency of using the scientific and technical terms when writing technical reports.

The preferences of the Chinese and Malaysian engineers for sentence-types will be analyzed in terms of simple, compound, complex, and compound-complex sentences. The frequency of the scientific and technical terms used by the Chinese and Malaysian engineers will be measured based upon the actual counting of the scientific and technical terms and nouns used in the ten reports written by the Chinese and Malaysian engineers.

3.2 INSTRUMENTATION

For this study, the researcher chose a multinational organization that has worksites in various countries in the world. The researcher chose two worksites of this multinational organization to collect the necessary data, one in China and the other in Malaysia. The choice of the worksites was based on the fact that the researcher has accessed to the technical reports of only these two countries.

The primary instrumentation for data collection in order to investigate the differences in the choice of sentence-types and the frequency of the scientific and technical terms used was carried out by means of collecting ten technical reports written by the Chinese and Malaysian engineers from both worksites.

In this study, an interview was also carried out to obtain the necessary information. Van Lier (1988) advocates gathering information on second language research by using "different kinds of data, different methods, and a variety of research tools".

3.2.1 Technical Reports

Ten technical reports from both worksites were selected based upon the topics which involve the technology of the assembly process, working experiences of the engineers concerned, which was gauged by the number of years they have worked

with the multinational organization, and the period during which the reports were written. The ten reports, which have the topics that involve the technology of the assembly process, and were written at about the same period (1998 to 1999) by engineers with about similar working experiences, were selected for this study, under the assumption that the reports are likely to have similar types of sentences and words. Such measures were taken to also overcome any biasness, if there were any.

The objective of using the reports written by the Chinese and Malaysian engineers is to obtain the necessary data on the preferences for the specific sentence-types and to investigate the frequency of the scientific and technical terms used by the Chinese and Malaysian engineers. In order to achieve the objective, the ten reports written by the Chinese and Malaysian engineers will be examined.

3.2.2 Interview with the Senior Process Engineering Manager

For this study, the researcher also used the interview method. The objective in conducting the interview was to obtain the necessary information about the reports and the personal profiles of engineers, which was not available in the technical reports. This information is necessary, as the profiles would show that there would not be any biasness in terms of the writers of the reports.

As the interview was customized, the researcher was permitted to explore some of the information about the engineers concerned in depth.

3.3 DESCRIPTION OF THE SAMPLE

Bell (1987) points out that efforts should be made to secure a representative sample, even in a small-scale study. This will involve selecting appropriate proportions of subgroups of the population, using whatever variables the researchers have determined to be important. In the selection process, it may be necessary to negotiate access to subjects or data collection sites with individuals or institutions (Bell, 1987).

3.3.1 The Multinational Organization

For this study, the researcher chose a multinational organization in order to identify the differences in the choice of sentence-types and to investigate the frequency of the scientific and technical terms in the ten technical reports written by the engineers who are working for this particular company.

The worksite of this organization in Malaysia is located in the Klang Valley, Selangor and the one in China is located in Xiqing Economy Development Area, Tianjin. The two worksites that the researcher chose for this study manufactures Integrated Circuit Packages. The organization's headquarters is in Chicago, USA.

The main reason for choosing this company is due to the fact that this company has worksites in both China and Malaysia and the engineers in both sites write the

technical reports in English. For this study, a total of ten technical reports collected from the two worksites were used to obtain the necessary data.

3.3.2 Writers of the Technical Reports

As information about the writers of the reports was given through the interviews with the Senior Process Engineering Manager, which is one of the instruments of this study, a brief description will be provided in this section. A more detailed information will be presented in Chapter four.

3.3.2.1 Chinese Engineers

All of the five Chinese engineers, who wrote the technical reports concerned, have worked for the organization for about three to six years and they are process engineers in the assembly process engineering department. These engineers write technical reports approximately every six months.

3.3.2.2 Malaysian Engineers

Similarly, the Malaysian engineers who wrote the reports have about three to six years of experience working for this organization.

As with the Chinese engineers, these Malaysian engineers also work in the assembly process engineering department. Three of them are process engineers and the other two are final test engineers. The Malaysian engineers write technical reports roughly every six months too.

3.3.3 Technical Reports

The technical reports were collected from the engineers who are working for a multinational organization based in China and Malaysia worksites. The topics of the ten reports selected for this study involve the technology of the assembly process. The ten reports concerned were written during the period of 1998 to 1999.

In this organization, technical reports are written for the purpose of continuous improvement on the assembly processes. After writing the reports, engineers discuss the findings of the reports and then submit the reports to the engineering manager.

3.3.3.1 Technical Reports Collected from the Chinese Engineers

Five technical reports were collected from the Chinese engineers. The titles of the reports and brief descriptions of the reports given by the Senior Process Engineering Manager are as follows:

Report 1. "Fine Pitch on Wire Bonding on SDIP Products":

This is a study on wire bonding process with fine pitch using SDIP products.

Report 2. "Study on SOIC Package with Fast Cure Molding Compound":

This is a study on the performance of the molding compound before and after curing.

Report 3. "PPF Study on Die bonding Process":

This is a study on die bonding process with the pre-plated frame.

Report 4. "PPF Study on Wire Bonding Process":

This is a study on wire bonding process with the pre-plated frame.

Report 5. "Kobold Assembly Characterization":

This is a study on the moisture absorption rate after baking process.

As such, amongst the five technical reports that the Chinese engineers have written, four reports involve the study on the processes of the technology of the assembly and one report is about the analysis of the technology.

3.3.3.2 Technical Reports Collected from the Malaysian Engineers

Five technical reports were collected from the Malaysian engineers. The titles of the reports and brief descriptions of the reports given by the Senior Process Engineering manager are as follows:

Report 1. "Stacking Prebake and Vacuum Sealing for PBGA Substrates":

This is a study on moisture absorption of substrates after baking.

Report 2. "Signal Conditioner Key Off Timer Issue":

This is a study on the failure analysis procedures for a wafer probe.

Report 3. "Bondability and Reliability for Ultra Fine Pitch Bonding Process":

This is a study on the process optimization of wire bonding with ultra fine pitch.

Report 4. "RFSOE Competitive Constructional Analysis":

This is a study on the new analysis method of RFSOE.

Report 5. "Bridging Defect Found on UDR2 Technology":

This is a study on the failure analysis of ESD thick field transistor.

As such, amongst the five technical reports that the Malaysian engineers have written, three reports involve the analysis of the technology of the assembly and the other two reports explain the process of the assembly.

3.3.4 The Senior Process Engineering Manager

For the purpose of collecting the necessary information about the engineers concerned, the researcher conducted interviews with one Senior Process Engineering Manager attached to the department of assembly process engineering, who has worked in both worksites and dealt with both Chinese and Malaysian engineers. He has been working for this organization for 15 years, out of which three years in China and 12 years in Malaysia. A number of discourse-based interviews were conducted with the Senior Engineering Manager to obtain the necessary information about the technical reports and the engineers who wrote the reports.

3.4 DATA COLLECTION

3.4.1 Using the Interview

Data collection was facilitated through the interviews with one Senior Process Engineering Manager who has worked in both worksites and dealt with both Chinese and Malaysian engineers. The researcher was permitted by the relevant authorities of the company to conduct a few interviews with the Senior Process Engineering

manager. The appointments to meet him in his office in Klang Valley, Selangor were set up.

The interviews were of the semi-structured type where there were specific core questions that had been determined in advance. The researcher was allocated thirty minutes for each interview and the nature of the interviews was face to face, with the researcher asking specific questions whenever necessary. The researcher was allowed to reconfirm the answers and seek clarification and elaboration of the answers, whenever necessary.

The Senior Process Engineering manager answered the questions about the engineers concerned based on his knowledge as well as his working experiences with them. In addition, in the process of confirmation, the senior engineering manager referred to the files on his computer to ensure the accuracy of the information he imparted. Overall, the senior manager was very cooperative and the researcher recorded and compiled all the answers.

It should also be mentioned that the researcher was not able to personally interview the writers of the reports, as the organization would rather not disclose the names of the writers for anonymity reason. Therefore, detailed background of the writers, which would further explain the findings, could not be obtained.

3.4.2 Using the Technical Reports

Permission to obtain the technical reports was enquired and the relevant authorities of the company granted it. The appointments with the Senior Process Engineering Manager were made to collect the reports.

The manager retrieved about 20 technical reports from his computer files, ten reports written by the Chinese engineers and ten reports written by the Malaysian engineers. Out of the 20 reports, the Senior Process Engineering Manager chose ten reports based upon the topics that involve the technology of the assembly process, as requested by the researcher. As such, the researcher had accessed to only ten reports as determined by the Senior Process Engineering Manager.

Therefore, five reports written by the Chinese engineers and five reports written by the Malaysian engineers were selected based upon the topic, which involve the technology of the assembly process, and working experiences of the engineers concerned, which was gauged by the number of years they have worked with the multinational organization.

The name of the multinational organization chosen for this research was erased whenever mentioned on any of the ten reports for the sake of the anonymity. For the same purpose, any mention of the name of the rival company and engineers was removed.

3.5 DATA ANALYSIS

The aim of the study is to identify the differences in the choice of sentence-types and to investigate the frequency of the scientific and technical terms used in the ten technical reports written by the Chinese and Malaysian engineers.

In order to achieve the aim of identifying the differences in the choice of sentence-types, all the sentences in the reports will be looked at. Therefore, only complete sentences found in each of the ten reports written by the Chinese and Malaysian engineers are included and analyzed in terms of whether they are simple, compound, complex, or compound-complex sentences. The frequency of the scientific and technical terms used in the reports will be measured based upon the actual counting of the scientific and technical terms among the nouns.

The ten reports consist of the five reports from the worksite in China and the five reports from the worksite in Malaysia. The five reports written by the Chinese engineers were numbered as C1, C2, C3, C4, and C5. The numbering was made randomly and each number behind C does not carry any meaning other than being referred to as one of the five reports written by the Chinese engineers.

Likewise, the five technical reports written by the Malaysian engineers were numbered as M1, M2, M3, M4, and M5.

3.5.1 Analysis of the Sentence-Types Preferred by the Chinese and Malaysian Engineers

In order to identify the sentence-types preferred by the Chinese and Malaysian engineers, the sentences were classified into four kinds: simple, compound, complex, and compound-complex sentences based upon the classifications of Webb (2003) as described in Chapter two. In the process of classifying all the sentences written on the reports, every sentence was looked at and underlined with different colors based on the sentence-type.

Simple sentences were identified and underlined with black color, whereas compound sentences were identified and underlined with red color. While complex sentences were identified and underlined with blue color, compound-complex sentences were identified and underlined with brown color.

The actual number of each sentence-type used in each of the ten technical reports will be counted based on the process of identification mentioned above. In order to come up with the percentage, the total number of each sentence-type will be divided by the total number of all the four sentence-types used in each report. The most preferred sentences and the least preferred sentences will be identified based on the number and percentage of each sentence-type used in each report.

This research will also include the data of dependent markers for sentence-types obtained from the ten technical reports written by the Chinese and Malaysian engineers. The data will be analyzed and reported in terms of the dependent markers for each of the sentence-types. The most preferred dependent markers and the least preferred markers will be identified based on the number and percentage of each dependent marker used in each report of the Chinese and Malaysian engineers.

3.5.2 Analysis of the Frequency of the Scientific and Technical Terms Used by the Chinese and Malaysian Engineers

To investigate the frequency of the scientific and technical terms used by the Chinese and Malaysian engineers, all the nouns used in each of the ten reports were identified and circled with black color first. Secondly, all the nouns that had been circled with black color were checked against the McGraw-Hill Dictionary of Scientific and Technical Terms (sixth edition, 2003). This was to identify the scientific and technical terms amongst the nouns. Thirdly, the nouns that were listed as the scientific and technical terms in this particular dictionary were colored green. The same process was applied to each of the ten reports selected for the study.

In order to measure how often the Chinese and Malaysian engineers use the scientific and technical terms, all of the nouns in each of the ten technical reports written by the Chinese and Malaysian engineers will be counted first. Secondly, amongst the nouns that have been counted, the nouns that are listed in the McGraw-

Hill Dictionary of Scientific and Technical Terms (sixth edition, 2003) will be counted as the scientific and technical terms. Lastly, the percentage of the scientific and technical terms used by the Chinese and Malaysian engineers will be calculated based on these countings.

As such, the frequency of the scientific and technical terms used by the Chinese and Malaysian engineers will be measured by calculating the percentage of the total number of scientific and technical terms used against the total number of nouns used in the technical reports written by the Chinese and Malaysian engineers.

3.6 CONCLUSION

This study was undertaken to identify the differences between the Chinese and Malaysian engineers in the usage of sentences and lexical items in their writing tasks. These differences may indicate that the Chinese and Malaysian engineers have a different style in writing technical reports. Due to different backgrounds in learning English, these engineers might have acquired different styles in writing technical reports. As such, this research hopes to bring some light into ESP needs in both China and Malaysia.