

MIDLANDS STATE UNIVERSITY



FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF PSYCHOLOGY

**THE RELATIONSHIP BETWEEN INDIVIDUAL APTITUDE TEST SCORES AND JOB
PERFORMANCE FOR EMPLOYEES IN SELECTED HARARE COMPANIES.**

BY

BRENDA TSITSI MUNHAMO

(R102791Y)

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GWERU ZIMBABWE

MAY 2014

SUPERVISOR: MR B. MAMBENDE

MIDLANDS STATE UNIVERSITY

APPROVAL FORM

FACULTY OF SOCIAL SCIENCES

The undersigned certify that they have read and recommend to the Midlands State University for acceptance of a dissertation entitled: “The relationship between individual aptitude test score and job performance for employees in selected Harare companies”.

SUBMITTED BY Brenda TsitsiMunhamo, Registration Number R102791Y, in partial fulfilment of the requirements of the Bachelor of Social Science Honours Degree in Psychology.

SUPERVISOR:..... DATE:.....

MR. B. MAMBENDE

CHAIRPERSON:..... DATE:.....

MS. F. NGWENYA

EXTERNAL EXAMINER:.....DATE.....

MIDLANDS STATE UNIVERSITY

RELEASE FORM

NAME OF AUTHOR: BRENDA TISITSI MUNHAMO

**TITLE OF DISERTATION: The relationship between individual aptitude test scores and
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SIGNED:.....

ADDRESS: 42 Horatio Ave

Braeside

Harare

Zimbabwe

Dedication

To my late mother.

For being a source of inspiration.

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ABSTRACT

The purpose of this study was to test the relationship between individual aptitude tests score results and actual job performance, as measured in selected Harare companies. The rationale for the study was based on the observation that some people who do well on the job but have not necessarily passed psychometric tests, also experience has shown that candidates fail psychometric test when they have excellent reference letters from previous employers. The significance of this study was to enable selected Harare companies to have an insight into the relationship between psychometric tests and job performance as a way of informing their recruitment policies. There are no studies to the researcher's knowledge that have been carried out in Zimbabwe on aptitude test as a valid predictor of job performance. Also the previous studies did not focus much on aptitude tests. This study was quantitative in nature and the simple random sampling technique was used. The researcher obtained the performance rating score of employees who took part in the research from their respective companies through the help of Industrial Psychology Consultants, the aptitude tests score results were obtained from Industrial Psychology Consultants since they are the tests administrators. Individual test scores on aptitude tests were correlated with performance rating scores. The major finding of this investigation was that all three subtests of differential aptitude tests namely verbal reasoning, numerical reasoning, and abstract reasoning correlated positively with job performance. A moderate correlation $r = 0.39$ between aptitude tests and job performance was found leading to the rejection of all the null hypothesis. The researcher would recommend that the organization which use aptitude test/ psychometric test to continue using these tests as they are valid predictors of job performance, and also organizations which do not use these to start using them for their recruitment/ selection process. To the future researcher would recommend that they focus on larger sample or include many job families in order to generalize results.

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CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 INTRODUCTION

The research study is about the relationship between individual aptitude tests results and job performance in the selected Harare companies, USAL Investments, ZIMPLATS, Schweppes, Curechem and MEFMI. This chapter introduces the whole study and it includes the background of the study, statement problem, and the purpose of the study, its objectives, and the research hypothesis, the significance of the study, assumptions, delimitations, limitations, and definitions of key terms.

1.1 BACKGROUND OF THE STUDY

Nicholas (2006) is of the view that in current worldwide market place there is a great call for extremely skillful individuals, and it is of great significance for organization to have the best recruitment approaches possible. As jobs become more multifaceted, discrete difference in production variability also increases, henceforth there is need to decide based on certain criteria who best fit to occupy a position among so many applicants (Boroucki & Burke, 1999). Smith (1977) asserts that paper and pencil tests happen to be a crucial part of the recruitment procedure for numerous companies.

In general psychometric test is a word used to explain tests which measure a skill such as verbal, numerical, abstract or mechanical reasoning (these are often called aptitude tests) and questionnaires used to indicate an individual personality type, learning style or career choices, which can help an individual and/ or an employer make well-versed selection. According to Menday (1996) psychometric tests are extensively used and studied widely in all selection process for the workplace and their use has increased over the years in business and industry over the world. Most of the studies on the validity of psychometric test were conducted in countries overseas, in Africa much of the studies have been done in South Africa, but the question remains especially when we look at psychometric testing in the African context. In simpler terms this study serves to look at psychometric tests applicability and validity in our

Zimbabwean context at the same time comparing it to findings from studies conducted in other countries.

Studies done in the United States companies indicated that psychometric tests, (both aptitude and personality tests) enthusiast claim that there is plenty of respectable validity in such tests, as they really do predict absenteeism, morale and productivity. Helen De Cein and Kramar wrote that it appears that the use of personality tests for recruitment purpose in Australian organizations is increasing despite criticism of them as unreliable and unethical. Schmidt and Hunter (1998) assert that decades of research have revealed that aptitude or cognitive tests are the best predictors of both future job performance and job related learning for a person who does not relevant experience. Findings from United States of America cannot be generalized to African population especially Zimbabwe because of differences in background and cultures. What is perceived as fair or normal in the Western context cannot be perceived similarly in Zimbabwe, such a research is therefore need. Therefore is important to see if the USA findings on the association between aptitude tests and job performance yield similar results in Zimbabwe.

On the other side, Kanengoni (2013) assert that the application and validity of psychometric testing to personnel selection in Africa has been problematic and present both researchers and practitioners with challenges. The controversy over the use of psychometric tests and how to deal with adverse impact resulting from group difference continues with no definitive answer, (Kanengoni, 2013). Theron (2007) asserts that in South Africa this appears to be true not only for labour representative and government officials, but also for quite a number of human resource management professionalism. Regardless of the fact that psychometric test is a scientific and precise instrument for measurement as noted by Harold (2003), psychological testing is a culturally biased procedure which results in the discrimination of minority groups, and such discrimination and bias raises problems which have adverse legal implication resulting in psychometric tests being regarded as poor predictors of job performance (Kanengoni, 2013). This is also supported by Van der Merwe (2005) who states that in the early 1990s the results of psychometric assessments were somewhat unsatisfactory because they were not standardized across racial groups. As a result they tended to discriminate against some population groups while favoring others, simply by the nature of their design (Owen, 1992).

Hackston (2013) assert that are some criticism leveled against psychometric testing have to do with the test validity. Does it really measure what it is intended to test? In simpler terms, an aptitude test is intended to measure an individual's strengths and weaknesses and their compatibility with a specific job or occupation (Kaplan & Saccuzzo, 2010). Nevertheless, because of manageable and overwhelming issues, the test might not truthfully reflect what it is supposed to be measuring. Hackston (2013) asserts that many test takers try to fuzz their responses, sometimes uncontrollably and in most cases it is obvious what types of answers the employer is looking for, and the applicants will skew their answers to reflect what they believe the employer wants. When this happens, the test no longer reflects the performance of the candidate, but rather the expected wants and needs of the employer. This is also supported by Krumm et al (2011) who state that the current diffusion of cognitive ability tests in the field of personnel selection is not reflecting their outstanding predictive validity; this is partly due to the fact that cognitive ability tests provide less face validity as compared to other selection tools. Also the National Academy of Sciences committee concluded that the Myers-Briggs Type Indicator (MBTI) has failed to establish satisfactory validity even though its acceptance and use has been progressively increasing. David Boje, Professor of Management states that the Myers-Briggs Type Indicator test lacks predictive validity hence it is not valid or authorized to be used for recruitment assignments, hiring, or promotion.

Even though there is an agreement that aptitude test can be expected to predict performance in many jobs (Gatewood & Field, 2001; Schmidt & Hunter, 1984), there has been controversy over the widespread use of these tests for selection (Alexander, 2007). Much of the argument emphasize on aptitude tests use as the only base for employing decisions and the potential of excluding historically low scoring groups which are most frequently racial or ethnic minorities. This leads to the possibility of adverse impact, discrimination in hiring that occurs when members of a subgroup are selected disproportionately less frequently than members of another group (Robertson & Smith, 2001). This unintentional discrimination can have a strong impact on minority groups for instance women, people over the age of 40, and people with disabilities (Robertson & Smith, 2001). Some studies have highlighted that cognitive ability testing lead to adverse impact.

There are numerous difficulties with the aptitude and reasoning tests but one of the most serious is the questionable relationship between the test and the competency being assessed. This is reinforced by King (2013) who state that, it's like going to a supermarket and asking for a specific aptitude test in 'clerical administration' and being given the 'one size fits all' supervisors test, one will get some sort of test result but it won't measure what you want. King (2013) goes on to state that these tests are about big money, they play on employer's fears that they need to get right person for the job. Here's a heads up. There is no right person and the only way employers can tell is by interviewing them, checking references and giving the successful candidate a probation period, (King, 2013). All the HR jargon about 'right fit' is anti-empirical rubbish. Consider this, if psychometric tests were 'kosher' then why would organizations such as the Institute of Psychometric Coaching in Australia, offer applicants coaching to improve their aptitude, personality and psychometric test results (King 2013)?

Christine Fitzherbert (2011) executive director human resources at Royal Melbourne Hospital assert that the notion of the right person in the right role at the right time is simple enough, but why do so many employers still get it wrong? Progressively employers are using psychometric assessment as a valuable tool to provide a greater insight into candidates.

Most organizations in Zimbabwe are now using aptitude test for recruitment. Henceforth it is entirely reasonable to question test results obtained by individual due to the imperfect nature of psychometric tests. This study aims to deduce on the use of aptitude testing by employers in the selected Zimbabwean companies, since they are controversial outcomes on the use of psychometric tests and also since in African context psychometric test are said to be culture biased. The study also considers whether information on psychometric testing can be used to make deduction about changes in the demand for skills in Zimbabwe. Is there a value in managers spending huge sums of money on psychometric tests? Hence should the managers abandon or continue to use these tests or stick to the traditional recruitment methods. Do high scores in aptitude tests predict good performance on the job? It is against this background that this study was conceived.

1.2 STATEMENT OF THE PROBLEM

Managers have often communicated a disparity between individual psychometric test results and actual job performance. In some instances, experience has shown that candidates fail psychometric test when they have excellent reference letters from previous employers. Also among in the selected companies, few months after they have recruited an employee for a particular position through psychometric, would find that they send another group of people for psychometric test for that particular position. One therefore wonders about the nature of the relationship between psychometric performance results and actual job performance. It seems there is not much research carried out on validity and reliability of psychometric tests and job performance in Zimbabwe. This indicated that the predictive validity of the psychometric tests needed to be investigated.

1.3 SIGNIFICANCE OF THE STUDY

Organizations: The literature and findings of the study will enable the following companies USAL Investments, ZIMPLATS, Schweppes, Curechem and MEFMI to have an insight on the relationship between psychometric tests and job performance. On whether they should improve selection drive in the future or phase out or continue to use psychometric tests for recruitment or selection. Also it is anticipated that the present research will offer information to assist the selected companies to select candidates with the potential to successfully complete the training program, thus reducing the financial burden on the organization.

Test Developers: Test developers and test administrators will also benefit from this study as it going to highlight the reliability and predictive validity of the psychometric tests when it is used within a specific context in this case Zimbabwe. This study will give an insight on whether test developers should design new aptitude tests for Zimbabwean employees or not. This will also help the test developers to ensure their instrument is designed in such a way that it measures what it is intended to measure and that performance on the test items remains consistent overtime.

Future Researchers: The significance of the study is to establish a framework of future studies on the validity of psychometric test since there is not much literary articles or books written on the relationship between psychometric test and job performance in Zimbabwe. The study

outcomes will benefit psychology researchers as they form a basis for further research on the relationship between psychometric test and job performance.

1.4 PURPOSE OF THE STUDY

The purpose of this study is to test the relationship between individual aptitude tests score results and actual job performance, as measured at organizations.

1.5 OBJECTIVES

1.5.1 To determine the relationship between employees aptitude tests scores and actual job performance.

1.5.2 To establish the relationship between employees verbal reasoning score and actual job performance.

1.5.3 To ascertain the relationship between employees numerical test score and actual job performance.

1.5.4 To ascertain the relationship between employees abstract test score and actual job performance.

1.6 HYPOTHESIS

Leedy and Ormard (2001) define a hypothesis as a logical supposition that gives an uncertain description for a phenomenon under exploration.

The hypotheses were formulated as follows:

The main hypothesis

1.6.1 H_0 : There is no significant correlation between individual's scores on the aptitude tests and actual work performance as measured by the differential aptitude test ($r=0$).

Sub hypothesis

1.6.2 There is no correlation between individual's verbal reasoning score and actual job performance as measured by the differential aptitude test.

1.6.3 There is no correlation between individual's numerical reasoning score and actual job performance as measured by the differential aptitude test.

1.6.4 There is no correlation between individual's abstract reasoning score and actual job performance as measured by the differential aptitude test.

1.7 DELIMITATIONS OF THE STUDY

The research is geographically limited as the research is going to be carried out in the following Harare industries or organizations only which are USAL Investments, ZIMPLATS, Schweppes, Curechem and MEFMI. The study will largely focus on the aptitude tests only and not any other type of psychometric tests.

1.8 LIMITATIONS

Limitations are a shortfall of the study which may make the study findings imprecise. Every level of analysis is often restricted to certain parameters. The subsequent are shortcomings that may hamper accuracy of the research:

1.8.1 Sample Size: The study sample is going to rely only on the perception of the selected organizations in Harare which may affect the accuracy or correctness of the study.

1.8.2 Sensitivity: A challenge may possibly occur in trying to attain exact information which will be used on the analysis of aptitude test results and supervisor ratings as it may be considered sensitive information to give away. This can be dealt with by giving assurance of the confidentiality of they are information.

1.8.3 Instrument bias: the researcher will use balanced scorecard as a research instrument and the scores may not be very correct because they are subjective to the supervisor or manager and this may obscure the research finding. This limitation can be overcome by designing questionnaire similar to a balanced scorecard which have rating scales.

1.9 ASSUMPTIONS

1.9.1 Participants are willing to provide information relating their personalities and team performance.

1.9.2 It is assumed that the sample's data is going to have the characteristics of normal distributions.

1.9.3 This study is investigative in nature and its findings should be considered descriptive rather than definitive.

1.9.4 It is assumed that accurate records had been kept by the company of candidates' scores on the aptitude tests, and their actual job performance score

1.10 DEFINITION OF KEY TERMS

The following terms are used throughout this report, and are clarified in this section for ease of reference:

1.10.1 PSYCHOMETRIC TEST- it is a term used to define tests that measure abilities such as verbal, numerical, abstract or mechanical reasoning (these are often called aptitude tests) and questionnaires used to find out about one's personality type, learning style or career choices, which can help one and / or an employer make informed choices (Kaplan & Saccuzzo, 2010). For the purpose of this study the term psychometric test refers to any standardized process of measuring aptitude and personality.

1.10.2 APTITUDE TEST- is defined by Dewberry (2011) as the unique example of an overall category of assessment methods referred to as psychometric tests, and is also referred to as cognitive tests. For the purpose of this research this the researcher will adopt Dewberry (2011) definition of aptitude tests which refers to the extent to which an individual has the psychological and behavioural characteristics necessary to perform at a high level in a particular environment (including task, job, training or educational programme) in the long term.

1.10.3 JOB PERFORMANCE- is defined by Campbell (1990) as an individual's production in terms of quality and quantity anticipated from every employee in a specific job. Job performance in this research will refer to employee work related activities anticipated of him/or her and how best these duties were performed.

1.11 SUMMARY

The chapter managed to introduce the background, the hypothesis, statement of the problem, importance of the study, assumptions as well as purpose of the study. The chapter in essence is the highlight to the whole study.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

The issue of aptitude tests and its impact on job performance has been a vital issue to psychologist and researchers. Roth et al. (2005) assert that some authors have gone on to criticize these studies by saying psychologists have overvalued the influence of aptitude tests score on job performance, but a host of scholars continue to imply that job performance is overwhelmingly influenced by things such as remuneration, appraisal. This literature review is determined to demonstrate how aptitude test and job performance has been studied previously and enhance the understanding and knowledge of the field. The literature reviews will contain a comprehensive discussion on the concepts of aptitude tests and job performance, theoretical framework through which the study results are viewed and understood. This chapter will also examine former related studies on the relationship between aptitude tests and job performance with the aim of divulging the knowledge gap that wants to be filled.

2.1 APTITUDE TESTS

Aptitude tests are a global term covering several kinds of psychometric tests and there are also referred to as cognitive ability tests. Humphreys (1987) define an aptitude test (also called a "cognitive ability test") as a structured systematic means of testing a job candidate's aptitudes to perform specific tasks and react to a range of different situations given. Each aptitude tests have a standardized method of administration and scoring with the results quantified and compared with all other test takers and also each test has specific objectives to measure specific knowledge, skills, abilities and personality, (Barrett & Williams, 2003). The aptitude tests adopt the perceptives that individuals differ in their specific capabilities and that these differences can be useful in predicting future attainments. Carter and Russell (2003) assert that to get a complete view on a candidate's profile, administrators should use at least two or three different tests. According to scientific researches, aptitude tests can be considered as indicators of intelligence, and predict the future performance of candidate in any work-related situations.

Aptitude tests are designed to assess the test taker's logical reasoning or thinking performance. Today, it is really important for companies/organizations to recruit the best profiles. Owen and Taljaard (1996), assert that aptitude tests are more and more used during the recruitment process, as they are strong tools to help recruiters to identify the strong performers among a large amount of candidates: get a full profile on the personality, identify strengths/weaknesses, challenge candidate's aptitudes on various levels (verbal, numeric, abstract, mechanical and space relations), evaluate the stress level.

According to Barrett and Williams (2003) aptitude test comprises of multiple choice questions which are administered under examination situations. Some of the aptitude tests are categorized either as speed tests or power tests (Psychometric success, 2009). In speed tests the questions are straightforward as they are concerned with number of questions answered correctly within a given time (Friedenberg, 1995). Henceforth they are strictly timed and a typical test might allow 30 minutes for 30 or so question. Speed tests tend to be used in selection at the administrative and clerical levels. The test result will be compared to that of a control group so that judgments can be made about an individual's abilities. Anastasi and Urbina (1997) postulate that power test present a smaller number of more complex questions. Power tests tend to be used more at the professional or managerial level.

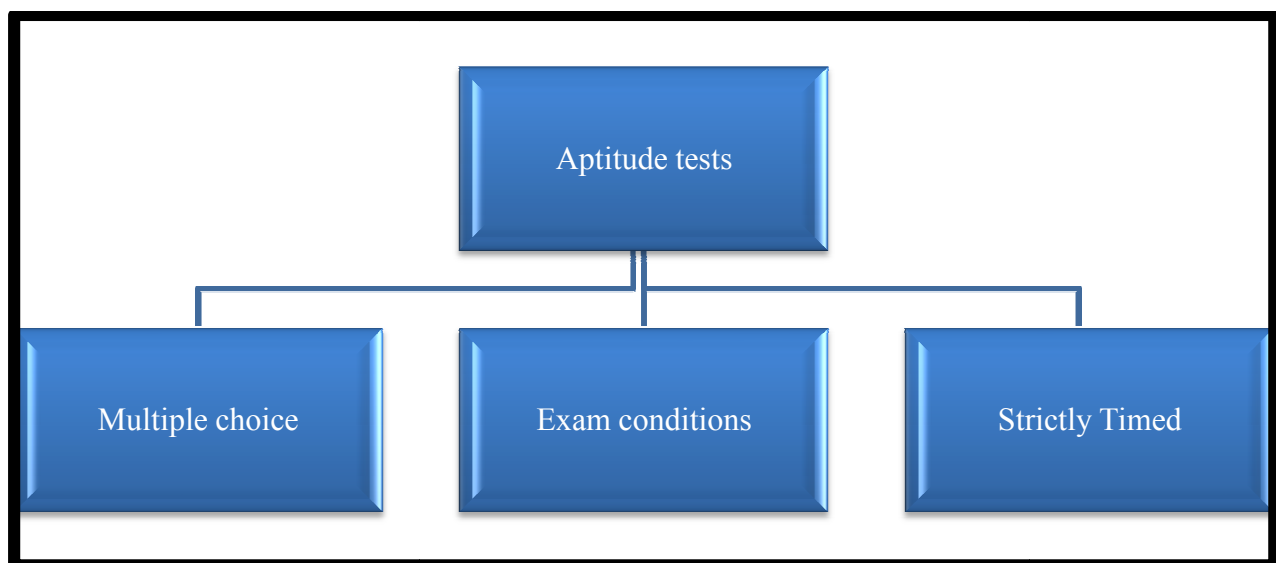


Figure 2.1 Showing aptitude test procedures by Smith (2003)

2.1.1 DIFFERENT APTITUDE TESTS (DAT)

- **Abstract reasoning:** It analyses candidate's ability to discovery designs and links between a number of figures, and see where different shapes fit in (Smith, 2003).
- **Verbal reasoning:** Focus on the candidate's ability to effectively pay attention to and communicate business related concepts in a verbal form. These tests pay particular attention to candidate's effective use of written ideas and information to construct accurate conclusions (Psychometric test guide, 2013).
- **Numerical reasoning:** It determines a candidate's ability to perform accurate arithmetic, to understand and present conclusions regarding numerical data. Central themes emphasized are the analysis of numerical data through the interpretation of graphs and basic calculations (Psych Press, 2013).
- **Mechanical reasoning:** It ascertains a candidate's ability to perceive and understand the kinetic role of visual objects. These motion and effect tasks are indicative of the techniques used in everyday performance of realistic problem solving tasks. This test takes a diagrammatical form and requires candidates to understand the subsequent effects of the configuration of certain elements (PsychPress, 2013).
- **Spatial reasoning:** It emphasis on a candidate's capacity to perceive, construct and deconstruct visual objects within differing contexts. For instance, spatial reasoning tests assess whether candidates are able to mentally flip, rotate and/or fit together objects, (Mark &Egenhofer, 1994).

2.2 JOB PERFORMANCE

Research on job performance (both at the individual and group level) indicates the importance of job performance to industrial and organizational psychologists. Newman et al, (2004) assert that researchers in the 1960s and 1970s were mainly focused on ratings formats; those in the 1980s and early 1990s predominately examined issues pertaining to rater mental processes; and current researchers have been concerned with 360 degree feedback systems. Regardless of the shifting

focus of interest in this field, one enduring challenge for researchers has been the inherent difficulty in defining and assessing job performance, given its multidimensionality.

Job performance can be defined in relation to:

- *measurable work behaviour results*- for example, an employee's sales figures, or
- *Behavioral dimensions* - which are more challenging to quantify for instance, attention to detail, (Viswesvaran& Ones, 2007).

Also job performance can be defined in relation to:

- *duty performance* -those activities formally recognized as core components of the job, or
- *Contextual performance* -those activities that contribute to the social environment of the organization – or 'organizational citizenship behaviour', commonly known as (OCB), (Viswesvaran& Ones, 2007).

Ones et al (2008) denotes that depending on which description of job performance is functional, information on an individual's performance can be obtained from multiple sources, including:

- *objective indexes* which are countable and directly observable (for example, sales volume), or
- *subjective indexes* which are based on judgments of others (for example, ratings by an individual's supervisor or colleagues).

Most organizations however, use subjective indices, which require raters (usually supervisors) to make subjective judgements concerning the performance of employees. These subjective judgements often take the form of ratings or rankings, and are collected using a variety of rating formats; the most widely used being graphic ratings scales and balance scorecards.

Graphic ratings scales provide the rater a set of task categories considered important to the job, requiring the rater to evaluate an individual's performance on the task categories using a polarized scale. For example, a rater may be asked to evaluate an individual's performance using a scale ranging from 1 (where the individual does not meet expectations) to 5 (where the individual surpasses expectations) (Guido &Vecchione, 2012).

2. 3 STUDIES ON APTITUDE TESTS AND THEIR EFFECT ON JOB PERFORMANCE

2. 3. 1 Studies that indicate that aptitude tests are predictors of job performance

Schmidt and Hunter (1998) in their seminal paper, reviewed over 85 years of research into the validity of different selection methods. They concluded that reasoning tests have consistently been found to be the best predictors of job performance, with graphology (not surprisingly) having been consistently found to be the least valid predictor of job performance. Schmidt & Hunter (1998) also reported that in addition to predicting job performance, reasoning tests have consistently been found to predict the effectiveness of staff training programmes, with those staff that have higher levels of reasoning ability benefiting more from training than those who have lower levels of reasoning ability. Using statistical procedures (meta-analysis) to aggregate results across different studies, Schmidt and Hunter (1998) concluded that reasoning tests have high validity coefficients for predicting job performance and predicting trainability. This study seek to give light on what happening now on aptitude test because Schmidt and Hunter was done some years back and they have not conducted any current study on the predictive validity of aptitude tests. Hence the study seek finding out if there are any changes on the correlation between aptitude tests and job performance.

Hunter and Hunter (1984) findings indicated that for job performance and training success criteria, the validity of cognitive tests for more complex occupational families was larger than that of less complex occupations (Salgado et al,2003). The Panel of the National Research Council (Hartigan&Wigdor, 1989 cited in Salgado et al, (2003) reanalyzed Hunter and Hunter's data set, investigated a new set of data, and found basically the same findings. Consequently, these two large-scale meta-analyses came to the same conclusion that job difficulty is a moderator of the criterion-related validity of cognitive ability measures. These two previous

studies focused on more complex job just like the current study. However, these studies did not analyze specific or small occupational groups for example managerial, clerical, sales, (Salgado et al 2003). This study is going to address this issue by analyzing specific and small job-related groups which were not covered by Hunter and Hunter 1984 findings to find out if the results will still be the same or not.

Also Pearlman et al. (1980) carried out a meta-analysis on the validity of cognitive ability measures for predicting job performance and training success in clerical occupations(Salgado 2003). They established that General Mental ability (GMA) and other precise cognitive measures, including memory and verbal, numerical, spatial, mechanical, and perceptual abilities, showed moderate to large criterion related validity and that they generalized validity across samples and jobs, (Salgado et al,2003). The current study will focus specifically on managerial employees in different occupations for instance information technology, sales, marketing, finance and others unlike the study by Pearlman which focused on clerical occupation to see if the same results will still be obtained. Salgado et al (2003) examined the validity generalization of aptitude measures for law enforcement occupations; they found validity coefficients of a modest magnitude for job proficiency criteria, (Robertson &Smith, 2011). However, except for spatial–mechanical ability measures, there was either no validity generalization, or its magnitude was very small. In the case of training success, they found a large validity generalization effect. The current study will also focus on one different type of aptitude tests namely differential aptitude tests and also on different occupation to see if there is any change in the predictive validity of aptitude tests on different occupations.

2. 3 2 Studies done in United State of America on the predictive validity of psychometric tests

A number of meta-analyses have been carried out in the USA examining the criterion-related validity of General Mental Abilities and Differential aptitude tests (Schmidt, 2002). Bertual et al (2011) state that in the midst of these, the major meta-analyses based on occupational samples are those conducted by Hartigan and Wigdor (1989), Hunter (1986), Hunter and Hunter (1984), and Levine, Spector, Menon, Narayanon, and Canon-Bowers (1996). Generally, these have shown that the average operational validity for General Mental Ability and Differential aptitude

tests ranges from .38 to .47 for overall job performance and from .54 to .62 for training success, (Bertual et al 2011). Furthermore, Hunter and Hunter (1984) cited in Bertual et al (2011) established that regardless of differences in jobs and organizations, the predictive validity of General Mental Abilities and aptitude tests generalizes across samples and settings. Accordingly, it has been concluded that General Mental Abilities and Differential aptitude tests are robust predictors for all types of jobs (Salgado, 1999; Salgado, Ones, & Viswesvaran, 2001; Schmidt & Hunter, 1998), and that their validity generalizes across occupations in the USA (Bertual et al, 2011).

However, despite the large body of evidence supporting the validity of General Mental Abilities and Differential aptitude tests, there are a number of limitations within the current body of research. As highlighted by Bertualet al (2011), the findings from US meta-analyses have been unreservedly cited as being generalizable to the UK, without consideration of possible cultural, social, legislative, and recruitment and appraisal differences between countries. With these differences, it can be argued that they may well impact on the magnitude of validities observed in General Mental Abilities test and Differential aptitude tests validity between the USA and UK (Bertual et al, 2011). Despite high predictive and generalization of General mental abilities and Differential aptitude test in USA, this study only focused in the USA employees which have different background from other countries, it possess a need for further research in different countries due to differences in background. This study will address this issue by doing a research in Zimbabwe which is a different setting from USA to see if results of aptitude test have the same predictive validity in different regions and countries.

Also a meta-analysis on the criterion validity of specific cognitive abilities (i.e., verbal, numerical, spatial, and memory) was examined in the civil settings, with a large sample of military employees in the USA. Lance (1989) state that for instance, meta-analyses by Hunter & Hunter, (1984), Pearlman et al (1980), Schmidt et al (1981) demonstrated that specific abilities showed small validity over and beyond General Mental Abilities measures or cognitive composites, (Salgado et al., 2003). Ree et al., (2001) examined the validity of the specific abilities for predicting job performance and training success using large military samples. They found that the specific abilities showed very small contributions over General Mental Ability for predicting these two criteria. These two studies were conducted in USA using only military

employees; the current study will focus on different industries which include mining, manufacturing to see if aptitude tests predict job performance as it has been highlighted by some authors that the use of specific abilities can have important implications for personnel selection. For example, Kehoe (2002) has suggested that if the selection decision was based on specific abilities rather than on General Mental Abilities measures, the specific abilities can reduce the group differences and may result in more positive applicant reactions, (Lance et al., 1989). Murphy (2002) has suggested that different applicants may be selected depending on the specific abilities emphasized. Consequently, these are compelling reasons for examining the magnitude of the specific abilities in Zimbabwe.

2.3.3 Studies on the correlation between differential aptitude sub-test and job performance.

Also a study on specific differential aptitude tests was conducted in this study they focused on verbal reasoning. Here, the results showed an operational validity of .35, which is remarkably lower than the operational validity of General Mental Abilities (Bertual et al, 2011). The 90% credibility value was .04 and the explained variance was 53%. These last two results indicate that validity may be moderated by other variables. The results may partially reflect the effects of an outlier with a large sample size. In effect, we found a study for managers reporting a value of (-.02) with a sample size of 437 individuals. When this coefficient is removed, the new operational validity is .39, the 90% credibility value (CV) is .11, and the explained variance is 62%. An anonymous reviewer suggested another explanation for the lower validity of verbal ability. Tests of verbal ability are in different languages across the countries included in the meta-analysis. Different language-based test complexity across countries may be responsible for these results. Zimbabwe has many different languages and for most people in Zimbabwe is second language hence there is need to see if verbal reasoning is the best predictor of job performance since employees which have English as their second language usually score poor.

Salgado et al (2003) assert that a mental-analysis on numerical ability was also examined, the operational validity was .52. This result indicates that numerical ability is a good predictor of job performance and that it has generalized validity across samples and countries (Ree et al., 1994).

Also on spatial-mechanical ability was the next ability analyzed and operational validity of .51 was found. This figure shows that spatial-mechanical aptitude predicts job performance very well, to a similar extent as numerical ability, (Salgado et al., 2003). The 90% credibility value indicates that spatial/mechanical ability has generalized validity but its magnitude is small. This result, together with that of the percentage of explained variance (52%), suggests that some moderator may affect the operational validity (Carretta&Ree, 2000).

Even in the light of their important findings, these meta-analyses still contain several characteristics that limit the generalized applicability of their findings. For example, (a) they only included American primary studies, and, therefore the international validity generalization was not examined, hence the need to carry out this study.

2. 3. 4 Studies that indicate that aptitude test have a discriminative power over other racial groups.

Regardless of the apparent predictive validity and high utility presented by aptitude testing, few companies use them as selection tools. The reason for this is that aptitude tests have been demonstrated to produce group differences or adverse impact on aptitude tests performance (Thomas & Scroggins, 2006). Research carried out by Heneman et al (2000) and Lubenski, (1995) indicated that in general, groups including Hispanics and African-Americans score lower than the general population while other groups including Asian-Americans score higher, (Thomas & Scroggins, 2006). This study tries to find out if aptitude tests have a discriminative power over ethnic group since in Zimbabwe there are different tribes.

2.3.5 International studies on the validity of aptitude tests as predictors of job performance

A research was also carried out in Australia due to the high predictive validity of General Mental Abilities and cognitive test in the meta-analysis conducted in the USA and Europe (Bertual et al., 2005). Dewberry (2004) wanted to see if there is a link between cognitive ability and job performance using Australian sample. This research comprised of 37 participants who were professional, supervisors and managers working in different industrial organization. Each applicant completed 3 cognitive ability tests as part of the recruitment assessment process which include verbal critical reasoning, numerical critical reasoning and Raven's standard progress

matrices, while job performance was evaluated via ratings attained from senior human resource officer, (Green & Macqueen, 2008). The analyses examined the predictive validity of specific cognitive ability test results as predictors of job performance. Concurrent regression was conducted as the goal of the study was to examine the correlation between the whole set of predictors and the dependent variable performance. The observed validity R is .37 and the overall R^2 value in this analysis (using all three independent variables) is .14, indicating that all three variables together account for 14% variance of job performance. An analysis of variance (ANOVA) produced a non-significant result ($F = 1.78$, probability $> .17$). That is, based on the observed data, there was no significant relationship between any (or all) of the predictors (tests) and the ratings of job performance.

Also another research on the predictive validity of psychometric tests was carried out in New Zealand. Dakin and Armstrong (1989) assert that there where beliefs about the validity of various selection tools and their claimed usage of these tools was then compared with the validities in a previous meta-analysis. Hunter and Hunter (1984) reviewed the validities of a range of different selection predictors which include cognitive tests, job try outs, interviews, biographical data forms, interest tests, age, and education. The main criterion of job performance used in this research was ratings of performance made by supervisors. The outcomes for entry level jobs indicated that aptitude test were the most accurate single predictor with a correlation of 0.53, job try out with a correlation of 0.44, biographical inventory 0.37, reference check 0.26, experience 0.18, interviews 0.14, academic achievements 0.11, education 0.10, interest 0.10 and age -0.01, (Dakin & Armstrong, 1989). Tests of cognitive ability were the most accurate of thinking jobs for example managers, salesperson, while psycho-motor skills were most accurate for jobs requiring manual skills. These results reinforce those from previous reviews by Ghiselli (1973), Dunnette (1972), Reilly and Chao (1982) and Vineberg and Joyner (1982) (Dakin & Armstrong, 1989).

One study carried out in the Netherlands found that the difference on verbal and numerical ability tests between the majority white Dutch on the other hand, and immigrants from Surinam, the Antibes, North Africa, and Turkey on the other, were between one and two standard deviations (Dewberry, 2011). Dewberry (2011) is of the view that these results suggest that sub-

group differences in cognitive ability tests in Holland at this time were even more pronounced than those between Whites and Blacks found in North America.

2.3.6 Regional studies on the validity of aptitude tests as predictors of job performance

A research was done to explore the correlation between Clerical Test Battery numeracy scores and work performance of Call Centre agents in a South African retail company, (Maphunga, 2011). The research had a sample size of 2429 job applicants and the study focused on three variables, the correlation between Clerical Test Battery by gender, race and entry-level call centre agent. Firstly correlation between Clerical Test Battery by gender the results were as follows, males 0.004 and females 0.012. These results indicate that there is no relationship between Clerical test battery and job performance by gender. Secondly the relationship between Clerical test battery and job performance by race, results were as follows Blacks -0.056, Indian -0.095, Coloured 0.055 and White 0.171. Only the white subgroups showed some degree of correlation between Clerical test battery and job performance. Lastly correlation between Clerical test battery and job performance by entry level staff and these include team managers, secretaries and people trained in financial services. A correlation of 0.026 was obtained, the results indicated that for entry level there was no evidence of a statistically significant relationship between Clerical test battery numeracy score and work performance scores. Regional studies indicates that there is no correlation between psychometric tests and job performance which is contradictory to the USA studies this study aims to see the relationship between these two variable due to the notion that aptitude tests are said not to be culture free, especially in Africa because they are Eurocentric.

There are no local studies to the researcher's knowledge on the relationship between aptitude test results and job performance.

2.4 THEORETICAL FRAMEWORK

Theories of intelligence are used to explain the relationship between aptitude tests and job performance. The factor analysis theory by Charles Spearman and Thurstone's Theory of Intelligence will provide further insight into aptitude tests and job performance.

2. 4. 1 The factor analysis theory by Charles Spearman

Charles Spearman was one of the earliest psychologists to propose a factor analytic approach to intelligence testing. His theory stated that there was one general factor (g) and one or more specific factors (s) that accounted for individuals' performance on intelligence tests, (Spearman, 1904). Motley (2006) asserts that Spearman conceptualized the g factor as general mental energy. This factor is involved in deductive reasoning and is linked to the "skill, speed, intensity, and extent of intellectual output", (Sattler, 2011: 138). Spearman believed that general mental ability represented the 'inventive' aspect to mental ability rather than the 'reproductive' aspect. The cognitive abilities associated with general mental ability might include being able to describe how two concepts are related or being able to find a second idea that is related to one that has already been proposed. Tests with high g loading are complex and include tasks that involve reasoning and hypothesis testing, (Spearman, 1904). Tests with low g loadings are less complex and include tasks that involve recognition, recall, and speed Spearman noted that all tests of mental ability are positively correlated.

Spearman discovered that people who score high on IQ or mental ability tests usually scored higher on other types of tests, and people that scored lower generally had lower scores on other tests. General intelligence is an individual's underlying intelligence, in which their performance at one type of cognitive task tends to be comparable to their performance at other kinds of cognitive tasks. Spearman speculated that if all mental tests are positively correlated there must be some common variable or factor that produces this positive correlation. The positive correlations among mental tests indeed resulted from a common underlying factor. This method is known as factor analysis. Using factor analysis Spearman believed it would be possible to identify clusters of tests that measure a common ability. Statistical procedures, such as factor analysis, were developed by Spearman to help identify clusters of skills that people tended to excel in and were therefore related.

Spearman's theory guides this study in that the general intelligence would predict or correlate with the specific intelligence, and in this case individual performance on the aptitude test is influenced by the general intelligent and this general intelligence will determine which area the employee is good at which is the specific intelligence. This theory helps to predict that a high score in aptitude test will predict future good job performance, whilst low score in aptitude test

will indicate lack of knowledge on that particular job. Hunter (1986) reviewed hundreds of studies which showed that *g* predicted job performance criteria including training success, supervisory ratings, and content valid hands-on work samples for both civilian and military jobs. However, direct tests of the incremental contribution of specific abilities for the prediction of job performance criteria were not made.

2. 4. 2 Thurstone's theory of intelligence

Louis Thurstone (1938:80) disagreed with the idea that intelligence comprised an overarching, general factor. He analyzed the results of 50 intelligence tests which he administered to college students and came to the conclusion that there are seven primary mental abilities that make up a person's intelligence. The abilities or factors are:

- **Spatial (S)** – the ability to form spatial and visual images, (Thurstone 1938:80).
- **Perceptual (P)** - The ability to find or recognize particular items in a perceptual field (Thurstone 1938:81).
- **Numerical (N)** - The ability to perform simple numerical calculations (Thurstone 1938:83).
- **Verbal relations (V)** - The ability to conceptualize ideas and meanings in language (Thurstone 1938:84).
- **Word (W)** - The ability to deal with single and isolated words in a fluent manner (Thurstone 1938:84-85).
- **Memory (M)** - The ability to recognize and recall words, numbers and figures after having memorized them (Thurstone 1938:52-54).
- **Inductive Reasoning (I)** - The ability to find a rule or principle and apply it. An example of an item requiring inductive reasoning requires the identification of figures that belong to a specified category even though they differ in other properties. For example, if the category of shaded shapes is specified, the respondent must choose shaded shapes in his or her answer even though the shapes may be of different sizes or kinds (Thurstone 1938:25).

He also tentatively identified two further abilities as factors of intelligence:

- **Restrictive Reasoning (R)** - The ability to successfully complete tasks that involve restriction in the solution. Arithmetical reasoning utilizes restrictive reasoning as the answer to an arithmetical calculation is limited to one correct solution.
- **Deductive Reasoning (D)** - The ability to draw a logical conclusion from a set of assumptions. For example, the ability to correctly identify that the following item uses faulty reasoning: Some sports are dangerous, and football is a sport. Therefore, football is dangerous (Thurstone 1938:47).

This theory guides the research in that there seems to be a tendency for people who perform well on one intelligence test to also perform well on different intelligence tests. Although some would argue that this may provide evidence that there is a general intelligence, it may also suggest that over time, related abilities become strengthened. For example, van der Maas and colleagues in 2006 proposed a mutualism model that assumes that intelligence depends on several independent mechanisms, none of which influences performance on all cognitive tests. These mechanisms support each other so that efficient operation of one of them makes efficient operation of the others more likely, thereby creating the positive correlations between intelligence tests. They used the following sports analogy: someone who runs well and throws well grows more skilled at these tasks when involved with sports that make use of both these abilities.

2. 5 KNOWLEDGE GAP

The previous studies focused on different types of aptitude tests for instance the general mental ability, little was researched on the differential aptitude test as the valid predictor of job performance, and hence the current study will focus on the differential aptitude test. Also the previous studies focused on similar occupations and then generalized the results to other professions; the current study will focus on managerial employees in different industrial sectors. Also the previous studies did not focus much on the subtest of differential aptitude tests, they focused on the whole overall aptitude tests and generalize the results hence this study seeks to correlate each subtest of differential aptitude test results with job performance.

There is little knowledge about the relationship between aptitude tests and job performance in the selected companies since there are no studies to the knowledge of the investigator that have concentrated on that predictive validity of psychometric test. No studies to the researcher's knowledge have been carried out in Zimbabwe on the aptitude test as valid predictor of job performance. Many studies have been carried out in the USA, UK and South Africa on the relationship between aptitude test and job performance. However these studies brought controversial results, studies done in the USA, UK indicated a high correlation between aptitude test and job performance with white Americans passing the aptitude tests on the contrary Black American performing poor on the aptitude test. However opposing results have been obtained in the African context especially in South African, there has been a poor relationship between aptitude test and job performance due to the nature of these tests.

2.6 SUMMARY

The chapter focused on the literature review, theoretical framework and knowledge gap of the study. Information contained in this chapter indicated that aptitude tests results have an influence on job performance. Nevertheless, little is known about the relationship between aptitude tests score and job performance in the selected companies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

Research methodology is defined as the procedures by which researchers go about their work of describing, explaining and predicting phenomena (Kumar, 2005). This section discusses the following components of research methodology: research approach, research design, research instruments, target population, sample size, data collection procedures, data analysis and ethical considerations.

3.1 NATURE OF THE STUDY

The research is quantitative in nature. Quantitative researches explain phenomena by gathering numerical data that are analysed using mathematically based methods (in particular statistics). Graham and Skinner (1999) assert that numbers and scores tend to be the main type of data researchers collect and analyze using this frame, this is the reason why the researcher used this approach as it distinguishes correlation. Also the researcher chose quantitative because the researcher wanted to identify cause and effect relationships between aptitude tests score and job performance, (i.e. however not causality but rather co-variance).

The researcher used the quantitative method since the raw data to be analyzed was already available in the companies' database. This data consisted of two sets; 1) the aptitude tests scores, 2) the work performance scores (balanced scorecard) rated by supervisors of employees at MIFME, ZIMPLATS, Curechem, USAL Investments and Schweppes. Given that the required data was already numerically measured and recorded, the choice of a quantitative methodology is justified.

One of the advantages realised was that quantitative method ensure high reliability levels of gathered data, and minimizes the involvement of researchers while maximizing objectivity during the research process, (Matveew, 2002). A quantitative research enabled the researcher to establish and determine the correlation between aptitude tests score and actual job performance.

3. 2 RESEARCH DESIGN

According to Johnson and Christen (2010) a research design is a perspective about research held by a community of researchers that is based on a set of shaped assumptions, concepts, value and practices. The researcher used a correlation research design. A correlation research design is defined as a statistical analysis of covariant data to determine a pre-existing relationship and the researcher makes no attempt to manipulate any variables. The researcher used correlational research design since it's a method where subject's score on binary variables are basically measured, and in this study there were two variables name employee's aptitude tests results and employee performance score and there was no manipulation of any variable in determining whether there was a relationship.

There are two types of correlational research design, namely exploratory design and prediction design, (Mack et al., 2005). Under exploratory research design, the researcher looks for simple association amongst variables and examines the degree to which the variables correlate. Whereas under the prediction research design the investigation is intended to classify variables that will definitely forecast results. The researcher used the exploratory research design because the aim of the study was to see if there was any correlation between aptitude test score and employee performance on the job and to what extent did these two variables relates.

3.3 TARGET POPULATION

Chimedza (2003) define a population as a collection of individual items under research. According to Holt et al., (1999) a target population is the universal were participant of the study are to be drawn. In this study, hundred managerial male and female employees who were recruited through psychometric test administered by Industrial psychology consultants from MIFME, ZIMPLATS, Curechem, USAL Investments and Schweppes were the target population.

3.4 SAMPLE SIZE

A population sample is the definite number of people that the investigator is going work with, (Kothari, 2009). A sample size of sixty managerial employees from five selected organizations was used. The age range of these managerial employees used in the study was ranging from 25 to 60 years. Also it should be noticed that only managerial employees with at least 1 to 6 years of working experience where used in this research. Most of these managerial employees met the

following educational qualification, the least being a diploma followed by degree, Master's Degree or Masters in Business Management (MBA) and lastly a doctorate. The reason why the researcher conducted the study in five different organizations was to eliminate bias and get reliable information, since these organizations were in different sectors for instance somewhere manufacturing, banking, service providers and mining, also due to the importance of frequency in quantitative research. The sample should also be manageable by the primary researcher in terms of data analysis and time-frames for completing the research. The researcher's sample size is supported by Guadagnoli and Velicer, (1988), who postulate that bigger samples are preferred than smaller samples since bigger samples are likely to reduce the chance of errors and at the same time increase the generalizability of the outcomes.

3.5 SAMPLING METHOD

Sampling is the course of choosing individuals to partake in a study (Gravetter & Farzano, 2009). A simple random sampling technique was used by the research because it ensures that all participants have an equal chance to be sampled. The researcher obtained the balanced scorecard results for managerial employees rated by their supervisors in their respective organization for the managers who were recruited via psychometric test administered by Industrial Psychology Consultants. After obtained the scorecards of the managers from respective company the research then made a list of the names obtained from the respective companies and randomly picked eleven employees from each organization. The main advantage with simple random sampling method is that every object has the same probability of being chosen.

3.6 RESEARCH INSTRUMENTS

These are tools used for gathering material and data required to discover answers to the problems under exploration. The study will use two data gathering instruments namely the aptitude tests and balanced scorecard.

3.6.1 APTITUDE TESTS

A uniform test intended to foretell a person's capability to learn specific skills. Aptitude tests attempt to predict the capacities or the degree of achievement that may be expected from individuals in a particular activity. According to Wang (1993) differential aptitude test comprises of the following tests, verbal reasoning, numerical reasoning, abstract reasoning, mechanical

reasoning and space relations. The total number of items asked for each subtest is 40 questions expect for the mechanical reasoning which have 60 items and space relations which have 50.

Some of the examples of items asked per each subtest;

Verbal Reasoning- Example

..... is pencil as ink is to

A eraser ----- paper

B pen ----- well

C lead ----- pen

E easer ----- blotter

Figure 3.1 Verbal reasoning example

What number continues this number sequence?

2	4	6	8	?
---	---	---	---	---

A 9

B 10

C 11

D 12

E None of these.

Figure 3.2 Numerical reasoning

These tests are norm referenced tests and for each test is marked out of the total number of items it constitutes. The score are then compared with those of the people in the same category to get an individual percentile score, which is the norm range in which that particular individual ranges. An individual will be classified into any of the following the categories, high risk employees, moderate risk employees and low risk employees.

The Differential Aptitude Test (DAT) has a history stretching back to 1947 with its original authors being amongst the most prestigious names in the history of psychometric test development, (Bennett et al, 1986). Separate scoring norms are available for individual tests in the battery.

3. 6. 2 BALANCED SCORECARDS

Is a strategy performance management tool, a semi-standard structure report, supported by design methods and automation tools, which is used by managers to keep track of the execution of activities by the staff within their control and to monitor the consequence arising from these actions.

While the "balanced scorecard" terminology was coined by Art Schneiderman, the roots of performance management as an activity run deep in management literature and practice. Management historians such as Alfred Chandler suggest the origins of performance management can be seen in the emergence of the complex organization most notably during the 19th Century in the USA. The balanced scorecard has been adopted by many companies worldwide for example in Zimbabwe companies such as Delta beverages, Zimbabwe Electricity Supply Authority, (ZESA) among others.

One of the advantages of using a balanced scorecard is that it shed light on an individual's performance.

3. 7 PRETESTING OF INSTRUMENT/S

Pretesting is all about testing the research instrument in order to see how the instrument performs. A pre-test was conducted at Industrial Psychology Consultants (IPC) since they used aptitude tests for their own recruitment and they also used the balanced scorecards as their performance appraisal tool. Pretesting was done with the main aim of ensuring that the proposed instrument measured what it was supposed to measure. The sample consisted of six employees from IPC. The researcher observed that it is better to use percentile scores than the raw score reason being that the subtests had different number of items or questions.

3. 8 DATA COLLECTION PROCEDURES

This offers a comprehension on the procedures that were followed during the data collection process by the researcher. The researcher obtained an approval letter from the Midlands State University department of Psychology and then took the letter to selected companies to request for permission to carry out the research.

Data collection is the process of gathering data with the intention of obtaining information, so as to make decision about important research question. The researcher carried out a research on the relationship between aptitude test score and job performance at the following Harare companies MEFMI, ZIMPLATS, Schweppes, Curechem and USAL Investments. However the research obtained tests results from Industrial Psychology Consultants because there are the ones which had administered the psychometric tests for the targeted managerial employees, hence they had the tests score results for the selected employees. As for the performance score for the selected managerial employees eleven from each organisation the results was obtained from their respective companies. The research was conducted from the 9th to the 11th of April since they are five organisations, it should also be noted that the researcher was helped by the Industrial Psychology employees in obtaining employee performance score. The researcher together with Industrial Psychology Consultants employees sent emails to the Human Resource Department with a template of a performance rating to selected companies to rate the managerial employees who were recruited through psychometric tests which were administered by Industrial Psychology Consultants, the supervisors of the selected companies then returned the performance rating templates of rated managerial employees via email. The main reason why the researcher carried out this research was to test if there was any correlation between aptitude test score and job performance.

3. 9 ETHICAL CONSIDERATIONS

According to Gravetter and Farzona (2009), ethics are the study of proper actions. Ethical considerations must be put into considered to evade engraving on the rights of the individuals who will take part in the study.

3.9.1Autonomy:

This describes acknowledgement of the right of the individual to determine their own course of action in accordance with their own wishes and plans. Autonomy therefore underlies the need for informed consent.

3.9.2Professionalism and Integrity

According to (Gross: 2005) one must not expose people to situations that could cause mental physical, psychological and socio-cultural and such risks include pain, stress, emotional distress embarrassment and exploitation. Lahey (2004) argue that the researcher must consult participants to ascertain any risks they may identify or any concerns they may have. The participants were granted the opportunity to ask the researcher questions for clarification where they feel it necessary.

3.9.3Informed Consent

Informed consent comprises three major elements information, voluntariness and comprehension. When providing information researchers must ensure that participants are given sufficient detail about the nature of the research and the procedures involved.

3.9.4Privacy and Confidentiality

Each individual is entitled to privacy and confidentiality both on ethical grounds and in terms of the protection of their personal and sensitive data under the Data Protection Act (1998). Each person therefore has the freedom to decide the time, extent and circumstances under which they will withhold or share information. Standards of privacy and confidentiality protect the access, control and dissemination of personal information; such standards also help to protect mental or psychological integrity.

3. 10DATA PRESENTATION AND ANALYSIS

In this study the researcher used Statistical Packages for Social Science Version 17.0 to analyze the data collected. The test of statistical analysis which the researcher used was the Pearson-correlation. The researcher used correlation coefficient because it is a numerical way to quantify

the relationship between two variables, and in this research it was the aptitude test results and job performance score.

Pearson Correlation formula:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

In presenting the findings the researcher will use descriptive statistical tools namely tables, and graphs so that the data can be viewed at a glance.

3.11SUMMARY

The chapter draws attention to the research methodologies that will be used by the researcher in the course of obtaining data for the research study. The section also revealed the data collection procedures, sampling techniques, research instrument and the ethical issues that will be put into deliberation by the researcher.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 INTRODUCTION

In this chapter, the results of the study are presented together with a discussion about the process of data analysis. The main focus was on testing whether there was any relationship between aptitude tests scores and job performance. The use of statistical tools such as graphs and tables was used to analyze the research finding from the survey undertaken at Curechem, MEFMI, USAL Investments, Schweppes and ZIMPLATS. Demographic information about the participants is presented first, followed by the results of the data analysis.

4.1 BALANCED SCORECARD RESPONSE RATE

A total number of 55 balanced scorecards were obtained from respective organization, giving a response rate of 73.33%. This was considered justifiable representative of the managerial population and the results can be generalized. The other 26.67% of expected participants had either left the organization the time when the data was collected or their performance score was said to have been influenced by training or working experience or education since they have been in the organization for a longer period.

4.2 DATA ANALYSIS

Statistical Package of Social Science (SPSS) version 17 was used as statistical analyses. Descriptive statistics were used to provide descriptive data of the total sample as well as the different groups.

4.2.1 Demographic Data of Respondents

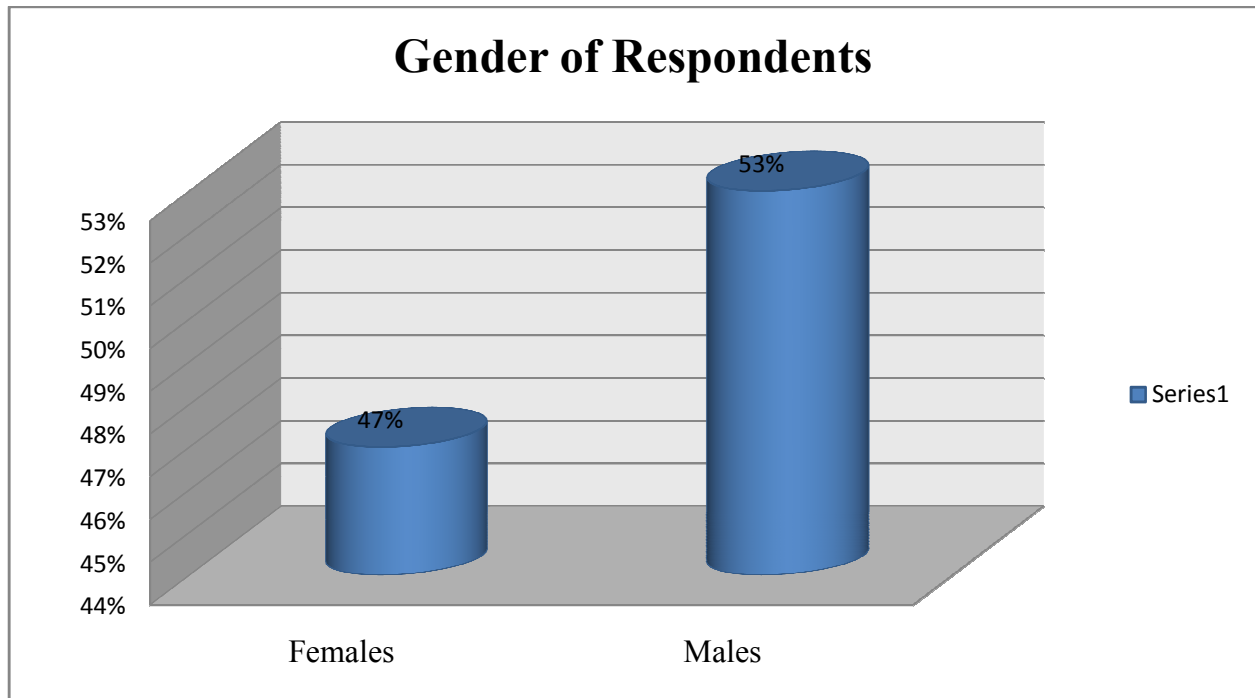


Figure 4.1 Gender of respondents

Figure 4.1 shows that 47% of the respondents were female managers whilst 53% were males managers. These results indicate that females were the minority in this research this could be ascribed to the fact that some of the organizations are male-dominated industry due to the duties carried out for instance mining or manufacturing.

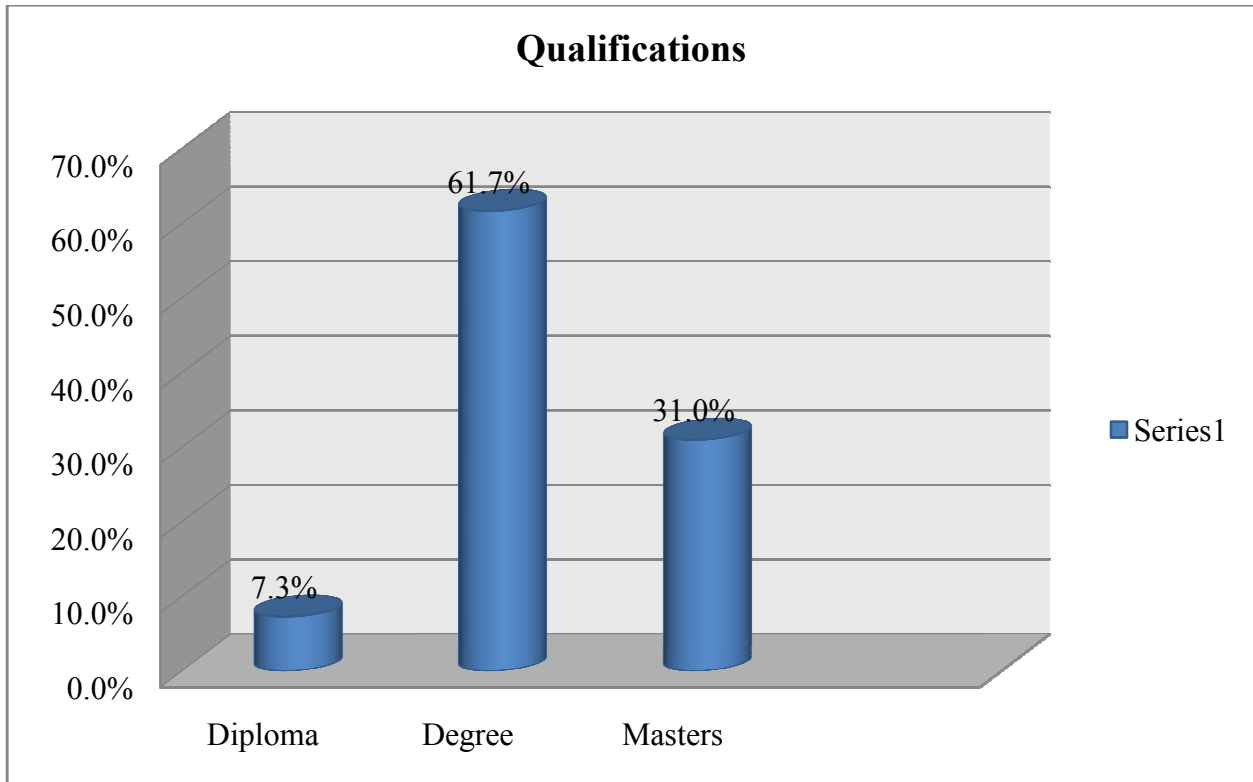


Figure 4.2 Level of qualification of respondents

Figure 4.2 show that 7.3% of the participantshad a diploma; 61.8% had a degree and 31.0% of the participants had a master’s degree. These results indicate that most of these managerial employees had a degree, the time they were employed.

Table 4.1 Length of service in organizations

Length of service	Number	Percentage
One year	14	25.5%
Two years	12	21.8%
Three years	17	30.9%
Four years	7	12.7%
Five years	1	1.8%
Six years	2	3.6%
Eight years	1	1.8%
Ten years	1	1.8%

Table 4.1 show that the majority of employees (30.9%) who participated in the survey have three years of service in respective organizations. Followed by employees who had a year in that particular organization, (25.5%).

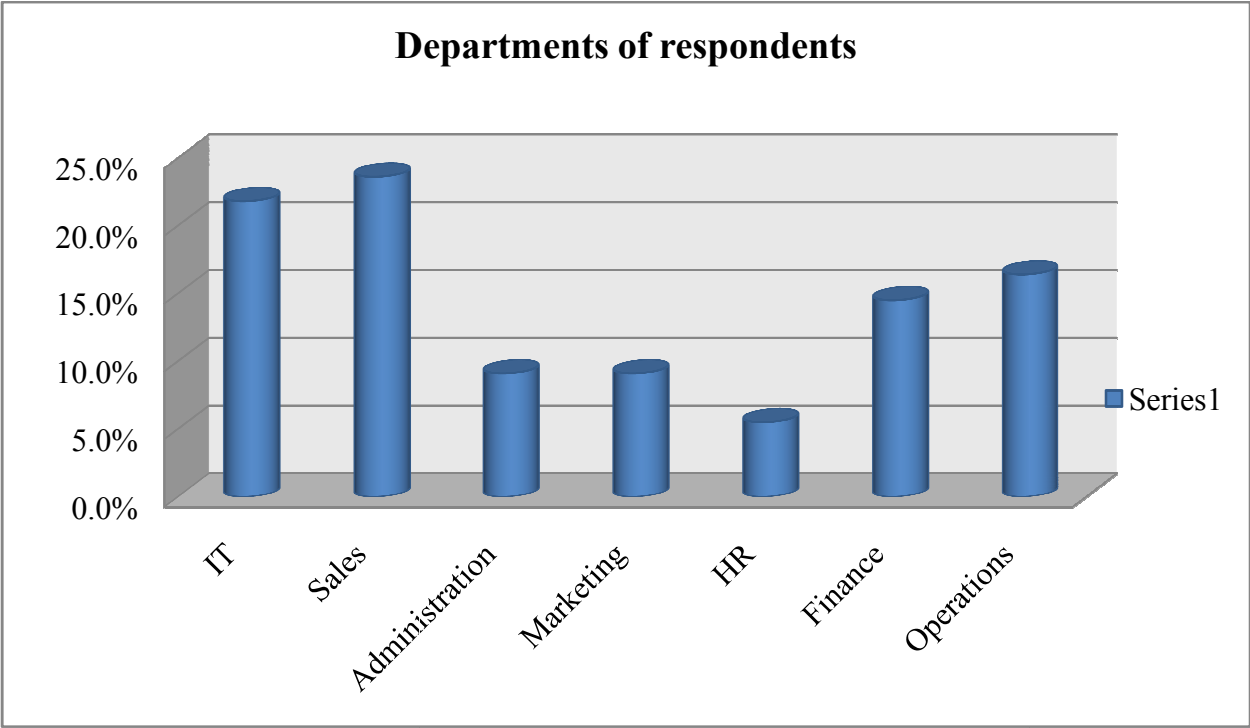


Figure 4.3 Departments of participants

As shown in figure 4.3, 21.8% of the employees who took part where from the information technology department, sales department 23.6%, administration 9.1%, marketing 9.1%, human resource 5.5%, finance 14.5% and operations 16.4%. These results indicate that most of the departments were fairly represented and hence the results cannot be adversely affected by one group.

Table 4.2 Descriptive Statistics

	Verbal Reasoning	Numerical Reasoning	Abstract Reasoning	Performance score
N Valid	55	55	55	55
Missing	0	0	0	0
Mean	58.67	65.73	65.27	73.76
Median	61.00	66.00	69.00	76.00
Mode	21	66	64 ^a	78
Std. Deviation	25.547	25.158	24.153	9.834
Range	94	97	92	40
Minimum	6	3	8	56
Maximum	100	100	100	96

Table 4.2 shows the mean, median, mode, standard deviation, variance and range of the test and job performance score. The mean is the average score and for verbal reasoning, 58.67, numerical reasoning 65.73, abstract reasoning 65.27 and performance score 73.76. The median is the center value, whereas the mode is the most frequent value in a particular variable. Standard deviation shows how much variation or dispersion from the average exist it shows that verbal reasoning has the greatest dispersion (25.547). Range is subtraction of the lowest value from the highest value.

4.3. CORRELATIONS

4.3.1 Hypothesis 1

H₁ had proposed that there is no significant relationship between individual' scores on the aptitude tests and actual job performance as measured by the differential aptitude test.

Table 4.3 Correlation between aptitude tests and actual job performance

			Numerical Reasoning	Abstract Reasoning	Verbal Reasoning
Performance score	Numerical Reasoning	Correlation	.325	.294	.336
		Significance (2-tailed)	.013	.031	.013
		df	0	52	52
	Abstract Reasoning	Correlation	.294	1.000	.308
		Significance (2-tailed)	.031	.	.023
		df	52	0	52
	Verbal Reasoning	Correlation	.336	.308	1.000
		Significance (2-tailed)	.013	.023	.
		df	52	52	0

*Correlation is significant at 0.05 level

Table 4.3 above shows a significant correlation between individual's scores on the aptitude tests and actual job performance. Pearson correlation is relationship between two or more variables it can either be positive or negative ranging from -1 to 1. The above results indicate that there is a positive correlation between aptitude test and job performance of 0.39. In statistical significant testing two-tailed test are alternative ways of computing the statistical significance of a data set in terms of a test statistic depending on whether both directions are considered equally. A p-value of 0.00 was obtained in this study; the p-value shows the likelihood that the statistic was obtained by chance. A null hypothesis can be rejected if $p \leq \alpha$ ($p \leq 0.05$), and the result is statistically significant.

4.3.2 Hypothesis 2

H₂ had proposed that there is no correlation between individual's verbal reasoning score and actual job performance as measured by the differential aptitude test.

Table 4.4 Correlation between verbal reasoning test and job performance

		Performance score	Verbal Reasoning
Performance score	Pearson Correlation	1	.336
	Sig. (2-tailed)		.013
Verbal Reasoning	Pearson Correlation	.336	1
	Sig. (2-tailed)	.013	
P-value 0.00			

*Correlation is significant at 0.05 level

Table 4.4 above show a person correlation of r 0.336 between verbal reasoning score and job performance rating. This result indicates that there is a positive correlation between individual's verbal reasoning score and actual job performance. The statistical significance of 0.013 was obtained which indicates that there was a positive direction. A p-value of 0.00 was obtained in this study; the p-value shows the likelihood that the statistic was obtained by chance. The null hypothesis is rejected when the $p \leq \alpha$ ($p \leq 0.05$). Under the investigation of the correlation between job performance and verbal reasoning the p-value is less than the alpha hence we disconfirm the null hypothesis.

4.3.3 Hypothesis 3

H3 had proposed that there is no correlation between individual's numerical reasoning score and actual job performance as measured by the differential aptitude test.

Table 4.5 Correlation between numerical reasoning test and job performance

		Performance score	Numerical Reasoning
Performance score	Pearson Correlation	1	0.325
	Sig. (2-tailed)		.013
Numerical Reasoning	Pearson Correlation	0.325	1
	Sig. (2-tailed)	.013	
	p-value 0.00		

*Correlation is significant at 0.05 level

Table 4.5 above show a person correlation of r 0.325 between numerical reasoning score and job performance rating. This result indicates that there is a significant correlation between individual's numerical reasoning score and actual job performance. The statistical significance level of 0.013 was obtained which indicates that there was a positive direction. A p-value of 0.00 was obtained in this study; the p-value shows the likelihood that the statistic was obtained by chance. The null hypothesis is rejected when the $p \leq \alpha$ ($p \leq 0.05$). Under the investigation of the correlation between job performance and numerical reasoning the p-value is less than the alpha hence we disconfirm the null hypothesis.

4.3.4 Hypothesis 4

H₂ had proposed that there is no correlation between individual's abstract reasoning score and actual job performance as measured by the differential aptitude test.

Table 4.6 Correlation between abstract reasoning and job performance

		Performance score	Abstract Reasoning
Performance score	Pearson Correlation	1	.294
	Sig. (2-tailed)		.031
Abstract Reasoning	Pearson Correlation	.294	1
	Sig. (2-tailed)	.031	
p-value 0.00			

*Correlation is significant at 0.05 level

Table 4.6 above shows a Pearson correlation of $r = 0.294$ between abstract reasoning score and job performance rating. This result indicates that there is a positive correlation between individual's abstract reasoning score and actual job performance. The statistical significance level of 0.031 was obtained which indicates that there was a positive direction. A p-value of 0.00 was obtained in this study; the p-value shows the likelihood that the statistic was obtained by chance. The null hypothesis is rejected when $p \leq \alpha$ ($p \leq 0.05$). Under the investigation of the correlation between job performance and abstract reasoning the p-value is less than the alpha hence we disconfirm the null hypothesis.

4.5 SUMMARY

This chapter focused on the findings of the research and gave answers to the research hypothesis. The results indicated that there is a correlation between aptitude tests and job performance and all the null hypothesis were rejected because the p-value was less than the alpha.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

In this final chapter, the results reported in the previous chapter are discussed in more detail. An attempt is made to explain the findings theoretically and from a practical point of view. Conclusions about the findings are presented and discussed. The chapter concludes with some recommendations as per research findings for future research, as well as specific recommendations regarding the use of the aptitude tests as a recruitment tool.

5.2. DISCUSSIONS

The purpose of this study was to test the association between individual aptitude tests score results and actual job performance, as measured at organizations. The major hypothesis of the study proposed that there is no significant correlation between individual's scores on the aptitude tests and actual work performance ($r=0$). A quantitative research designed was used in this study, the reason being that numbers and scores tend to be the main type of data researchers collect and analyse using this frame, in the current study it helped to distinguish correlation. There is a slight difference between the results of this study and previous studies, this might due to the larger sample size used in the previous researches as compared to the current study.

5.2.1 Hypothesis 1:

H_0 , had proposed that there is no significant relationship between individual' scores on the aptitude tests and actual job performance as measured by differential aptitude test.

The results in the previous chapter indicated an association between aptitude tests results and actual job performance (r 0.39) at a significant level of 0.015 for managerial employees in selected Harare companies. This is in line with the study carried out in USA by Schmidt (2002), examining the criterion validity of General mental abilities. The results showed that the average operational validity ranged from r 0.38 to 0.47 for overall job performance. This is also supported by a study carried out on the predictive validity of different selection tools by Dakin

and Armstrong (1989), in New Zealand. The outcomes for entry level jobs indicated that aptitude test were the most accurate single predictor with a correlation of 0.53, job try out with a correlation of 0.44, biographical inventory 0.37, reference check 0.26, experience 0.18, interviews 0.14, academic achievements 0.11, education 0.10, interest 0.10 and age -0.01 (Dakin & Armstrong, 1989). A study carried out by Pearlman et al (1980) using clerical occupations established that General mental abilities and other precise cognitive measures, including memory, verbal, numerical, spatial, mechanical showed moderate to large criterion related validity (Salgado, 2003). The null hypothesis, which stated that no significant association exists between aptitude tests scores and work performance scores, is disconfirmed. It appears that people's ability to score highly on the aptitude tests does relate to their actual work performance.

5.2.2 Sub- Hypothesis 1

H₀: There is no correlation between individual's verbal reasoning score and actual job performance as measured by differential aptitude test.

The current study findings indicated that there is a correlation between individual's verbal reasoning score and actual job performance with a person correlation of $r = 0.33$ for managerial employees in selected Harare companies. The significant level was tested 0.013 level. A study carried by Ree (2000) on verbal reasoning indicated similar results with the present study. Ree (2000) results showed an operational validity of $r = 0.35$, he goes on to state that this result was remarkably lower than the operational validity of General mental abilities. The outcomes of this research are uniform with the other results; hence we disconfirm the null hypothesis. Therefore it is apparent that aptitude tests are valid predictors of job performance.

5.2.3 Sub- Hypothesis 2

H₀: There is no correlation between individual's numerical reasoning score and actual job performance as measured by differential aptitude test.

The results in this investigation presented in the previous chapter indicated that there is a correlation between numerical reasoning tests results and actual job performance ($r = 0.325$) at a significant level of 0.015 for managerial employees in selected Harare companies. These results are in line with the studies carried out by previous researchers. One of the studies which support the results of the current study is that which was carried out by Ree (2000), on the predictive validity of numerical reasoning and it had a predictive validity of 0.52. This result indicates that numerical reasoning is a valid forecaster of job performance and that it has a universal validity across sample and country. Hence the null hypothesis, which stated that no relationship exists between numerical tests scores and work performance scores, can consequently be rejected. It appears that people's ability to score highly on the aptitude tests does relate to their actual work performance.

5.2.4 Sub- Hypothesis 3

H₀: There is no correlation between individual's abstract reasoning score and actual job performance as measured by differential aptitude test.

The current study findings indicated that there is a correlation between individual's abstract reasoning score and actual job performance with a person correlation of $r = 0.29$ for managerial employees in selected Harare companies. The significant level was tested 0.031 level. A study carried by Schmidt and Hunter (1980) on all the reasoning tests, consistently found out that the all reasoning test are best predictors of job performance. However their study concluded that abstract reasoning (graphology) not astonishingly have been constantly found to be the least valid predictor of job performance among all reasoning tests, just like the in the current study, (Schmidt & Hunter 1998). The results of the current study are uniform with the other findings, hence reject the null hypothesis. Therefore it is apparent that aptitude tests are valid predictors of job performance.

5.3 RESEARCH CONCLUSIONS

The link between psychological tests and actual job performance had been studied somewhere in countries such as South Africa, Australia and USA but not in Zimbabwe. This study has confirmed that there is a moderate positive correlation between psychological tests results and actual job performance because selected managers' tests done by Industrial Psychology Consultants compare very well with the performance ratings that managers are getting from their companies. The job performance scored used by the researcher where from different companies hence the rater bias is rated out.

The findings of the study revealed that there is a correlation between sub tests of aptitude test which are verbal reasoning, numerical reasoning and abstract reasoning results and job performance. The findings of current study are similar to most of the previous studies as they all came to the same inference that cognitive tests are valid predictors of job performance. Most of the studies done in Africa had concluded that aptitude tests are not culture free because they are written in English which is not the first language for Africans especially verbal reasoning, however the outcome of this research signposted that employees are scoring high on verbal reasoning, despite English being not the first language and they have indicate a positive correlation between verbal reasoning and job performance. This study managed to address the knowledge gap as it focused on different subtests of aptitude tests and different employees from different sectors. The results of this study validated the factor analysis theory proposed by Spearman (1904) which proposed that general intelligence is an individual's underlying intelligence, in which their performance at one type of cognitive tasks tends to be comparable to their performance at other kinds of cognitive tasks.

As far as previous research is concerned, the findings of the study are reflective of previous studies. While acknowledging the subjectivity of the supervisor's ratings and limitation in the sample size and representation of the sample which could have influenced the results obtained in the research, this study attempted to gain a better understanding on the relationship between aptitude tests result and job performance.

5.4 RECOMMENDATIONS

Due to a significant correlation found between aptitude tests and job performance, one can conclude that they are useful for recruitment or selection of managerial employees. The researcher would recommend that the organization which use aptitude test/ psychometric test to continue using these tests as they are valid predictors of job performance, and also organizations which do not use these to use them for their recruitment/ selection process.

Whilst a correlation was found, however it was found to be moderate, this might imply that psychological tests in selection should be used in conjunction with another recruitment or selection tools such as interviews, or reference checks in order to have a more comprehensive information or assessment in this area of candidates' ability.

Since this study focused on a particular job family which where managerial employees, hence there is need for future research on all job family and with a larger sample, to guarantee a better representation and allow for generalization of empirical findings.

5.5 SUMMARY

Finally this chapter presented a discussion of the results and findings of the study. The statistical analysis found evidence of a relationship between aptitude test scores and actual work performance scores. The recommendations and suggestions arising from this research include the continual use of the aptitude tests when screening employees.

APPENDICES 1

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APPENDICES 2

Performance Assessment Data Collection Template

Organisation Name: _____

Employee Name: _____

Job Title: _____

Length of Service: _____

Grade: _____

Department: _____

Could you please rate this employee on the following performance dimensions?

		Needs Much Improvement	Needs Some Improvement	Satisfactory	Good	Excellent
1	Quantity of work output					
2	Quality of work output					
3	Accuracy of work					
4	Customer Service Provided(internal or external)					
5	Coming up with new ideas					
6	Working to implement new ideas					
7	Finding improved ways to do things					
8	Creating better processes and routines					
9	Promotion potential					
10	Discipline					
11	Safety consciousness					

Please indicate if the person being assessed has ever been promoted, demoted or dismissed;

Promoted

Demoted

Voluntarily Left

Dismissed

APPENDICES 3

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APPENDICES 5

RESEARCH LETTER

Midlands State
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Telephone: (263) 54 260404 ext 261
Fax: (263) 54 260233/260311

FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF PSYCHOLOGY

Date... 15/04/2014...

To whom it may concern

Dear Sir/Madam

RE: REQUEST FOR ASSISTANCE WITH DISSERTATION INFORMATION
FOR...BRENDA TSITSI MUNHAMO
R102791Y.....
BACHELOR OF PSYCHOLOGY HONOURS DEGREE


This letter serves to introduce to you the above named student who is studying for a Psychology Honours Degree and is in his/her 4th year. All Midlands State University students are required to do research in their 4th year of study. We therefore kindly request your organisation to assist the above-named student with any information that they require to do their dissertation.

Topic: THE RELATIONSHIP BETWEEN INDIVIDUAL APTITUDE TEST RESULTS AND
JOB PERFORMANCE FOR EMPLOYEES

For more information regarding the above, feel free to contact the Department.

Yours faithfully


F. Ngwenya
Chairperson

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APPENDICES 4

DEPARTMENT OF PSYCHOLOGY

SUPERVISOR-STUDENT AUDIT SHEET

DATE	ACTIVITY	SUPERVISOR'S COMMENTS	STUDENT'S SIGNATURE	SUPERVISOR'S SIGNATURE
21 October 2013	Research Proposal	Rework		
29 October 2013	Research Proposal	Proceed		
17February 2014	Chapter 1	Rework		
19February 2014	Chapter 1	Proceed		
21 February 2014	Chapter 2	Rework		
28 February 2014	Chapter 2	Proceed		
4 March 2014	Chapter 3	Rework		
7 March 2014	Chapter 3	Proceed		
14April 2014	Chapter 4	Rework		
16 April 2014	Chapter 4	Proceed		
17 April 2014	Chapter 5	Rework		
23 April 2014	Chapter 5	Proceed		
28 April 2014	First Draft	Proceed		
30 April 2014	Second Draft	Proceed		
02 May 2014	Final draft	Done		

.....

.....

SUPERVISOR'S SIGNATURE

DATE