CHAPTER 5
RESEARCH METHODOLOGY

5.1 INTRODUCTION

The research process can be compared to a guide or a map. On a map some paths are better charted than others. Some are difficult to travel on and some are more interesting and scenic than others. Rewarding experiences may be gained during the journey. It is important to remember there is no single right path or best path for all journeys. The road one takes depends on where one wants to go and the resources (money, time, labour and so on) one has available for the trip (Zikmund, 2003:60).

The Longman dictionary of contemporary English (1993:655) defines methodology as the set of methods used for study or action in a particular subject, as in science or education.

According to Cooper & Schindler (2003:663), the section of a study describing the methodology is an important one, describing at least five parts:

- Sampling design
- Research design
- Data collection
- Data analysis
- Limitations

For the purpose of comprehensiveness this chapter will not only cover the five sections identified above, but will also discuss the problem statement and research objectives of this study.

5.2 PROBLEM STATEMENT AND OBJECTIVES

The adage “a problem well defined is a problem half solved” is worth remembering. This adage emphasises that an orderly definition of the research problem gives a sense of direction to the investigation. Careful attention to problem definition allows a researcher to set the proper research objectives. If the purpose of the research is clear, the chances of collecting the necessary and relevant information will be much greater (Zikmund, 2003:60-61).

5.2.1 Problem statement

According to Cooper & Schindler (2003:662), the problem statement includes the need for the research project. The problem is usually represented by a management question, and is followed by a more detailed set of objectives.

As indicated in Chapter 1, it is important that enterprises must select managers who, with their families, will be most able to adapt internationally and who also possess the necessary expertise to get the job done in that foreign environment. Many enterprises that lack experience in international operations, as they try to increase their foreign sales, overlook the importance of the cultural variation in other countries. This attitude, combined with the enterprises' inclination to choose employees for the expatriate experience because of their technical abilities, generally leads to international assignments being made without the benefit of training or help in acculturation. This may – and all too often does – lead to failure in the foreign assignment, with premature return to the parent company and country, or even dismissal in the foreign locale (Briscoe & Schuler, 2004:242). Scullion & Linehan (2005:125) add that success depends to a large extent on cross-cultural adaptation, as well as selection and training practices.

In order to avoid the costly failure of expatriates it is important to realise that psychological and emotional peace of mind is the single most important element for the successful relocation of an employee and members of his or her family abroad. It is important to select the right employee and then provide the individual with the proper cross-cultural training, support and services that will position him or her to be successful (Anon, 2002a:61). Fontaine (1997:631) echoes this view, stating that the success of international assignments can be ensured if effective preparation, support and training are provided.

As stated in Chapter 1, the full extent of the problem in South Africa is not known, as determining the failure rate and the reasons for failure of South African expatriates are predominantly done by research houses on behalf of individual MNEs or a particular industry. As a result this information is treated as confidential. However, according to Sapa (2004) the University of South Africa has determined that South African MNEs are falling short in terms of the structured training programmes they offer to expatriates, as well as on their repatriation upon completion of an international assignment. In the light of the fact that the success of expatriates on an international assignment is influenced by the preparation, support and

training they receive, the lack of such support could contribute towards the current and future failure of expatriates on international assignments.

5.2.2 Objectives of the study

After identifying and clarifying the problem, researchers should make a formal statement of the problem and the research objectives. A decision must initially be made as to precisely what should be researched, so as to delineate the type of information that should be collected and provide a framework for the scope of the study, or the research project. The best expression of a research objective is a well-formulated, testable research hypothesis (Zikmund, 2003:65).

The objective of this research is to determine what South African MNEs should do – in terms of preparation, support and training – in order to better prepare their expatriates for international assignments. As was seen in the previous chapters, ill-prepared expatriates tend to fail – come home from international assignments early – and as a result are incurring direct and indirect losses for their enterprises.

The following hypotheses will be tested in this study:

H_{10}: South African MNEs are not providing the preparation, support and training that expatriates feel they need for international assignments.

H_{1A}: South African MNEs are providing the preparation, support and training that expatriates feel they need for international assignments.

H_{20}: Expatriates with spouses and families do not have special preparation, support and training needs.

H_{2A}: Expatriates with spouses and families do have special preparation, support and training needs.

H_{30}: There is no difference between the preparation, support and training needs of expatriates on an international assignment in Africa and those expatriates on an international assignment in the rest of the world.

H_{3A}: There is a difference between the preparation, support and training needs of expatriates on an international assignment in Africa and those expatriates on an international assignment in the rest of the world.

H_{40}: There is no relationship between the age group that expatriates fall in and the type of preparation, support and training that they feel they need for international assignments.

H_{4A}: There is a relationship between the age groups that expatriates fall in and the type of preparation, support and training that they feel they need for international assignments.

H_{50}: There is no relationship between the duration of international assignments and the type of preparation, support and training that expatriates feel they need for these assignments.

H_{5A}: There is a relationship between the duration of international assignments and the type of preparation, support and training that expatriates feel they need for these assignments.

H_{60}: There is no difference in the preparation, support and training needs of top and middle management expatriates on an international assignment.

H_{6A}: There is a difference in the preparation, support and training needs of top and middle management expatriates on an international assignment.

5.3 SAMPLING DESIGN

The basic idea of sampling is that by selecting some of the elements in a population – the total collection of elements about which we wish to make some inferences – we may draw conclusions about the entire population. There are several compelling reasons for sampling, including: lower costs, greater accuracy of results, greater speed of data collection and availability of population elements (Cooper & Schindler, 2003:179).

5.3.1 Target population

According to Zikmund (2003:373), the first question related to sampling concerns identifying the target population, that is, the complete group of specific population elements relevant to the research project. At the outset of the sampling process, it is vitally important to carefully define the target population so that the proper source from which the data are to be collected can be identified. Answering questions about the critical characteristics of the population is the usual technique for defining the target population. For instance does the term "comic book reader" include children under six years who do not actually read the words?

The target population for this research includes all expatriates working for South African Multinational Enterprises currently on an international assignment abroad.

5.3.2 The sampling frame

Zikmund (2003:373) states that in actual practice the sample will be drawn from a list of population elements that is often somewhat different from the target population that has been defined. A sample frame is the list of elements from which the sample may be drawn. A simple example of a sampling frame might be a list of all members of the American Banking Association. It is generally not feasible to compile a list that does not exclude some members of the population. For example, if the student telephone directory is utilised as a sampling frame listing of a university's student population, the sampling frame may exclude those students without phones, or those who have their telephones listed only under their room-mates' or pets' names.

The sampling frame used in this study was all known South African private MNEs, thus excluding governmental departments as well as non-governmental organisations. All non South African enterprises were also excluded. The sampling frame used for this study was all expatriates working for these MNEs currently on an international assignment abroad. This excludes all expatriates who have finished and have returned to South Africa. The sampling frame was obtained from the South Africa MNEs approached in the first sampling frame.

5.3.3 Sampling units

During the actual sampling process, the elements of the population must be selected according to a certain procedure. The sampling unit is a single element or group of elements subject to selection in the sample. For example, if an airline wishes to sample passengers, every 25th name on a complete list of passengers may be taken. In this case the sampling unit is the same as the element. Alternatively, the airline could first select flights as the sampling unit, and then select certain passengers on the previously selected flight. In this case defining the sample unit occurs in two stages. If the target population has first been divided into units, such as airline flights, additional terminology must be used. The term primary-sampling units designates units selected in the first stage of sampling. If successive stages of sampling are conducted, sampling units are called secondary sampling units or tertiary sampling units (if three stages are necessary)(Zikmund, 2003:375).

In this study the primary sampling units are South African MNEs that make use of expatriates, while the secondary sampling units are all the expatriates currently on an international assignment abroad in the sampling frame provided by the South African MNEs.

5.3.4 Probability versus nonprobability sampling

There are several alternative ways of taking a sample. The major alternative sampling plans may be grouped into probability techniques and nonprobability techniques. In probability sampling, every element in the population has a known nonzero probability of selection. The simple random sample is the best-known probability sample, in which each member of the population has an equal probability of being selected. In probability sampling the probability of any particular member of the population being chosen is unknown. The selection of sampling units in nonprobability sampling is, on the other hand, quite arbitrary, as researchers rely heavily on personal judgment. It should be noted that there are no appropriate statistical techniques for measuring random sampling errors from a nonprobability sample. Thus, projecting the data beyond the sample is statistically inappropriate (Zikmund, 2003:379-380).

As only known South African MNEs were approached in this study, nonprobability sampling was used to determine the primary sampling units. Questionnaires were then sent to all the expatriates whose information could be obtained from these MNEs, meaning that in order to determine the secondary sampling units nonprobability sampling was again used.

5.3.4.1 Convenience versus judgment/purposive sampling

Convenience sampling refers to sampling by obtaining units of people who are most conveniently available. For example, it may be convenient and economical to sample employees in companies in a nearby area.

Judgment or purposive sampling is a nonprobability sampling technique in which an experienced individual selects the sample based on his or her judgment about some appropriate characteristic required for the sample members (Zikmund, 2003:381-382).

For this research judgment sampling was used, as only South African MNEs who make use of expatriates could be used. Only South African MNEs were phoned – at random – and asked if they made use of expatriates; if they did not they were not included in the sample. If they did they were included. Judgement sampling was also used in determining the secondary sampling units. The chosen MNEs from the primary sampling units were asked to provide a list of their expatriates currently on an international assignment abroad.

5.3.5 Sample size

Because expatriates who were currently on an international assignment abroad needed to answer the questionnaire, it was decided that an electronic questionnaire would be the best approach. Due to fears that the MNE's e-mail firewalls might not allow the attachment to the e-mail containing the questionnaire to reach the expatriates, a web page hosting the questionnaire needed to be created. For this purpose the Informatics Department at the University of Pretoria was approached. This meant that a link to the web page containing the questionnaire could be sent to the expatriates with an instruction that the web page could best be viewed using Outlook Express. In total 48 South African MNEs were approached. These organisations were approached using phone calls, faxes, e-mails, personal visits and sometimes a combination of these methods in order to determine whether these MNEs made use of expatriates. If they did, they were asked if they would be willing to provide the e-mail addresses of their expatriates currently on an international assignment abroad so that the link to the web site containing the questionnaire could be sent to them. Of these MNEs, five did not make use of expatriates. In total eight MNEs were willing to provide the e-mail addresses for their expatriates, and 102 links to the web site containing the questionnaire were sent out. Of these only 80 were still active addresses. A further six MNEs indicated that either they were afraid that their expatriates' information might reach their competitors, or that the information might be used for other purposes than the research and as a result they offered to send the link to the web site themselves, meaning that an undisclosed number of links was sent out by these six MNEs.

Apart from the original 48 MNEs, one London-based enterprise specialising in expatriate research and other IHRM matters, upon hearing of the research, offered to send the link to the web site to its South African members with a letter asking them to participate in the research. As their membership records are confidential, no numbers or MNE names were divulged and as a result, again it is not known what the response from their members was. However, of the 65 responses to the questionnaire, 30 could be traced back to the 80 links sent out by the researcher, meaning that the remaining 35 responses came from the eight MNEs who sent the links themselves, and from the members of the enterprise specialising in expatriation consulting.

5.4 RESEARCH DESIGN

This was a formal study, as the research objective and hypotheses had already been determined through a literature study. Self-administered questionnaires were used by sending the link to the web site where the questionnaire was hosted via e-mail to expatriates currently on an international assignment, making this an interrogation study. No attempt was made to control and/or manipulate any variables in the study and the researcher only reported what was currently happening as far as expatriate preparation, support and training were concerned. This means this was an ex post facto design. As it was attempting to determine what expatriates from South African MNEs need in terms of preparation, support and training, as well as what was being offered to them this was a descriptive study. This was moreover a cross-sectional study, as the current experiences of expatriates in South African MNEs were surveyed. As the research tested the six hypotheses identified under the research objectives using quantitative, techniques this study can be classified as a statistical study. Lastly, as the research did not attempt to stage or manipulate any conditions but rather conducted the research under actual environmental conditions, this research was conducted under field conditions.

5.5 DATA COLLECTION

Once the research design (including the sampling plan) has been formalised, the process of gathering information from respondents can begin. Obviously, because there are many research techniques, there are many methods of data collection. Often there are two phases to the process of collecting data: pretesting and the main study. A pretesting phase, using a small subsample, may determine whether the data collection plan for the main study is an appropriate procedure. Thus, a small-scale pretest study provides an advance opportunity for the investigator to check the data collection form and minimise errors due to improper design, such as poorly worded or organised questions. There is also the chance to discover confusing interviewing instructions, learn if the questionnaire is too long or too short and to uncover other such field errors (Zikmund, 2003:72).

5.5.1 Questionnaire design

According to Diamantopoulos & Schlegelmilch (2000:24-27), the following types of measurement scales can be distinguished:

- **Nominal scale**

A nominal scale, as the name implies, is a scale in name only and represents the simplest type of scaling. In nominal scaling, the numbers used have no mathematical properties in themselves and serve only as labels for identification and/or classification. For example, assigning a unique number to each athlete in a sporting event serves only to identify the individual athlete taking part (otherwise how would you know who won?). This is the most elementary nominal scale (sometimes referred to as a label nominal scale); there is a strict one-to-one correspondence between each number and each athlete and as long as this correspondence is preserved, any set of numbers could be assigned.

A more common nominal scale is the category nominal scale, whereby the number assigned represents mutually exclusive and collectively exhaustive categories of persons, objects and others. For example, classifying individuals according to their nationality, eye colour or sex is done by means of category nominal scales.

The first seven questions in this questionnaire were demographic questions, which included both unstructured response as well as structured response questions using a nominal scale.

- **Ordinal scale**

An ordinal scale establishes an ordinal relationship between persons or objects being measured. In ordinal scaling, numbers are used to indicate whether a person or object has more or less of a given characteristic than some other person or object. However, the numbers do not provide information as to how much more or less of the characteristic is possessed by the person or object concerned. For example, a consumer may be asked to try out and rank four brands of cornflakes (A, B, C and D) according to digestibility, as follows: 1 = most digestible, 2 = second most digestible, 3 = third most digestible, 4 = least digestible.

After the first seven demographic questions, the next 59 questions were structured response questions on the preparation, support and training of expatriates using a four-point Likert scale. The Likert scale is the most frequently used variation of the summated rating scale. Summated scales consist of statements that express either a favourable or unfavourable attitude towards the object of interest (Cooper & Schindler, 2003:253).

- **Interval scale**

An interval scale possesses all the characteristics of an ordinal scale (i.e. equivalence and order) and in addition, is characterised by equality of intervals between adjacent scale values. In interval scaling, the numbers used permit inferences to be made concerning the extent of differences that exist between the measured persons, objects and the like, with regard to a particular characteristic. The distance between the numbers corresponds to the distance between the persons, objects and the like, on the characteristic concerned. For example, when we measure temperature on the Fahrenheit scale, we can say that the difference between 70 degrees Fahrenheit and 50 degrees Fahrenheit is the same as the difference between 40 degrees Fahrenheit and 20 degrees Fahrenheit, and that both are twice the difference between 10 degrees Fahrenheit and 0 degrees Fahrenheit; however, we cannot say that 50 degrees Fahrenheit is five times as hot as 10 degrees Fahrenheit (i.e. suggest a 5:1 ratio). The reason for this is that the zero point on the Fahrenheit scale is arbitrary and does not reflect the true zero of the underlying characteristic (i.e. absence of heat).

- **Ratio scale**

Finally, a ratio scale has all the features of an interval scale (i.e. equivalence, order, equality of intervals) plus an absolute zero point (also known as true or natural zero). In ratio scaling the numbers assigned enable comparisons to be made between the measured persons, objects and the like, in terms of absolute magnitude on a give characteristic; equal ratios between the scale values correspond to equal ratios among the persons or objects concerned (which is not the case with interval scales). For example, we can measure the speed of a motorcycle in kilometres or miles per hour. On either scale, a reading of zero actually corresponds to absence of speed (i.e. the motorcycle is static). Moreover we can say that driving at 240 kph is twice as fast as at 120 (a ratio of 2:1).

Most financial research that deals with monetary values utilises ratio scales. Because the scale of measurement is ratio, financial researchers are allowed to construct ratios derived from the original scale. However, for most behavioural research, interval scales are typically the highest form of measurement (Zikmund, 2003:298).

The scale of measurement on which the data are based or the type of measurement reflected in the data determines the permissible statistical techniques and the appropriate empirical operations that may be performed, as can be seen in table 5.1 (Zikmund, 2003:505).

Table 5.1: Measures of central tendency and dispersion permissible with each type of measurement scale.

Type of scale	Measure of central tendency	Measure of dispersion
Nominal	Mode	None
Ordinal	Median	Percentile
Interval or ratio	Mean	Standard deviation

Source: Zikmund (2003:505)

According to Cooper & Schindler (2003:373) another major decision area in question design is the degree and form of structure imposed on the participants. The various response strategies offer options that include unstructured responses (or open-ended response, the free choice of words) and structured response (or closed response, specified alternatives provided). Free response, in turn, ranges from those in which the participants express themselves extensively to those in which participants' latitude is restricted by space, layout or instructions to choose one word or phrase, as in a "fill-in" question. Closed responses typically are categorised as dichotomous, multiple-choice, checklist, rating or ranking response strategies.

The questionnaire was ended with two unstructured response questions to cover any areas that might not have been covered in the structured response questions.

5.5.2 Testing of the questionnaire

The data-gathering phase of the research process typically begins with pilot testing. One form of pilot testing, pretesting, may rely on colleagues, respondent surrogates or actual respondents to refine a measuring instrument. This important activity has saved countless survey studies from disaster by using the suggestions of the respondents to identify and change confusing, awkward or offensive questions and techniques (Cooper & Schindler, 2003:86).

The pilot testing and validation of the questionnaire was undertaken using 10 lecturers in the field of management at the University of Pretoria, the University of South Africa and the University of Cape Town in order to determine whether the questionnaire was properly structured and whether the questions were understandable. This pilot test was also used to determine how long it took to complete the questionnaire.

5.5.3 Response rate

The basic calculation for obtaining a response rate is to count the number of questionnaires returned or completed, then divide this total by the number of eligible people who were contacted or asked to participate in the survey (Zikmund, 2003:215). In total 65 responses were received (n = 65). Because expatriates currently on an international assignment abroad needed to complete the questionnaire it was necessary to first approach South African MNEs in order to obtain a list of e-mail addresses for their expatriates. Next the link to the web site hosting the questionnaire needed to be e-mailed to these expatriates.

A total of 48 South African MNEs were approached. These organisations were first approached using phone calls in order to determine whether they made use of expatriates and, if they did, to obtain the e-mail addresses or fax numbers of the expatriate managers working with the expatriates. A letter stating the purpose of the research and giving the link to the questionnaire was then sent to these managers with a request to look through the information. Within a week these managers were again phoned in order to speak to them about the research and to find out if they would be willing to participate in the research. The managers were visited personally where required, in order to try and persuade them to participate.

Of these MNEs five did not make use of expatriates. Only eight MNEs were willing to provide the e-mail addresses for their expatriates, and 102 links to the web site containing the questionnaire were sent out. Of the e-mail addresses received from the MNEs, only 80 were operational; the other 22 were no longer active. The 80 addresses that were still operational were followed up three times during the following six months in an attempt to ensure a high response rate; however, only 30 of these expatriates responded to the questionnaire.

A further six MNEs indicated that they were afraid that either their expatriates' information might reach their competitors or that the contact information might be used for other purposes than the research and as a result they offered to send the link to the web site themselves. This meant that an undisclosed number of links were sent out by these six MNEs, which made it impossible for the researcher to follow up on the questionnaires. These MNEs were, however, contacted again within the following six months as a follow-up, and asked whether the links to the web site had been sent out to the expatriates.

Apart from the original 48 MNEs, one London-based enterprise specialising in expatriate research and other IHRM matters, upon hearing of the research, offered to send the link to the web site to its South African members with a call to participate in the research. As their membership records are confidential, no numbers or MNE names were divulged and as a result, again it is not known how many links their members sent out. A follow-up e-mail was sent to the CEO of the enterprise in order to ensure that the link and letter had been sent out to its members.

As 30 of the 65 respondents could be traced to the 80 links sent out by the researcher, it can be assumed that the remaining 35 responses came from the six MNEs who sent out the link themselves and from the members of the enterprise specialising in expatriation consulting.

5.5.4 Coding

Coding involves assigning numbers or other symbols to answers so the responses can be grouped into a limited number of classes or categories. The classifying of data into limited categories sacrifices some data detail but is necessary for efficient analysis. Instead of requesting the word male or female in response to a question that asks for the identification of one's gender, the codes "M" or "F" can be used (Cooper & Schindler, 2003:456).

In this study the coding was done electronically as soon as the respondent finished the questionnaire and pressed the finish button at the end of the electronic questionnaire. The fact that the questionnaire was electronic and hosted on a web site made it possible to write software that would automatically code the responses to the questions and save them to a separate file in the comma delimited format. This format made it very easy for the statistician to do the data analysis, and substantially reduced the chance of human error in coding the questionnaires and transferring the codes onto computer (Cooper & Schindler, 2003: 536).

5.6 DATA ANALYSIS

Data analysis usually involves reducing accumulated data to a manageable size, developing summaries, looking for patterns and applying statistical techniques. Scaled responses on questionnaires and experimental instruments often require the analyst to derive various functions, as well as to explore relationships among variables (Cooper & Schindler, 2003:87).

5.6.1 Characteristics of sound measurement

According to Cooper & Schindler (2003:231), the characteristics of a good measurement tool are that the tool should be an accurate counter or indicator of what you are interested in measuring. In addition, it should be easy and efficient to use. There are three major criteria for evaluating a measurement tool: validity, reliability and practicality.

5.6.1.1 Validity

Validity is the ability of the measuring instrument (for example an attitude-measuring instrument) to measure what it is supposed to measure. If it does not measure what it is designated to measure, there is a problem (Zikmund, 2003:215). Cooper & Schindler (2003:231) define validity as the extent to which differences found with a measuring tool reflect true differences among respondents being tested. The measurement tool should be sensitive to all the nuances of meaning in the variable and to changes in nuances of meaning over time. Table 5.2 provides a summary of validity estimates.

Table 5.2: Summary of validity estimates

Type	What is measured	Methods
Content	Degree to which the content of the items adequately represents the universe of all relevant items under study.	Judgemental or panel evaluation with content validity ratio.
Criterion-related	Degree to which the predictor is adequate in capturing the relevant aspects of the criterion.	Correlation
Concurrent	Description of the present; criterion data are available at same time as predictor scores.	
Predictive	Predictor of the future; criterion data are measured after the passage of time.	
Construct	Answer the question, "What accounts for the variance in the measure?" Attempts to identify the underlying construct(s) being measured and determine how well the test represents it (them).	Judgmental Correlation of proposed test with established one. Convergent-discriminant techniques

		Factor analysis Multitrait-multimethod analysis

Source: Cooper & Schindler (2003:232)

5.6.1.2 Reliability

Reliability means many things to many people, but in most contexts the notion of consistency emerges. A measure is reliable to the degree that it supplies consistent results. Reliability is a necessary contributor to validity but is not a sufficient condition for validity. The relationship between reliability and validity can be simply illustrated with the use of a bathroom scale. If the scale measures your weight correctly (using a concurrent criterion such as another scale known to be accurate), then it is both reliable and valid. If it consistently overweighs you by six kilograms, then the scale is reliable but not valid. If the scale measures erratically from time to time, then it is not reliable and therefore cannot be valid. In this context, reliability is not as valuable as validity, but it is much easier to assess (Cooper & Schindler, 2003:236). Table 5.3 provides a summary of reliability estimates.

Table 5.3: Summary of reliability estimates

Type	Coefficient	What is measured	Method
Test-retest	Stability	Reliability of a test or instrument inferred from examinee score. Same test is administered twice to same subjects over an interval of less than six months.	Correlation
Parallel forms	Equivalence	Degree to which alternative forms of the same measure produce same or similar results. Administered simultaneously or with a delay. Interrater estimates of the similarity of judges' observations or scores.	Correlation
Split-half KR20 Cronbach's alpha	Internal consistency	Degree to which instrument items are homogeneous and reflect the same underlying construct(s).	Specialised correlation formulas

Source: Cooper & Schindler (2003:237)

5.6.1.3 Practicality

The scientific requirements of a project call for the measurement process to be reliable and valid, while the operational requirements call for it to be practical. Practicality has been defined as economy, convenience and interpretability (Cooper & Schindler, 2003:240).

5.6.1.4 Reliability of this measure

The internal-consistency reliability of the measurement tool used in this research was tested using Cronbach's coefficient alpha. According to Statsoft (n.d.[a]), if several subjects respond to certain items, the variance for each item could be computed as well as the variance for the sum scale. The variance of the sum scale will be smaller than the sum of the item variance if the items measure the same variability between subjects, that is, if they measure some true score. Technically, the variance of the sum of two items is equal to the sum of the two variances minus (two times) the covariance, that is, the amount of true score variance common to the two items.

The proportion of true score variance that is captured by the items could be estimated by comparing the sum of item variances with the variance of the sum scale. The formula for calculating Cronbach's coefficient alpha (α), the most common index of reliability, is:

$$\alpha = (k/(k-1))^{*}[1 - \Sigma(s^2_i)s^2_{sum}]$$

Where:

$S_i^{**}2$ = denotes the variance for the k individual items; and

$S_{sum}^{**}2$ = denotes the variance for the sum of all items.

If there is no true score but only error in the item (which is esoteric and unique and, therefore, uncorrelated across subjects), then the variance of the sum will be the same as the sum of variances of the individual items. Therefore, coefficient alpha will be equal to zero. If all items are perfectly reliable and measure the same thing (true score), then coefficient alpha is equal to 1. Specifically, $1-\Sigma(s_i^{**}2)/s_{sum}^{**}2$ will become equal to $(k\text{-}1)/k$; if we multiply this by $k/(k\text{-}1)$ we obtain 1.

Cronbach's alpha, when computed for binary (e.g., true/false) items, is identical to the so-called Kuder-Richardson-20 formula of reliability for sum scales. In either case, because the reliability is actually estimated from the consistency of all items in the sum scale, the reliability coefficient computed in this manner is also referred to as the internal-consistency reliability.

Ehlers (2000:141) states that users of Cronbach's alpha have often wondered whether the reliability they have obtained is good. It is suggested that a reliability level of 0.70 will be enough on predictor tests or hypothesised measures of a construct. It is, however, acknowledged that a minimum 0.90 should be tolerated in those applied settings where important decisions are made. It is thus suggested that a minimum of 0.70 for exploratory work and a standard 0.90 for advanced practice should be applied. However, according to Cooper & Schindler (2003:216-217), a Cronbach's alpha value of above 0.50 is regarded as an indication of reliability. In this case the latter (0.50) was used as an indication of reliability.

5.6.2 *t*-Test

According to Zikmund (2003:524-525), the *t*-test may be used to test a hypothesis stating that the mean scores on some variable will be significantly different for two independent samples or groups. It is used when the number of observations (sample size) is small and the population standard deviation is unknown. To use the *t*-test for difference of means, we assume that the two samples are drawn from normal distributions. Because σ is unknown, we assume the variances of the two populations or groups are equal (homoscedasticity). Further we assume interval data. The null hypothesis about differences between groups is normally stated as: $\mu_1 = \mu_2$ or $\mu_1 - \mu_2 = 0$. In most cases comparisons are between two sample means. A verbal expression of the formula for *t* is:

$$t = \frac{Mean\ 1 - Mean\ 2}{Variability\ of\ random\ means}$$

Thus the *t*-value is a ratio with the information about the difference between means (provided by the sample) in the numerator and the random error in the denominator. The question is whether the observed difference has occurred by chance alone. To calculate *t*, the following formula is used:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S_{\overline{X}_1 - \overline{X}_2}}$$

Where:

$\overline{X}_1$ = Mean for group 1

$\overline{X}_2$ = Mean for group 2

$S_{\overline{X}_1 - \overline{X}_2}$ = Pooled, or combined, standard error of difference between means

Antonites (2004:172) adds that the appropriate inferential test when comparing two means obtained from different groups of subjects is a *t*-test for independent groups. The *t* for independent groups is defined as the difference between the sample means divided by the standard error of the means difference. The p-level reported with a *t*-test represents the probability of error involved in accepting the research hypothesis about the existence of a difference. The null hypothesis is that of no difference between the two categories of observations (corresponding to the groups).

Some researchers suggest that if the difference is in the predicted direction, you can consider only one half (one "tail") of the probability distribution and thus divide the standard p-level reported with a *t*-test (a "two-tailed" probability) by two. Others, however, suggest that you should always report the standard, two-tailed *t*-test probability. In this study the *t*-test was used to test the first two hypotheses.

5.6.3 Chi-Square test

Probably the most widely used nonparametric test of significance is the chi-square (χ^2) test. It is particularly useful in tests involving nominal data, but can be used for higher scales. Typical are cases where persons, events or objects are grouped in two or more nominal categories such as "yes-no", "favour-undecided-against" or class "A, B, C or D". Using this technique it is possible to test for significant differences between the observed distribution of data among categories and the expected distribution based on the null hypothesis. Chi-square is useful in cases of one-sample analysis, two independent samples or *k* independent samples. It must be calculated with actual counts rather than percentages (Cooper & Schindler, 2003: 536).

According to Berenson & Levine (1996: 622), for the test to give accurate results, the χ^2 test for 2 x 2 tables assumes that each expected frequency is at least five. If this assumption is not satisfied, other procedures, such as Fisher's exact test, can be used. This test is only available for 2 x 2 tables; it is based on the following rationale: given the marginal frequencies in the table and assuming that in the population the two factors in the table are not related, how likely is it to obtain cell frequencies as uneven or worse than the ones that were observed? For small *n*, this probability can be computed exactly by counting all possible tables that can be constructed based on the marginal frequencies. Thus, the Fisher exact test computes the exact probability under the null hypothesis of obtaining the current distribution of frequencies across cells, or one that is more uneven (Statsoft, [n.d.(b)].). Fisher's exact test was used to test the last four hypotheses in this study.

5.7 LIMITATIONS

The greatest limitation of this study was the sample size. In total only 65 responses were received (n = 65). As can be seen from 5.5.3 above, for nearly a year the researcher first had to try to convince the HR manager in charge of the expatriates at South African MNEs to participate in the research, and then had to try to convince the expatriates to complete the questionnaire. In most cases the HR managers in charge of the expatriates used the following excuses for why they did not want to participate in the research:

- They did regular surveys themselves and as a result did not want to overload their expatriates with too many questionnaires.
- Their expatriates had just completed a questionnaire and would not want to complete another one so soon.
- They did not want to participate in the research because they were afraid that the information on their expatriates might leak out and another MNE might steal their expatriates.
- They would consider the request; but when the MNE was called back the employee could not be found or would not respond.

Some MNEs simply refused to participate without providing a reason.

5.8 SUMMARY

Six hypotheses were tested in this study; however, before the hypotheses could be tested the reliability of the measure had to be tested. In order to do this Cronbach's coefficient alpha

was used. Due to the small sample size the validity of the measure could, however, not be tested.

After the reliability of the measure was tested, the data analysis was done. First a *t*-test was used in order to look for statistically significant differences between the mean scores of what was provided to expatriates by the MNEs they worked for and the mean scores of what they required from these MNEs. The *t*-test was also used in order to determine whether expatriates with a trailing spouse and children have special needs in terms of preparation, support and training.

The last five hypotheses were tested using Fisher's exact test, which is a refined version of the Chi-square test. This test was used in order to determine whether there were statistically significant differences between what expatriates required from the MNE and:

- the location of the international assignment;
- the age of the expatriate;
- the duration of the assignment; and
- the management level of the expatriate.

The results of the data analysis will be discussed in the next chapter.