# THE DEVELOPMENT OF A VOCATIONAL INTEREST MEASURING INSTRUMENT IN AN ADULT EDUCATIONAL SETTING

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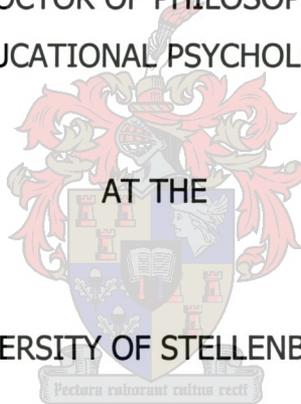
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DECLARATION

I, the undersigned, hereby declare that this dissertation is my original work, and that I have not previously in its entirety or in part submitted it at any university in order to obtain a degree.

Signature:

Date:

SUMMARY

The major concern in the world of work has been the mismatch between a person's vocational interests and job pursuits. The understanding has been that jobs make differing demands on people and that the abilities of the individual and demands of the job have a bearing on productivity hence the need for matching people to jobs. The most notable attempts to identify and organize vocational interests have been Holland's theory of vocational interests and personality types. Holland asserts that people can be categorized predominantly as one of six personality types, namely, realistic (R), investigative (I), artistic (A), social (S), enterprising (E), and conventional (C).

The review of literature has shown that person-environment fit explains the degree of match between occupational pursuits and one's vocational interests and that before a measure can be used across cultures, its construct validity must be established in each culture.

The current study was motivated by the Zimbabwe Public Service Commission's quest, in the absence of vocational interest measures tailored for Zimbabwe, for assessment tools that can assist in predicting suitability for recruitment or promotion. The study was therefore designed to (a) develop a measure of vocational interest validated on the Zimbabwe population, (b) build a model for predicting and classifying people into job sectors and (c) assess the adequacy of Holland's RIASEC structure

for assessing person-job fit in the Zimbabwe Public Service. To achieve this, a correlational research design was used. The vocational interest measure and the MB-10 were the two instruments used for data collection. A sample of 500 public servants representing six occupational sectors in the Zimbabwe Public Service participated in the study. Statistical approaches to data analysis included reliability and validity analysis, factor analysis and multiple discriminant analysis.

The results of the reliability coefficients were within acceptable levels. The subscale reliabilities of the vocational interest measure ranged from $r_\alpha = 0.85$ to $r_\alpha = 0.89$. Overall, the concurrent validity of the vocational interest measure was established.

Factor analysis and correlation coefficients statistic assessed the adequacy of the hexagonal ordering of the RIASEC types. Factor analysis was computed resulting in 8 factors being extracted instead of the theoretically conceptualized 6 factors. The 8 extracted factors accounted for 65.88% of the total variance. Holland's theory affirms that occupational types that are more proximate on the hexagon are more similar than types that are more distant. Results of the RIASEC intercorrelations showed strong correlations between Realistic and Investigative (r = 0.69) and moderate correlations with four of the adjacent types. However, low and negative correlations were obtained between Conventional and Realistic (adjacent types) (r = -0.14) and between Investigative and Conventional (alternate types) (r = -0.11). On the other

hand, there was strong correlation between Realistic and Social (opposite types) (r = 0.25.)

The model for predicting and classifying people into appropriate job sectors was developed. The model's utility was confirmed using the scores from the sample data. The cross validation table obtained an error rate of 0.29, an indication of a relatively good model.

Given the results of the present study, it appears the study hypotheses were generally supported. Further work in refining the model is recommended.

OPSOMMING

In die beroepswêreld was die konflik tussen 'n persoon se beroepsbelangstellings en beroepsdoelwitte tot dusver 'n wesenlike probleem. Dit word aanvaar dat beroepe verskillende eise aan mense stel en dat die vermoëns van die individu en die eise van die beroep 'n invloed op produktiwiteit het. Vandaar die behoefte om mense by beroepe te laat pas. Die belangrikste poging om beroepsbelangstellings te identifiseer en te organiseer is Holland se teorie van beroepsbelangstellings en persoonlikheidstipes. Holland voer aan dat mense oorwegend as een van ses persoonlikheidstipes gekategoriseer kan word, naamlik realisties (R), ondersoekend (I), artisties (A), sosiaal (S), ondernemend (E), en konvensioneel (C).

Die literatuuroorsig het aangedui dat persoon-omgewing-passing die graad van harmonie tussen beroepsdoelwitte en die individu se beroepsbelangstellings verklaar. Dit het ook getoon dat 'n meetinstrument slegs kruiskultureel gebruik kan word nadat die konstrukgeldigheid daarvan in elke kultuur bepaal is.

Die huidige studie is gemotiveer deur die Staatsdienskommissie van Zimbabwe se behoefte aan assesseringsinstrumente wat kan bydra tot die voorspelling van mense se geskiktheid vir beroepswerwing of bevordering. Dié behoefte het ontstaan vanweë die gebrek aan 'n meetmiddel vir beroepsbelangstelling wat vir Zimbabwe geskik is. Hierdie studie is gevolglik ontwerp om (a)-'n meetinstrument vir beroepsbelangstelling te ontwikkel wat vir Zimbabwe se populasie gevalideer is, (b)

'n model te ontwikkel vir die voorspelling en plasing van mense in beroepsektore, en (c) die geskiktheid van die Holland se RIASEC-struktuur te evalueer vir persoon-arbeid-passing in Zimbabwe se staatsdiens. Die meetinstrument vir beroepsbelangstelling en die MB-10 is die twee instrumente wat vir data-insameling gebruik is. 'n Steekproef van 500 werknemers, wat ses beroepsektore in Zimbabwe se staatsdiens verteenwoordig, het aan die ondersoek deelgeneem. Die statistiese benaderings tot die data-analise het betroubaarheids- en geldigheidsanalises, faktoranalises en meervoudige diskriminasie-analises ingesluit.

Die resultate het betroubaarheidskoëffisiënte op aanvaarbare vlakke aangedui. Die subskaal-betroubaarheidskoëffisiënte van die beroepsbelangstellingsinstrument het gewissel van r = 0.85 tot r = 0.89. Globale saamvallende geldigheid is vir die instrument bevind.

Die geskiktheid van die heksagonale struktuur van die RIASEC-tipes is deur middel van faktoranalises en korrelasiekoëffisiënte ondersoek. Deur die faktoranalises is agt faktore identifiseer in plaas van die teoreties-gekonseptualiseerde ses faktore. Dié agt faktore was verantwoordelik vir 65.88% van die totale variansie. Holland se teorie bevestig dat beroepstipes wat meer sentraal op die heksagoon geleë is meer ooreenstem as tipes wat verder weg geleë is. Die RIASEC-interkorrelasies het 'n sterk korrelasie tussen die realistiese (R) en ondersoekende (I) tipes getoon (r = 0.69), en matige korrelasies met vier van die verwante tipes. Lae en negatiewe

korrelasies is egter verkry tussen die konvensionele (C) en realistiese (R) verwante tipes (r = -0.14), en tussen die ondersoekende (I) en konvensionele (C) alternatiewe tipes (r = -0.11). Aan die ander kant is 'n sterk korrelasie tussen die realistiese (R) en sosiale (S) opponerende tipes gevind (r = 0.25).

Die model vir die voorspelling en klassifisering van persone in geskikte beroepsektore is ontwikkel. Die bruikbaarheid van die model is bevestig deur die tellings van die steekproefdata. Die kruisvalideringstabel het 'n foutwaarde van 0.29 aangedui, wat 'n aanduiding van 'n redelik goeie model is.

Volgens die resultate van die studie blyk dit dat die hipoteses algemeen ondersteun word. Verdere navorsing vir die verfyning van die model word aanbeveel.

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CHAPTER 1

INTRODUCTION AND STATEMENT OF THE PROBLEM

1.1   INTRODUCTION

Psychological tests and personality inventories have been used in work situations as aids in occupational decisions such as the selection, classification, and placement of human resources. In the same vein, the relationship between vocational interest and occupational pursuits has been the subject of empirical interests the world over. Vocational interest measures have been used, especially in the Western countries, to assist students and, in some cases, adults to make informed decisions regarding occupational pursuits. Vocational preferences are acquired early in life and become distinct as the person matures. Alluding to that notion, Gottfredson (1999, p.30) explained,

> Over time, a child's hereditary and other biological potentials, combined with patterns of opportunities and the shaping provided by environment reinforcers, begin to develop increasingly stable affective responses to different situations or opportunities. The preferences and aversions together with developed competencies or skills are eventually associated with patterns of values, beliefs, and styles.

This shows that personality traits stabilize with maturity. Stabilization is brought about through the interactions one has with the environment vis-à-vis the occupational decisions and choices and the display of competencies. Personality traits and

occupational interests are, to a large extent, a product of the interaction between inherited biological factors, on the one hand, and opportunity and social evaluation on the other (Super & Crites, cited in Hogan & Blake, 1999).

The measurement of vocational interests, rooted in Parson's 1909 theoretical model of matching people to jobs, has been the subject of interest since the early 1940s. Unfortunately, the same cannot be said for Zimbabwe where, until the early 1990s, the assessment of one's occupational interests and competencies was not considered crucial to job performance or to educational pursuits. Evidence from literature indicates that the nature and strength of one's vocational and occupational interests, values, and attitudes represent an important aspect of personality (Anastasi, 1988; Gottfredson, 1999; Holland, 1985, 1997; Osipow, 1990). These characteristics are understood to affect educational and occupational achievements, interpersonal relations, and the motivation one gets from undertaking the activity.

The major concern in the world of work worldwide has been the mismatch between a person's vocational interests and one's occupational pursuits. Empirical evidence shows that a person's interest and competencies create a particular disposition that leads the individual to acquire a personality type (Holland, 1985a). As such, knowledge of the person's vocational interests and competencies corresponding to job demands can be an important source of information to the individual and the organization.

Nordstrom and Ridderstrale (2000, p.32) argue that "all modern companies compete on knowledge, but knowledge is perishable. We must treat it like milk – we have to date it." All this creates an environment of continuous change. Hence, the need to pay special attention to later career issues cannot be underestimated if career development is to mirror population and demographic changes. In fact the harsh economic environment the world over is forcing governments to adopt survival strategies, by critically examining the traditional employment strategies with a view to transforming them (Krumboltz & Worthington, 1999; Nyirenda, 1994; Nordstrom & Ridderstrale, 2000)). Lent, Hackett, and Brown (1999) suggest that with increasing changes due to the turbulent economic environment the world over, work transition interventions might profitably convey the value of continuing education. The Accrediting Commission of the Continuing Education Council of the United States (cited in Jarvis, 1995, p.28) defines continuing education or adult education as "the further development of human abilities after entrance into employment or voluntary activities. It includes in-service, upgrading, and updating education. It may be occupational education or training which furthers careers or personal development."

Similarly, Bhola (1988) sees adult education as the purposive enterprise pursued systematically as an instrument of human resource development. According to Bhola, emphasis is on purposive action that is aimed at preparing the individual to act upon his/her environment, to transform it and make life more humane for the individual and for others.

Adult education or continuing education, therefore, refers "to any activity or program deliberately designed to satisfy any learning need or interest that may be experienced at any stage by a person who is over the statutory school-leaving age. Its ambit thus spans non-vocational, vocational, formal, non-formal studies as well as education with a collective social purpose" (Lowe, 1982, p. 22). Of importance is the need to understand continuing education in the context of the prevailing ideology and cultural influence as these factors impact on adult behaviour. In this regard, career development (Hackett & Watkins, 1995) should be viewed as a process that extends throughout the life span wherein workers have to continually undergo skills updating to enable them keep abreast of technological changes and the social and economic demands of the work situation.

On the other hand, organizational restructuring and downsizing in response to global competitive pressures have reinforced the need for the use of assessment tools in facilitating the accurate placement of people to new roles or new areas of operation. Savickas and Watts (cited in Krumboltz & Worthington, 1999) indicate that the nature of work and of job tenure across the life span have changed during the past 20 years and are likely to continue to do so well into the 21st century. These economic changes call for far greater flexibility and, inevitably, new roles demand new skills and the placement of people into areas where they can be productive. Mechanisms for the identification of the degree of similarity between the individual's vocational interests/abilities and occupational pursuits are a prerequisite to job satisfaction and productivity. Invariably, vocational interest inventories play a major role in this regard.

1.2   **Motivation for the Study**

This research is motivated by two concerns. The first was the Zimbabwe Public Service Commission's quest for assessment tools that can objectively assist decision makers to predict suitability of those being recruited into the service or being promoted to positions of higher responsibilities with regards to person-job fit. The second concern has been the absence of vocational interests measures tailored to the needs of Zimbabwe. Prior research suggests that the area of vocational interest measures has been generally ignored in Africa (Stead & Watson, 1998). It is this absence of occupational measures validated for the Zimbabwean population that has been one of the motivating factors in undertaking the current study. The importance of studying the relationships between vocational and personality interests and work environments is crucial especially in the Zimbabwe Public Service Government setting where the personnel costs of doing the public's business range from 80 to 90 percent of the budgetary allocation (Estimates of expenditure for 2001: Zimbabwe Government). Matching one's vocational interests and competencies with the occupation enhances job efficiency and productivity.

Empirical evidence shows that vocational behaviours are influenced substantially by person-job fit. Satisfaction, stability, and achievement depend, to a large extent, on the match between one's vocational interests and occupational or educational pursuits (e.g., Dawis & Lofquist, 1984; Holland, 1985a, 1997; Holland, Powell, & Fritzsche, 1994). Vocational and personality interest measures, according to Hogan

and Blake (1999), tell us how much a person will like an occupation and about the social skills and drives necessary to succeed once in the occupation. Holland's (1985a) theory asserts that individuals are most successful when they operate in environments that are congruent with their personality type. The assumption is that occupations attract particular personality types and that individual differences interact differentially with occupational differences and that the well-adapted individuals within an occupation share certain psychological characteristics.

Likewise, people have varying levels of cognitive ability and jobs have varying levels of cognitive demands. People vary in their occupational and life interests and occupations vary in their capacity to satisfy an individual's interests (McDaniel & Snell, 1999). From the social sciences perspective, people are said to differ. They differ in their beliefs, abilities, occupational preferences or interests, wants and values and they differ in their aptitude. These important individual variables need to be taken into consideration. On the whole, the thrust of vocational and occupational psychology (Holland, 1985a; Osipow, 1990) is to understand and predict work and career-related behaviours and to use this knowledge to best advantage.

Vocational assessment tools facilitate maximum utilization of personnel. Stead and Watson (1998, p.294) criticize the absence of career measures validated to the African cultural setting. The authors note that, "while it can be stated with reasonable certainty that most career measures in international use are also used in South Africa, it is equally true that there is a paucity of research that has assessed the

relevance and validity of such usage." The same could be said of Zimbabwe where, for example, plans to introduce assessment systems for recruitment and promotion purposes in the public service have been on the cards since 1990 but very little meaningful progress has been achieved beyond policy formulation. Of note, the desire to introduce assessment for job placement and promotion has been expressed at the highest level of Government and Cabinet, unfortunately, lack of technical expertise and the absence of occupational measures suited to the Zimbabwean cultural setting have stalled the implementation of the program to date.

Psychological tests and personality inventories (Anastasi & Urbin; cited in Van Der Merwe, 1999) are appropriate assessment tools that can be employed in such matters as hiring, job assignment, transfer, promotion, or termination. In the main, vocational and personality inventories (Anastasi, 1988) are used for the measurement of emotional, motivational, interpersonal, and attitudinal characteristics, as distinguished from abilities. The measures sample directly a person's goals, values, and aspirations, which, in essence, define a person's vocational identity (Holland, 1985, 1997). The narrowing down of aspirations to a small number of occupations manifests a clear vocational identity (Holland, 1985a).

The most notable attempts to identify and organize occupational interests and personality traits, mostly in North America, has been Holland's (1985a, 1997) model. The model has been useful for career education, vocational and occupational guidance, and for placement purposes. The assumption is that the abilities of the

individual and job demands have a bearing on productivity. Person-job fit provides a valid and useful way of thinking about the interaction between the individual and the work environment. The world of work (Gottfredson & Richards, 1999) is viewed as a population of occupational environments, with each occupation being an organized whole characterized by its pattern of activities. Holland (1996) elaborates further by noting that congruence (match) of person and job environment leads to job satisfaction and stability of career path and that incongruence or person-job mismatch leads to dissatisfaction, instability of career path, and low performance. The theory assumes that occupational interests are an important expression of personality. Central to Holland's theory is the assumption that people can be categorized meaningfully into one of the six personality types and work environments on the basis of their vocational interests. The proposed six personality types and six corresponding work environments arranged in a hexagonal structure are:

- **Realistic (R)** – Possesses manual and mechanical competencies (e.g., auto-mechanic, farmer, and electrician). Prefers interacting with objects or things such as machines, tools, and materials rather than interacting with people. Described as asocial and practical. Values concrete and practical activities.

- **Investigative (I)** – Possesses analytical, mathematical, scientific, and verbal competencies. (E.g., physicist, microbiologist). Scores high in situations involving critical thinking, problem solving and intellectual activity aimed at trouble-shooting and creation and use of new knowledge. Prefers working with ideas such as theories and insights rather than with

people. Values the acquisition of knowledge through scholarship or investigation.

- **Artistic (A)** – Possesses artistic and creative ability (e.g., artist, musician, architect, and interior designer). Described as imaginative, innovative, original, and emotionally expressive. Prefers working with ideas such as insights. Values unconventional ideas and aesthetic expression.

- **Social (S)** – Possesses interpersonal competencies, skill in mentoring, treating, and helping others (e.g., teacher, clergy, and counselor). Described as empathetic, sociable, and friendly. Has concern for the welfare of others. Prefers working with people providing care and services.

- **Enterprising (E)** – Possesses persuasive, manipulative, and verbal skills (e.g., lawyer, sales person, and entrepreneur). Initiatives are in pursuit of financial and material accomplishments. Described as ambitious, extroverted, and self-confident. Prefers dominating others and taking leadership role.

- **Conventional (C)** – Possesses accounting, clerical and arithmetic ability. Typified by a great concern for orderliness, routine, rules and regulations (e.g. accountant and banker). Described as inflexible, methodical and conforming. Prefers working with data (e.g., facts and records). Values working with numbers or machines to meet predictable organizational demands or specified standards.

The strength of relationship among the six personality types and work environments (Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) also known as RIASEC (Holland, 1985a) is depicted through the hexagonal model as shown in Figure 1. The RIASEC model is parsimonious and facilitates the understanding of work environments, personality types, and occupational choice. Essentially, the hexagonal model provides a framework for assessing the degree of consistency in a personality pattern and the extent of congruency or match between a personality type and the work environment (Rachman, Amernic, & Aranya, 1981). According to the theory, adjacent types (RI, IA, AS, SE, EC, and CR) have stronger relationship than alternate types (RA, IS, AE, SC, ER, and CI), which, in turn, have stronger relationship than the opposite types (RS, IE, and AS). Thus, occupational types that are more proximate on the hexagon are more similar than types that are more distant. Equally, the psychological distance between any two-personality types is calculated according to their distance on the hexagon. Generally, vocational interests have been assessed using interest questionnaires and self-report inventories. Accordingly, the Self-Directed Search (SDS) is a measure designed to measure the six RIASEC traits. Holland's model groups occupations into job families on the basis of their shared psychological features. To determine one's vocational interest patterns and personality, Holland (1985a) suggests assigning three letter codes based on the analysis of one's inventory scores(e.g., RIA).

REALISTIC (R)
(TECHNICAL)

INVESTIGATIVE (I)
(SCIENCE)

CONVENTIONAL (C)
(BUSINESS
OPERATIONS)

ARTISTIC (A)
(ARTS)

ENTERPRISING (E)
(BUSINESS CONTACTS)

SOCIAL (S)
(SOCIAL SERVICE)
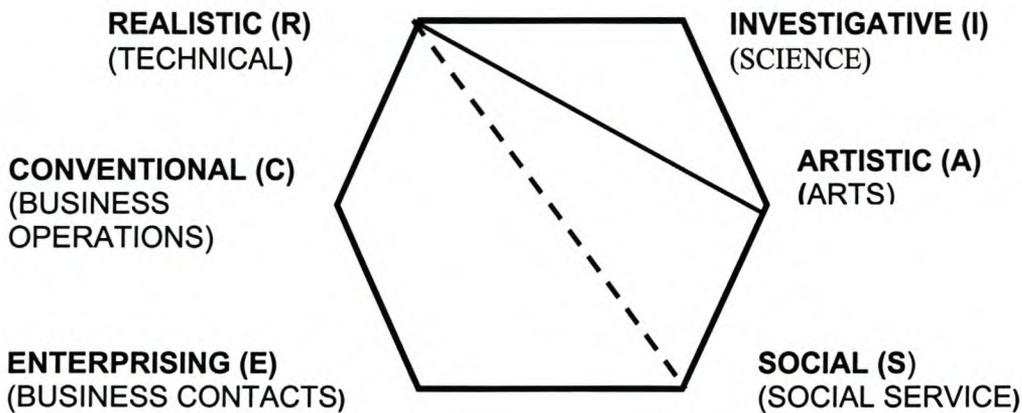
Figure 1. The hexagonal model: Person-environment relations (Holland, 1985a).

As explained by Holland (cited in Lew, 1997), consistency, differentiation, and identity of a personality pattern determine the degree of predictability of behaviour. Accordingly, the individual's profile of resemblance to the six personality types and work environments can be described in terms of differentiation, consistency, and identity.

Differentiation, according to the theory, is the distinctness of personality and of occupational profile. Differentiation explains the extent to which individuals and their environments are defined.

Consistency refers to the coherence of aspirations and work history. High consistency is considered a positive sign and normally manifests into stability in work history and clarity of occupational pursuits (Reardon & Lenz, 1999).

Identity refers to clarity and stability of a person's goals and self-perceptions. Clarity of vocational identity manifest in a relatively stable picture of one's goals, vocational interests, skills, and occupational aspirations. Lack of vocational identity is

characterized by incompatible occupational choices and frequent job changes (Holland, 1996).

Holland (1997) asserts that vocational satisfaction, stability, and achievement depend on the congruency between one's personality and the environment in which one works. Congruence is the compatibility or correspondence of the personality type and the work environment. The assumption is that congruence between an individual's vocational interests and the characteristics of the occupation should result in satisfaction, stability, and work achievements (Dawis & Lofquist, 1984; Holland, 1985).

In particular, the model is viewed as an icon that represents a theory rich in assessment tools of great counseling utility. Among Holland's vocational interest inventories is the Self-Directed Search (SDS), a measure validated on the North American population and designed to assess the relationship between one's vocational interest and occupational pursuits. The measure (Form R) is suited to the assessment of person-job correspondence/fit. The measure facilitates the identification of the degree of correspondence between one's vocational interests and abilities and one's occupational pursuits. As mentioned earlier, knowledge of the extent of correspondence between a person's occupational interests and the work environment is key to productivity in any organization be it the private or the public sector. For the most part, the survival of government depends, to a large extent, on the calibre of the workforce. Nyirenda (1994, p.314) reiterates, "whenever there is a social or economic crisis, Americans turn to education to provide a solution."

Similarly, in Zimbabwe, the need for reforming the public sector in general, and the civil service in particular, has characterized government thinking since the late 1980s. The World Bank/IMF led Economic Structural Adjustment (ESAP) of 1990 to 1996 and the subsequent Zimbabwe Programme for Economic and Social Transformation (ZIMPREST) of 1996 to 2000 as well as the recently introduced Millennium Recovery Program have significantly impacted on policy changes in the Zimbabwe Public Service. The reform programs have been employed as tools for revamping the economy and the Public Service.

1.2.1 Developments in the Zimbabwe Public Service

1.2.1.1 Overview

The Zimbabwe Public Service Commission (PSC) is a Constitution Body created in terms of Section 74 of the Zimbabwe Constitution and its operations are regulated through the provisions of the Public Service Act (Chapter 16:04). The functions and powers of the Public Service Commission are stated in both the Zimbabwe Constitution and the Public Service Act as follows:

- Regulate and control the general organization of the Public Service.
- Appoint persons to hold a post or grade in the Public Service
- Determine and regulate working conditions in the Service.
- Exercise disciplinary powers in relation to persons employed in the service.
- Conduct entrance and promotion examinations

Essentially, the Commission is mandated to oversee the operations of the entire Civil Service currently comprising fifteen (15) ministries and two departments that are in the Office of the President and Cabinet. Overall, the Commission is responsible for the human resource management and for the effective and efficient delivery of services to the nation wherein the public, as the stakeholder, expects the Civil Servants to undertake to work for the good of the nation and its people. Stakeholders in this case include:

- The general public who expect quality service from the various organs of government.

- Line Ministries whose operations are, to a large extent, guided and monitored by the Public Service commission.

- Private Sector and Parastatals whose operations are enshrined within the broad government policy guidance.

- Parliament, the Cabinet, and the Donor Community who expect accountability and tangible outcomes.

- Staff Associations and employees as pressure groups expect better working conditions, job security, and better remuneration.

- And Non-Governmental Organizations (NGOs) who expect fairness (e.g., gender equity) in the way the Public Sector discharges of its duties.

On the whole, the stakeholders desire a Public Service that is results-oriented and able to discharge of its duties in the most efficient and effective manner.

1.2.1.2 Public Service Reforms

Largely, the public service has, since the early 1990s, faced new challenges aimed at transforming and rationalizing the sector. The Presidential Public Service Review Commission of 1989 set the tone of subsequent changes. In its report, the Commission noted the following general weaknesses service-wide:

- Absence of measurements of inputs to outputs for efficiency and effectiveness resulting in low productivity.

- Centralized system and narrow focus on restructuring and rationalization of the public service.

- Lack of targets with specified time scales for completion.

- Absence of expected standards resulting in performers and non-performers being equally rewarded.

- Absence of urgency and work ethics commensurate with the occupation.

Likewise, the TECHTOP Baseline Survey of 1998 and 2000 on "Service Delivery" in the Public Service identified similar weaknesses ten years after the Public Service Review Commission's report. They highlighted the need for a review of the recruitment and selection procedures for efficient and effective service-delivery. In particular, the study identified weaknesses in the placement and utilization of personnel within the service. Of note, was the apparent mismatch between individuals' competencies and job demands. Such a mismatch could compromise productivity. The recommendations were that the Public Service reform initiatives

should, among others, focus on proper utilization of staff expertise. Unfortunately, these factors have not been considered important when recruiting personnel into the service and placing them in jobs.

The unsystematic recruitment of people into the service compounded by high unemployment has resulted in the majority of job seekers seeking employment in the civil service as a stopgap measure while waiting for something better to come. As highlighted by the Central Statistical Office (CSO) in the 1999 Indicator Monitoring Labour-Force Survey, the population of Zimbabwe is about 12 million people, and of these roughly 66% are either engaged in non-formal self-sustaining activities or unemployed. Unemployment rate, according to the 1999 Indicator Monitoring Labour-Force Survey, according to the Central Statistical Office, is the percentage of unemployed persons in the economically active population. The unemployed persons are persons at the age 15 years and above who, during the reference period, did not work though available for work and actively looking for work." Of note, the majority of these job seekers are highly qualified but because of lack of opportunities they end up accepting any job that come their way. Likewise, Farh, Leong, and Law (1998) found social career in the Hong Kong Public Service to be the most popular among science majors. This was regardless of whether they had the requisite competencies for the job or for that matter, the vocational interest. However, closer examination revealed that science majors who chose to join the public sector did not do so because of their social interests but because of their concern for jobs.

In essence, the quest for civil service reforms has not been a concern for Zimbabwe alone. The South African Public Service Commission, for example, intends introducing assessment throughout the service as part of the reform measures in order to enhance efficiency (Star, August 29, 2000, p.3). Fraser-Moleketi (cited in the Star, Aug.29, 2000, p.3) unveiled new measures aimed at increasing management efficiency. These measures include the introduction of new systems, processes, and procedures that would improve the recruitment, selection, and retention of staff. Above all, the new system is aimed at establishing a more appropriate employment framework with terms and conditions of service designed to attract and retain high-calibre staff.

In Zimbabwe the introduction of the Economic Structural Adjustment Programme (ESAP) marked the shift not only in economic policy and development paradigm, but also in the administrative and managerial systems of the public sector (Rukobo, 2001). The changes continued through the successor programs, that is, the Zimbabwe Program for Economic and Social Transformation (ZIMPREST) and the Millennium Recovery Program. Consequently, PSC embarked on a program of reforming the civil service in order to make it more efficient, effective, and responsive to the needs of the public that it is supposed to serve. The reforms entail the restructuring, merging, and downsizing of the civil service and identification of core-activites for each ministry and/or department upon which it is then expected to focus. The thrust is the rationalization and reduction of the Civil Service as a cost saving measure and the inculcation of a performance oriented culture. In view of that, the

reforms that the Zimbabwe Public Service Commission embarked on since 1990 include:

- Restructuring and rationalizing of the public service.

- Subcontracting and commercialization of non-core business.

- Institutionalizing performance management.

- Strengthening the human resource development initiatives.

- Revamping current systems.

In light of this, non-core activities are either being privatized or commercialized. 'Purchasing specialized skills' for a limited time by out-sourcing to specialized firms particular functions that were historically the source of permanent jobs within the public sector is being mooted. The adoption of cost-recovery measures for certain services delivered; the development and dissemination of client/service charters in which departments publicly state the standards of service that members of the public should expect; and the introduction of performance management systems are some of the reform measures being introduced. The thrust of the Reform Program, as enshrined in the Public Service Regulations, 2000, is the institutionalization of the change process by shifting the entire civil service to a result oriented culture.

However, Nordstrom and Ridderstrale (2000) argue that the notion that an organization could shrink to greatness was a misnomer because, if not carefully and expertly handled, downsizing can become 'dumbsizing' instead of 'rightsizing'. The

authors explain further that to remain unique, an organization must constantly sharpen its competitive edge by being:

- *Innovative* – adopting a frame of mind that applies to everyone in the organization, a frame of mind that turns the organization into an idea and dream factory, a frame of mind that competes on imagination, inspiration, ingenuity, and initiative.

- *Leveraged* – real diversification.

- *Focused* – by exposing the organization to the question: What are we better than everyone else at doing? Are we really world class? If not, out-source it. The thrust is the identification of key competencies by focusing on key value-adding processes, and eliminating unnecessary actors.

Notably, the first phase of the Public Service Reform Program has been a catalyst that jump-started the civil service into a new era of results oriented thinking. Hence, it is in the First Phase of the Public Service Reform program that

- Performance management was introduced into the service though in an ad-hoc manner and with very little training for people to appreciate the new system.

- A job evaluation exercise was conducted throughout the entire service.

- Over 23500 posts were abolished.

- Mission statements, corporate plans, and client's charters were developed in all Ministries

The framework for the Second Phase of the Public Service Reform Program is built on the achievements of the first phase. The framework provided an instrument through which all reforms relating to the Public Service are articulated and implemented and also dovetailed into and provided underpinning support to the Zimbabwe Government's Program for Economic and Social Transformation (ZIMPREST). Above all, these challenges require a public servant who understands the country's developmental goals and objectives and is capable of defining his/her role and responsibilities within that framework. As succinctly put by Nordstrom and Ridderstrale (2000), the traditional way of doing business is under constant change, as such, the bottom line is that tomorrow's business cannot always be more of the same. In essence, the challenges entail cultivating a performance management culture.

Thus, realizing that the achievement of the goals of the Reform Program would, to a large extent, depend on the calibre of persons recruited and retained in the government service, PSC intends revamping the selection and promotion systems through the introduction of assessment techniques. The changes take into account the critical need for an efficient and effective civil service in the attainment of social and economic goals. Echoing similar sentiments, Chetsanga (The Zimbabwe Daily News, Nov. 14, 2000, p. 24-25) argues that "the challenging goal for every country is to develop a set of measures that enhance economic growth. Never before has this challenge been greater than it is today, being fanned by globalization." He further suggests that productivity must be recognized as an output from the human activity,

which means for an enterprise to achieve great heights in productivity, the development of human capital should not be overlooked. This entails the development of a workforce with skills in both design work and in shop floor skills. A competent and flexible workforce, one that can adapt to changing economic circumstances, is a necessary prerequisite for economic and social development, the paper notes.

Shullman and Carder (1983, p.146) explain that "an organization's vocational needs stem from planning for recruitment, selection, management, and replacement of the human resources necessary to accomplish its tasks and purposes." Career planning and management, in this case, refer to the entire process designed to meet the organization's occupational needs. In line with this thinking, the PSC intends introducing entrance and promotion examinations in the public service as a performance management tool for providing an accurate estimate of one's occupational capability and disposition. In fact, the tools so designed should, apart from ensuring that people with the right disposition are recruited into the service and/or promoted within the service, be capable of addressing the issue of congruence between the person's personality type and occupational demands.

Specifically, the concern is whether the individual's orientation and vocational interests are congruent with the demands of the job being undertaken and vice versa. Furthermore, the new system that is being advocated endeavours to employ mechanisms that can objectively screen and categorize people according to abilities

and occupational interests. Emphasis is on service delivery and the match or congruence between one's vocational interests and occupational pursuits. As mentioned earlier, there is a void regarding vocational interest measures validated on the Zimbabwean population and tailored to the country's needs.

1.3   Statement of the Problem

Leong and Brown (1995) argue that research regarding the proposition that occupations require a person to possess certain traits to be successful in the job has not addressed whether the assertion is applicable in all cultural settings. Elaborating on this viewpoint, Mararike (1999) highlights the fact that the African cultural setting must be understood in the context of complex processes, which involve social, political, and economic factors. These processes, he notes, take place on the basis of existing conceptual framework. Accordingly, human behaviour will tend to sample the cognition that corresponds to the dominant cultural pattern since culture is an integral aspect of human nature and is a domain of shared meaning (Kitayama, cited in Triandis, Chen, & Chan, 1998; Mararike, 1999). Therefore, a number of social variables such as occupational interests, orientation, experience, available resources, and patterns of people's interaction have a bearing on the person's behaviour.

Although a good deal of research (e.g., Farh, Leong, & Law, 1998; Rounds & Tracey, 1996; Stead & Watson, 1998) has examined the utility of vocational interest measures across cultures, emphasis has been on college and university students.

Furthermore, most of the studies have used either the adapted version of Holland's model or the translated versions. Rounds and Tracey (1996, p. 314) explain that "revising RIASEC measures is particularly important when occupational structure of a country differs from the United States." Evidence from literature shows that very little research has been carried out with adult workers (e.g., Furnham, Toop, Lewis, & Fisher, 1995, Herr, 1999; Lent & Worthington, 1999). Moreover, there has not been, to my knowledge, empirical research on vocational and occupational interest carried out in the public sector in Africa in general and Zimbabwe in particular. In South Africa, for example, studies on cross-cultural validity of vocational interest inventories (Stead & Watson, 1998) were carried out on college students not working adults or, for that matter, public sector employees. In addition to this, studies on cross-cultural validity of vocational interest measures have cautioned the utility of these measures when used outside their countries of origin (Berry, 1989; Farh, Leong, & Law, 1998; Knight, 1997; Rounds & Tracey, 1996). Considering the need to match one's vocational interests and competencies with job demands and vice versa at recruitment and promotion levels in the Zimbabwe Public Service, it is important that such measures are relevant to the Zimbabwe cultural context.

In this view, the challenges of the study will involve the development and validation of an occupational measure that could be used as a tool to establish the extent of relationship between the individual's vocational interests and job requirements in the Zimbabwe Public Service. Holland, Fitzsche, and Powell's (1994) self-directed search (SDS), a published measure used to assess the match between personality traits and

occupational pursuits, forms the basis for coming up with the new measure. The present study is designed to investigate occupational interests and person-job fit in the Zimbabwe Public Service.

1.4   **The Research Questions**

As already noted, extensive research attention (e.g., Farh, Leong, & Law, 1998; Rounds & Tracey, 1996; Tracy, Wanatabe, & Scheider, 1997) has been devoted to the utility of career instruments in settings other than those the instruments were validated. The study by Campbell and Borgen (1999) on the utility of Holland's (1994) SDS in categorizing people according to their personality traits and occupational pursuits revealed that:

- The content of the Holland scales (i.e., Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) needs to be modified to suit the adult working population.

- Holland's '*Conventional Theme*' focuses mainly on lower level office activities as opposed to a higher level of organizational management involving budgets, financial services, and resource allocation.

- The '*Enterprising Theme*' is more tightly focused towards leadership and slightly less on sales, and so are the other themes, such as, Realistic, Investigative, Artistic, and Social.

- Similarly, items for the *Realistic Theme*, for example, have been noted as being gender biased.

Masango (1999) notes anomalies in the SDS instrument at item and at scale levels. At item level, some of the items did not carry the same conceptual meaning. Lack of item relevance might possibly have been due to behaviours or situations that are not equally relevant to the Zimbabwe cultural context. This, in essence, centres on the construct validity of the SDS across cultures. As Messick (1980, p. 956) explains, "The extent to which a measure displays the same properties and patterns under different circumstances, then, is an important empirical question."

Given the findings of Masango's (1999) study and the concerns from literature (Berry, 1989, Farh et al., 1998; Leong & Brown, 1995; Stead & Watson, 1998), it appears there was need to develop a vocational interest measure for the Zimbabwe adult educational setting. For this reason, Holland's RIASEC model will be used in the present study to address some limitations in the literature by exploring the possibility of developing a vocational interest measure suited to the adult educational setting in Zimbabwe with specific reference to the Zimbabwe Public Service. Accordingly, the current study addresses the following questions:

1.4.1 To what extent does a measure of vocational interest validated on the Zimbabwe population facilitate the prediction of person-job fit?

1.4.2   To what extent does a model developed to predict occupational membership accurately classify public servants in Zimbabwe on the basis of the scores obtained from the vocational interest measure?

1.4.3 Does the RIASEC structure provide a framework for assessing person-job fit in the Zimbabwe Public Service?

1.5   Research Objectives

Although Holland's theory of vocational interest has generated considerable research (Dumenci, 1995; Gottfredson, 1978; Upperman & Church, 1995) which has shown wide-ranging support for the universality of the model being reported among the Anglo-American population, the same cannot be said for Zimbabwe (Masango, 1999). On the contrary, relatively little research has been carried out in Africa on the construct validity of Holland's SDS. Evidence from literature shows only two studies having been carried out in the whole of Africa, that is, in Nigeria and South Africa (Holland et al., 1994; Masango, 1999; Stead & Watson, 1998). Masango (1999) investigated the construct validity of the SDS among the Zimbabwe College students. The results, though not quite conclusive, failed to support the assertion that the SDS is culture invariant. Proof of the adequacy of the SDS for use in the Zimbabwe context is still questionable.

As Messick (1980, 1989) explains, adequacy of a measuring instrument, especially construct validity, entails the appropriateness and relevance of a measure in a different setting from which the measure was validated.

Cronbach and Meehl (1955) state that construct validation is involved whenever a test is to be interpreted as a measure of some attribute. Leong and Brown (1995) argue that, it is only through the testing of the construct validity of western-centered theories and models that knowledge of the boundary conditions of these models can

be increased. In an endeavour to extend the empirical evidence of vocational and occupational interests, the objectives of this study are to:

1.5.1 Develop a vocational interest measure for an adult educational setting in the Zimbabwe cultural context based on Holland's RIASEC model.

1.5.2 Develop a model for predicting and classifying people into job sectors based on scores from the vocational interest measure

1.6 **Hypotheses to be tested**

1.6.1 The developed measure of vocational interests will provide an indication of person-job fit in the Zimbabwe Public Service.

1.6.2 A model different from Holland's RIASEC model could emerge.

1.7 **Research Design and Research Methodology**

Research design and research methodology are aspects of a research project. A research design is a plan or blueprint whose main focus is the logic of the research and the end product. The research design (Mouton, 2001) specifies the type of study to be undertaken in order to provide acceptable answers to the research problem. The research design is, thus, a strategic framework that guides research activity (Durrheim, 2000). Research methodology is based on the design and focuses, in the main, on research participants, the apparatus or materials and procedures to be employed in carrying out the study and answering the research questions (Huysamen, 1994; Mouton, 2001).

1.7.1 **Research Design**

The current study aims at developing an occupational instrument that can best describe people's vocational interests and person-job fit in the Zimbabwean context. In order to gain a better understanding of the extent of relationships between vocational interests and occupational pursuits, the current study employs a correlational research design. Correlational research designs are about relationships and according to Kerlinger (1986) and Mouton (2001) correlational research designs:

- Allow for the identification of relationships between or among variables.

- Help indicate the strength and direction of relationships between two or more variables.

- Allow for the testing of hypothesized models.

- Are used to examine phenomena involving inherent characteristics (latent traits or unobservable constructs).

To this extent, correlational designs provide an estimate of the magnitude of the relationship between variables. Correlational studies can either be prediction or relationship studies (Mertens, 1998). Correlation coefficient (r) indicates the strength and direction of association between variables. A correlational research design falls under a positivist research paradigm and ascribes to the belief that facts are theory laden. The positivist paradigm is closely associated with correlational research designs in that positivist studies are greatly influenced by

physical sciences, involve the collection of quantitative data and the analysis of data using statistical procedures (Gall, Borg, & Gall 1996). Through this approach, numerical scales and models can be used to summarize complex variables, especially latent (unobservable) variables. The present study adopts a positivist paradigm in the main although some aspects of the interpretive paradigm will be included in the development of the measure to enable the researcher to capture the salient points that cannot be adequately quantified.

1.7.2 Research Method

1.7.2.1   Literature Review

The review of literature shows that knowledge of the fit between one's vocational interests and occupational competencies and job demands is an important aspect in the world of work (Holland, 1985a; Osipow, 1987; Tokar & Fischer, 1998). The assumption is that people function better when there is a match between their personality type and occupational pursuits. On the other hand, the review of literature (Rounds & Tracey, 1996; Stead & Watson, 1998; Triandis, 1995) also points to the fact that vocational interest inventories that have dominated the assessment of personality and vocational interest have their origin from North America. Moreover, there have been conflicting reports on the generalizability of the instruments in settings other than those they were validated. Berry (1989) cautions the belief that construct validity of an instrument in one culture could be taken as a passport for use in another culture. Consequently, the present study aims at developing a vocational

interest measure that will be validated on the Zimbabwean population using Holland's RIASEC classification structure as the basis.

Notwithstanding this, the review of literature is being undertaken in order to obtain a deeper understanding of key conceptual and methodological issues in the field of study. A thorough literature review places the study into the "big picture" of what is known and not known about the subject (Leedy, 1997; Mertens, 1997; Mouton, 2001). Furthermore, an effective literature review provides insight into how the proposed study relates to and builds upon the existing knowledge base. Similarly, the review of literature provides guidance as to the appropriate sample size, identification of suitable data collection practices and instrumentation with proven validity and reliability.

As a result, literature that is recent, less than 6 years, (e.g., Aiken, 2000; Farh et al., 1998; Meyer, 1998) credible and relevant to the research problem for the current study will be selected for review. Classical literature will be an exception to the rule. "Scholarship review", as coined by Mouton (2001) will be employed. Sources relevant to cross-cultural studies will receive priority in the search for relevant literature. The location and selection of relevant literature will, among others, be through the identification of key authors and journals, bibliographic reference sources, computerized literature searches, book chapters, and the advice of supervisors of the study. Literature from primary sources is preferred to secondary sources in the selection of the relevant literature. Articles selected for

review will be grouped thus: (a) articles that dealt with the construct validity of vocational interest measures with particular reference to Holland's RIASEC structural classification and (b) articles that dealt with person-environment fit with special reference to person-job fit. These will be chronologically ordered within the categories of relatedness. Overall, the review of literature should provide the rationale for a theory-based approach to the development and validation of a measure of occupational interests suitable for an adult educational setting in the Zimbabwe Public Service context.

1.7.2.2   Participants

Decisions about the target population, representativeness of the sample, sampling procedures and sample size will be based on the literature (e.g. Gall, Borg, & Gall, 1996; Gay, 1996; Leedy, 1997) and on Holland's RIASEC structure. The target population for the study is Zimbabwe Public Servants. A representative sample will be drawn based on the six RIASEC personality traits as shown in Figure 1. A stratified random sampling procedure (Gall, Borg, & Gall, 1996; Kerlinger, 1986) will be used. Sample size will be determined through the review of literature and the statistical analysis approach employed for data analysis.

1.7.2.3   Procedure

One research assistant will assist in the administration of the questionnaires. The research assistant will be briefed on the procedures to be used. Permission will

be sought from the participants prior to conducting the research and every effort will be made to ensure confidentiality. Questionnaires will be administered to groups selected for the study and collected thereafter.

1.7.2.4 Data Collection Methods

The preliminary review of literature on the construct validity of vocational interest measures across cultures provided a rationale for developing and validating a measure for use in the Zimbabwean setting (Boyle & Fabris, 1992; Farh, Leong, & Law, 1998; Masango, 1999). Limitations of western based vocational interest instruments are, by and large, due to culture-specific considerations which are concerned with concepts, constructs, and models that are specific to certain cultural groups and that play a role in explaining and predicting behaviour (Leong, 1997; Triandis, 1995). In this regard, a measure of vocational interest developed and validated on the Zimbabwe adult population will be used for data collection. Instrument validation will be undertaken prior to using the instrument. The Meyer (1998) MB-10 Interest Questionnaire, a published self-report measure, will be used for validation.

1.7.2.5 Data Analysis

Reliability analysis will be performed on the research data to establish the reliability of each subscale. Multivariate statistical approach, especially discriminant analysis will be performed in order to develop a model for predicting

and classifying people to job sectors based on scores obtained from the vocational interest measure. Additionally, factor analysis and correlational statistics will be used to assess the adequacy of the hexagonal ordering of the RIASEC types.

1.8   **Operational Definition of Terms**

As explained earlier, *Vocational interest measuring instruments* (Gottfredson, 1999; Holland, 1985a; Osipow, 1990) are inventories for the measurement of person-job correspondence or fit. Vocational interests reflect the individual's preferences for particular work activities based on one's personality type and occupational ability.

An *adult educational setting*, as it relates to the study, is the context in which adult education takes place especially in the work situation. Adult education or continuing education, according to the Accrediting Commission of the Continuing Education Council of the United States (cited in Jarvis, 1995) is the continuing development of human abilities after entrance into employment. Adult education or continuing education, according to Lowe (1982), refers to activities designed to satisfy some felt need by those over the statutory school-leaving age. The thrust is on personal development in terms of career or occupational advancement. In fact, adult education can be formal or non-formal and is purposive in nature. Of importance, adult education should be understood in the context of the prevailing cultural influences as these factors impact on adult behaviour.

1.9   Structure of Presentation

Chapter 1 provided the motivation for the study leading to the formulation of the research problem. The thrust of the study, as explained in this chapter, is the development of a vocational interest measure leading to the development of a model for prediction and correct job placement. The subsequent chapters will provide the necessary link between and among the chapters. In **Chapter 2** theories underpinning career development and vocational interests will be discussed. A review of relevant literature will be conducted in order to put the study in context. Thus, chapter 2 covers career theories that have dominated the field of vocational interests. Career development is discussed in the context of the role of theory in shaping and facilitating a better understanding of career decision-making. A critical examination of contemporary research articles that dealt with vocational interest measures will be made. Of special interest are the research studies that dealt with cross-cultural career development and person-job fit.

Linking with Chapters 1 and 2, **Chapter 3** examines in detail the appropriate methodology for the study. Strategies to be used in the development of a vocational interest measure will be explained including the methodology to be employed in the identification of the target population, sampling procedures and sample size. Besides, it is from theory and literature that model building and data analysis techniques will be derived. The study results will be given in **Chapter 4**,

mainly in table form. Discussions of the main findings of the study will be in Chapter 4. The summary for the study, limitations, conclusions and recommendations will be covered in **Chapter 5**.

CHAPTER 2

CAREER CHOICES AND VOCATIONAL INTEREST MEASURES

2.1   Introduction

This chapter places in context central vocational psychology theories that underpin human behaviour, career choice and vocational interest measures. A critical analysis of career theories and contemporary literature on career development and vocational interest measures is made. Essentially, the focus of the present study is the development of a vocational interest-measuring instrument in an adult educational setting. In this regard, identification of relationships between the individual's vocational interests and competencies vis-à-vis occupational pursuits is crucial. Vocational psychology theories provide a deeper understanding of vocational interests, career decision-making and vocational behaviours that influence the person's personality. It is through theory formulation that hypotheses can be drawn and tested on the basis of observable data. A theory (Bhola, 1988, p. 42) is essentially

A set of statements that define, delimit, and bind a concept or unify and make coherent an area of an enterprise; make transparent the internal structure of means and ends of a phenomenon as well as its external relationships with other relevant phenomena, thereby clarifying causal links, correlational patterns and relationships of mutual influence.

A theory serves to describe events, predict consequences, and identify interventions to modify results (Rayman & Atanasoff, 1999). Fitzgerald and Rounds (cited in Hesketh, 1995) emphasize, in particular, the importance of theories and research studies that address career activities considering that technological, demographic, and structural change to work emphasize the ongoing need for adaptation and adjustment throughout adult life. In line with this, theories relevant to the study will be selected based on their empirical and operational utility.

Empirical evidence (Aiken, 2000; Holland, 1985a, 1997; Nunnally, 1978; Osipow, 1990) shows that theories of vocational and occupational psychology date back to about a century ago when Parsons (1909) proposed a tripartite model of choosing a vocation. That is, (a) self analysis of one's abilities, aptitudes, interests, ambitions, and resources, (b) occupational analysis of work requirements, tasks, and opportunities and (c) the use of "true reason" to relate the self and the occupation. Osipow (1990) notes that theories of vocational and occupational psychology are diverse but those that seem to dominate thinking about vocational and occupational interests are few. Furthermore, the few influential ones that have dominated the field of career development and career choice tend to resemble each other in important ways. Cognizant of this, a critical analysis of the relevance and utility of theories of vocational interests to occupational pursuits will be made with specific reference to the Zimbabwe

cultural setting. This should lead to drawing together the common thread that can be found.

Of note, theories of vocational and occupational psychology can be classified into three broad categories, which are Developmental, Social-Learning, and Person-Environment Fit (P-E). Table 1 highlights key concepts under each category and the commonality of the theories.

Furthermore, contemporary literature regarding career choice and vocational interest measures will be reviewed. A review of relevant literature as a precursor to the study is important in that an analysis of what is already known about the subject will put the current study in context. It is through a comprehensive review of relevant literature that the theoretical basis for the conceptual definitions is developed. Mouton (2001) emphasizes the importance of establishing, through literature review, how much ground has already been covered in the area of interest before carrying out a research study. This is in terms of how much is empirically known about the subject of interest, what instrumentation was used and to what effect.

Table 1

Theories of Career Development: Underpinning Concepts.

Development Theories		Social-Learning Theories	Person-Environment Fit Theories
Concepts	♦ Life-stages	♦ Self-efficacy	♦ Person-work environment
	♦ Self-concept	♦ Role-models	♦ Personality type
	♦ Life-roles	♦ Self-percepts	♦ Congruence
	♦ Vocational maturity	♦ Environment	♦ Reinforcers
Outcome	Occupational fit	Self-perceptions	Person-job fit and Job tenure

Adapted from Osipow (1990)

2.2   Theoretical Approaches

Vocational psychology theories are useful in explaining, describing, and predicting career-related values and behaviour. Theories that have been found pertinent to the study, as illustrated in Table 1, are Career Development Theories, Social-learning Theories and Person-Environment Fit (P-E) Theories.

2.2.1   Theories of Career Development

Career development theories conceptualize career preferences and the formulation of self-concept in terms of life stages, that is, from childhood to retirement stages (Gottfredson, 1981; Super, 1957, 1990).

2.2.1.1 **Career Development Theory** (Super, 1957, 1990)

Super views a career as "the combination and sequence of roles played by a person during the course of a lifetime" (Super, cited in Stead and Watson, 1998, p. 40). The developmental process, according to Super, is from childhood to retirement. The theory proposes four distinct career developmental stages that an individual goes through in his/her working life and in the molding of one's self-concept after the growth stage of 4 – 13 years. The stages are:

- Exploration and crystallization of job preference stage (14 - 24 years). At this stage, the identification of interests and capabilities vis-a-vis occupational pursuits is more pronounced.

- Establishment stage (25 - 44). Work stability and the desire for personal advancement and growth are expected at this level.

- Maintenance stage (45 - 60). Very little innovation, if any, is expected at this late stage.

- Disengagement stage (61+) considered the retirement period.

Super's theory is formulated on the premise of life stages, self-concept and their impact on personality and vocational choice. It is assumed that the relationship between self-concept and career behaviour varies as a function of the stages of development. The theory assumes that people are differentially qualified for occupations and as such their vocational interests and abilities fall into similar patterns. According to Super, career development should be viewed as a synthesis of

a person's self-concept and the external realities of the work environment. Self-concept determines occupational choices. This synthesis, as Super (1990) explains, develops through a person's increasing awareness of his/her self-concept and through work experience.

However, while it is generally accepted that self-concept is a key factor in one's career choice and personality, Super's theory fails to address issues of ethnic and cultural differences that might impact on the person's developmental stages and self-concept formation. Stages of self-concept formation, as outlined by Super, are not as clear-cut in all cultural settings. For example, some ethnic groups forbid women from performing certain roles and even force the girl child to enter into marriage on religious grounds and/or as part of the prevailing cultural beliefs. On the other hand, political turmoil, instability, and poverty have resulted in children being used as child labour and even as child soldiers in some countries. The issue of "street children", though a recent phenomenon, is a case in point. Ethnic and cultural beliefs and the prevailing socio-political and socio-economic environment militate against the development of self-concept. Coupled to this, is the high unemployment of suitably qualified persons due to the economic state of most developing countries. Stead and Watson (1998, p.41), in an article on career research in South Africa, argue that "the concept of career development stages was devised in a context where unemployment was not as pervasive as in South Africa at present. Wide spread unemployment makes it difficult to maintain a focus on Super's life-stages of development." These factors negate the developmental process as outlined by Super

(1990). Leong and Serafica (cited in Leong & Brown, 1995) suggest that the ability for one to cope with developmental tasks and the role that self-concept may play in cross-cultural career development can vary, depending on the degree of the person's acculturation. The authors further highlighted that Super's career development stages do not fit the career reality of some ethnic groups where early labour-force is promoted.

2.2.1.2 **Theory of Circumscription and Compromise** (Gottfredson, 1981)

Gottfredson's theory (1981) lays emphasis on four stages in the development of one's self-concept across cultures. In the first stage of development, the self-concept acquires an orientation of size and power. In the second stage, an orientation towards the prevailing gender roles is acquired. An orientation to social evaluation, social class, and ethnic identity is acquired in the third stage. And, lastly, the development of personality is acquired in the fourth stage. The assumption is that the individual is in a better stead to make occupational choices based on the self-concept and orientations acquired in the process of going through the four developmental stages. These stages constitute the circumscription (job-self compatibility) aspect of the theory. Gottfredson states further that occupational choices are a product of perceived job-self compatibility and perceived accessibility of jobs. In situations where there are restrictions or limitations to jobs perceived as suitable to one's personality, people compromise their choices by sacrificing those aspects of the self-concept.

Gottfredson's theory acknowledges culture diversity and the influence of the prevailing environment on self-concept formation and personality. The model acknowledges the pivotal role of cultural norms and beliefs in molding one's self-concept and the way that one perceives job options. This is true in situations where job opportunities are limited and where collectivism perspective as opposed to individualism is practiced to decide on career choice and job options. The Collectivism perspective entails that career choice is a family concern and their inputs in career decision-making are unquestionable, whereas individualism perspective entails that the individual makes his/her career choice decisions with minimal coercion from family members. However, just like Super's developmental theory, Gottfredson's developmental stages may, to a large extent, depend on the socio-political and socio-economic status of a country.

2.2.2 Social Learning Theories

From a social learning perspective (Aiken, 2000), personality interests are viewed as the result of differential reinforcement coupled with the impact of role models on the individual. The understanding is that most human behaviour is learned in a social context. "The social settings in which individuals live, work, and play are powerful influences on behaviour, attitudes, and beliefs about one's self and the world" (Gredler, 1997, p. 275). Learning (Krumboltz & Worthington, 1999) includes the development of work habits, interests, beliefs, and values. Individuals learn from observing the behaviours of others and the social consequences of their action. In

this way, live models and symbolic models have a role in molding and reinforcing one's behaviour. The assumption is that, accomplishment of given tasks and acquisition of skills depend on one's perceived self-efficacy or belief that one can execute the complex task. On the other hand, attribution theory addresses the individual's perceived causes of events or outcomes (Gredler, 1997).

2.2.2.1 **Career Self-Efficacy** (Betz & Hackett, 1986)

Based on the work of Bandura (1986), career self-efficacy theory asserts that ability to successfully perform occupationally relevant behaviours depends on one's self-perception. Extending Bandura's self-efficacy theory to the career domain, Betz and Heckett (1986) suggest that self-efficacy expectations help determine one's confidence in career-related pursuits. Expectation beliefs determine one's action, effort, and persistence on a task. Career self-efficacy theory is aimed at enhancing the understanding of career development across cultures. Social learning theories (Mitchell, Jones, & Krumboltz, cited in Osipow, 1990) emphasize person-environment interaction with regard to upbringing, the environment, and type and nature of reinforcement. Amamoo (New Africa magazine, September 2000, p.35) emphasizes the importance of role models in shaping the behaviour of children as they grow into adulthood. In the main, the author explains, "the role models we have to parade our children as living testament to our greatness as a people are an invaluable part of the development process, especially if we are to promote Africa and African norms and beliefs to our children." The issue of role models cuts across cultures.

On the whole, the theory of career self-efficacy is not culture specific. The theory takes into account the importance of culture and role models in molding one's behaviour. Basically, the influence of culture on one's perception, cognition, beliefs, attitudes, and values impact on people's self-efficacy differently.

2.2.2.2   **Social-Cognitive Learning Theory** (Bandura, 1986, 1997)

Similarly, the theory of social cognitive theory emphasizes the importance of self-efficacy beliefs in achieving set targets. According to Bandura (1986), environmental influences and the individual's self-regulatory system plays a major role in regulating the sources of behaviour. Efficacy beliefs enhance or limit motivation by influencing the types of goals that individuals set for themselves, the extent to which they can expend their energy, and their persistence in the face of problems (Bandura, 1997). Perceived self-efficacy refers to the belief in one's capability to perform specific tasks and behaviours. Bandura (1986, p.391) defines self-efficacy as "people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgements of what one can do with whatever skills one possesses." Perceived self-efficacy, as Bandura explains, exerts its influence through four major processes, which are, cognitive, motivational, affective, and selection processes. To all intents and purposes, efficacy belief influences how people feel, think, motivate themselves, and behave. Schein (cited in Shullman & Carder, 1983) refers to self-efficacy beliefs as adult career anchors.

Essentially, factors contributing to efficacy beliefs include mastery experiences and vivid experiences provided by role models. It is clear from Bandura's social learning theory that cultural beliefs and the environment under which one is brought up have significant influence on one's self-perception and vocational behaviour.

2.2.2.3 **Social Cognitive Career Theory** (Lent, Hackett, & Brown, 1999)

Emphasis is on work transition interventions, which, as the authors explain, may profitably convey the value of life long career development such as interest exploration in new areas, skills updating, and learning to manage transitions. The three key attributes underpinning the social cognitive career theory are:

(a) *Self-efficacy* as it pertains to one's ability to successfully perform given tasks. Self-efficacy determines the level of perseverance and success in an activity.

(b) *Outcome expectations* refer to the consequences of behavioural efforts.

(c) *Goals* concern one's determination to engage in an activity.

The authors emphasize the fact that these attributes impact on people's occupational pursuits differently.

Lent, Hackett, and Brown (1999) argue that SCCT may be used as a vantage point from which to view the school to work (STW) transition processes. The theory asserts that school to work transition should be viewed on the premise of developmental stages, such as:

- Formation of self-efficacy and outcome beliefs

- Interest development and interest goal linkages

- Translation of goals into actions

- Performance skills

- Negotiation of transition support and barriers

The understanding is that the labour market is not static. Evidence of recent corporate downsizing and business re-engineering within organizations is a case in point. In such a dynamic context, continued self-development and career renewal is the answer (Watts, cited in Lent, Hackett, & Brown, 1999). The theory emphasizes the significance of contextual inputs on self-efficacy expectations and outcomes. Possible barriers to career development, as noted in the theory, might be due to the environment, cultural norms and beliefs as well as factors such as gender or disability.

2.2.2.4 **Attribution Theory** (Weiner, 1997)

Attribution theory focuses on the way individuals arrive at causal explanations and the implications of those beliefs. This, to a large extent, hinges on the person's locus of control (i.e., internal or external). Research on human judgmental processes has shown that the way people attribute causes to good or poor performance is very complicated. There is a tendency to explain one's own poor performance in terms of situations and circumstances, but other people's in terms of motives and personality traits (Weiner, 1997). Two basic assumptions underpinning the theory are the nature

of causal inferences (attribution) and the relationship of attribution to behaviour. Thus, knowledge of individuals' attributions may provide guidelines for future actions. The concepts apply across cultures. Essentially, knowledge of one's locus of control assists in job placement and appointment to leadership positions.

2.2.2.5   **Theory of Reasoned Action** (Ajzen & Fishbein, 1980)

The theory asserts that one's behaviour is a function of reasoned action. A person's intention is a function of two basic determinants. The first is attitude toward the behaviour. This is about one's judgement of the consequences in performing the behaviour. The theory asserts that for one to predict and understand an individual's behaviour there is need to identify and measure the behaviour of interest. Once the behaviour has been clearly defined, it is possible to isolate the determinants of the behaviour. Thus, a person's 'intention' to perform and not to perform depends on the person's attitude toward the behaviour as well as the intensity of social influence on the individual. Attitudes are a function of behavioural beliefs. Conviction towards performing a behaviour leads to positive outcomes and negative attitude towards a behaviour leads to negative outcomes. The theory underscores the fact that behaviour is determined by an interaction between personality and the environment. Attitudes, according to Thomas and Znaniecki (cited in Ajzen & Fishbein, 1980) refer to mental processes that determine a person's actual and potential responses. The understanding is that:

Attitudes always produce pressure to behave consistently with them, but external pressures and extraneous considerations can cause people to behave inconsistently with their attitudes. Any attitude or change in attitude tends to produce behavior that corresponds with it. (Freedman, Carlsmith, & Sears, cited in Ajzen & Fishbein, 1980, p.25).

The central theme in the theories of social learning is the importance of one's beliefs and self-perception in explaining career behaviour. The ability to evaluate one's pattern of vocational interest is generally influenced by factors such as attitudes towards occupational pursuits, personality traits, and the environment. One's perceived self-efficacy, attitudes and beliefs, locus of control, the environment and role models as reinforcers of behaviour play a crucial role in molding one's behaviour across cultures and ethnic groups. The influence of the external and internal events on one's perceptions and actions is important. Leong and Brown (1995) emphasize the importance of the 'etic' and 'emic' perspectives when formulating career development theories. Etic perspective focuses on identifying universal laws of behaviour across disparate cultural groups. Social learning theories conform to this perspective. Emic perspective focuses on culturally unique factors in the experiences of persons in each ethnic group that causes them to behave in certain ways.

2.2.3 **Person-Environment (P-E) Theories**

Person-environment theories emphasize vocational choice and vocational adjustment in terms of vocational interests, abilities, personality traits, and person-job fit (Dawis & Lofquist, 1984; Holland, 1985a, 1997). The theories provide the mechanism for predicting work environments congruent to the individual based on vocational interests and personality type. The assumption is that people seek out work environments congruent to their personality type and vocational interests. Furthermore, theory of work adjustment (TWA) asserts that individuals inherently seek to achieve and to maintain a harmonious relationship with their environment. Person-environment theories (Swanson & Fouad, 1999) are grounded in Parsons' (1909) trait-factor framework.

2.2.3.1   **Theory of Work Adjustment** (Dawis & Lofquist, 1984)

Theory of work adjustment (TWA) advances personality type dimensions. The primary focus of the theory (Dawis & Lofquist, 1984) is person-work environment correspondence and adjustment during adulthood. The theory (Hesketh, 1995) provides a structure for establishing the relationship between the individual and the environment. Correspondence between the individual and the work environment is understood to be a function of: (a) the extent to which individual supplies of skills and abilities meet job demands (leading to satisfactoriness); and (b) the extent to which the environmental supplies, that is, occupational reinforcers, meet individual's needs and values. Accordingly, person-job fit results in satisfaction, achievement, better

performance, stability, and tenure. Absence of fit results in dissatisfaction, poor performance, job turnover, and negative outcomes. The work environment and the individual must continue to meet each other's requirements for the interaction to be maintained. In reality, work is conceptualized as an interaction between an individual and the work environment requiring the individual to bring the skills needed to perform certain tasks.

Dawis and Lofquist's (1984) model provides a means for quantifying characteristics of the individual and the environment. It provides a perspective on vocational choice and adjustment that extends throughout the life span (Swanson & Fouad, 1999). Emphasis is on vocational adjustment and a harmonious relationship between the individual's characteristics and the work environment. The theory gives equal attention to the needs and expectations of the individual and those of the job. Specifically, Dawis and Lofquist (1984) advocate for two sets of linked dimensions that have to be fulfilled if a harmonious relationship between the individual and the work environment is to be achieved. These are, "satisfactoriness" in terms of the match between the individual's abilities and job demands and "satisfaction" in terms of the match between the individual's values and the rewards (reinforcers) that the job offers.

2.2.3.2   **Theory of Personality Types** (Holland, 1985a, 1997)

Holland views vocational interests as an expression of personality. Holland postulates that people can be categorized as predominantly one of the six personality types, namely, realistic, investigative, artistic, social, enterprising, and conventional. The assumption is that personality type is a product of a characteristic interaction among a variety of cultural and personal factors including peers, parents, the environment, and social class. Equally, vocational interest is seen as a manifestation of personality. As a result, individuals seek occupational environments, which match or are congruent with their personality type/characteristics.

This matching process (Osipow, 1990) is affected by coherence of aspirations to work history (consistency), distinctness of one's vocational interest profile (differentiation), and clarity and stability of a person's goals, interests, and abilities (identity) of the Holland code-type. Accordingly, "people search for environments that will let them exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles" (Holland, 1997, p. 4). The understanding is that people in different occupations should evidence different patterns of interests. Holland postulates six categories of personality types and occupational environments arranged in a hexagonal model (i.e., Realistic, Investigative, Artistic, Social, Enterprising, and Conventional - RIASEC). The environmental profiles are characterized in a similar manner. The hexagonal structure has both theoretical and applied implications. Theoretically, predictions of stability, satisfaction, and job-

related outcomes are derived from the application of the hexagon by assessing the degree of correspondence between one's vocational interests and the demands of the job. In addition, the hexagonal model – a circular order of R-I-A-S-E-C represents the structural relations among the personality types. As noted earlier, adjacent personality types are more similar than the alternate types, which, in turn, are more similar than the opposite types.

The Self-Directed Search (SDS) is one of the inventories used to measure the RIASEC model. Based on Holland's (1997) theoretical dimensions, most people are said to have a 'personal career theory (PCT) about careers or work ranging from weak and invalid to strong and valid. Personal career theory, in this context, is a collection of beliefs, ideas, assumptions, and knowledge that guides the individual to choose occupations or field of study. The understanding is that a person's interests and competencies create a particular personality disposition that leads to thinking, perceiving, and acting in a special way. The model has wide acceptance in North America (Rounds & Tracey, 1996). On the whole, Holland's theory of personality types and work environments has been the subject of varied research since the early 1950s. To date more than 400 studies (Athanasou & Cooksey, 1993) have investigated the practicability of Holland's (1985a, 1997) theoretical model.

Although Holland's model of personality types and work environments has been extensively researched, no consensus has yet emerged on the applicability of the model across cultures. Bhola (1988) argues that personality is socially constructed

and is rooted in context. For that reason, theory formulation cannot be carried out independently of the ideology of the culture in which social action takes place. Characteristics, perceptions, and life situation impact differently on vocational interests and these factors have not been taken into consideration. Holland's model, like other theories of vocational interests, is based on the laws underlying the behaviour of Anglo-Americans. From a cross-cultural perspective, Farh, Leong, and Law (1998, p. 427) noted that, "Holland's model and its associated measuring instruments were indigenous to the United States." Hence, their generalizability to persons of other cultures remains questionable. On the same note, Ofori-Amoah (cited in Mararike, 1999, p. 9) argues, "theories which seek to explain people's social conditions, have a tendency to become detrimental when applied to problems of societies other than the ones they originated from."

2.3   Construct Validity of Vocational Interest Measures

Construct validity is concerned with the adequacy, appropriateness, and relevance of a measure. Cronbach and Meehl (1955) explained that construct validation is involved whenever a test is to be interpreted as a measure of some attribute. Messick (1989) argues that the adequacy of a test as a measuring tool of some characteristic is established by appraising the psychometric evidence especially construct validity.

Masango (1999) investigated the construct validity of Holland's model in Zimbabwe where it has not been empirically demonstrated that measures of vocational interest, especially Holland et al.'s (1994) Self-Directed Search (SDS), have utility for describing vocational interests and occupational competencies of the Zimbabwe College students. A representative sample of 400 was drawn from 10 technical colleges in Zimbabwe. Population characteristics and the RIASEC classification formed the basis for determining sample representation. The Self-directed Search (SDS) was the inventory used for data collection. Multiple regression and confirmatory factor analysis (CFA) are the data analysis procedures used to investigate the cross-cultural validity of the RIASEC model and the extent to which the theoretical model classified the Zimbabwe College students in accordance with their vocational interests and occupational pursuits.

Results from the data of the Zimbabwe College sample failed to support Holland's assertion that the SDS was culture invariant. Differences at item and at scale levels were evident from the results. This could possibly have been due to lack of item relevance in that some of the items refer to behaviours and situations that are not equally relevant across cultures. Basically, there were differences in word meaning. For example, items such as, 'I can use an automated posting machine' or 'I can post credits and debits' did not seem to carry the same conceptual meaning in the Zimbabwean context. Besides, it is possible that socio-economic and experiential differences between the Zimbabwean sample and the American sample could have had a bearing on the results. Addressing issues of cultural validity and equivalence of

measurement, Leong (1997) emphasizes the importance of *methodological* and *conceptual issues* in terms of whether different cultures attach the same meaning to a similar concept. Tracey, Wanatabe, and Schneider (1997) confirm that these different structures could exist at either item level or at the scale level. Apparently, these differences were evident both at item and scale levels in the results of the Zimbabwean sample. Furthermore, the RIASEC structure (Hexagonal model) was not reproduced. Results of the whole group showed lower than expected correlation between adjacent types – *Conventional* and *Realistic* (r = -.15) *Investigative* and *Artistic* (r = .06).

Overall, a poor model fit was obtained. Goodness-of-fit indices which provide an indication of the adequacy of the hypothesized model were below acceptable levels with a chi-square - χ^2 (390, N = 339) = 1782.45, *p* < .001; goodness of fit index (GFI) = .69; adjusted goodness of fit index (AGFI) = .63; root mean square residual (RMSR) = 1.09; and root mean square error of approximation (RMSEA) = .10. The results show that the hypothesized model was not adequately supported by the sample data. Indications from literature are that the RIASEC model has not been subjected to a thorough scrutiny with regards to psychometric properties of the SDS outside the United States (Chartrand & Camp, 1991; Rounds & Tracey, 1996, 1996). Rounds and Tracey further question the practice of applying and generalizing models and measures generated on one population across cultures and ethnic backgrounds.

In another study on cross-cultural validity of Holland's theoretical model, Farh, Leong and Law (1998), employing the etic and emic approaches, explored the structural validity of Holland's RIASEC model in Hong Kong. A sample of 1813 freshmen enrolled in science, engineering and business were involved in the study. A variety of vocational interest measures were used for data collection. These were, the UNIACT (Unisex edition of the American College Testing Interest Inventory), and open-ended questions (e.g., "what kind of a job do you think you will choose when you are through with school"), and a Traditionality Inventory (Yang, Yu, & Yeh, cited in Farh et al., 1998). The UNIACT Inventory and the open-ended questions measured career interest and career choice respectively. The Traditionality Inventory measured the impact of cultural beliefs and values on vocational behaviour. The UNIACT, which, in essence, is based on Holland's RIASEC classification scale, and uses a three-point scale (dislike, indifferent, like) measured vocational interests and person-job fit.

Confirmatory factor analysis (LISREL 8) was used to examine model fit. The RIASEC model as measured by the UNIACT showed a reasonably good model fit with fit indices of GFI = .92, Comparative Fit Index (CFI) = .93, Tucker Lewis Index (TLI) = .92, RMSEA = .08, and χ^2 (120, N = 1674) = 736.51, p = < .01. However, data of the Hong Kong students failed to support Holland's circumplex (equal intervals) model with lower than expected correlation between alternate types (e.g., Realistic and Artistic) and higher than expected correlation between opposite types (e.g., Realistic and Social).

Generally, Holland's model was found to have potential in Hong Kong. The results (Farh, et al., 1998) were somewhat mixed in support of the model. Possible reasons could be the acculturation of some of the Hong Kong people due to the British influence and the adherence by others to the Chinese culture. Another possible reason for the mixed support might be the nature of the sample considering that authors drew their sample from first year university students with no work experience. Moreover, the sample was drawn from just three academic majors, that is, Science, Engineering and Business hence, this lack of adequate representation of Holland's RIASEC classification might have had an effect on the results. However, the indications are that Holland's model tends to perform better among the Anglo-American group than other cultural groups except of course groups whose culture resembles that of the Anglo-Americans.

In one of the few studies on the development and validation of career measures in Southern Africa, Meyer, (1998) developed a vocational interest questionnaire for use in South Africa taking into account the diversity of the population. A sample of 3 477 comprising high school students from schools in the Western Cape and students from the University of Stellenbosch in South Africa participated in the study.

The Kodus Interest Questionnaire (Meyer, 1980), developed and validated on the White South African population, formed the basis for the development of a new measure. Essentially, the instrument's utility was inadequate for use across

cultures since it did not take into account the different ethnic groups in the country as well as the political and socio-economic setting of an independent South Africa, and the dynamic nature of the world of work (Meyer, 1998). The MB10 is a vocational interest measure that was developed taking into cognizance the new social order in South Africa and the demands of the world of work. The measure consists of 10 fields and a total of 360 items with 36 items per field. An ipsative or forced choice response format was adopted. A rigorous item selection process was employed paying special attention to:

- Simplicity and economy of instrument administration.

- Uniformity in the conceptual interpretation of the items by all ethnic groups.

- Clarity of the items and item bias

- Relevance of items to the world of work in the South African context.

The reliability coefficient for each of the 10 subscales of the MB10 measure was determined by means of the split-half method and item analysis. The reliability coefficients ranged from .63 to .93 with $r \geq .65$ for each of the 10 subscales being acceptable. Concurrent validity was established by comparing student majors with their MB10 scores (Meyer, 1998).

The development of a vocational interest measure relevant to the cultural context of South Africa is a welcome development. The instrument is likely to have utility in the Southern African Region considering similarities of cultures between South

Africa and the neighbouring countries such as Zimbabwe. As noted earlier (Farh, Leong, & Law, 1998; Masango, 1999), most vocational interest measures originate from North America and their utility has minimal applicability to other ethnic groups within and outside the United States. Likewise, literature (Tracey, Wanatabe, & Schneider, 1997; Triandis, 1996) points to the fact that values, skills, and interests may be differentially nurtured depending on one's cultural context. Shweder and LeVine (cited in Triandis, 1996, p.110) argue that "Culture is a shared meaning system." Accordingly, the MB10 inventory's utility should be in tune with the African cultural setting considering that the validation of the instrument took cognisant of the cultural diversity of the South African population.

Correspondingly, Taylor and Boeyens (1991) investigated the construct and score comparability of the South African Personality Questionnaire (SAPQ). The SAPQ, though used across cultures and ethnic groups in South Africa, was developed and validated on the White South African sample. In their investigation, Taylor and Boeyens found the SAPQ to be unsuitable for use among the black population. The sample for the comparability study was drawn from the black and white groups and composed of males only. A sample of 640, that is, 381 whites and 259 blacks participated in the study.

The SAPQ has 5 subscales and a total of 150 items. From the data analysis, the results of the descriptive statistics were comparable but coefficient alpha indices of reliability of some of the scales were below acceptable levels. Scale

reliabilities ranged from r_a 0.55 to r_a 0.85 for the black group as opposed to r_a 0.73 to r_a 0.86 for the white group. Construct comparability was investigated through intercorrelational and exploratory confirmatory factor analysis (EFA). Construct comparability (Taylor & Boeyens, 1991) concerns the nature of the trait being measured and whether the construct is conceptually understood and shared by both groups. Scale intercorrelations showed some differences between the two groups. Results of confirmatory factor analysis showed a poor model fit for the black group with root mean square residual (RMS) of .064 instead of < .05 and goodness of fit index (GFI) of .84. Of note, were shortcomings associated with cross-cultural bias. Low item-total correlations were noted in both groups with 53% of the items being either biased and/or having unacceptable item-total correlation indices. Possible underlying reasons for item bias, according to the authors, were attributed to:

- *Cultural mores* in terms of customs and traditions.

- *Cultural beliefs*. Values, attitudes, and way of life.

- *Situational and experiential factors*. White-black disparities in socio-economic status and opportunities may affect item relevance.

- *Word meanings*. Cultural differences in the understanding and interpretation of certain items (conceptual meaning).

- *Social desirability*. Social desirability refers to a pattern of responding that reflects the need to provide perceived socially acceptable responses to questions rather than reporting on one's actual feelings or behaviour

(Vella-Brodrick & White; cited in Constantine & Ladany, 2000). The 'lie' factor (Taylor & Boeyens, 1991) has a differential impact on scores.

Generally, the factor structure of the SAPQ was comparable to both black and white groups but the overall item failure rate of 53% is proof of the instrument's inadequacy for use across cultures. Literature on cross-cultural validity of personality interest measures (Byrne & Campbell, 1999; Leong, 1997; Masango, 1999; Tracy, Wanatabe, & Schneider, 1997) shows that although the factor structure of a measuring instrument might replicate across cultures, it is no guarantee that the item measurements and theoretical structures are invariant across groups. Variations in item score data put into question cross-cultural validity of instruments originally designed for a specific cultural group. The results of the comparability study by Taylor and Boeyens (1991) highlight the problems of generalizing such measures across different ethnic groups. Taylor and Boeyens (1991, p.9) conclude that:

> It is important that a new South African personality assessment instrument be constructed, for there is no instrument that one can confidently recommend for general use at this stage; and it is important that the constructors 'listen to the people' rather than impose their academic ideas and assumptions – advertently or inadvertently – when creating the material. What do we mean by 'listen to the people'? We mean that a grassroots approach be adopted when conceptualizing the constructs to

be included in the instrument, that the people on whom the instrument will ultimately be used be drawn into the conceptualization process.

In a study of the RIASEC equivalence, Rounds and Tracey (1996) evaluated the extent to which constructs characterizing personality in one culture could be applied across diverse cultures. A meta-analytic review of studies that examined the cross-cultural equivalence of Holland's (1985a) RIASEC model was conducted. Evaluation of model fit was based on comparative analysis of Holland's circular model, Gati's three-group partition and the alternative three-class partition (see Figure 2). Ninety-six (96) RIASEC matrices from 19 countries excluding Africa and East Europe were synthesized. Matrices from the United States were used as benchmark.

Alternative Three-Class Partition

Holland's Circular Order   Gati's Three-Group Partition
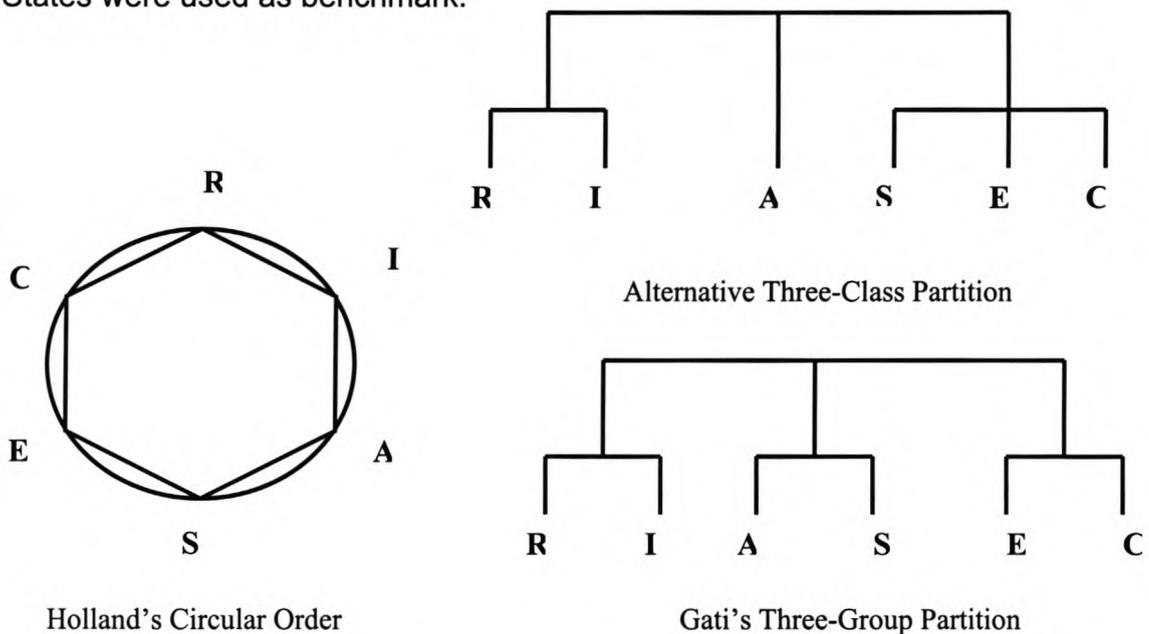
Figure 2. Representation of 3 models of the RIASEC (Tracey & Rounds, 1996)

For model prediction, Rounds and Tracey (1996) employed Hubert and Arabie's (1987) randomization test and the multivariate analysis of variance (MANOVA) and post hoc paired t test. From the results of the randomization test, Holland's circular model had ρ value of < .05 on 55 (57%) matrices, the alternative three-class partition model had ρ value of < .05 on 60 (62%) matrices and Gati's three-group partition model had ρ value > .05 on all the matrices. The first two models were partially supported but Gati's model was not supported. Results of the multivariate analysis of variance (MANOVA and post hoc paired t test), showed a perfect model data-fit of Holland's model for the U.S. matrices, drawn from Anglo-American sample. Similarly, matrices from Iceland, Japan and Israel showed a good model fit of Holland's model but a poor model fit was obtained on the total sample across cultures.

The meta-analytic approach enabled Rounds and Tracey (1996) to cover a wide cross-section of studies that dealt with the cross-cultural validity of the RIASEC model.

Overall, their findings point to the fact that knowledge accumulated on RIASEC inventories in the United States cannot simply be applied to other countries. Farh, Leong, and Law (1998) argue that generalizability of Holland's SDS to a non-U.S. cultural context depends on the similarity of that culture to the United States. Furthermore, lack of support of the RIASEC model could have been due to the matrices used in the study. Considering that the meta-analytic review was based on studies covering the period 1970 – 1989, it is highly probable that the studies were

out of date and not quite representative of the present situation. Of note, are Rounds and Tracey's (1996) recommendations to employ confirmatory factor analysis (CFA) and multidimensional scaling (MDS) for evaluating Holland's structural hypotheses.

Expanding further on the structural equivalence of the RIASEC model, Ryan, Tracey, and Rounds (1996) investigated the generalizability of Holland's RIASEC structure across gender, ethnic and socioeconomic groups. A sample of 370 high school students participated in the study. A modified form of the Vocational Preference Inventory (VPI) was used. A 7-point scale ranging from strongly dislike to strongly like was adopted. The response format was aimed at maximizing variance in participants' responses. Hubert and Arabie's (1987)-correspondence index and a three-way multidimensional scaling (MDS) were used to test the adequacy of model-data fit. The results of the comparative analysis showed no differences in the interest structures between white and black American high school students. Similarly, the interest structures between low- and high-SES groups showed no difference. However, gender differences were noted in the structure of interest in terms of the RIASEC dimensions.

Socioeconomic status and gender differences have been overlooked in studies that investigated vocational interests and occupational pursuits. The indications, according to the findings, show that the vocational preference inventory is gender biased. The items tend to tap the interest and experience of males at the expense of females. Similarly, Aiken (2000) points to the fact that gender differences, especially

with Holland's SDS instrument, may partly be due to the structure of items focusing on specific activities or materials with which one sex has more experience than the other. The Realistic scale, for example, lays emphasis on activities such as carpentry, automobile and electric repairs that are a male domain. The study points to the need for a thorough review of the items if the instrument is to be generalized to the target population.

Notwithstanding the significance of the issues raised, the study had some noticeable limitations in that the sample was not representative of any academic majors. Generalizability of the findings might be problematic in that the sample was not based on the RIASEC structure. Instead, the authors laid emphasis on ethnic, socioeconomic, and gender representation while paying minimal attention to sample representation of the RIASEC classification. Testing of the RIASEC classification without specifying the occupations or majors might have compromised the results. In addition, a sample size of 370 was quite small for one to draw conclusions on the vocational interests of high school students across White and African American groups.

2.4 Person-Environment (P-E) Fit

Literature suggests that person-environment fit or person-organization fit explains the degree of match between occupational pursuits and one's vocational interests and abilities (Dawis & Lofquist, 1984; Holland, 1985a, 1997; Prediger, 1982, 1999). The

idea of 'fit,' particularly person-job congruence, has been the subject of interest in occupational and industrial psychology. A study by Prediger (1999) investigated the structure underlying work-relevant abilities. A nationally representative sample of 4 387 12th graders drawn from 49 schools and a validation sample of 618 12th graders drawn from six States in the U.S. participated in the study. In particular, the study investigated whether the basic structure of work-relevant abilities is similar to that of interests and occupations by examining the relationship between the dimensions underlying 15 work-relevant abilities including a general ability dimension.

The comparative analysis between work-relevant abilities and vocational interests was based on Prediger's (1982) Data/Ideas and Things/People work tasks dimensions underlying Holland's (1997) hexagonal model of vocational interests and occupational types (see Figure 3). According to Prediger (1999), *Data* tasks refer to impersonal tasks such as transmitting facts, working with numbers, following instructions, organizing and recording. *Ideas* tasks refer to intrapersonal tasks involving insights, theories, and new ways of expressing a given scenario. For example scientists create or apply scientific knowledge. Similarly, artist's creativity is inspired by inspiration. *Things* tasks involve impersonal tasks such as machines, tools, and materials. *People* tasks involve interpesonal tasks such as caring for, educating, serving and directing others.

BUSINESS CONTACT
(Enterprising)

BUSINESS OPERATIONS
(Conventional)

Data

People   Things

SOCIALSCIENCE
(Social)

TECHNICAL
(Realistic)

Ideas

ARTS
(Artistic)

SCIENCE
(Investigative)
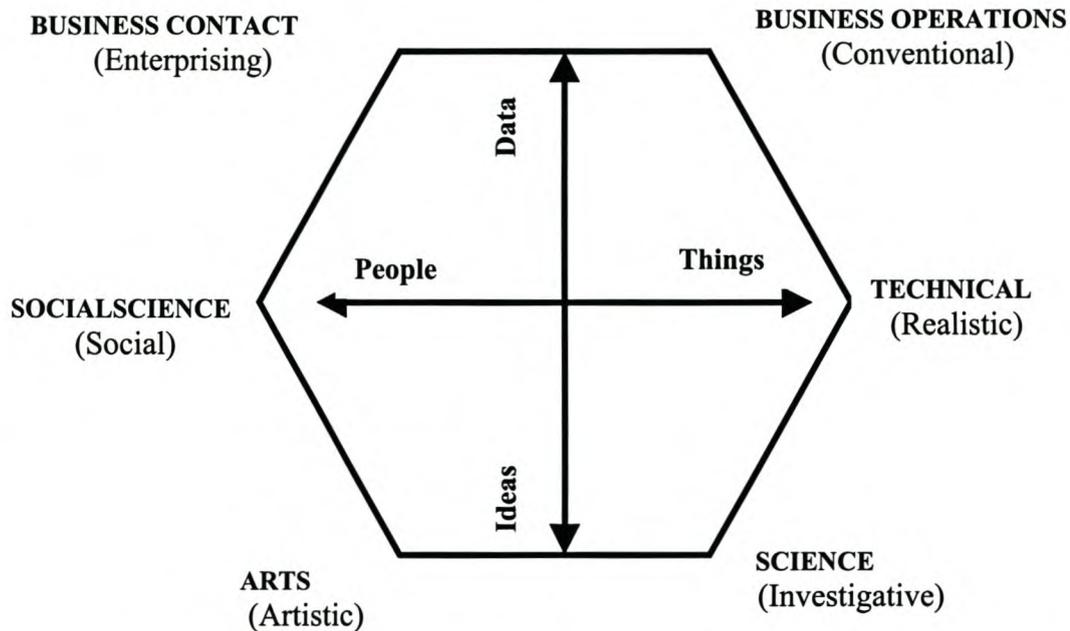
Figure 3. The hexagonal model: Underlying work-task dimensions (Holland, 1997; Prediger, 1982)

For data collection, two published instruments, that is, the Inventory of Work Relevant Abilities (IWRA) and the Unisex edition of the American College Testing Interest Inventory (UNIACT) were used. Exploratory factor analysis (EFA) (Principal Component Analysis) was used to determine the extent to which the basic structure of work-relevant abilities correspond with the RIASEC dimensions and the extent to which interest scale intercorrelations support Prediger's (1982) bipolar work task dimensions. Extracted factors corresponded with Holland's (1997) theoretical model. Results showed that abilities might have the same basic structure as vocational interests. What is worthy noting though is the fact that the results were merely exploratory and not robust enough to be considered conclusive.

In a related study, Shivy, Rounds, and Jones (1999) investigated occupational perception structures in naturally occurring settings and their stability across time. Stability of occupational cognition across time was established through pre- and post entry tests. Model testing was based on Holland's RIASEC model (cited in Shivy et al., 1999), Prediger's (1982) bipolar work-task dimensions, and Gati's (1979, 1991) three-group partition. Holland's RIASEC circular model generates 72 order predictions and Gati's three-group partition (R, I), (A, S), and (E, C) generates 36 order predictions. Prediger's dimensions – working with *data*, working with *ideas*, working with *things*, and working with *people* are an extension of the RIASEC structural concept.

A total of 181 students drawn from the career development and exploration class including the psychology subject pool participated in the study. These were from the Midwestern University. Multi-dimensional scaling, cluster analysis and Hubert and Arabie's (1987) randomization test were the techniques used to evaluate model-data fit of the three models. The correspondence index (CI) employed in the randomization test indicates the degree of fit of the models to the data. Support of Holland's categorization of occupations was evident from the data but the hypothesized circular order model was not supported. The results of the randomization tests were:

(a) Holland's (1992) RIASEC model - p value = 0.27, CI = 0.17, and only 42 of the 72 order predictions were met.

(b) Prediger's (1982) dimensions, though represented in the data, were not reproduced as hypothesized.

(c) Gati's three-group partition was supported by the data. Results showed a p value of 0.07, CI = 0.69 with 30 of the 36 order predictions met. Thus, Gati's model represented the data better.

The structural ordering of the RIASEC model was not supported. The study revealed that individuals do not perceive occupations as theoretically conceptualized by Holland. This shows that occupational perceptions might not be stable across cultures. On the whole, occupational perceptions must be viewed in context. Cultural background, socio-economic status, and the prevailing environment tend to impact on people's perceptions differently. In view of this, the results of the study might not be generalizable. It is also difficult to tell, from the study, the target population to which the results might be generalized. Furthermore the sample was not representative of all the occupational titles selected for the study (i.e., 18 occupational titles). The grouping of occupations as "similar" or "dissimilar" might have been based on assumed knowledge, which could be somewhat misleading. On the other hand however, the use of different statistical techniques, such as, the MDS, cluster analysis, and Hubert and Arabie's randomization test in model testing was good.

Tokar and Fischer (1998), expanding on the body of research on P-E fit, examined the correspondence between Holland's vocational personality typology and five-

factor model of personality (see Figure 4). A sample of 490 employees drawn from a wide range of occupational settings (174 occupational titles) participated in the study. The sample was predominantly Anglo-American (94%). The NEO Five-Factor Inventory and the Self-Directed Search were the two instruments used to measure vocational interests and personality type

The authors (Tokar & Fischer, 1998) investigated the relation between the five-factor model (i.e. neuroticism, extraversion, openness, agreeableness, and consciousness) and the dimensions underlying RIASEC using Prediger's (1982) bipolar dimensions of data/ideas and things/people and Hogan's orientation (see Figure 4). Prediger proposed that the two bipolar work-task dimensions of things/people and data/ideas underlie the RIASEC model. These basic aspects, as Prediger explained, underpin human activity and experience. Accordingly, the 'data pole' is characterized by a preference for impersonal ordered tasks, whereas the 'idea pole' is characterized by a preference for interpersonal tasks involving abstraction, curiosity, and originality. Thus, the 'things end' is characterized by a preference for non-personal tasks involving machinery and working with one's hands, whereas the 'people end' is characterized by interpersonal tasks.
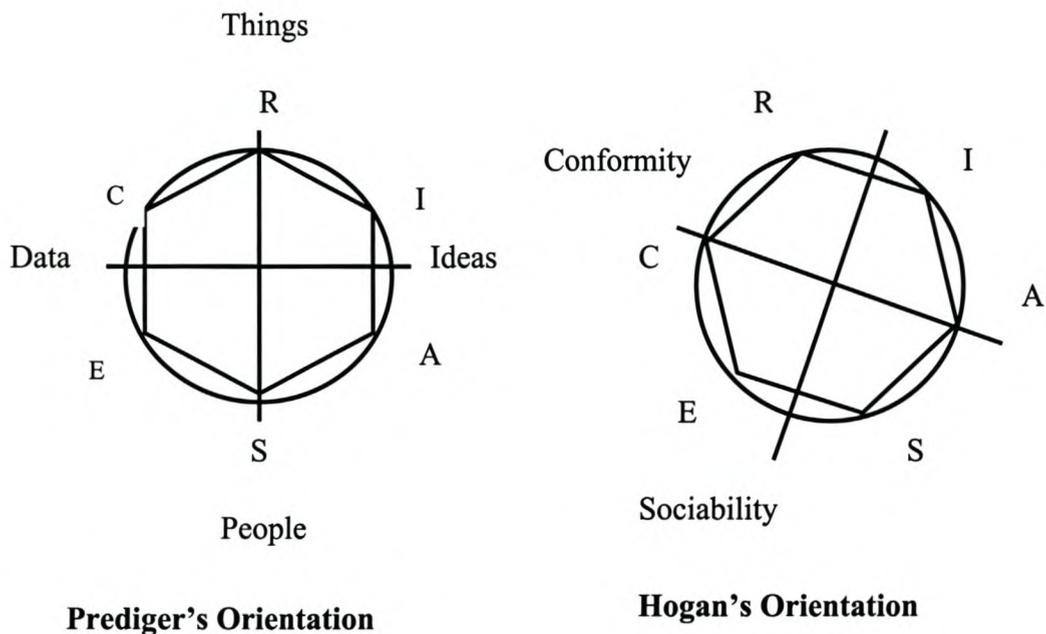
Figure 4. Prediger's (1982) and Hogan's (1983) dimensional orientations: Holland's RIASEC model

Data was analyzed separately by gender. Multiple regression was the statistical analysis used. Results of the analysis by gender showed that the personality scores predicted 46% of the variance in Prediger's dimensions for women and 60% for men. The findings were significant when the congruence index was examined using a first-letter agreement index, but not significant when computed using the two-letter code. The results showed that the Big-Five personality variables predicted more variance in Prediger's (1982) and Hogan's (1983) sets of dimensions for men than for women. The poor link for women might be due to women's perception of some of the occupations.

Furnham, Toop, Lewis, and Fisher (1995) examined the relationship between P-E fit and job satisfaction among occupational groups by conducting three studies in Britain using Holland's (1985a) model. The first study comprising managerial and non-managerial levels investigated the relationship between Holland's P-E fit dimensions (congruency, consistency, and differentiation) and job satisfaction. A total of 135 employees (managers and non-managers) representing a wide range of occupations were involved in the study. Each of the RIASEC types was represented. The second study focused on a group of 60 speech therapists that had experienced considerable organizational change that affected their work. The third study investigated person-job fit differences between three specialist areas within the nursing profession. The sample was drawn from the General Medical Nursing, Intensive Therapy, and Pediatric Nursing. The total sample size was 80 nurses. The three studies focused on person-job fit. Two occupational measures were used for data collection. These were, (a) Index of Organization Reactions (IOR) – a paper and pen test that measures job satisfaction and general managerial skills and (b) The Self-Directed Search.

Multiple regression was the statistical method used for data analysis. Congruence between occupations and satisfaction was found to be generally weak. The results failed to confirm central tenets of Holland's theory, a clear indication that the theory does not 'travel well' across national and occupational boundaries (Furnham et al., 1995). Differences in organizational structure and professions as well as the selection and retention policies could have had some effect on the results.

It is noteworthy that this study investigated person-job fit as it pertains to people who are actually employed and not university or college students. In contrast, most research studies on vocational and occupational interest have been based on college and university students and in some cases on high school students. Very few studies investigated vocational interests and occupational pursuits as they relate to people in employment. It is highly commendable that the authors drew their participants from experienced workers.

Nevertheless, the three mini-studies were flawed. First, the sample size for three studies was 60, 80, and 135 respectively. Obviously, the samples for the three studies were too small to make any meaningful conclusions. Secondly, it is highly unlikely that the findings would generalize to the target population. For example, the sample for studies 1 and 2 were drawn from the British Health Services (NHS) and generalizing to the target population findings from a sample of 60 therapists and 80 nurses respectively might be misleading.

2.5   Conclusion

This chapter provided the framework for the conceptual understanding of personality types, vocational interests, and person-job fit. As previously noted, vocational and occupational psychology theories and their contemporary literature provide a deeper understanding of personality types and career choice.

Essentially, it is through theory that insights into personality traits are obtained. The common thread in all the theories has been the extent to which self-perception influences one's vocational interests and occupational pursuits and the importance of role models and the environment as reinforcers to one's self-concept.

Literature (Dumenci, 1995; Gottfredson, 1978; Upperman & Church, 1995) indicates that theories of vocational interests, particularly Holland's theory, have generated considerable research and overwhelming acceptance among the Anglo-American groups. However, the criticism from a cross-cultural perspective is that the theories have failed to take cognizance of sociopolitical, socioeconomic, and socio-cultural realities of diverse cultural groups. For example, Mararike (1999) argues that the African cultural setting must be understood in the context of complex processes such as social, political, and economic factors. Furthermore, these processes, Mararike notes, take place on the basis of existing conceptual framework. Hence, the assumption that vocational choice is a personal matter and that the development of self-concept follows prescribed life stages might not generalize across cultures. It is common knowledge that the harsh economic environments of most developing countries force people to opt for certain occupations not as a matter of choice but as a means to survival. It is not surprising therefore that poor countries experience high unemployment and the prevalence of child labour. Besides, African culture, in general, tends to hold a 'collective social value' as opposed to an

'individualistic view' (Triandis, 1995). Thus, career decision-making is considered a family matter and as such, it is in this context that career decisions are made.

Apart from this, Holland's (1985a, 1997) theoretical model is being chosen because, overall, the model is parsimonious in that the RIASEC structure classifies nearly all occupations into six broad categories. Furthermore, Holland transformed vocational psychology by providing the theory of personality types and work environments and corresponding measurement tools. The self-directed search (SDS) and vocational preference inventory (VPI) are some of Holland's vocational interest instruments suited to the measuring of person-job fit. In fact, theoretical orientation of most vocational interest measures is based on Holland's RIASEC classification. These include: The Strong Interest Inventory (SII), the Unisex edition of the American College Testing Program (UNIACT) Interest Inventory, the Kuder Occupational Interest Survey (KOIS), the Career Decision-Making Interest Survey (Harrington & O'Shea, 1993) and the Career Assessment Inventory (Johansson, 1986).

The review of relevant literature, on the other hand, puts the study in context by bringing to the fore what is known about the subject and what areas need further exploration. It is through the review of relevant and contemporary literature that guidance on the appropriate methodological approaches was provided. Table 2 gives a summary of the literature that was reviewed including information on sample size, data collection techniques used, concepts studied, data analysis procedures employed, and the findings of the respective studies

TABLE 2

SUMMARY OF ARTICLES REVIEWED

AUTHOR/YEAR	SAMPLE SIZE	INSTRUMENTS USED	CONCEPTS STUDIED	DATA ANALYSIS A	FINDINGS
Masango (1999)	400	Self – Directed Search (SDS)	Cross - Cultural Validity of SDS	- Multiple Regression - Confirmatory Factor Analysis (CFA)	Not supported
Farh, Leong, & Law (1999)	1 813	• UNIACT • Open – Ended Questionnaire • Traditionality Inventory	Cross - Cultural validity of UNIACT	Confirmatory Factor Analysis	Mixed support
Meyer (1998)	3 477	Kodus Interest Questionnaire (MB – 10)	Cross – Cultural Validation of MB - 10	Exploratory Factor Analysis (EFA)	Supported
Taylor and Boeyens (1991)	640	South African Personality Questionnaire (SAPQ)	Cross – Cultural Validation of SAPQ	EFA -	Not supported
Rounds and Tracey (1996)	96 Matrices	SDS	Construct Validity of (a) Holland's Circular Model (b) Gati's three group partition (c) Alternative three-Group Partition	- MANOVA - Randomization test - Post hoc paired t test - -	Mixed support

AUTHOR/YEAR	SAMPLE SIZE	INSTRUMENTS USED	CONCEPTS STUDIED	DATA ANALYSIS A	FINDINGS
Ryan, Tracey & Rounds (1996)	370	Vocational Preference Inventory	Validity of Holland's RIASEC structure across gender, ethnic, and socio-economic groups	- Hubert and Arabie's Randomization test - Multidimensional Scaling (MDS)	Supported but Gender differences noted in terms of RIASEC Dimensions
Prediger (1999)	4 387	- Work Relevant Abilities (WRA) - UNIACT	Relationships between Work Relevant abilities and Occupational interests	Exploratory Factor Analysis	Supported
Shivy, Rounds, & Jones (1999)	181	Self-Directed Search (SDS)	Stability of occupational perceptions across time	- MDS - Randomization Test. - Cluster Analysis	Structural ordering of the RIASEC and supported
Tokar & Fischer (1998)	490	Self-Directed Search (SDS) NEO Five-Factor Inventory	Correspondence between Holland's Typology and the Big-Five Model	Multiple Regression	Supported but gender difference noted especially women's perception of some occupations.
Furnham, Toop, & Lewis (1995)	275	Index of Organisational Reactions (IOR) SDS	Relationship between P – E Fit and Job Satisfaction.	Multiple Regression	Not supported.

As shown in Table 2, sample sizes ranged from 181 to 4387 with an average sample size of 1203. In investigating person-job fit and the validity of vocational interest measures, the studies adopted the correlational research design. Quantitative data were collected using vocational interest inventories that employ Holland's RIASEC structure. Tailor-made questionnaires were also utilized. Data analysis approaches used included Hubert and Arabie's (1987) randomization test and correspondence index, multidimensional scaling, cluster analysis, multiple regression, and exploratory and confirmatory factor analysis. The statistical approaches to data analysis provided information on the extent of relationships among variables.

Although moderate support on the utility of vocational interest measures with regard to the RIASEC assumption has been reported across cultures, doubts have been raised regarding the adequacy of the RIASEC structural model to non-U.S. cultures. Conflicting conclusions have been made on the cultural invariance of vocational interest measures (see Table 2). Concerns have been raised regarding the use of models and occupational measures generated on one population and generalizing them across cultures (Leong, 1997; Ryan, Tracey, & Rounds, 1996). In actual fact, differences in cultural beliefs and way of life have serious implications on career choice and on the individual's conceptual framework. The general theme from literature is that before a measure can be used across cultures, its construct validity must be established in each culture (Aiken, 2000; Berry, 1989; Farh, Leong, & Law, 1998; Masango, 1999).

Additionally, the concept of vocational interests and personality types should be extended to workers as adults. As already mentioned, research on personality types and work

environments has concentrated on college and university students. Research in the area of vocational interests and occupational pursuits among adult workers, especially in Zimbabwe, is lacking. Literature suggests that job satisfaction and tenure are dependent on many factors that extend beyond interest congruence (e.g., Dawis & Lofquist, 1984, Hesketh, 1995). Major issues revolve around ways of measuring people's interest, the environment, and congruence. The empirical question needing additional work in the context of Holland's theoretical framework is a rethinking of the RIASEC structural model across cultures and the assumption of person-job fit where, according to the theory, people tend to resemble their work environments.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1   INTRODUCTION

Holland (1985a, 1997) asserts that individuals are most successful when they operate in work environments that are congruent with their personality type and vocational interest. The assumption, according to Holland, is that, based on personality type and vocational interests, people can meaningfully be classified as predominantly one of the six personality types, namely, Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC). Holland believes that the match between one's vocational interests and occupational pursuits should result in job satisfaction and productivity.

In line with Holland's theoretical assumption, the thrust of the present study is to develop a vocational interest measure and a model for predicting and classifying people into appropriate job sectors based upon scores obtained from the vocational measure. With this in mind, the process and procedures for developing the measure and the model will be discussed in the context of the research design being used. The Meyer (1998) MB-10, a published vocational interest measure will be used to validate the new measure. Following after will be a description of the target population and the procedures for selecting a representative sample. Finally, the statistical approaches to data analysis will be discussed.

3.2   Research Design and Research Methodology

As discussed in Chapter 1, correlational research design is considered best suited to the current study. Correlational research designs seek to establish the nature and extent of relationships among a set of variables. Correlational designs thus provide a means for objectively assessing the magnitude and direction of relationship between variables. As Gall, Borg, & Gall (1996) elaborate, apart from making predictions, establishing relationships between variables, and suggesting possible cause-and-effect patterns among variables, correlational research designs are also used in test construction. It is in this view that a correlational research design is considered most fitting for the current study.

3.2.1   Method of Research

The review of literature and of career development theories, as covered in Chapter 2, provided insights into personality types and person-job fit as it relates to the work environment. The assumption, as mentioned previously, is that people function better when there is a match between their vocational interests and occupational pursuits. Furthermore, the review of literature provided a base for the current study in terms of what is already known. Literature review provided also the relevant methodology to investigating vocational and occupational interests and areas for further study.

3.2.2 **Research Procedure**

The study is basically is in two phases. The first phase involves the development and verification of the new measure by a team of content experts before piloting the measure. The purpose is to ascertain how well the items relate to the conceptual definitions. After incorporating the views and comments of the content experts, the measure will be piloted to a sample representative of the target population. Exploratory factor analysis and reliability analysis will be employed for the data analysis. The statistical approaches should provide information on the functioning of individual items. It is from the results of these that decisions on either to return or drop an item are made.

The second phase involves the identification of the study sample, the administration and validation of the measure and the developing of the model. Selection of the study sample will be through job profiling workshops to which all the sectors will be represented. Job profiling is a methodology of describing a job, with the direct involvement of expert workers, that is job incumbents. The precise description of the job entails the identification of the specific duties and tasks performed in that job. Critical tasks that underpin the job are identified and the tasks are stated in measurable terms. Job profiling provides the only valid reference point for matching people to jobs and for the development of a measure suited to the Zimbabwean public service. In the same vein, the size of

the sectors will be used to determine proportionate representation. For example, education is the largest sector in the public service.

The new measure of vocational interest and the MB-10 are the two instruments to be used for data collection. The measures will be administered to the study sample during the job profiling workshops and collected after completion. The MB-10, an external criterion, will be administered for the purpose of gathering data for validation purposes. Validation of the measure with an external criterion helps establish the usefulness of the measure in terms of the concurrent validity. Data analysis approaches will include factor analysis, reliability analysis, and multiple discriminant analysis.

3.2.3 **Participants**

The target population from which a representative sample will be drawn for field-testing is the Zimbabwe public servants. Following the implementation of the job evaluation exercise of July 1995 (Public Service General Letter No. 12 of 1995), public servants were categorized into the following occupational sectors:

- Economic Management (Economists)

- Finance (Accountants, Auditors)

- Education (i.e., everything to do with imparting knowledge)

- Judicial (Legal Practitioner)

- Engineering and Technical Services (e.g., Civil, Structural, Mechanical, Architects)

- Natural Sciences (e.g., Chemists, Physical Planners)

- Agriculture

- Management and Administration

- Clerical and Support Services

The job classifications will provide guidance in the selection of the sample representative of the target population and, in addition, the job profiling exercise that the researcher embarked on should facilitate the sampling process. The profiling of occupations/jobs was designed to systematically develop job profiles with the active involvement of job incumbents who are the subject matter experts. Through this approach, a precise description of the job was made including the requisite knowledge and skills and worker traits. Furthermore, job profiles provided invaluable information about the related knowledge and skills peculiar to each job category. For example, knowledge of accounting procedures and adherence to rules and regulations is important to the finance sector, whereas with the education sector, counseling and public relations are but some of the relevant worker traits for that job. Likewise, Holland's (1985a, 1997) theory of personality types and work environments states that the '*investigative type*' (e.g., accountant) is more concerned about rules and regulations, whereas the '*social*

type' (e.g., teacher, counselor) is more concerned about the welfare of people and is described as empathetic.

Accordingly, Holland's RIASEC structure and the job profiling classification will form the basis for the selection of a representative sample. Additionally, the size of the sectors will be taken into consideration to ensure proportionate representation. For example, the education sector constitutes 75% of the Zimbabwe public service and this aspect will be taken into account at the sampling stage. A stratified sampling procedure will be used in selecting a representative sample. This procedure takes into account the heterogeneous nature of the target population. Leedy (1997, p.214) reiterates that "population consists of definite strata, each of which is distinctly different, but the units within the stratum are as homogeneous as possible."

Literature in the area of vocational interest and person-job fit will provide the general guidance on sample size. As detailed in Chapter 2, Table 2 summarizes the sample size and the methodology of each of the studies that were reviewed. Gay (1996, p. 125) states that when deciding on the sample size, "the larger the population size, the smaller the percentage of the population needed to get a representative sample". Thus, according to Gay, for a population beyond 5 000, a sample size of 400 to 600 should be adequate. The target population for the current study is about 150 000. Mindful of this, a sample of 600 is considered adequate for the study.

3.2.4 **Vocational Interest Measures**

Literature (e.g., Aiken, 2000; Gable & Wolf, 1993; Schutz, 1999) confirms that the development of a good measure is a very lengthy process and, in general, development of a new measure should be undertaken cautiously. Adaptation of existing established measures is recommended instead. Rounds and Tracey (1996) note that researchers in Australia, New Zealand, and Canada developed new measures based on Holland's RIASEC model. The authors acknowledge that the adoption of the RIASEC model provides useful and relevant assessment procedures to non-U.S. groups.

Notably, Leong (1997) emphasizes the need for a critical examination of methodological issues when using measures validated in one culture across cultures. These methodological issues include functional equivalence, conceptual equivalence, and metric equivalence. Functional equivalence, Leong explains, is concerned with whether the instrument serves the same function across cultures while conceptual equivalence is concerned with whether two cultures attach the same concepts to an item. Metric equivalence, on the other hand, is concerned with whether the numerical scales have metric equivalence (e.g., conceptual meaning of a 2-point scale as opposed to a 5-point scale) across cultures. The concerns raised by Leong (1997) have relevance to the Zimbabwe cultural setting. These issues were considered during the development and verification of the measure.

3.2.4.1   **Published Vocational Interest Measures**

Holland et al.'s (1994) Self-Directed Search (SDS) forms the basis for the development of a measure for use in the Zimbabwe setting. The self-directed search (SDS) is a self-report measure specifically designed to assess a person's resemblance to each of the RIASEC types, that is, Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Respondents are asked about their occupational wishes, preferred activities, level of abilities or competencies in performing the stipulated tasks, and occupational preferences including self-estimates of one's abilities. The SDS instrument has a total of 228 items and uses a 2-point scale (Like/Dislike or Yes/No).

Meyer's (1998) MB-10, to be used for validation purposes, is a self-report measure designed to measure one's vocational interest. The MB-10 has 10 Interest Fields and a total of 360 items. Each field consists of 36 items that are relevant to the occupational category. The 10 interest fields are denoted by a symbol as follows:

In =   Preference for working with people as individuals or with small groups of people e.g., social worker.

Gr =   Preference for public appearance and working with groups of people e.g., politician.

B =   Preference for business related and economics related activities or occupations.

Nu =   Preference for working with figures

L =   Preference for reading and writing (linguistic). This includes journalist and librarian.

A =   Artistic preferences e.g., architect, photographer, and graphic designer.

Pr =   Preference for practical work such as, mechanic, carpenter, and bricklayer.

Sc =   Scientific preference, for example, chemist, and physicist.

Z =   Preference for animals, zoology and biological related activities.

P =   Preference for plants, botanical, and horticultural activities.

The reliability of the MB-10 was determined through the internal consistency using the split-half (even and uneven numbers) method and item analysis. Reliability coefficients of $r \geq 0.65$ was the cut off point (Meyer, 1998). The reliability coefficients of the MB-10 subscales range from 0.71to 0.95.

It is, thus, assumed that, based on theory, the MB-10 subscales should relate to the RIASEC classification. It is further assumed that the pattern of relationship between the RIASEC types and the MB-10 should be according to the classification shown in Table 3.

Table 3

MB-10 and RIASEC Structure

The New Measure Based on the RIASEC Structure	MB-10
Realistic (Technical)	Pr
Investigative (Science)	Sc; Z; and P
Artistic (Art)	A and L
Social (Social Science)	In; Gr and L
Enterprising (Business Contact)	B and Gr
Conventional (Business Operations)	Nu and B.

3.2.4.2 Instrument Development

Although support on the validity and reliability of Holland's RIASEC model continues to accumulate, especially in North America, careful inspection of the items reveal that the appropriateness of the SDS instrument across cultures is still questionable. Additionally, recent literature (Aiken, 2000; Campbell & Borgen, 1999; Leong, 1997) has noted a number of weaknesses in the utility of the SDS measure across different job levels and has also questioned the utility of the model across cultures (Berry, 1989; Masango, 1999; Tracey & Rounds, 1993; Tracey & Wanatabe, 1997). For example, Campbell and Borgen (1999) highlight that the content of the Holland scales, that is, Realistic, Investigative, Artistic, Social, Enterprising, and Conventional does not quite suit the adult population.

The authors underscore the inadequacy of the 'themes' in addressing all the job levels under each occupation. The 'Conventional Theme', for example, focuses mainly on the lower level office activities for the clerical group at the expense of, say, the financial management levels. Besides, Aiken (2000) points out that the structure of items of some themes is biased. In effect, the Realistic Theme focuses on specific activities and materials with which one sex has an unfair advantage over the other.

Mindful of the views raised in the literature, efforts will be made to minimize bias and to ensure that question items are, as much as possible, representative of the job levels within each subscale. Likewise, the cultural and socio-economic changes in terms of the current reform programs will be considered. It is against this background that an instrument suitable for use in an adult educational setting in Zimbabwe will be developed based on the work of Holland.

In developing the measure, expert judgement was sought from within the country to review and verify the items and to comment on the suitability and utility of the items in determining person-job fit in the Zimbabwean cultural context. In effect, verification of the items was in respect of clarity of items, comprehension, and the extent to which the items described the constructs of interest. The content experts included, among others, practising registered educational and industrial psychologists, training managers from both the public and private sectors and

educational specialists from government parastatals such as the Scientific Institute of Research and Development Centre (SIRDC), the Zimbabwe Arts Council and the Zimbabwe Schools Examination Council (ZIMSEC). The aim was not for the judges to agree or disagree with the items, but rather, to assist in quantifying the favourable or unfavourable state of the statements.

In the main, the involvement of content experts provided invaluable information on the content validity of the measure and the extent to which the content of the construct is reflected in the instrument. Content validity involves specifying the content for the construct, and selecting items that represent the content. Consequently, expert judgement concerning what items to include (Aiken, 2000) especially at the beginning of the item construction provided useful information with regards to content validity.

Gable and Wolf (1993) emphasize that, validity evidence is based upon two types of evidence, which are, judgmental and empirical. Judgmental evidence consists mainly of methods for examining the adequacy of the items in addressing the constructs of interest. This evidence is generally gathered prior to the actual administration of the instrument. In this view, content validity was addressed as experts reviewed the items to ascertain how well the items addressed the constructs of interest. Therefore, the involvement of content

experts at the initial stage in the development of the instrument provided judgmental evidence.

Overall, content experts provided useful information regarding the suitability of the measure as well as the relevance of the items in the Zimbabwean cultural setting. They brought to the fore methodological issues requiring attention. These included conceptual issues and the item response format. In light of the comments by the content experts, a 228-item vocational interest measure for use in the Zimbabwe adult educational setting was developed. A three-point scale with anchors: '*yes*', '*uncertain*', and '*no*'; and '*like*', '*indifferent*', and '*dislike*' was adopted (Farh, Leong, & Law, 1998; Leong, 1997). Anchors such as '*uncertain'* and '*indifferent'* were designed. Hence, in situations where, instead of responding '*yes'/'no'* or '*like'/dislike'*, participants felt indifferent to an item or uncertain, they were requested to qualitatively summarize such decisions. Demographics, to include gender, marital status, qualifications, tenure, and job title were included in the questionnaire. The statistical description of these demographics should provide an indication of the demographic profile of the sample.

3.2.4.3 **Pilot Study and Data analysis**

The next stage in the development of the measure was piloting the measure to a group similar in characteristics to the target population. Piloting involved the administration of the new set of items to a sample representative of the target

population. What is of importance, according to Gable and Wolf (1993), is not so much the size of the pilot sample but the variability and representativeness of the response pattern compared to those of the large population from which the sample is obtained. As a result, about 200 people participated in the pilot study. The sample was drawn based on the RIASEC classification. The issue of gender balance was taken into account although it was not possible to attain an equal representation of females and males. The purpose of piloting the measure was to establish the suitability of the instrument by analyzing data of the pilot sample to determine if the items were taping the constructs of interest. As explained previously, empirical evidence (Gable & Wolf, 1993) is gathered after administering the instrument. Analysis of pilot data provided empirical evidence in terms of the relationship among items and the constructs of interest.

3.2.4.4   **Results of the Pilot Study**

Analysis of the pilot data was through exploratory factor analysis, item analysis, reliability analysis, and item-total scale correlation. The statistical approaches provided information on the functioning of the items. Factor analysis (Hair et al., 1998) is useful in searching for a structure among a set of variables. It is through factor analysis that the structure of interrelationships among a large number of variables is defined. Additionally, factor analysis provides an empirical basis for judging the structure of the variables in terms of factor loadings. The factors are formed to maximize their explanation of the entire variable set. Factor loadings

are the correlation of each variable and the factor. Loadings indicate the degree of relationship between the variable and the factor. As Hair et al. (1998) point out, higher loadings make the variable representative of the factor. On the whole, the results so obtained enable the researcher to compare the response data-generated constructs with the theoretically derived constructs. Table B1 (Appendix B) shows the results of factor loadings.

Decisions on the number of factors to represent the underlying structure in the data were made a priori. This approach is useful when testing a theoretical hypothesis. As specified, a total of six (6) factors were extracted. The factor matrix of loadings in Table B1 (Appendix B) does not quite reflect the theoretical assumptions. Using a cut off point of 0.3 (Crocker & Algina, 1986; Hair et al., 1998) and relating the factors to the RIASEC classification, factor loadings were as follows:

- Factor 1 (Investigative/ Science) had 24 (66.6%) of the 36 items loading on the factor. A few items (30.5%) had equally high loadings on factors 2, 4 and 6.

- Factor 2 (Art) was clearly defined with 31 (86%) of the 36 items loading on the factor. The factor was well defined.

- Factor 3 (Enterprising/Business Contacts) had 21 (58%) of the 36 items loading on the factor with high loadings on Factors 1, 4 and 5.

- Factor 4 (Conventional/Business Operations) was moderately defined according to the theory with just about half (16, i.e. 44%) of the items loading on the factor and the rest of the items had high loadings on Factors 1, 3 and 5

- Factor 5 (Social) had 23 (63.8%) of the items loading on the factor. With high loadings on Factor 1

- Factor 6 (Realistic/Technical) had only 14 (38.8%) of the items loading on the factor and the majority of the items loading on factor 1 with the factor loadings of the remaining items being spread among the factors. The results of the preliminary analysis point to the fact that the hexagonal ordering of the RIASEC structure might not be reproduced.

Item analysis focused on the functioning of individual items and this was determined through the results of item-total scale correlation shown in Table 4. The results of the item-total correlation generated correlations of items with the total scale score. Furthermore, a series of diagnostic measures to assess internal consistency were carried out. These included the analysis of item-total correlation (correlation of the item to the summated scale score) and inter-item correlation (intercorrelations among items). A minimal item-total scale correlation of 0.3 for item inclusion was adopted (Hair, Anderson, Tatham, & Black, 1998). As a rule of thumb (Hair et al., 1998), inter-item correlations should exceed 0.30. However, some items with low loadings were considered for inclusion based on

the knowledge about the items and how they rationally and theoretically relate to the constructs. Item analysis helped in identifying items to be deleted or revised. It was from the results of item analysis that decisions to either revise or discard ineffective items were made. Furthermore, a final review of the items, prior to administering the measure to the study sample, was undertaken based on the preliminary results. Table 5 summarizes the results of the reliability analysis (r_a) for each of the 6 sub-scales. In addition, the results of the mean inter-item correlation (r_{ii}) and item-total scale correlation (r_{it}) are provided. Scale reliability refers to the degree of consistency and dependability of a measure. As shown in Table 5, the reliability coefficients were reasonably high and within acceptable levels. The minimum acceptable levels are between 0.60 and 0.70 (Crocker & Algina, 1986; Gable & Wolf, 1993; Hair et al., 1998).

Table 4

The Six RIASEC Subscales: Item-Total Correlation ((r_{it})) - 36 Items each.

REALISTIC (r_{it})		INVESTIGATIVE (r_{it})		ARTISTIC (r_{it})		SOCIAL (r_{it})		ENTERPRISING (r_{it})		CONVENTIONAL (r_{it})	
ATE 1	.433	SCI 1	.375	AAR 1	.486	ASS 1	.148	ABC 1	.301	ABO 1	.641
ATE 2	.419	SCI 2	.301	AAR 2	.407	ASS 2	.329	ABC 2	.347	ABO 2	.330
ATE 3	.203	SCI 3	.485	AAR 3	.389	ASS 3	.278	ABC 3	.352	ABO 3	.407
ATE 4	.471	SCI 4	.289	AAR 4	.294	ASS 4	.326	ABC 4	.417	ABO 4	.556
ATE 5	.248	SCI 5	.413	AAR 5	.455	ASS 5	.339	ABC 5	.235	ABO 5	.448
ATE 6	.295	SCI 6	.559	AAR 6	.477	ASS 6	.368	ABC 6	.381	ABO 6	.426
ATE 7	.144	SCI 7	.414	AAR 7	.455	ASS 7	.479	ABC 7	.275	ABO 7	.559
ATE 8	.407	SCI 8	.442	AAR 8	.458	ASS 8	.211	ABC 8	.285	ABO 8	.623
ATE 9	.411	SCI 9	.411	AAR 9	.512	ASS 9	.423	ABC 9	.214	ABO 9	.431
ATE 10	.424	SCI 10	.437	AAR 10	.429	ASS 10	.497	ABC 10	.425	ABO 10	.626
ATE 11	.283	SCI 11	.526	AAR 11	.516	ASS 11	.317	ABC 11	.401	ABO 11	.665
CTE 1	.109	CSC 1	.226	CAR 1	.060	CSS 1	.326	CBC 1	.487	CBO 1	.226
CTE 2	.395	CSC 2	.401	CAR 2	.036	CSS 2	.180	CBC 2	.407	CBO 2	.473
CTE 3	.300	CSC 3	.162	CAR 3	.155	CSS 3	.379	CBC 3	.124	CBO 3	.495
CTE 4	.135	CSC 4	.276	CAR 4	.456	CSS 4	.506	CBC 4	.474	CBO 4	.618
CTE 5	.215	CSC 5	.502	CAR 5	.446	CSS 5	.444	CBC 5	.532	CBO 5	.216
CTE 6	.238	CSC 6	.114	CAR 6	.363	CSS 6	.260	CBC 6	.249	CBO 6	.425
CTE 7	.404	CSC 7	.354	CAR 7	.541	CSS 7	.380	CBC 7	.501	CBO 7	.327
CTE 8	.209	CSC 8	.304	CAR 8	.313	CSS 8	.199	CBC 8	.551	CBO 8	.387

CTE 9	.271	CSC 9	.383	CAR 9	.432	CSS 9	.507	CBC 9	.624	CBO 9	.357
CTE 10	.401	CSC 10	.261	CAR 10	.254	CSS 10	.289	CBC 10	.244	CBO 10	.413
CTE 11	.354	CSC 11	.334	CAR 11	.179	CSS 11	.328	CBC 11	.204	CBO 11	.403
OTE 1	.608	OSC 1	.576	OAR 1	.651	OSS 1	.152	OBC 1	.452	OBO 1	.298
OTE 2	.300	OSC 2	.654	OAR 2	.618	OSS 2	.564	OBC 2	.515	OBO 2	-.056
OTE 3	.344	OSC 3	.555	OAR 3	.553	OSS 3	.494	OBC 3	.532	OBO 3	.678
OTE 4	.505	OSC 4	.473	OAR 4	.545	OSS 4	.309	OBC 4	.450	OBO 4	.681
OTE 5	.477	OSC 5	.515	OAR 5	.609	OSS 5	.484	OBC 5	.566	OBO 5	.487
OTE 6	.407	OSC 6	.532	OAR 6	.591	OSS 6	.402	OBC 6	.366	OBO 6	.467
OTE 7	.390	OSC 7	.609	OAR 7	.582	OSS 7	.423	OBC 7	.520	OBO 7	.647
OTE 8	.487	OSC 8	.617	OAR 8	.625	OSS 8	.507	OBC 8	.627	OBO 8	.493
OTE 9	.556	OSC 9	.636	OAR 9	.483	OSS 9	.289	OBC 9	.470	OBO 9	.284
OTE 10	.510	OSC 10	.528	OAR 10	.543	OSS 10	.445	OBC 10	.430	OBO 10	.373
OTE 11	.398	OSC 11	.611	OAR 11	.570	OSS 11	.502	OBC 11	.641	OBO 11	.670
OTE 12	.487	OSC 12	.634	OAR 12	.699	OSS 12	.609	OBC 12	.610	OBO 12	.650
OTE 13	.489	OSC 13	.581	OAR 13	.733	OSS 13	.495	OBC 13	.548	OBO 13	.654
OTE 14	.381	OSC 14	.499	OAR 14	.302	OSS 14	.459	OBC 14	.605	OBO 14	.637

Table 5

Internal Consistency Reliability Estimates: Pilot Results: Vocational Interest Inventory

Subscales	Sample Size	Number of Items	r_a	r_{ii}	r_{it} Range
REALISTIC (TECHNICAL)	94	36	.87	.15	.11 to .61
INVESTIGATIVE (SCIENCE)	95	36	.91	.22	.11 to .65
ARTISTIC (ARTS)	99	36	.91	.22	.03 to .73
SOCIAL	96	36	.88	.17	.15 to .61
ENTERPRISING (BUSINESS CONTACTS)	93	36	.90	.20	.12 to .64
CONVENTIONAL (BUSINESS OPERATIONS	94	36	.90	.25	-.06 to .68

Note: r_a = Reliability coefficient; r_{ii} = Mean inter-item correlation; r_{it} = Item-total scale correlation

3.2.5 Data Examination and Analysis

After entering the data into the SPSS data editor, a critical examination of the data will be made in order to clean up the data. Examination of the data prior to data analysis provides critical insights into the characteristics of the data in terms of the level of accuracy in capturing the data, the nature and magnitude of missing data,

and the respondents' response patterns. Hence, through this process, decisions are made on either to exclude cases with erroneous response patterns or to include them especially in situations where they have minimal effect to the overall results. In cases of missing data, this might entail either deleting such cases that are likely to distort the results, or employing recommended statistical remedies for missing data.

Statistical approaches to data analysis will include factor analysis, reliability and validity analysis and multiple discriminant analysis. Model building will be through multiple discriminant analysis.

3.2.5.1   Reliability Coefficient

In instrument development, the first thing that needs to be established is the reliability of a measure. The value of a measure, especially a new measure, is determined by establishing its reliability and its construct validity. The understanding from literature is that investigations of reliability should be made when a new measure is being developed (Gable & Wolf, 1993; Nunnally, 1978). The reliability coefficient assesses the consistency of the measure. Aiken (2000, p. 84) concurs and explains further that, "no assessment device can be of value unless it is a consistent or a reliable measure of something." Consequently, internal consistency reliability using Cronbach's coefficient alpha (r_a) will be performed on the research data. Cronbach's alpha is the most widely used measure and the added advantage is its positive relationship to the items in the

scale (Hair et al., 1998). The minimum acceptable scale reliability according to Hair et al., (1998) is 0.70.

3.2.5.2   Construct Validity

Construct validity, according to Messick (1980, 1989, 1995) is addressed through content validity and criterion-related validity. Construct validity addresses the question, "To what extent do certain explanatory concepts (constructs) explain covariation in the responses to the instrument items?" Content validity, on the other hand, is addressed when items on the test or instrument adequately sample from the intended universe of content (Cronbach, cited in Gable & Wolf, 1993). Similarly, criterion-related validity addresses the question, "What is the relationship between scores on the instrument and some external criterion that provides a more direct measure of the targeted characteristics?" Thus, depending upon the time frame, criterion-related validity can either provide evidence of concurrent validity or evidence of predictive validity.

Accordingly, the MB-10 will be used to validate the new measure. The MB-10, as explained earlier, is a vocational interest measure developed and validated on the South African population. The MB-10 is expected to function equally well in the Zimbabwean setting considering the cultural similarities of the two countries. Messick (1989, p, 14) notes that "the evidential basis of test interpretation is construct validity." This is in terms of the rationale supporting the trustworthiness

of score interpretation. Evidence for construct validity, in the main, will be obtained through content verification, scale intercorrelations and correlation of a test with an external test (instrument validation). Criterion-related validity according to Gable and Wolf (1993, p. 189) addresses the question, "What is the relationship between scores on the instrument and some external criterion that provides a more direct measure of the targeted characteristic?" Test validation provides information on whether the scale conforms to its conceptual definition or not. Specifically, test validation is the process of accumulating evidence to support such inferences. To establish the concurrent validity of the measure one of the approaches is through scale validation. This is achieved by computing the correlation between scores on the test and those on the criterion of interest, which in this case, is the MB-10.

3.2.5.3   Prediction Model for Job Placement

The main objective of the study, as stated in Chapter 1, is the building of a model that can be used to assess person-job fit. The secondary objective is to assess the adequacy of the RIASEC structure. Statistical discriminant analysis is used to provide a model for predicting group membership and classifying people to appropriate job sectors. Statistical discriminant analysis and classification analysis are multivariate procedures used to optimally separate known groups and to allocate new subjects to the previously defined group. Discriminant analysis can therefore be used to optimally separate the six occupational groups on the basis of variables 1 to 30. As

already explained, the occupational sectors in the Zimbabwe Public Service have, for the purpose of the study, been summarized into six broad categories, that is:

- Sector 1 (Technical/Realistic) - composed of the engineering and construction fields.

- Sector 2 (Science/Investigative)- consisting of scientific and agricultural fields such as horticulture

- sector 3 (Art) – artistic fields such as art, music and designing

- Sector 4 (Social) – comprising education, pastoral fields.

- Sector 5 (Business Contacts/Enterprising) – Comprising economics, sales and marketing, entrepreneurial and political fields.

- Sector 6 (Business Operations/Conventional)- comprising finance, administration and the clerical fields.

Thus, having identified the sectors, the resulting discriminant functions can then be employed to allocate a new applicant to one of these six groups on the basis of scores attained from the new measure of vocational interests. The procedure works in the following manner:

(a) Let Y be a grouping variable taking on values 1, 2, - - -, k denoting to which of k non-overlapping groups or classes an individual belongs.

(b) For each individual are available measurements on p random variables X_1, - - -, X_p.

(c) Linear discriminant analysis (LDA) finds linear combinations of the feature variables $X_1, ---, X_p$ to separate the k groups optimally according to statistical criteria such as maximizing the between groups variance to within groups variance ratio. LDA rests upon the assumption of equality within groups covariance matrices but it is known that, in practice, LDA performs well even when within groups covariance matrices differ as long as certain conditions are satisfied (cf. McLachlan, 1992). Therefore, in this study, only LDA will be considered.

A discriminant function is a linear combination of the independent (feature) variables selected for their discriminatory power used in the prediction of group membership. A discriminant function Z score can be calculated for each person or object in the analysis. In the case of k different groups, it takes the form of the linear equation thus:

$$Z_{ji} = \alpha_j + w_{ji}x_{1i} + w_{j2}x_{2i} + --- + w_{jp}x_{pi} \qquad j = 1, ---, k ; i = 1, ---, n$$

Where

Z_{ji} = discriminant Z score of object i on discriminant function j

α_j = Intercept for discriminant function j

W_{jr} = discriminant weight for independent variable r with respect to discriminant function j

X_{ri} = measurement of object on independent variable r.

In discriminant analysis, overall model fit is assessed by calculating the error rate. Various different error rates can be defined (cf. McLahlan, 1992). Apparent error rates (Johnson & Wichern, 1998) are easy to calculate but are known to be optimistically biased. The Lachenbruch hold-out error rate procedure (Lachenbruch & Mickey, 1968) is used in this thesis to assess the performance since it is considered to be an unbiased estimate of the expected actual error rate (Johnson & Wichern, 1998).

Basically, the objectives of discriminant analysis, according to Hair et al. (1998), are:

- Determine which of the independent variables account the most for the differences in the average score profiles of the two or more groups.

- Establish procedures for classifying people or objects into groups on the basis of their scores on a set of independent variables.

- Establish the number and composition of the dimensions of discrimination between groups formed from the set of independent variables.

The thrust is in predicting and explaining the relationships that impact the category in which the individual or an object is located. Discriminant analysis is the appropriate statistical approach when the dependent or grouping variable is non-metric and the independent variables are metric. In the current study, group classification is based on job sectors and multiple discriminant analysis is the appropriate statistical

technique for deriving a set of rules for classifying prospective candidates to job sectors on the basis of their performance on the measure.

3.3   **Conclusion**

Chapter 1 provided the rationale and objectives of the study, which included:

- Developing a vocational interest measure for use in an adult educational setting in Zimbabwe.

- Assessing the adequacy of the RIASEC structure in providing a framework for assessing person-job fit in the Zimbabwe Public Service.

- Model building for group classification.

It was also in Chapter 1 that a synopsis of the methodology for the study was given. Similarly, **Chapter 2** provided the framework for the conceptual and theoretical understanding of vocational measures thereby putting the current study into context.

Based on Chapters 1 and 2, **Chapter 3** examined in greater detail the methodology for the study. Invariably, literature and theories of career development, as explained in Chapter 2, guided the choice of the methodology for the study. It was, thus, through the review of relevant literature that guidance on the appropriate methodological approaches to the study was provided. Essentially, this chapter discussed further the research design for the study. The study was about relationships in terms of person-job fit. Correlational research

design was considered most appropriate for the study. The concept of association enshrined in correlational research design was fundamental to the study.

Equally important was the identification of the target population for the study. The target population was the Zimbabwe Civil Servants. The procedures in identifying and selecting a study sample representative of the target population were discussed. Decisions about the sampling procedures, representativeness of the sample to the target population and sample size were made based on literature (e.g., Gall, Borg, & Gall, 1996; Gay, 1996; Leedy, 1997) and on Holland's RIASEC structure. Likewise, the statistical approaches to data analysis influenced the sample size. Hair et al., (1998) emphasize that, in discriminant analysis, too small a sample size can negatively affect model estimation. They recommend a sample size of above 200.

As a matter of course, the process in the development of a vocational interest measure was discussed. The measure was being developed based on Holland's RIASEC structure and the Self-Directed Search (Holland et al., 1994). Meyer's (1998) MB-10 vocational interest measure was to be used to validate the new measure. The process in the development of the measure entailed extensive consultations and item verification by content experts. The measure was further piloted to a sample identified as exhibiting similar level of variability in the

affective characteristics and occupational pursuits as the target population. Analysis of the pilot data employed the techniques of factor analysis, item analysis, and reliability analysis. These statistical techniques were used to verify the suitability of the items in addressing the constructs of interest.

Data analysis approaches were discussed. These included reliability and validity analysis and model testing through discriminant analysis. The process of establishing the construct validity of the measure was discussed. Verification of items by content experts addressed the question about the extent to which the measure could adequately sample from the intended universe of content (Gable & Wolf, 1993). Instrument validation using an external criterion was also discussed. Construct validity, as discussed in the chapter, will be through correlation analysis. Finally, a description of the discriminant analysis for assessing group membership and for classifying people according to their vocational interests was made. Figure 5 provides a flow diagram of the research process for the study.

Dec 1999

Research Problem

Research Design
Correlational

Aug
2000

Literature Review

Journals, Books, CD-Rom Databases, Online Databases

Sep 2000

Method of Research

Instrument Development
Piloting and Validation

Target Population
Stratified Sampling

Feb 2001

Mar
2001

Review

Supervision

Data Collection
Vocational Enrolment Measure and MB-10

July
2001

Data Analysis
Reliability and Construct Validity Analysis, Factor Analysis,
Discriminant Analysis

Sept
2001

Review

Supervision

Oct 2001

Presentation of Results
Tables and Models

Nov
2001

Discussion
Results, Conclusions, Limitations, Recommendations

Figure 5 The Overall Research Process (Adapted from Cairns, 2001)

CHAPTER 4

RESULTS AND DISCUSSION

4.1   Introduction

In this chapter, the demographic profile of the study sample is given. The results of factor analysis, reliability and validity of the vocational interest measure are presented as well as the mean inter-item correlation, and item-total scale correlations. Included are the validation results of the measure with an external criterion, which, in this case, is the MB-10 vocational interest measure. Data analysis on the construct validity of the RIASEC structure is provided. In addition, results of the discriminant analysis on model building for the prediction and classification of people into occupational sectors are given.

4.2   Study Sample

A sample of 600 public servants representing the six occupational sectors was administered the new measure along with the MB-10. The sectors were (a) Technical, (b) Science, (c) Art, (d) Social, (e) Business Contacts and (f) Business Operations. Of the 600 people who participated in the study, 560 (93.3%) returned the questionnaires. Data from 60 (10.7%) of the returned questionnaires were unusable and, thus, excluded from the analysis. The 60 questionnaires could not be included in the study because they either had incomplete information or erroneous response patterns. Therefore, the final study sample

was 500. The description of the sample is provided in text form and graphically in chart form.

Based on the demographics, the sample consisted of personnel in the following occupational areas: technical 100 (20%), science 37 (7.4%), art 24 (4.8%), social 138 (27.6%), business contacts 8 (1.6%) and business operations 193 (38.6%) Approximately an equivalent distribution exists in the population.
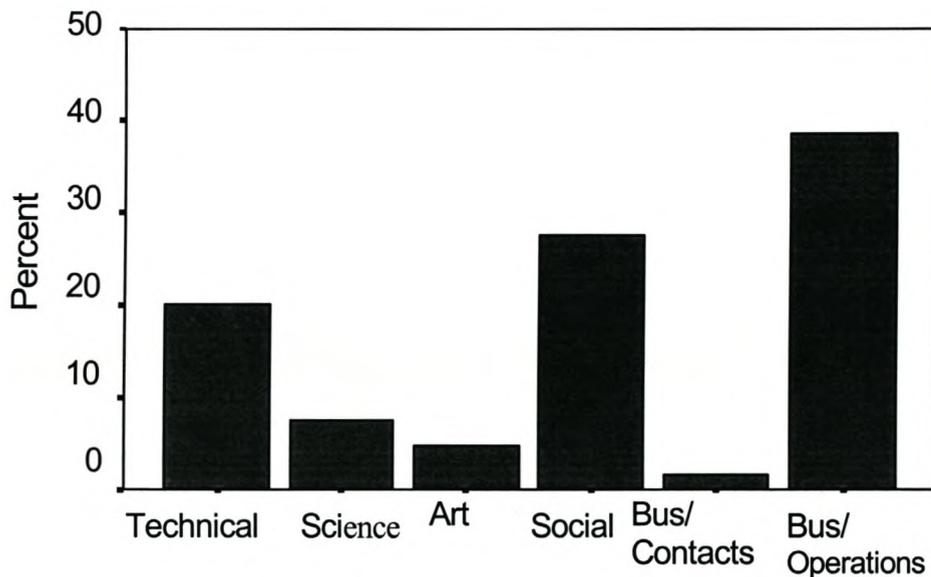

Figure 6. Occupational Sectors

With regard to gender, age, and marital status, 58% were male, 27.2% were female and 14.8% failed to indicate their gender. The gender distribution reflects the current position in the Zimbabwe Public Service where males dominate especially at supervisory and management levels.
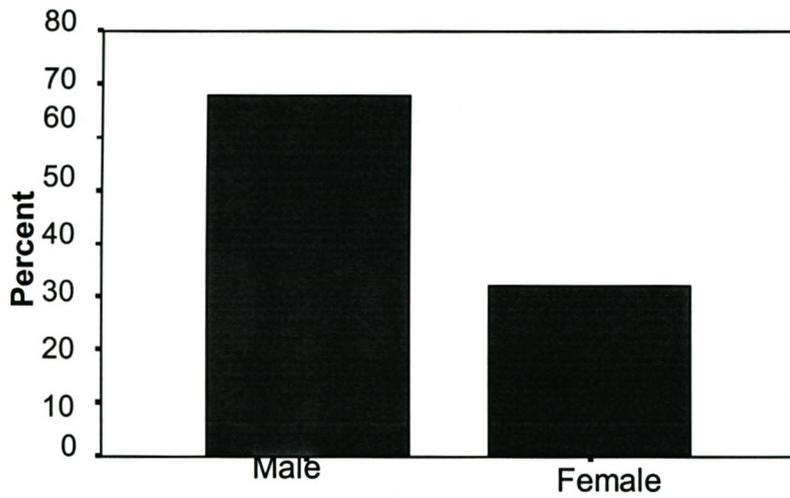
Figure 7. Sex

The majority of members, 85.2%, were married with only 8.8% being single and 3.0% being widowed.
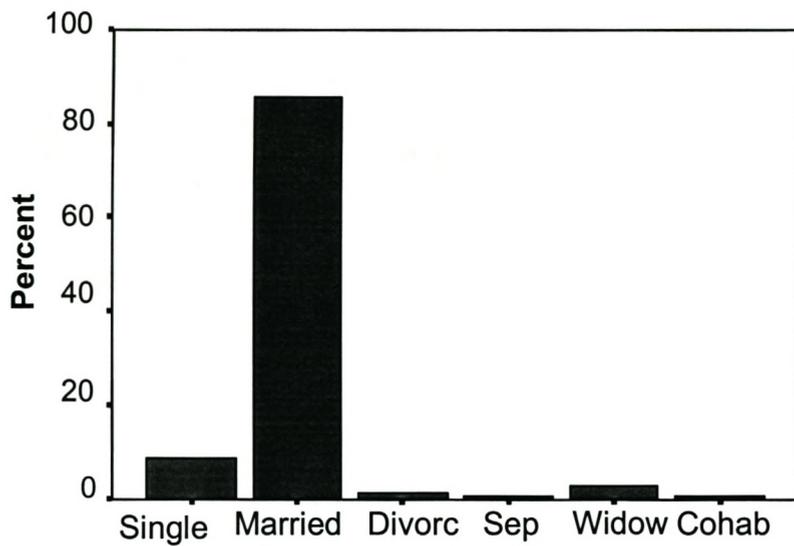

Figure 8. Marital Status

With regard to age, 50.8% of the sample were in the age group 31-40 years, 31.2% in the age group 41-50 years and 10.6% above 51 years of age.
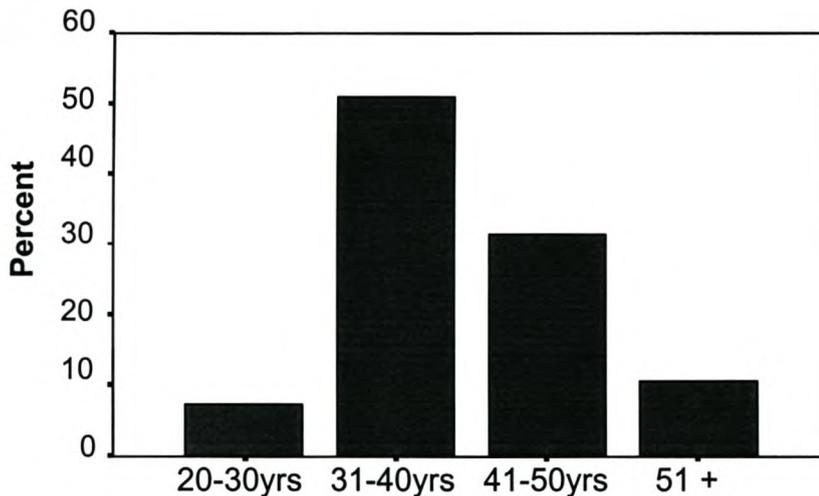
Figure 9. Age Range

In terms of job positions in the public service, 45.6% were in the professional category, which included education officers, lecturers of technical colleges, school heads and college principals. The next biggest group in the sample was the clerical sector (20.2%). This group forms the bulk of the junior administration staff in the service. The administration staff (18.6%), which is in the supervisory level, is, in essence, the group that was promoted from the clerical level. The senior managers (15.2%) represented the apex of the civil service comprising directors of finance, audit, human resources, and regional directors of education.
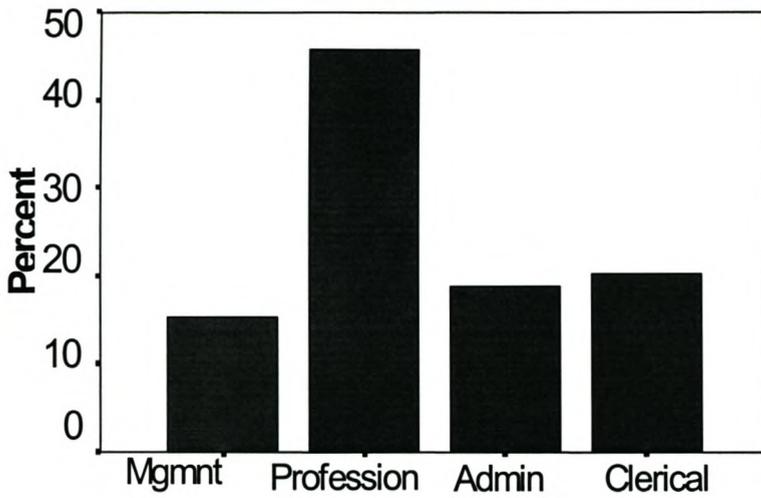
Figure 10. Job Title

Regarding the sample's educational qualifications prior to other forms of professional training, 201 (40.2%) had the basic '0' level academic qualification, 60 (12%) attained 'A" level, 117 (23.4%) had 1st degrees and 78 (15.6%) were postgraduates. About 37 (7.4%) had other qualifications and 7 (1.4%) did not indicate their qualifications.
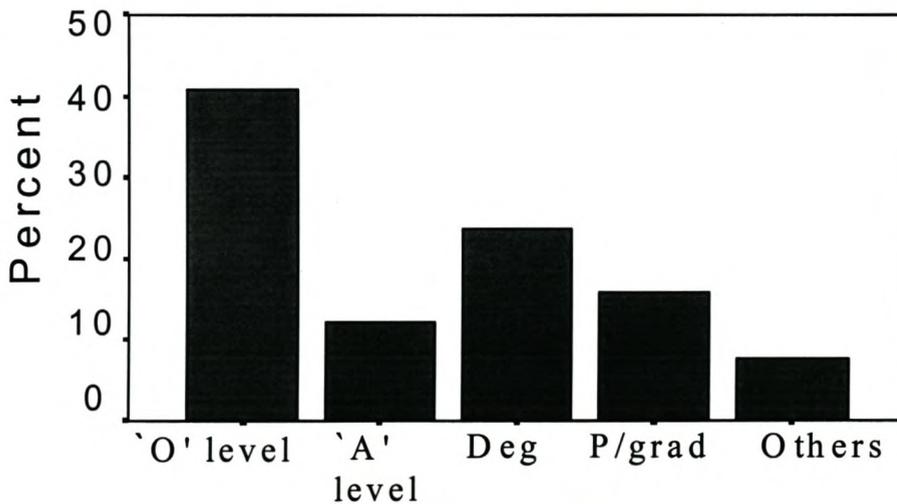
Figure 11. Academic Qualifications

In terms of tenure, 75 (15.8%) have worked in the public service for less than 5 years, 142 (28.4%) have been in the service ranging from 5 years to 10 years. The majority, 278 (55.6%) have been in the public service for over 11 years.
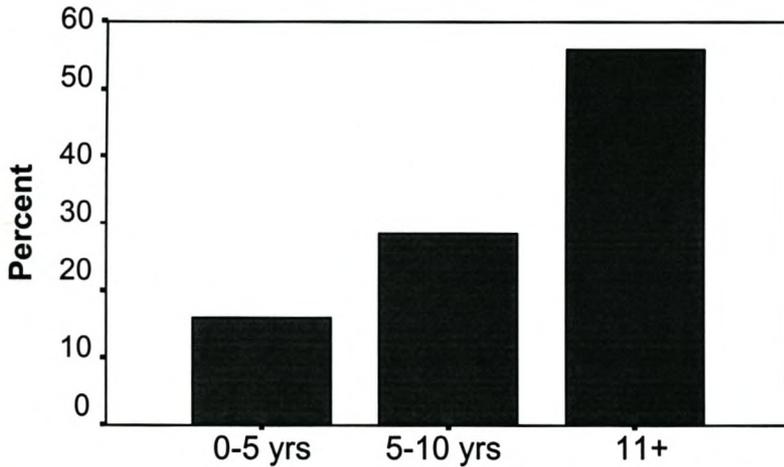
Figure 12. **Tenure**

Demographics on the level of satisfaction with the current job, showed that the majority (53.2%) were somewhat satisfied, 33.2% were very satisfied, and 13% were not at all satisfied with their current jobs. Accordingly, the sample showed that the level of job satisfaction is not very high in the public service.
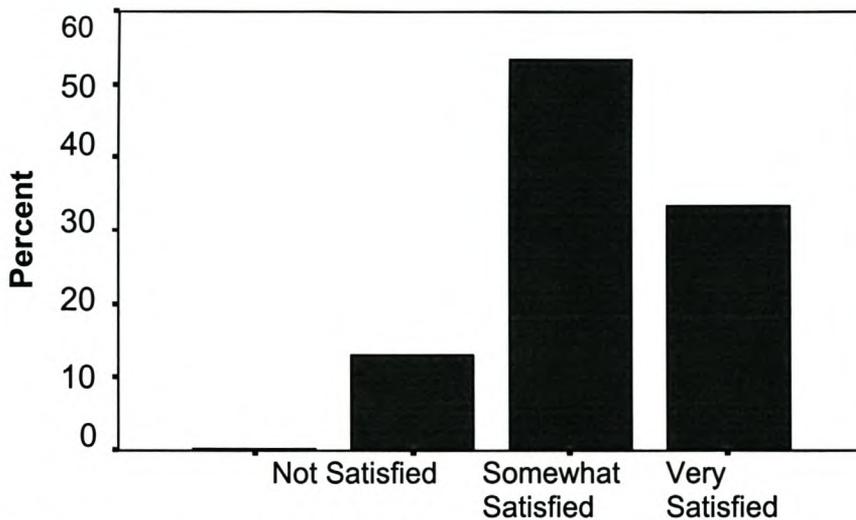
Figure 13. **Job satisfaction**

4.3   **Subscale Reliability Analysis Results**

Coefficient alpha reliabilities were computed using Cronbach's coefficient alpha to test the robustness of the measure. The results of the reliability coefficients were within acceptable levels (Gable & Wolf, 1993). The subscale reliabilities ranged from 0.85 to 0.89. The results of the reliability coefficient, mean inter-item correlations, and item-total correlations are shown in Table C1 (Appendix C). Table 6 provides a summary of the results. Item-total scale correlation (Gable & Wolf, 1993) is a statistic reflecting item-scale correlation wherein items correlating less than 0.3 with the respective scale should be targeted for review (Gable & Wolf, 1993).

Table 6

Internal Consistency Reliability Estimates

	N	No. of Items	r_α	r_{ii}	r_{it} Range
Technical / Realistic	493	38	.86	.14	.08 - .55
Science/Investigative	490	38	.86	.14	.16 - .448
Artistic	491	38	.85	.13	.18 - .57
Social	488	38	.88	.17	-.00 - .57
Bus. Contacts/ Enterprising	492	38	.89	.19	-.07 -.60
Bus. Op/ Conventional	498	38	.88	.17	.11 .56

4.4   **Instrument Validation**

Criterion-related validity according to Gable and Wolf (1993) addresses the question about the relationship between scores on the measure and on some external criterion. The assumption according to Holland's (1995a, 1997) theory of personality type and work environments is that the new measure should have a strong relationship with the criterion MB-10 subscales as follows:

- Realistic (Technical) type should have strong relationships with Pr. - preference for practical activities such as mechanical and carpentry.

- Investigative (Science) type should have strong relationships with (a) Sc. – preferences for scientific activities, (b) Z. - preference for animals and (c) P. - preference for horticultural activities.

- Artistic type should have a strong relationship with A. - Artistic e.g., sculptor

- Social type should have a strong relationship with In. - preference for working with small groups of people (e.g., social worker) and Gr. - preference for working with large groups of people e.g., politician

- Enterprising (Business contacts) should be correlated with B. - preference for business related activities or occupations

- Investigative (Business operations) should be correlated with Nu - preference for working with figures. Table 7 shows the results of the correlation coefficients. Correlation coefficients with p-value< .05 are considered statistically significant.

Table 7

Criterion Related Validity (Sample - N = 448)

	In	Gr	Bus	Nu	Lang	Art	Prac	Sc	Zsc	Plasc
Realistic	-0.317	-0.238	-0.367	0.000	-0.314	0.009	0.481	0.531	0.072	0.040
	p = 0.00	p = 0.00	p = 0.00	p = 0.98	p = 0.00	p = 0.84	p = 0.00	p = 0.00	p = 0.12	p = 0.39
Investigativ	-0.301	-0.158	-.0.327	-0.008	-0.235	-0.077	0.229	0.489	0.175	0.175
	p = 0.00	p = 0.00	p = 0.00	p = 0.85	p = 0.00	p = 0.10	p = 0.00	p = 0.00	p = 0.00	p = 0.00
Artistic	-0.051	0.042	-0.166	-0.193	0.049	0.253	0.094	0.037	0.000	0.026
	p = 0.27	p = 0.37	p = 0.00	p = 0.00	p = 0.29	p = 0.00	p = 0.04	p = 0.43	p = 0.99	p = 0.56
Social	0.206	0.177	-0.093	-0.189	0.051	0.033	0.104	0.005	-0.144	-0.140
	p = 0.00	p = 0.00	p = 0.04	p = 0.00	p = 0.27	p = 0.47	p = 0.02	p = 0.90	p = 0.00	p = 0.00
Enterpris	-0.040	-0.082	0.079	0.051	-0.035	-0.039	0.204	0.042	-0.166	-0.134
	p = 0.39	p = 0.08	p = 0.09	p = 0.27	p = 0.45	p = 0.40	p = 0.00	p = 0.36	p = 0.00	p = 0.00
Convention	0.144	0.137	0.285	0.246	0.113	-0.190	-0.166	-0.249	-0.228	-0.223
	p = 0.00	p = 0.00	p = 0.00	p = 0.00	p = 0.01	p = 0.00	p = 0.00	p = 0.00	p = 0.00	p = 0.00

Note: Correlation Coefficients with $p < .05$ are statistically significant.

Overall, the results showed high to low correlations between the subscales of the criterion and those of the new measure. The theory was generally supported. As shown in the table:

- The Realistic type (described according to the theory as asocial and practical), was negatively correlated with In - preference for working with small groups of people, Gr. - preference for public appearance, Bus – business and L – linguistic. However, as expected and in line with the theory, Realistic type was strongly correlated with Pr. -preference for practical work such as mechanic $(r = 0.481)$ and Sc. – scientific preference $(r = 0.531)$.

- Investigative (Science) which, according to theory denotes analytical, mathematical and scientific competencies was strongly correlated with Sc – scientific preference $((r = 0.489)$ but negatively correlated with In. $((r = -0.301)$ and B. $(r = -0.327)$.

- Similarly, Artistic (preference for working with insights and described as possessing artistic and creative ability), was positively correlated with A. – artistic preferences $(r = 0.253)$. However, the correlation, though statistically significant, was not as strong as expected. A possible explanation could be that half of the items in the MB-10 scale are about the theoretical aspects and the appreciation of art as opposed to practical aspects of art.

- Social (described as possessing interpersonal and mentoring skills) had positive but weak correlations with In. $(r = 0.206)$, Gr. $(r = 0.177)$.

- Enterprising or business Contacts was moderately correlated with Pr $(r = 0.204)$ and insignificantly correlated with B $(r = 0.079)$. Enterprising, according to the theory, refers to a dominating personality and the possession of manipulative and verbal skills. However, Weak correlation between Enterprising and the MB-10 subscale Bus may be due to lack of adequate sample representation and also the fact that Bus subscale lays emphasis on buying and selling as opposed to manipulating people and taking leadership role.

- Conventional or Business Operations which, according to the theory refers to accounting, clerical, and mathematical abilities and typified by a great concern for routine work, rules and regulations, had weak to moderate correlations with In $(r = 0.144)$, Gr. $(r = 0.137)$, B $(r = 0.285)$ and Nu $(r = 0.246)$

4.5   Factor Analysis

Factor analysis was employed on the study data to identify underlying factors that explain the pattern of relationship and to establish the extent to which the RIASEC structure can be supported by data of the Zimbabwean sample. A total of 30 observed variables, 5 variables for each subscale, were used in the analysis. In the initial factor analysis, 12 factors were extracted as opposed to the six RIASEC factors postulated by Holland's (1985a, 1997) theory. Data of the

Zimbabwean sample appeared to fit the model but with no clear pattern of the factor loadings. For example half of the variables for Technical and those for Science had loadings on Factor 1. Furthermore the 12 extracted factors accounted for only 61.99% of the total variance. In light of this, another factor analysis was conducted resulting in eight factors being extracted.

Results of the scree plot shown in Figure 14 were used to identify the optimum number of factors that could be extracted. Eigenvalue or Latent Root represents the amount of variance accounted for by a factor. The rationale as shown in Figure 14 was that each variable should contribute a value of 1 to the total eigenvalue for inclusion. Thus, only factors with eigenvalues of greater than 1 were considered significant. The scree test plotted 8 factors. The 8 extracted factors accounted for 65.88% of the total variance as opposed to the 61.99% with 12 factors. Hair et al. (1998, p. 104) note, "In the social sciences, where information is often less precise, it is not uncommon to consider a solution that accounts for 60% of the total variance (and in some instances even less) as satisfactory."

Table 8 shows eight factors and the corresponding factor loadings. Factor loadings, as earlier explained, refer to the correlation between observed variables (question items) and the factors. The factor analysis results in Table 8 show that:

(a) Factor loadings for the Technical/Realistic and Science/Investigative variables were on Factors 1 and 2. Holland's theory asserts that adjacent types (e.g, Realistic and Investigative) have a stronger relationship than the alternate types. The results tend to support the theory. In addition, the results in Figure 15 (r = 0.69) also confirm Holland's theoretical assumption.

(b) Factor loadings for the Artistic variables were not clearly defined. Factor loadings were on Factors 2, 4 and 7. Possible reasons might be because of the poor sample representation due to the fact that the majority of the artists (e.g., musicians, play writers, and designers) are not public servants and therefore did not participate in the study.

(c) Factor loadings for the Social variables were on Factor 4 with two variables (comp/social' and 'occup/social) loading on Factor 5 as well. The results tend to reflect the nature of work in the public service. For example, teachers (Social type) are, to a large extent, also involved in administrative work (Investigative). Results in Figures 21 to 25 confirm the nature of relationship between the social sector and the conventional sector in the public service.

(d) Factor loadings for the Business Contact/Enterprising variables were on Factors 3 and 5. This sector was poorly represented (only 5 participants) because entrepreneurs are mainly in the private sector and not the public sector.

(e)　lastly, factor loadings for the Business Operations/ Conventional variables were on Factors 5 and 6.

Of special note was the fact that two variables under Business Contacts/Enterprising exhibited complete collinearity. These were 'activibc' and 'competbc'. Collinearity denotes high correlation between two variables. This was a clear sign that one of the variables can perfectly be predicted by the other variable. In view of this, 29 instead of the original 30 variables were used in the study.
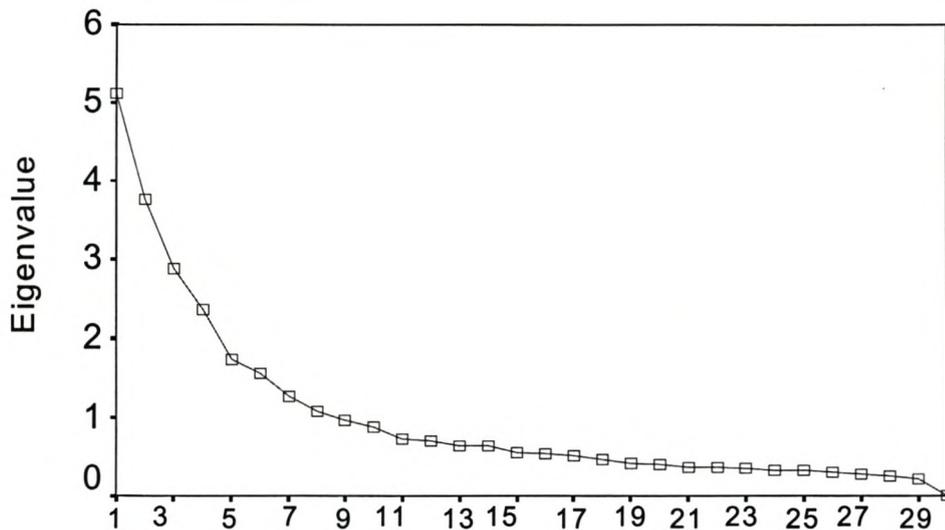

Figure 14. Scree Plot

Table 8

Factor Analysis Results

	1	2	3	4	5	6	7	8
ACTIV/TECNIC	.237	**.713**	.198					-.176
COMP/TECNIC	.264	.272		-.100		**.645**		
OCCUP/TECNIC	.181	**.650**	.118			.151	.242	.218
SELF/TECNIC (a)	**.801**	.125	.195				.174	-.127
SELF/TECNIC (b)	**.760**	.134	.133	.123		-.148	.211	
ACTIV/SCIENC	.213	**.767**	.156			-.116		
COMP/SCIENC	.217	**.363**	-.226	-.172		.179	**.588**	
OCCUP/SCIENC	.131	**.731**	-.119				.140	.194
SELF/SCIENC (a)	**.832**	.174						
SELF/SCIENC (b)	**.758**				.142	.111		
ACTIV/ART	-.163	**.570**	.237	.136		-.174	.162	.102
COMP/ART		.126		.181			**.782**	.130
OCCUP/ART	-.260	**.430**	.125	.277			**.309**	**.449**
SELF/ART (a)	.212			**.687**		-.118	.233	
SELF/ART (b)	**.365**		.108	**.618**	.174		.193	
ACTIV/SOCIAL		.226	**.702**	.230	-.119		.192	-.156
COMP/SOCIAL			**.306**	.322	.106	**.502**	**.345**	-.400
OCCUP/SOCIAL	-.103	.122	.141	**.402**	-.166	**.585**		
SELF/SOCIAL (a)				**.739**	.117	.181	-.137	-.115
SELF/SOCIAL (b)		.119	-.105	**.593**	.317	.195	-.267	
ACTIV/ENTERP	.197	.138	**.861**			.171	-.151	
Comp/ENTERP	.197	.138	**.861**			.171	-.151	
OCCUP/ENTERP		.146	**.356**			.221		**.703**
SELF/ENTERP (a)				.127	**.836**			
SELF/ENTERP (b)	.118		.113	.150	**.767**		.155	

ACTIV/BUS/OP	-.106		.291	-.165	.247	**.616**	-.105	.120
COMP/BUS/OP							.715	
OCCUP/BUS/OP		-.182			.175	**.596**		.508
SELF/BUS/OP (a)						**.772**	.131		.120
SELF/BUS/OP (b)	-.226		-.137	.332	**.449**	.214	-.277	

4.6   Construct Validity

Analysis techniques used to establish construct validity included correlations of the RIASEC subscales. As shown in Table 9 and figure 15, low and negative correlations were obtained between Realistic and Conventional (adjacent types) $r = -0.14$ and Investigative and Conventional (alternate types) $r = -0.11$. In addition, stronger than expected correlations were obtained between Realistic and Social (opposite types) $r = 0.25$ which is contrary to theory. Results for the other types show support for the RIASEC classification.

Table 9

Intercorrelation Matrix of the RIASEC types

| N = 500	Tech	Science	Artistic	Social	Enterpr	Conv
Technical	-					
Science	0.695	-				
Artistic	0.410	0.371	-			
Social	0.255	0.181	0.362	-		
Enterprising	0.267	0.181	0.213	0.326	-	
Conventional	-0.140	-0.112	-0.034	0.245	0.300	-
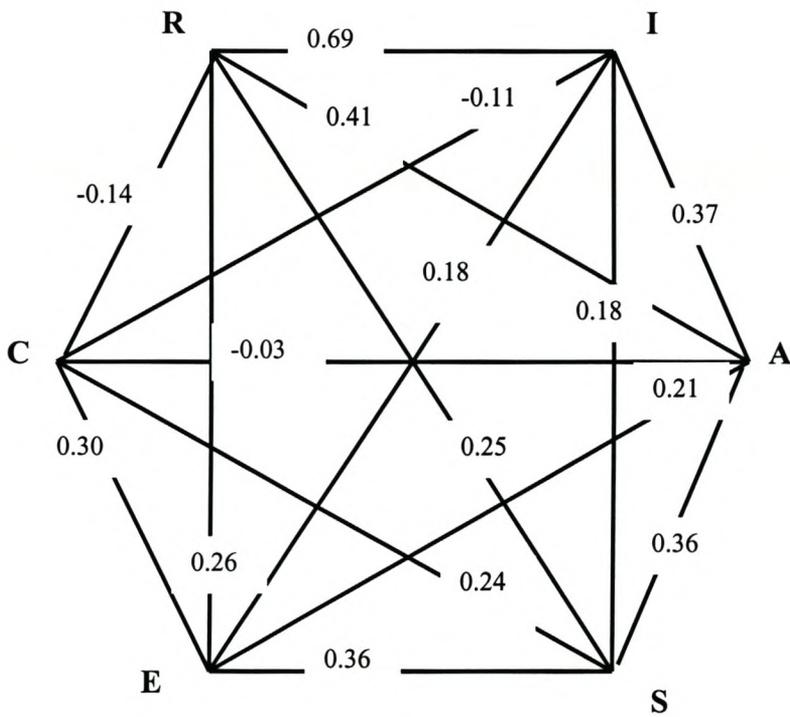
Figure 15. Intercorrelations of the RIASEC Latent Variables

4.7   Discriminant Analysis for Model Building

Discriminant analyses were performed in order to develop a model for classifying applicants into job roles upon their scores, which would be obtained, using the new measure of vocational interest. A step-wise linear discriminant analysis (LDA) was performed using the discriminant analysis module of the statistical package STATISTICA to select the 5 "best" variables for classification. The grouping variable was Sector and the forward stepwise procedure using an F criterion of 10 led to the inclusion of the following 5 feature variables, that is, (a) Activity Business Operations (Activbo), (b) Activity Social (Activsoc), (c) Activity Technical (Activtec), (d) Occupational Science (Occusci) and (e) Self-Estimates of Abilities Technical (Stechnca) into the model. The backward stepwise procedure resulted in a model incorporating also Activbo, Activsoc, Activtec, and Stechnca but with Compesci in place of Occupscl. These two models consisting of 5 feature variables each were then analyzed in detail using the statistical package S-PLUS 2000. The model consisting of Activbo, Activsoc, Activtec, Occupsci, and Stechnica resulted in an apparent error rate (APER) of 30.66% and an hold-out (cross validation or CV) of 31.46%. An error rate determines how good the model is by indicating, for example, the proportion of people in a sample that might have been classified wrongly by the model. The lower the error rate the better the model. Improved error rates of 28.86% (APER) and 29.86% (CV) were obtained using the model consisting of feature variables Activbo,

Activsoc, Activtec, Stechnica, and Compesci. The latter 5 feature variable model was, thus, adopted and studied in more detail.

To begin with, an analysis of group means was conducted to see if the 6 sectors were significantly different on a single variable. Table 10 shows the means of variables Activtec, Stechnica, Compesci, Activsoc and Activbo.

Table 10

Group means for the Feature variables

SECTOR	ACTIVTEC	STECHNCA	COMPESCI	ACTIVSOC	ACTIVBO	N	Proportion
1	5.595960	6.464646	10.4444444	16.888888	14.363636	99	0.19839679
2	12.486486	3.675676	13.405405	7.513514	7.135135	37	0.07414830
3	13.083333	4.0441667	7.500000	17.750000	11416667	24	0.04809619
4	9.681159	2.789855	9.956522	17.724638	15.434783	138	0.27655311
5	11.000000	4.000000	8.000000	16.500000	14.250000	8	0.01603206
6	8.414508	2.440415	6.735751	10.000000	17.160622	193	0.38677355

Figures 16 through to 20 contain notched boxplots displaying visually how the sectors differ for each of the 5 feature variables. Notches that do not overlap point to differences between medians at an approximate 5% level of significance (McGill, Tukey, & Larsen, 1978).
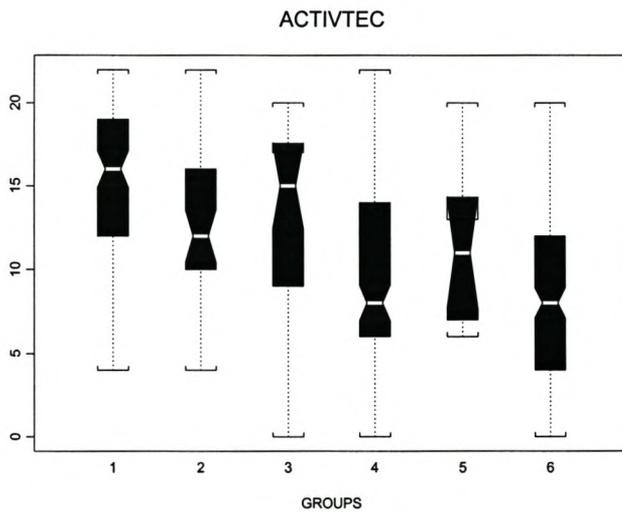
ACTIVTEC

Figure 16. Notched Boxplot of Activtec by sectors
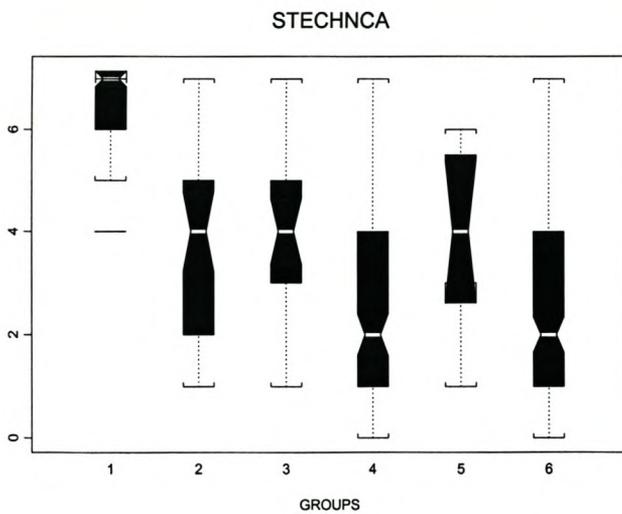
STECHNCA

Figure 17. Notched Boxplot of Stechnca by sectors
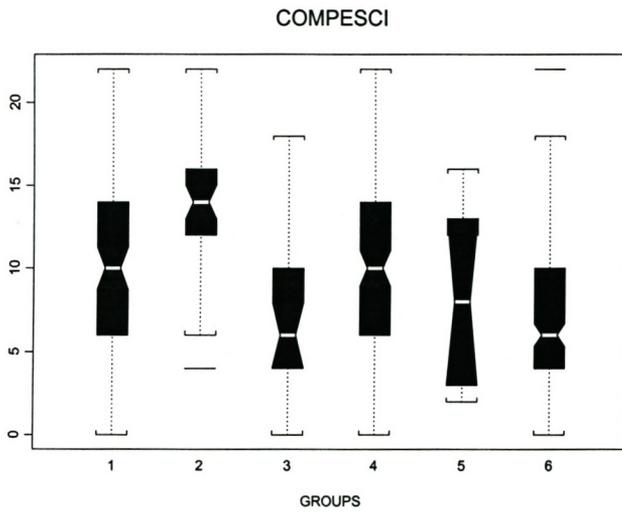
Figure 18. Notched Boxplot of Compesci by sectors
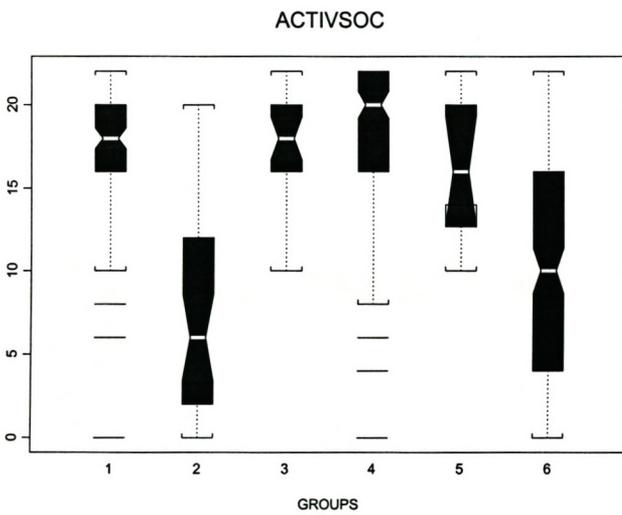
Figure 19. Notched Boxplot of Activsoc by sectors
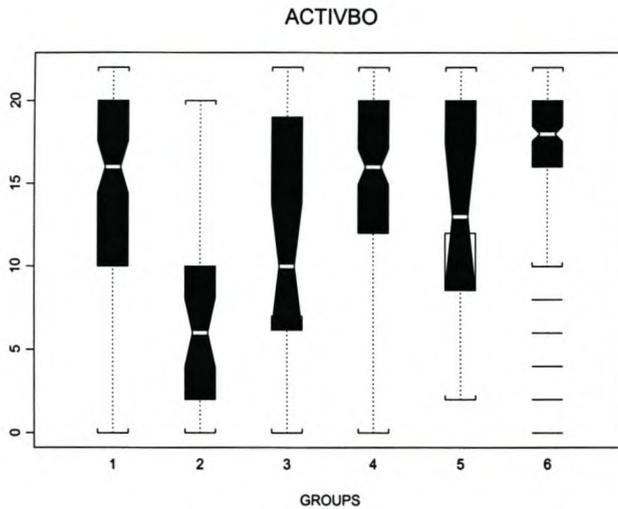
Figure 20. Notched Boxplot of Activbo by sectors

Examination of the boxplots results showed some overlap between sectors 1 and 2 and sectors 4 and 5 on variables ACTIVTEC and STECHNCA respectively. On variable COMPESCI, sector 5 showed some overlap with sectors 4 and 6. Slight overlap was obtained between sectors 3 and 4 on variable ACTIVSOC.

Tests for the MANOVA equality of means vectors were conducted using Wilks Lambda, Pillai Trace, Hotelling-Lawley Trace and Roy Greatest Root. The results of the tests showed that group mean vectors differ to a large extent. Differences between the mean vectors of the respective vectors can also be expressed in terms of squared Mahalanobis Distances (D^2). Table 10 shows the results of the squared Mahalanobis Distance (D^2). The D^2 statistic is employed to measure the actual pairwise squared distance between groups given the 5 variables.

Table 11

Squared Mahalanobis Distance $\left(D^2\right)$

	1	2	3	4	5	6
1	0.00000	7.528276	3.047431	7.277605	3.430019	10.85173
2		0.00000	4.984164	6.521932	5.314234	7.31212
3			0.00000	2.173637	0.525515	5.16709
4				0.00000	1.080461	2.72254
5					0.00000	3.04502
6						0.00000

The results of the squared Mahalanobis Distance showed that

(a) Sector 1 was furthest away from sectors 6, 2, and 4.

(b) Sector 2 was furthest away from sector 6

(c) Sector 3 was relatively close to sector 5.

(d) Sector 4 was relatively far away from the two sectors

(e) Sector 5 was far away from sector 6.

4.7.1   **The Linear Discriminant Functions**

As explained in Chapter 3, the linear discriminant scores can be obtained from the formula:

$$Z_{ji} = \alpha_j + w_{j1}x_{1i} + w_{j2}x_{2i} + - - - + w_{jp}x_{pi}$$

The model, which is to be used in classifying people to occupational groupings, is shown in Table 12 and has been formulated under the linear discriminant function assumption.

Table 12

Linear Coefficients and Constants $\left(\alpha_j; w_{jr}\right)$

Sectors	1	2	3	4	5	6
Constants $\left(\alpha_j\right)$	**-20.37074**	**-11.80401**	**-14.65902**	**-12.4295**	**-15.44035**	**-8.610839**
ACTIVTEC	0.407522	0.342102	0.330953	0.1750546	0.247170	0.1830573
STECHNCA	2.537392	1.382934	1.553979	0.9617083	1.507746	0.8306187
COMPESCI	0.343073	0.521758	0.257512	0.3871822	0.276711	0.2099302
ACTIVSOC	0.420745	0.186380	0.461842	0.4750722	0.426350	0.2249206
ACTIVBO	0.282544	0.091803	0.219789	0.3650888	0.323934	0.4714985

Using the model in Table 12, the sector to which a new applicant should be assigned can be predicted using these linear discriminant functions. As shown in Table 13, the applicant's scores for Activtec, Stechnica, Compesci, Activsoc and Activbo are obtained and using the linear discriminant functions the posterior probability of group membership for each group is calculated with the prior probabilities proportions of group membership supplied by the user. The highest posterior probability indicates the sector into which the applicant is to be assigned.

Table 13

Cross Validation Table

	1	2	3	4	5	6	Error Rate
1	92	2	0	4	0	1	0.0707071
2	7	22	0	5	0	3	0.4054054
3	8	2	1	10	0	3	0.9583333
4	19	7	0	85	0	27	0.3840580
5	3	0	0	3	0	2	1.0000000
6	7	5	1	30	0	150	0.2227979
Overall							0.2985972

The boxplots in Figures 16 to 20 are univariate displays. A multivariate visualization of the sectors can be obtained using biplot methodology. A biplot can be regarded as a generalization of an ordinary scatterplot (cf. Gardner, 2001; Gower & Hand, 1996). While a principal component analysis biplot displays variation of multidimensional data, a canonical variate analysis biplot (CVA biplot) separates group means maximally. Gardner (2001) shows how CVA biplots can be used to perform various different types of discriminant analyses *inter alia* LDA Since sectors 2 (Science), 3 (Art), and 5 (Business Contacts or Enterprising) had relatively small samples, initially, CVA biplots were constructed using sectors 1 (Technical or Engineering), 4 (Social or Education) and 6 (Finance and Administration) as shown in Figure 21.
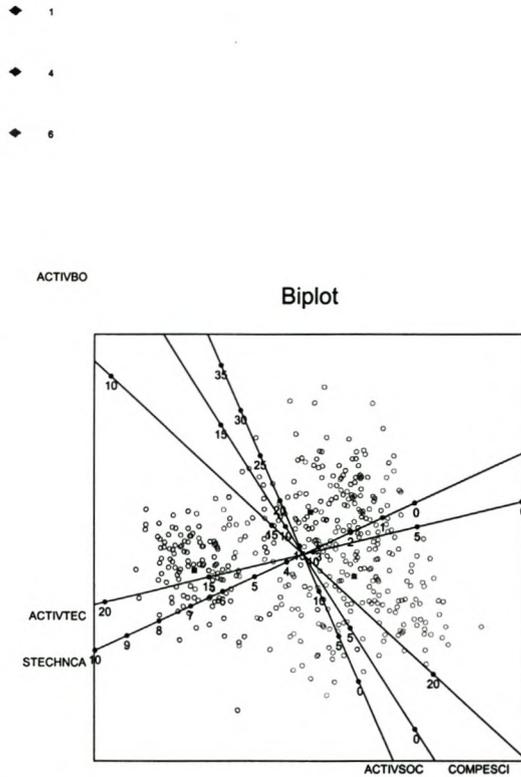
Figure 21 CVA Biplot showing Data Clustering for Sectors 1, 4, and 6

Perusal of Figure 21 shows the three score means to be well separated. This is visibly clearer in Figure 22 where the individual sample points are not shown. The positions of the sample points in Figure 21, however, indicate relatively little overlap of sector 1 with the other two sectors but a considerable amount of overlap between sectors 4 and 6 is quite apparent. Therefore, it was necessary to study the overlap among the sectors. Gardner (2001) introduces the concept of α-bags to quantify multidimensional overlap among various groups. This is

illustrated in Figures 22 and 23. These two figures contain the same biplot of Figure 21 but with 95% and 60% bags superimposed respectively. The mean vectors of the three sectors are also shown. Note that the mean value of each variable can be easily read off the respective biplot axes.

When the innermost 60% of the samples were considered, there was complete separation of sector 1 from sectors 4 and 6 with the latter two sectors possessing still a considerable amount of overlap as shown in Figure 23. Figure 22 shows the overlap when the innermost 95% of the samples in each sector are considered. However, the issue of merging of sectors was pursued further.
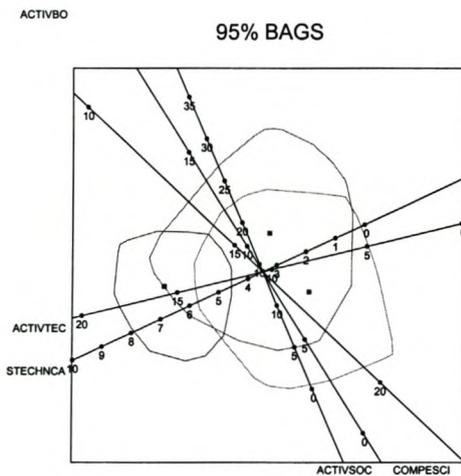

Figure 22. α-Bag with the Innermost 95% of the Sector Sample
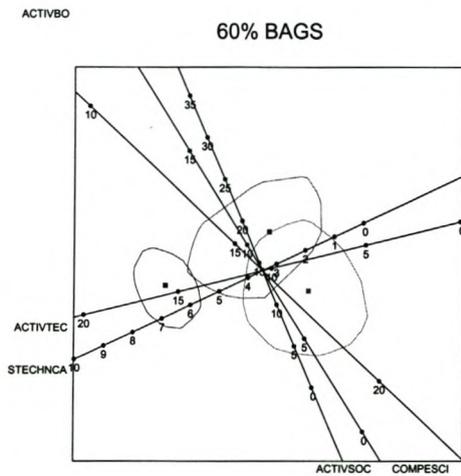
Figure 23. α-Bag with the Innermost60% of the Sector Sample

4.7.2 **Biplot with Classification Regions**

It can be shown that the CVA biplot given in Figures 21 through to 23 correspond closely to the linear discriminant analysis. Therefore, LDA classification regions can also be constructed on a CVA biplot. Figure 24 contains the 3-sector CVA biplot of Figure 21 but with LDA classification regions superimposed. The results in Figure 24 show a similar pattern of overlap as the results in Figure 21 and the α-bags in Figures 22 and 23. Thus, the biplot with regions showed overlap between sectors 4 and 6 with minimal overlap with sector 1.
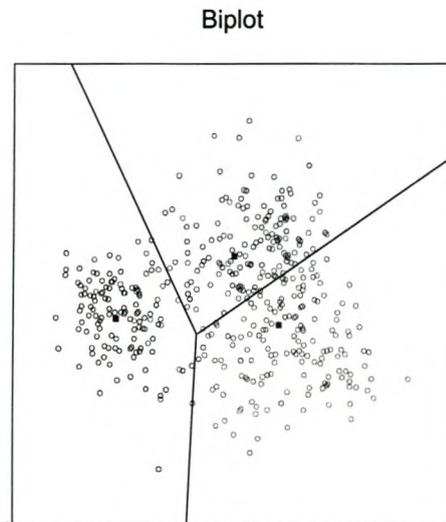
Biplot

<u>Figure 24.</u> Biplot with Classification Regions

4.7.3 **Biplots showing five Sectors**

In addition to the biplots discussed earlier, CVA biplots were constructed using five of the six sectors. Sector 5 was excluded from the analysis because it only constituted 8 observations. Alpha bags could also be constructed for investigating the overlap among sectors 1, 2, 3, 4 and 6.

Accordingly, in an endeavour to come up with the" best" variables for classification, further discriminant analysis tests were carried out first with 14 variables and then with all the 29 variables. Figure 25 shows alpha bags for investigating the overlap among 3 sectors using 14 variables.
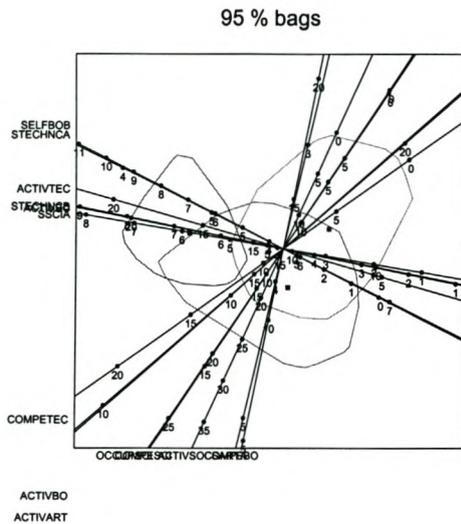
Figure 25. Biplot for 14 Variable model and 3 Sectors

The CV error rates obtained with 14 and all 29 variables used were 0.2424850 and 0,2324649 respectively. Considering that the CV error rate with 5 variables was 0.2985972, the improvement in the error rate when using either 14 variables or all the 29 variables seemed too insignificant to warrant their inclusion. In that regard, 5 variables were used in building the model for predicting and classifying public servants into appropriate job sectors based upon scores obtained from the vocational interest measure.

4.8 DISCUSSION OF THE RESEARCH FINDINGS

4.8.1 Introduction

The discussion of the results is made in the context of past research and the research objectives. Implications of the RIASEC structure for use in classifying occupations in the Zimbabwe Public Service setting will be discussed in the light of the results from data of the Zimbabwean sample. Other important issues such as cultural beliefs and differences in the understanding and interpretation of certain items as well as the impact of social desirability on the results will be discussed. As explained in Chapter 1, the objectives of the study were formulated as follows:

1. Develop a vocational interest measure for an adult educational setting in Zimbabwe using Holland's RIASEC structure as the basis.

2. Build a model for classifying people into appropriate job sectors based on the scores obtained from the vocational interest measure.

Accordingly, the verification of the items by content experts was undertaken prior to the pilot study. The results of the pilot study provided information on the functioning of the items. Results of item-total scale correlation (r_{it}) resulted in some items being dropped or revised. For example, item CSC_3 – "I understand the 'half-life' of a radioactive element" $(r_{it} = 0.162)$ under the Science/Investigative subscale was replaced with item – "I can conduct

geological surveys." Similarly, item CSC_{11} – "I understand the role of DNA in genetics" was replaced with item – "I can identify basic principles about the generation and transfer of energy." The Art subscale had two items with low item-total correlation, that is, CAR1 $(r_{it} = 0.060)$ and item CAR_2 $(r_{it} = 0.036)$. These were revised (See Table C1, Appendix C). Item OBO_2 $(r_{it} = -0.056)$ - "Typist/Stenographer", though negatively correlated, was not dropped or revised because of its theoretical and conceptual relevance. Over and above this, changes were also made to the structure of the questionnaire in order to minimize the 'lie' factor or responses of a social desirability nature.

4.8.2 Results on the Vocational Interest Measure

As mentioned previously, Holland's (1985a, 1997) theory claims that job performance is enhanced when there is a match between personality type and work environment. The understanding, according to Robbins (1998) is that jobs make differing demands on people and people differ in their vocational interests and the abilities that they possess. Accordingly, the vocational interest measure suited to the Zimbabwe Public Service was developed on that premise. The hexagonal ordering of the RIASEC types was used in the classification of occupational sectors within the public service. First, content-related validity was ensured through the involvement of content experts. Expert judgement was sought to review the items in terms of clarity, conceptual meaning and

appearance of bias. The review of literature (Aiken, 2000; Gable & Wolf, 1993; Meyer, 1998) on instrument development provided information about the nature and scope of the domain. Gable and Wolf (1993) emphasize the importance of involving content experts to establish the extent to which the measure relates to the conceptual definition.

Subscale reliability analysis was conducted to establish the consistency of the measure. Subscale reliability coefficients were within acceptable levels and generally consistent with some of the published vocational interest measures. For example, Meyer (1998) reported reliability coefficients ranging from 0.71 to 0.95 on the MB-10 vocational interest measure. Similarly, Holland et al. (1994) reported internal consistency coefficients (KR-20) of 0.72 to 0.92. Furthermore literature (e.g., Crocker & Algina, 1986; Gable & Wolf, 1993) shows that, with affective measures, the minimum acceptable scale reliability is 0.70. The subscale reliability coefficients in the current study were above 0.85. Results of item-total scale correlation were computed. Item-total scale correlation, according to Crocker and Algina (1986), is a statistic representing the correlation of the particular item to the summated scale score. In this study, a cut off point of 0.3 was adopted (Hair et al., 1998; Kerlinger, 1986). However, Gable and Wolf (1993) recommend a minimum cut off point of 0.2.

As shown in Table C1 (Appendix C) and Table 6, using 0.3 cut off point, the Technical (Realistic) subscale had 60.5% of the items above the cut off point.

However, items CTE 1 (Can operate an industrial sewing machine) and OTE 14 (I prefer working as a dentist) had low item-total scale correlation of 0.0811 and 0. 0840 respectively. The results might not necessarily be an indication of poor items. Possible reasons in the case of item CTE 1 might be that the majority of the public servants in the technical sector are males, as reflected in the demographic profile where of the 100 who participated in the study only 6 were females, and as such might not have the requisite experience. As for item OTE 14, possible reasons might be that the occupation is not well represented in the public service. The majority of the dentists are in private practice and, in addition, the field is not as appreciated or valued as the other areas.

Item-total scale correlation results for the Science (Investigative) subscale were generally good with 68% of the items above the cut off level.

The Art (Artistic) subscale had 71% of the items with item-total scale correlation above the 0.3 cut off point. The Social subscale had 78.94% of the items above the cut off point. However, item ASS 11 ("Supervise activities of mentally ill patients"), had a close to zero negative item-total scale correlation of –0.005. The results show that the area of special education as it relates to disability has not been taken seriously even by policy makers. Generally, the item (ASS 11) does not seem to indicate any technical flaws.

The Business Contacts (Enterprising) subscale had 81.57% of the items above the cut off point. However, two items had item-total scale correlation of below zero. Item ABC 8 (Participate in a political campaign) had low and negative item-total correlation of –0.072. Item-total scale correlation for item OBC 9 (Work as a politician) had item-total scale correlation of 0.0891. As can be seen, the two items are on the same subject, 'politics'. The results of the two items are inclined towards responses of a social desirability nature. Vella-Brodrick and White (cited in Constantine & Ladany, 2000) define social desirability as a pattern of responding that reflects the need to provide perceived socially acceptable responses to questions rather than reporting on one's actual feelings or behaviour. Consistent with this, Taylor and Boeyens (1991) warn that the 'lie' factor has a differential impact on scores. The Business Operations (Conventional) subscale had 68.42% of the items above the cut off point.

Instrument validation with the MB-10 employed the correlation coeffiecient statistic. The results of the intercorrelations among subscales supported the theory to a certain extent. For example, the Technical (Realistic) subscale was strongly correlated with the MB-10 subscales Prac (r = 0.481) and Sc (r = 0.531). Science (Investigative) was highly correlated with Sc (r= 0.489) and moderately correlated with Pr (r = 0.229). Art (Artistic) was moderately correlated with Art (r = 0.253). However, Social was moderately correlated with In and Gr. Moderate correlations were also obtained between Conventional and Nu and Bus. The

correlation between Enterprising and Bus was not statistically significant with a p-value 0.09. The lack of support might partly be due to the size and nature of the sample representing the sector considering the fact that the business or enterprising sector is more pronounced in the private sector than in the public sector.

The other possible reasons might partly be due to the disparate response formats of the two measures. The MB-10 uses the forced choice (Ipsative) response pattern whereas the new vocational interest measure uses the normative response pattern. Clemans (cited in Gable & Wolf, 1993) points out that in correlating scores on ipsative scales, the resulting intercorrelation matrix will have a larger number of low and negative correlations because the column sums of the initial covariance matrix must always equal zero.

4.8.3 Adequacy of the RIASEC Structure

According to Holland's theory, people can be categorized as predominantly one of six personality types, namely, Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. The RIASEC structure provided a framework for assessing person-job fit. Thus, in order to assess the adequacy of the RIASEC structure, factor analysis and construct validity analysis were computed to establish the extent to which the RIASEC structure provides a framework for assessing person-job fit in the Zimbabwe Public Service.

Factor analysis was computed on the study data resulting in 8 factors being extracted instead of the theoretically conceptualized 6 factors. Furthermore, although the factor loadings showed some semblance of relationship based on the theory, the general picture, as shown in Table 8 was that the RIASEC structure might not be reproduced. Data of the Zimbabwe sample appeared to provide a different dimension.

Examination of the RIASEC intercorrelations as shown in Figure 15 provided support for the RIASEC classification to some extent. Holland's theory asserts that occupational types that are more proximate on the hexagon are more similar than types that are more distant. Through visual examination of the pattern of intercorrelations, the results showed low and negative correlation between the adjacent types Realistic and Conventional ($r = -0.14$). Similarly, a negative correlation was obtained between alternate types, Investigative and Conventional ($r = -0.11$). On the other hand, a strong correlation was obtained between opposite types, Realistic and Social ($r = 0.25$). These results are consistent with those of Farh et al. (1998), Masango (1999) and Shivy, Rounds and Jones (1999). These studies revealed that individuals do not necessarily perceive occupations as theoretically conceptualized by Holland. Occupational perceptions might not be stable across cultures and furthermore, cultural background and the prevailing environment tend to impact on people's perceptions differently.

4.8.4 **Model Building**

The model for classifying people into appropriate job sectors within the public service was developed based upon the scores obtained on the vocational interest measure (see Table 12). Discriminant analysis was the statistic employed in developing the model. The process of building the model was explained in detail in the previous sections. As previously explained, visual inspection of group means showed that the means of the 6 sectors differed but the results of notched boxplots showed overlap on some of the sectors. Furthermore, the results of the squared Mahalanobis Distance calculated on all the six sectors showed that sector 3 was relatively close to sector 5 (see Table 11). Possible reasons might have been due to inadequate sample representation for sector 5.

Further analysis was conducted with only 3 sectors. These were sectors 1 (Technical), 4 (Education) and 6 (Business Operation e.g., Finance/Administration). Results of the biplots showed overlap between sectors 4 and 6 but slight overlap with sector 1. In addition, the overlap among the sectors was also investigated through the concept of alpha bags (Gardner, 2001). First, alpha-bag with the innermost 95% of the sector sample showed overlap between sectors 4 and 6 but slight overlap with sector 1 and secondly, Alpha-bag with the innermost 60% of the sector sample showed overlap between

4 and 6 but no overlap with sector 1. Biplot with classification regions also showed a similar picture.

The results are consistent with Holland's (1958a, 1997) theory of personality type and work environments. According to the theory, sectors 4 (Education) and 6 (Business Operations/Finance and Administration) are alternate types as per RIASEC classification and should have a relationship hence the overlap. The theory asserts that alternate types have a stronger correlation than opposite types (Education/Social and Technical/Realistic for example). Results of the RIASEC intercorrelations (Figure 15) confirm the relationship between sectors 4 and 6 but not sectors 1 and 4 and 1 and 6. On the whole, the results on model building are quite promising in that the cross validation table (see Table 13) obtained an error-rate of 0.2985972, an indication of a relatively good model.

In conclusion, the results supported the hypothesis that the developed measure of vocational interest will provide an indication of person-job fit. The results of the reliability analysis and item-total scale correlation have shown that the vocational interest measure is likely to have utility in determining person-job fit. Holland et al. (1994) highlight the fact that item analysis over time may refine the scales of a measure. Accordingly, further reviewing of the items taking cognizance of situational factors should enhance the utility of the measure. In addition, the theoretical and conceptual relationship between the new measure and the MB-10

was supported. Hence, concurrent validity of the vocational interest measure was established.

The results of factor analysis seemed to indicate that occupations might not be strictly specified according to the RIASEC structure. On the other hand, the results of the intercorrelations among the RIASEC latent variables showed that the RIASEC structure could provide some guidance in job classification.

The results of the discriminant analysis indicated a number of important areas needing attention. The classification of sectors raised important questions not only for the three occupational sectors with small samples but for all six sectors in general. The question was whether all six sectors should be considered as forming separate job classes or whether some of the sectors should be merged into larger sectors. Basically, the classification of sectors needs further refining in the light of the results of factor analysis, the RIASEC intercorrelations and the discriminant analysis results. Notwithstanding this, the model for predicting and classifying people into appropriate job sectors was developed. The results showed support of the hypothesis that a model different from the RIASEC model could emerge.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The present study was designed to develop a vocational interest measure validated on the Zimbabwe population and to build a model for classifying people into occupational sectors within the Service based on the scores on the vocational interest measure. In this regard, this chapter begins with a summary of the overall research process in the context of previous research and the objectives of the study. Limitations of the study will be highlighted and conclusions drawn. Finally, recommendations to include challenges and the way forward will be discussed.

5.2 Summary of Study

Chapter 1 provided the rationale for the study and the motivation leading to the formulation of the research problem. A detailed account of the Zimbabwe Public Service in terms of the on-going reform programs was given. Preliminary literature review was undertaken in this chapter in order to provide guidance in the identification and preliminary formulation of the problem. As explained previously, the motivation for the research was impelled by the absence of vocational interest measures suited to the Zimbabwean setting. The dire need for assessment tools that could be employed to objectively assess the suitability of

job seekers for entry into the Public Service and for promotion within the service cannot be underestimated. The absence of suitable assessment tools stalled the implementation of the program. As explained in Chapter 1, the objectives of the current study were to develop a vocational interest measure for assessing person-job fit in an adult educational setting in the Zimbabwe Public Service and to develop a model for predicting and classifying people into appropriate job sectors.

Accordingly, this chapter provided insights into vocational interests and occupational pursuits and their impact on productivity and job tenure. The understanding is that vocational behaviours are, in part, influenced by person-job fit. That is, job satisfaction, tenure and productivity depend, to a large extent, on the degree of match between one's vocational interests and occupational pursuits. Furthermore, the need for skills updating or continuing education by adult workers in view of the changes in the economic environment the world over was highlighted. The prevailing economic reform programs that most developing countries are grappling with serve to illustrate the need for continuing education. The need for vocational interest measures was apparent through out the chapter. A synopsis of the research design and methodology for the study was given and the structure and logical flow of the research process was outlined.

Chapter 2 provided, with the help of a literature review, the framework for the conceptual and theoretical understanding of vocational interests and occupational pursuits. In chapter 2 theories underpinning career development and vocational interests and their relevance to the study were discussed. For example, theories of career development provided insights into personality traits and patterns of thought. The common thread in the theories of career development centred on the criticality of 'role models' and the environment in molding and reinforcing one's self-concept and the degree to which personality characteristics influence career choice and occupational pursuits.

Similarly, as explained in Chapter 2, the review of relevant literature put the present study in context. The review of contemporary literature served as a precursor to the study. It was through the review of literature that invaluable information was provided on:

(a) What has already been done in the area of vocational interests and person-job fit?

(b) The theoretical framework underpinning career development and career choice.

(c) The research design and the methodology in terms of suitable data collection procedures, instrumentation, sample size and sampling procedures including appropriate data analysis approaches.

Largely, the review of literature provided clues and suggestions on areas for further exploration and, as elaborated in Chapter 2, the review of existing literature provided a deeper understanding of personality types and career choice.

Chapter 3 examined the appropriate research design and methodology for the study in depth. The process in the development of the measure, as discussed, involved extensive consultations and item verification by a team of content experts. Item editing was conducted prior to piloting the measure. Data analysis was through factor analysis, reliability and item analysis followed by further editing of the items. It is also in Chapter 3 that the description of the target population was made and this included the criteria for selecting a representative sample, sampling procedure and sample size.

Similarly, the statistical approaches to data analysis were discussed. These included factor analysis, reliability analysis and construct validity analysis. Statistical discriminant analysis was used to provide a model for predicting and classifying people to appropriate job sectors. As discussed in Chapter 3, statistical discriminant analysis and classification are multivariate procedures used to optimally separate known groups and to allocate new subjects to previously defined job sectors. Construct validity, as discussed in the chapter,

was through intercorrelation of the constructs to establish the magnitude and direction of relationship among the constructs.

Linking with Chapters 1, 2, and 3, **Chapter 4** provided a detailed description of the study sample to which graphical presentations of the demographic profiles in the form of bar charts were made. Results of the subscale reliability coefficients and item-total scale correlation were given. The reliability coefficients for the subscales of the vocational interest measure ranged from 0.85 to 0.89. Item-total scale correlation results were reported. Of note, over 60% of the items had item-total scale correlation above the cut off point of 0.3. Results of the validation of the measure with an external criterion were provided. The validation results generally supported the theory except for the enterprising subscale where the theoretical assumptions were not supported. Overall concurrent validity of the vocational interest measure was established.

To assess the adequacy of the RIASEC structure, factor analysis was computed and the construct validity of the RIASEC structure examined through correlation coefficients statistic. Results of the scree plot were used to identify the optimum number of factors extracted and contrary to the theoretically conceptualized six (6) factors, 8 factors were extracted. Examination of the RIASEC intercorrelations also showed partial support of the RIASEC classification.

The process in the building of the model for prediction and classification of people into appropriate job sectors based on the scores from the vocational interest measure was discussed and the model developed. Lastly, the chapter discussed the research results in the context of the research objectives and literature. Overall, the vocational interest measure was developed and validated. A model for predicting and classifying people to appropriate job sectors was developed and tested. The adequacy of the RIASEC structure was partially supported.

5.3   Limitations of the Study

A stratified sample of 600 was considered large enough and representative enough of the target population. Unfortunately, although the number was initially obtained, sample size fluctuations due to missing data or erroneous response patterns lowered the sample to 500. Three sectors (Science, Art, and Business Contacts) were the worst affected. This situation impacted on model building because discriminant analysis is a multivariate statistic and, as such, is sensitive to sample size. Secondly, lack of clear variability in the responses had a bearing on the overall results. Limitations of self-report measures are that self-assessments are only as accurate as the individual wishes them to be for a particular purpose. Extraneous considerations can cause people to behave inconsistently with their attitudes as evidenced by responses to some of the items on the measure.

5.4   Conclusion

The hypotheses for the study were that the developed measure of vocational interests will provide an indication of person-job fit and that a model different from Holland's RIASEC model could emerge. The results from data of the Zimbabwe Public Service sample supported the study hypotheses in that:

(a)   Concurrent validity of the vocational interest measure was established through instrument validation. This serves as an indication of the utility of the measure in the Zimbabwe public service context.

(b)   As hypothesized, the results of factor analysis seemed to indicate that occupations might not be strictly specified according to the RIASEC structure. Similarly, the results of the intercorrelations among the RIASEC latent variables showed the need for caution when using the RIASEC structure.

(c)   Essentially, the hexagonal ordering of the RIASEC structure was not reproduced. For example, 8 factors instead of 6 were extracted, an indication that the nature of occupations in the Zimbabwe Public Service is such that the RIASEC ordering might not adequately describe them. In a similar vein, strong correlations between opposite types – Realistic and Social show the need to review the theory in the context of the respective cultural settings. Theories modeled on the western culture might not apply wholesale in other cultures.

(d)   A model for predicting and classifying people into appropriate job sectors based on the scores obtained from the vocational interest measure was developed. The model's utility was confirmed using the scores from the sample data. The cross validation table obtained an error-rate of 0.2985972, an indication of a promising model.

Research in the area of vocational interest measures in Africa and particularly in Zimbabwe is limited. This study is, to my knowledge, the first to explore the possibility of building a model for predicting and classifying people to job sectors in Zimbabwe. Fundamentally, the present study extends the body of research on vocational interests and occupational pursuits in the Zimbabwe cultural context. The present study has both theoretical and practical implications. From a theoretical standpoint, the developing, validation, and testing of a vocational interest measure in the Zimbabwean public service context is likely to contribute to the understanding of personality types and occupational choice from a different cultural perspective. Moreover, the development of a model for predicting occupational group membership in the is likely to advance knowledge about person-job fit. From a practical standpoint, the findings of this study may facilitate the increased and efficient utilization of personnel in the Zimbabwe Public Service in order to realize productivity and job tenure.

5.5   Recommendations

The following recommendations are based on the research findings:

- A more **diverse sample** from the one used in the present study is recommended in order to ensure variability of responses.

- Further refinement of the model and the vocational interest measure is recommended.

- Proportionate sample representation of job sectors is also recommended.

- There is need to explore further the **number of occupational sectors** that are representative of the public service.

- Similarly, the **classification of occupations** should be reviewed in the light of the results on model building and the RIASEC structure respectively.

- The **model** for prediction and classification of people to job sectors and **the measure of vocational interest** are two measuring devices still at the nascent stage. There is need to continue refining them in order to enhance their utility.

Lastly, the question which begs an answer is the validity of personality measures over time. The question is, "Would an instrument be valid for all times?" The understanding is that while measures of personality might not change, the subjects of a study, for example, change. Further research is recommended.

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References

Aiken, L. R. (2000). Psychological testing and assessment. Boston, Mass: Allyn and Bacon.

Ajzen, I., & Fishbein, M. (1980). A theory of reasoned action. Englewood Cliffs, NJ: Prentice-Hall.

Amamoo, N. A. (September 2000, New Africa)). Naming our heroes (p.34-35). New Africa Publication, September 2000, No. 388.

Anastasi, A. (1988). Psychological testing (6th ed.), Fordham University, NY: Macmillan Publishing.

Athanasau, J. C., & Cooksey, R. W. (1993). Self-estimates of vocational interests. Australian Psychologist, 28 (2), 118-127.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. Educational Psychologist, 28 (2), 117-148.

Bandura, A. (1997). Social-cognitive learning theory. In M. E. Gredler (Ed.), Learning and instruction: Theory into practice (3rd ed., pp. 277-307). Upper Saddle River, NJ: Prentice Hall.

Berry, J. W. (1989). Imposed etics-emics-derived etics: The operationalization of a compelling idea. International Journal of Psychology, 24, p. 721-735.

Betz, n. e., & Hackett, G. (1986). Applications of self-efficacy theory to understanding career choice behavior. Journal of Social and Clinical Psychology, 4, 279-289.

Bhola, H. S. (1988). World trends and issues in adult education. UNESCO: Jessica Kingsley publishers.

Borgen, F. H. (1986). New approaches to the assessment of interests. In W. B. Walsh & S. H. Osipow (Eds.), Advances in vocational psychology: Vol. 1. The assessment of interests (pp. 31-54). Hillside, NJ: Erlbaum.

Boyle, G. J., & Fabris, S. (1992). Confirmatory and congeneric factor analysis of Holland's self-directed search. Personality and Individual Differences 13, 1077-1084.

Byrne, B. M., & Campbell, T. L. (1999). Cross-cultural comparisons and the presumption of equivalent measurement and theoretical structure. Journal of Cross Cultural Psychology, 30 (5), 555-574.

Campbell, D. P., & Borgen, F. H. (1999). Holland's theory and the development of interest inventory. Journal of Vocational Behavior, 55, 86-101

Central Statistical Office (2000, July). The 1999 indicator monitoring-labourforce survey. Harare: Zimbabwe.

Chartrand, J. M., & Camp, C. C. (1991). Advances in the measurement of career development constructs: A 20-year review. Journal of Vocational Behavior, 39, 1-39.

Chartrand, J., & Walsh, W. B. (1999). What should we expect from congruence? Journal of Vocational Behavior, 55, 136-146.

Chetsanga, C. (2000, November 14). Human activity and economic growth. The Zimbabwe Daily News, p. 24-25.

Constantine, M. G., & Ladany, N. (2000). Self-report multicultural counseling competence scales: Their relation to social desirability attitudes and multicultural case conceptualization ability. Journal of Counseling Psychology, 47 (2), 155-164.

Crocker, L., & Algina, J. (1986). Introduction to classical and modern test theory. NY: Holt, Rinehart, and Winston.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. Psychological Bulletin, 52, 281-302.

Dawis, R. V., & Lofquist, L. H. (1984). A psychological theory of work adjustment: An individual-difference model and its applications. Minneapolis, MN: University of Minnesota Press.

Dumenci, L. (1995). Construct validity of the self-directed search using hierarchical nested structural models. Journal of Vocational Behavior, 47, 21-34

Farh, J., Leong, F. T. L., & Law, K. S. (1998). Cross-cultural validity of Holland's model in Hong Kong. Journal of Vocational Behavior, 52, 425-440.

Fraser-Moleketi (2000, August29) New measures for management efficiency. The Star (Johannesburg), p. 3.

Furnham, A., Toop, A., Lewis, C., & Fisher, A. (1995). P-E fit and job satisfaction: A failure to support Holland's theory in three British samples. Personality and Individual Differences, 19 (5), 677-690.

Gable, R. K., & Wolf, M. B. (1993). Instrument development in the affective domain: Measuring attitudes and values in corporate and school settings (2nd ed.). Boston: Kluwer Nijhoff.

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). Educational research: An introduction (6th ed.), White Plains, N. Y.: Longman.

Gardner, S. (2001). Extensions of biplot methodology to discriminant analysis with applications of non-parametric principal components. Unpublished Ph.D. dissertation, University of Stellenbosch, Stellenbosch: South Africa.

Gati, I. (1979). A hierarchical model for the structure of vocational interests. Journal of Vocational Behavior, 15, 90-106.

Gati, I. (1991). The structure of vocational interests. Psychological Bulletin, 109, 309-324.

Gay, L. R. (1996). Educational research: Competencies for analysis and application (6th ed.). Upper Saddle River, NJ: Prentice Hall.

Gottfredson, G. D. (1999). John L. Holland's contributions to vocational psychology: A review and evaluation. Journal of Vocational Behavior, 55, 15-40.

Gottfredson, L. S. (1978). Career stability and redirection in adulthood. Journal of Applied Psychology, 62, 436-445.

Gottfredson, L. S. (1981). Circumscription and compromise: A development theory of occupational aspirations. Journal of Counseling Psychology, 28, 545-579.

Gottfredson, L. S., & Richards, J. M. (Jr.) (1999). The meaning and measurement of environments in Holland's theory. Journal of Vocational Behavior, 55, 57-73

Gower, J. C., & Hand, D. J. (1996). Biplots. London: Chapman and Hall.

Gredler, M.E. (1997). Learning and Instruction: Theory into practice (3rd ed.), University of South Carolina, NJ: Prentice Hall.

Hackett, G., & Watkins, C. E. (1995). Research in career assessment: Abilities, interests, decision making, and career development. In W. B. Walsh & S. H. Osipow (Eds.), Handbook of vocational psychology: Theory, research, and practice (2nd ed., pp. 181-215). Mahwah, NJ: Lawrence Erlbaum Associates.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). Multivariate data analysis (5th ed.), Upper Saddle River, NJ: prentice Hall.

Harrington, T. F., & O'Shea, A. J. (Eds.), (1984). Guide for occupational exploration (2nd ed.), Circle Pines, MN: American Guidance Service.

Herr, E. L. (1999). Theoretical perspectives on the school-to-work transition: Reactions and recommendations. The Career Development Quarterly, 47 (4), 359-364.

Hesketh, B. (1995). Personality and adjustment styles: A theory of work adjustment approach to career enhancing strategies. Journal of Vocational Behavior, 46, 274-282.

Hesketh, B., & Rounds, J. (1995). International and cross-cultural approaches to career development. In W. B. Walsh & S. H. Osipow (Eds.), Handbook of vocational psychology: Theory, research, and practice (2nd ed., p 5-40). Mahwah, NJ: Lawrence Erlbaum Associates.

Hofstede, G. (1991). Culture and organizations: Software of the mind. London: McGraw-Hill.

Hogan, H., & Blake, R. (1999). John Holland's vocational typology and personality theory. Journal of Vocational Behavior, 55, 41-56.

Holland, J. L. (1985a). Making vocational choices: A theory of vocational personalities and work environments (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Holland, J. L. (1987). Some speculation about the investigation of person-environment transactions. Journal of Vocational Behavior, 31, 337-340.

Holland, J. L. (1992). Making vocational choices: A theory of vocational personalities and work environments. Odessa. FL: Psychological Assessment Resources.

Holland, J. L. (1996). Exploring careers with a typology: What we have learned and some new directions. American Psychologist, 51 (4), 397-406.

Holland, J. L., Fritzsche, B. A., & Powell, A. B. (1994). Self-directed search: SDS Form R (4th ed.). Odessa, FL: Psychological Assessment Resources.

Hubert, L., & Arabie, P. (1987). Evaluating order hypothesis within proximity matrices. Psychological Bulleting, 102, 172-178.

Huysamen, G. K. (1994). Methodology for the social and behavioral sciences. Bloemfontein, South Africa: Southern Book Publishers.

Jarvis, P. (1995). Adult and continuing education: Theory & practice. London: Routledge.

Johansson, C. B. (1986). Manual for the career assessment inventory. Minneapolis: Computer Systems.

Johnson, R. A., & Wichern, D. W. (1998). Applied multivariate analysis (4th ed.), London: Prentice-Hall.

Kerlinger, F. N. (1986). Foundations of behavioral research. (3rd ed.), NY: Holt, Rinehart and Winston.

Knight, G. A. (1997). Cross-cultural reliability and validity of a scale to measure firm enterpreneurial orientation. Journal of Business Venturing, 12, 213-225.

Krumbolttz, J. D., & Worthington, R. L. (1999). The school-to-work transition from a learning theory perspective. The Career Development Quarterly, 47, (4). 312-325.

Kuder, F. (1977). Activity interest and occupational choice. Chicago: Science Research Associates.

Lachenbruch, P. A., & Mickey, M. R. (1968). Estimation of error rates in discriminant analysis. Technometrics, 10, 1-11.

Leedy, P. D. (1997). Practical research: Planning and design (6th ed.). Upper Saddle River, NJ: Prentice-Hall.

Lent, R. L., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest choice, and performance. Journal of Vocational Behavior, 45, 79-122.

Lent, R. W., Hackett, G., & Brown, S. D. (1999). A social cognitive view of school-to-work transition. The Career Development Quarterly, 47, 297-311.

Lent, R. W., & Worthington, R. L. (1999). Applying career development theories to the school-to-work transition process. The Career Development Quarterly, 47 (4), 291-311.

Leong, F. T. (1997). Cross-cultural career psychology. Journal of Counseling Psychology, 44, 355-359.

Leong, F. T. L., & Brown, M. T. (1995). Theoretical issues in cross-cultural career development: cultural validity and cultural specificity. In W. B. Walsh & S. H. Osipow (Eds.), Handbook of vocational psychology: Theory, research, and practice (2nd ed., p.143-180). Mahwah: NY: Lawrence Erlbaum Associates.

Lew, C. C. (1997). <u>Person-environmental congruence, job satisfaction, and job involvement.</u> Unpublished master's thesis, Rand Afrikaans University, Western Cape, South Africa.

Lowe, J. (1982). <u>The education of adults: A world perspective</u> (2nd ed.), UNESCO: OISE Press.

Mararike, C. D. (1999). <u>Survival strategies in rural Zimbabwe: The role of assets, indigenous knowledge and organizations.</u> Harare, Zimbabwe: Mond Books.

Masango, S. J. (1999). <u>Cross-cultural validity of Holland's SDS with a specially designed measure of entrepreneurial intentions</u>. Unpublished master's thesis, University of British Columbia, Vancouver, British Columbia, Canada.

McDaniel, M. A., & Snell, A. F. (1999). Holland's theory and occupational information. <u>Journal of Vocational Behavior, 55,</u> 74-85.

McGill, R., Tukey, J. W., & Larsen, W. A. (1978). Variations of Box Plots. <u>The American Statistician, 32,</u> 12-16.

McLachlan, G. J. (1992). <u>Discriminant analysis and statistical pattern recognition.</u> New York: John Wiley.

Mertens, D. M. (1998). <u>Research methods in education and psychology: Integrating diversity with quantitative & qualitative approaches.</u> Thousand Oaks, California: Sage Publications.

Messick, S. J. (1980). Test validity and the ethics of assessment. <u>American Psychologist, 30</u> (11), pp. 1012-1027.

Messick, S. J. (1989). Validity. In L. Linn (Ed.), <u>Educational measurement</u> (3rd ed., pp. 13-146).

Messick, S. J. (1995). Standards of validity and the validity of standards in performance assessment. <u>Educational Measurement: Issues and Practice, 14,</u> 5-8

Meyer, J. C. (1980). <u>The development, standardization and vaidation of the KODUS interest questionnaire.</u> Unpublished D. Phil-dissertation. University of Stellenbosch, Cape Town: South Africa.

Meyer, J. C. (1998). The development and standardization of a new interest questionnaire. <u>South African Journal of Psychology, 28</u> (1), 36-43.

Mouton, J, (2001). <u>How to succeed in your Master's & Doctoral studies: A South African guide and resource book.</u> Pretoria, South Africa: Van Schaik.

Nordstrom, K., & Riddestrale, J. (2000). <u>Funky Business: Talent makes capital dance.</u> Bookhouse Publishing AB.

Nunnally, J. C. (1978). <u>Psychometric theory</u> (2nd ed.). New York: Mc Graw-Hill.

Nyirenda, S. (1994). Assessing highly accomplished teaching: Developing a metaevaluation criteria framework for performance-assessment systems for national certification of teachers. <u>Journal of Personnel Evaluation in Education, 8,</u> p. 313-327.

Osipow, S. H. (1990). Convergence in theories of career choice and development: Review and prospect. Journal of Vocational Behavior 36, 122-131.

Parsons, F. (1909). Choosing a vocation. In W. B. Walsh & S. H. Osipow (Eds.), Career decision making (pp. 2). Hillside, NJ: Lawrence Erlbaum Associates.

Prediger, D. J. (1982). Dimensions underlying Holland's hexagonal: Missing link between interests and occupations? Journal of Vocational Behavior, 21, 259-287.

Prediger, D. J. (1999). Basic structure of work-relevant abilities. Journal of Counseling Psychology, 46 (2), 173-184

Rachman, D., Amernic, J., & Aranya, N. (1981). A factor-analytic study of the construct validity of Holland's self-directed search. Educational and Psychological Measurement, 41, 425-436.

Rayman, J., & Atanasoff, L. (1999). Holland's theory and career intervention: The power of the hexagon. Journal of Vocational Behavior, 55, 114-126.

Reardon, R. C., & Lenz, J.G. (1999). Holland's theory of career assessment. Journal of Vocational Behavior, 55, 102-113.

Robbins, S. P. (1998). Organizational Behavior: Concepts, controversies, applications (8th ed.), Upper Saddle River, NJ: Prentice-Hall.

Rounds, J., & Tracey, T. J. (1996). Cross-cultural structural equivalence of RIASEC models and measures. Journal of Counseling Psychology, 43, 310-329.

Rukobo, (2001). Public Service reforms: ZIM/97/008: Strengthening government capacity for reforms. Unpublished paper, Zimbabwe Public Service Commission, Harare, Zimbabwe.

Ryan, J. M., Tracey, T. J. G., & Rounds, J. (1996). Generalizability of Holland's structure of vocational interests across ethnic, gender, and socioeconomic status. Journal of Counseling Psychology, 43 (3), 330-337.

Shivy, V. A., Rounds, J., & Jones, L. E. (1999). Applying vocational interest models to naturally occurring occupational perceptions. Journal of counseling Psychology, 46 (2), 207-217.

Shullman, S. L., & Carder, C. E. (1983). Vocational psychology in industrial settings. In W. B. Walsh & S. H. Osipow (Eds.), Handbook of vocational psychology (Vol. 2, p 141-206). Hillside, NJ: Lawrence Erlbaum Associates.

Stead, G. B., & Watson, M. B. (1998). Career research in South Africa: Challenges for the future. Journal of Vocational Behavior, 52, 289-299.

Stead, G. B., & Watson, M. B. (1998). The appropriateness of Super's career theory among black South Africans. South African Journal of Psychology, 28 (1), 40-43.

Super, D. E. (1957). The psychology of careers. NY: Harper & Row.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown, L. Brooks & Associates (Eds.), <u>Career choice and development: Applying contemporary theories to practice</u> (2nd ed., pp. 197-261). San Francisco: Jossey-Bass.

Swanson, J. L., & Fouad, N. A. (1999). Applying theories of person-environment fit to the transition from school to work. <u>The Career Development Quarterly, 47</u> (4), 337-347.

Taylor, T. R. & Boeyens, J. C. A (1991). The comparability of the scores of blacks and whites on the South African personality questionnaire: An exploratory study. <u>South African Journal of Psychology, 21</u> (1), 1-11.

Tokar, D. M., & Fischer, A. R. (1998). More on RIASEC and the Five-

Tracey, J. G., Wanatabe, N., & Schneider, P. L. (1997). Structural invariance of vocational interests across Japanese and American cultures. <u>Journal of Counseling Psychology, 44,</u> 346-354.

Tracey, T. J., & Rounds, J. (1993) Evaluating Holland and Gati's vocational interest models: A structural meta-analysis. <u>Psychological Bulletin, 113,</u> 229-246.

Triandis, H. C. (1995). <u>Individualism & collectivism</u>. San Francisco: Westview.

Triandis, H. C. (1996). The psychological measurement of cultural syndromes. <u>American Psychologist, 51</u> (4), 407-415.

Triandis, H. C., Chen, X. P., & Chan, D. K. S. (1998). Scenarios for the measurement of collectivism and individualism. Journal of Cross-Cultural Psychology, 29 (2), 275-285.

Upperman, P. J., & Church, A. J. (1995). Investigating Holland's typological theory with army occupational specialties. Journal of Vocational Behavior, 47, 61-75.

Van Der Merwe, R. P. (1999). Psychological assessment in industry. Journal of Industrial Psychology, 25 (3), 8-11.

Weiner, B. (1997). Attribution Theory. In M. E. Gredler (Ed.), Learning and instruction: Theory into practice. (3rd ed., pp 313-350). Upper Saddle River, NJ: Prentice Hall.

APPENDIX A

QUESTIONNAIRE

Vocational Interest Questionnaire

VOCATIONAL INTEREST QUESTIONNAIRE

You are kindly requested to complete the demographics and then respond to the Questionnaire by indicating your occupational preferences.

Please answer all questions.

Sex: (circle) **M** **F** (Tick)

Age Range :

20 - 30 years ☐

31 - 40 years ☐

41 - 50 years ☐

51 years and above ☐

Current marital status:

1. Single ☐

2. Married ☐

2. Divorced ☐

4. Separated ☐

5. Widowed ☐

6. Cohabiting ☐

Academic Qualifications (Tick) the highest qualification

1. 'O' Level ☐

2. 'A' Level ☐

3. Degree ☐

4. Postgraduate ☐

5. Other (Please specify)

_____

Professional Qualifications (Specify_____

Organisation currently working for　　(Tick)

1.　　　Government　　　　　　　　　　☐

2.　　　Parastatal　　　　　　　　　　☐

3.　　　Industry and Commerce　　　　☐

4.　　　NGO　　　　　　　　　　　　☐

5.　　　Self Employed　　　　　　　　☐

Department …………………………………………..

Section……………………………………………

Years at current Company　　　(Tick)

1.　　　Less than 5 years　　　　　　☐

2.　　　5 to 10 years　　　　　　　　☐

3.　　　11 years and above　　　　　☐

Current Job Title　……………………………..

Years in Current Job　　　　(Tick)

1.　　　Less than 5 years　　　　　　☐

2.　　　5 to 10 years　　　　　　　　☐

3.　　　11 years and above　　　　　☐

Level of Satisfaction with current Job (Tick)

1.　　　Not satisfied　　　　　　　　☐

2.　　　Somewhat Satisfied　　　　　☐

3.　　　Very Satisfied　　　　　　　☐

**Please turn overleaf and respond to the Questionnaire.
Answer all the Questions.**

Activities

Please indicate the extent to which you like or dislike the activities using the following 3-point scale

2	Like	(L)
1	Indifferent	(I)
0	Dislike	(D)

Please shade ☐ the preferred box   **L**   **I**   **D**

		L	I	D
ATE_1	Repair cars	☐	☐	☐
ATE_2	Fix electrical gadgets	☐	☐	☐
ATE_3	Work in a carpentry shop	☐	☐	☐
ATE_4	Work as a machinist	☐	☐	☐
ATE_5	Supervise Installation of domestic appliances	☐	☐	☐
ATE_6	Work outdoor	☐	☐	☐
ATE_7	Operate motorized machines	☐	☐	☐
ATE_8	Design Communication Systems	☐	☐	☐
ATE_9	Work in agricultural related field	☐	☐	☐
ATE_{10}	Service computer hardware	☐	☐	☐
ATE_{11}	Repair Sewing machines	☐	☐	☐

Please comment on each of the activities you are indifferent to:

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		L	I	D
SCI_1	Predict Population growth	☐	☐	☐
SCI_2	Work in a research office or laboratory	☐	☐	☐
SCI_3	Work on a scientific project	☐	☐	☐
SCI_4	Work with chemicals	☐	☐	☐
SCI_5	Apply mathematics to practical problems	☐	☐	☐
SCI_6	Study living organisms	☐	☐	☐
SCI_7	Study the function of the human body	☐	☐	☐
SCI_8	Study soils and vegetation	☐	☐	☐
SCI_9	Acquire forensic knowledge in crime scene investigation	☐	☐	☐
SCI_{10}	Analyze alcohol or drug levels in human fluids	☐	☐	☐
SCI_{11}	Construct field maps	☐	☐	☐

Please comment on each of the activities you are indifferent to:

....

....

	Please shade ☐ **the preferred box**	**L**	**I**	**D**
AAR$_1$	Sketch, draw, or paint	☐	☐	☐
AAR$_2$	Design furniture, clothing, or posters	☐	☐	☐
AAR$_3$	Play in a band, group, or orchestra	☐	☐	☐
AAR$_4$	Arrange flowers	☐	☐	☐
AAR$_5$	Create portraits or photographs	☐	☐	☐
AAR$_6$	Write novels or plays	☐	☐	☐
AAR$_7$	Work as a music instructor/teacher	☐	☐	☐
AAR$_8$	Work in recording studios	☐	☐	☐
AAR$_9$	Work with a gifted artist, writer, or sculptor	☐	☐	☐
AAR$_{10}$	Work in sport, health and fitness environments	☐	☐	☐
AAR$_{11}$	Work as a graphic designer	☐	☐	☐

Please comment on each of the activities you are indifferent to:

....

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		L	**I**	**D**
ASS$_1$	Report on national events	☐	☐	☐
ASS$_2$	Interact with important educators and therapist	☐	☐	☐
ASS$_3$	Work as a teacher	☐	☐	☐
ASS$_4$	Respond to customer complaints	☐	☐	☐
ASS$_5$	Study human behaviour	☐	☐	☐
ASS$_6$	Help others with their personal problems	☐	☐	☐
ASS$_7$	Study juvenile delinquency	☐	☐	☐
ASS$_8$	Plan, organize and direct personnel activities	☐	☐	☐
ASS$_9$	Investigate social aspects of human behaviour	☐	☐	☐
ASS$_{10}$	Take a Human Relations course	☐	☐	☐
ASS$_{11}$	Supervise activities of mentally ill patients	☐	☐	☐

Please comment on each of the activities you are indifferent to:

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Please shade☐ the preferred box   **L** **I** **D**

		L	I	D
ABC_1	Learn strategies for business success	☐	☐	☐
ABC_2	Run own business	☐	☐	☐
ABC_3	Assist Organizations identify economic goals	☐	☐	☐
ABC_4	Attend sales conferences	☐	☐	☐
ABC_5	Supervise the work of others	☐	☐	☐
ABC_6	Research on economic trends	☐	☐	☐
ABC_7	Meet important executives and leaders	☐	☐	☐
ABC_8	Participate in a political campaign	☐	☐	☐
ABC_9	Act as an organizational or business consultant	☐	☐	☐
ABC_{10}	Study ways organisations distribute goods and services	☐	☐	☐
ABC_{11}	Advise on Investment prospects	☐	☐	☐

Please comment on each of the activities you are indifferent to:

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		L	I	D
ABO_1	Report on the financial affairs of an enterprise	☐	☐	☐
ABO_2	Oversee the interpretation of government policy	☐	☐	☐
ABO_3	Devise plans for better budgeting	☐	☐	☐
ABO_4	Take an Accounting Course	☐	☐	☐
ABO_5	Prepare specifications for purchases	☐	☐	☐
ABO_6	Take an inventory supplies or products	☐	☐	☐
ABO_7	Device systems for corporate financial control	☐	☐	☐
ABO_8	Develop financial Management Systems	☐	☐	☐
ABO_9	Act as liquidator in insolvency cases	☐	☐	☐
ABO_{10}	Advise on taxation and pension	☐	☐	☐
ABO_{11}	Undertake audits	☐	☐	☐

Please comment on each of the activities you are indifferent to:

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Competencies

Using the scale below, please indicate those activities you can do competently well and those that you have no competence in using the following 3-point scale

2.	Yes	(Y)
1.	Uncertain	(U)
0.	No	(N)

Please shade □ the preferred box

		Y	U	N
CTE_1	I can operate an industrial sewing machine	□	□	□
CTE_2	I can make a scale drawing	□	□	□
CTE_3	I have an aptitude for engineering fundamentals	□	□	□
CTE_4	I can change a machine oil	□	□	□
CTE_5	I have operated power tools such as a drilling press,	□	□	□
CTE_6	I have knowledge of agricultural practices	□	□	□
CTE_7	I can supervise commercial farming	□	□	□
CTE_8	I can maintain electronic systems	□	□	□
CTE_9	I am good at plumbing	□	□	□
CTE_{10}	I can provide technical advise on life stock propagation	□	□	□
CTE_{11}	I have expertise in defining dimensions of land features	□	□	□

Please comment on each of the items you are uncertain of

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....

		Y	U	N
CSC_1	I am good at computer programming	□	□	□
CSC_2	I can interpret statistical data	□	□	□
CSC_3	I can conduct geological surveys	□	□	□
CSC_4	I can develop methods for preservation of food	□	□	□
CSC_5	I can analyze patterns of human behaviour	□	□	□
CSC_6	I can design computer systems	□	□	□
CSC_7	I can interpret simple chemical formulae	□	□	□
CSC_8	I understand why man-made satellites do not fall to earth	□	□	□
CSC_9	I am good at working with figures	□	□	□
CSC_{10}	I understand the "Big Bang" theory of the universe	□	□	□
CSC_{11}	I understand the ecosystems that provide natural resources	□	□	□

Please comment on each of the items you are uncertain of:

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Please shade ☐ the preferred box Y U N

		Y	U	N
CAR_1	I can prepare sketch drawings	☐	☐	☐
CAR_2	I am able to design buildings	☐	☐	☐
CAR_3	I possess a creative flair	☐	☐	☐
CAR_4	I can do painting or sculpture	☐	☐	☐
CAR_5	I can arrange or compose music	☐	☐	☐
CAR_6	I can teach interior designing	☐	☐	☐
CAR_7	I can design advertising posters	☐	☐	☐
CAR_8	I write stories or poetry well	☐	☐	☐
CAR_9	I can apply creative concepts	☐	☐	☐
CAR_{10}	I can communicate ideas in three dimension (3-D)	☐	☐	☐
CAR_{11}	I write and publish contemporary fiction	☐	☐	☐

Please comment on each of the items you are uncertain of.

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		Y	U	N
CSS_1	I can develop human resource (HR) strategies.	☐	☐	☐
CSS_2	I can interact with all kinds of people	☐	☐	☐
CSS_3	I am able to provide insights into human behaviour	☐	☐	☐
CSS_4	I can develop strategies to boost worker morale	☐	☐	☐
CSS_5	I can assist people to manage stress	☐	☐	☐
CSS_6	I can work as a social science researcher	☐	☐	☐
CSS_7	I am good at helping people with disabilities	☐	☐	☐
CSS_8	I can address a public gathering	☐	☐	☐
CSS_9	I am good at teaching others	☐	☐	☐
CSS_{10}	I have expertise in planning organizational change	☐	☐	☐
CSS_{11}	I can develop welfare schemes for staff	☐	☐	☐

Please comment on each of the items you are uncertain of

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Please shade ☐ the preferred box	Y	U	N
CBC_1 I am able to formulate models of business practice	☐	☐	☐
CBC_2 I have marketing skills	☐	☐	☐
CBC_3 I am a good public speaker	☐	☐	☐
CBC_4 I have a strong business acumen	☐	☐	☐
CBC_5 I can forecast business trends	☐	☐	☐
CBC_6 I am good at getting people to do things my way	☐	☐	☐
CBC_7 I am able to develop business databases	☐	☐	☐
CBC_8 I can supervise the running of a food outlet	☐	☐	☐
CBC_9 I have entrepreneurial skills	☐	☐	☐
CBC_{10} I have a pioneering Spirit	☐	☐	☐
CBC_{11} I have leadership skills	☐	☐	☐

Please comment on each of the items you are uncertain of.

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	Y	U	N
CBO_1 I can prepare tax returns using a tax software package	☐	☐	☐
CBO_2 I can design pay for performance systems	☐	☐	☐
CBO_3 I can use simple data processing equipment	☐	☐	☐
CBO_4 I can keep accurate records of payment or sales	☐	☐	☐
CBO_5 I can perform routine office work	☐	☐	☐
CBO_6 I am able to report on expenditure forecasts	☐	☐	☐
CBO_7 I can develop recruiting procedures	☐	☐	☐
CBO_8 I am able to conduct financial investigations	☐	☐	☐
CBO_9 I can perform personnel functions	☐	☐	☐
CBO_{10} I am able to prepare financial reports	☐	☐	☐
CBO_{11} I can use information technology to process data	☐	☐	☐

Please comment on each of the items you are uncertain of

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Occupational Preferences

This is an inventory of your preferences about many kinds of work. Show the occupations that appeal to you even though you might have minimal competencies in the area and those that you find uninteresting using the following 3-point scale.

2	Like	(L)
1.	Indifferent	(I)
0.	Dislike	(D)

Please shade the preferred box   **L**   **I**   **D**

		L	I	D
OTE_1	Fitter and Turner	☐	☐	☐
OTE_2	Pilot	☐	☐	☐
OTE_3	Carpenter	☐	☐	☐
OTE_4	Agronomist	☐	☐	☐
OTE_5	Structural Engineer	☐	☐	☐
OTE_6	Radiographer	☐	☐	☐
OTE_7	Programmer	☐	☐	☐
OTE_8	Quantity Surveyor	☐	☐	☐
OTE_9	Machinist	☐	☐	☐
OTE_{10}	Electrician	☐	☐	☐
OTE_{11}	Farmer	☐	☐	☐
OTE_{12}	Construction Manager	☐	☐	☐
OTE_{13}	Computer Service Technician	☐	☐	☐
OTE_{14}	Dentist	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to:

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Please shade ☐the preferred box   **L**   **I**   **D**

		L	I	D
OSC_1	Statistician	☐	☐	☐
OSC_2	Meteorologist	☐	☐	☐
OSC_3	Hydrologist	☐	☐	☐
OSC_4	Computer programmer	☐	☐	☐
OSC_5	Horticulturist	☐	☐	☐
OSC_6	Chemist	☐	☐	☐
OSC_7	Microbiologist	☐	☐	☐
OSC_8	Mathematician	☐	☐	☐
OSC_9	Geologist	☐	☐	☐
OSC_{10}	Forensic Scientist	☐	☐	☐
OSC_{11}	Geographer	☐	☐	☐
OSC_{12}	Physicist	☐	☐	☐
OSC_{13}	Environmental Specialist	☐	☐	☐
OSC_{14}	Dietician	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to:

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		L	I	D
OAR_1	Poet	☐	☐	☐
OAR_2	Musician	☐	☐	☐
OAR_3	Graphic or Fashion Designer	☐	☐	☐
OAR_4	Florist	☐	☐	☐
OAR_5	Dramatist	☐	☐	☐
OAR_6	Video Producer	☐	☐	☐
OAR_7	Journalist	☐	☐	☐
OAR_8	Artist	☐	☐	☐
OAR_9	Broadcaster	☐	☐	☐
OAR_{10}	Columnist	☐	☐	☐
OAR_{11}	Sculptor/Sculptress	☐	☐	☐
OAR_{12}	Playwright	☐	☐	☐
OAR_{13}	Cartoonist	☐	☐	☐
OAR_{14}	Architect	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to

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	Please shade ☐**the preferred box**	**L**	**I**	**D**
OSS_1	Public Administrator	☐	☐	☐
OSS_2	Counselor	☐	☐	☐
OSS_3	Educational Planner	☐	☐	☐
OSS_4	Librarian	☐	☐	☐
OSS_5	Community Worker	☐	☐	☐
OSS_6	Pastor	☐	☐	☐
OSS_7	Occupational Therapist	☐	☐	☐
OSS_8	Public Relations Officer	☐	☐	☐
OSS_9	Legal Practitioner	☐	☐	☐
OSS_{10}	Social Welfare Officer	☐	☐	☐
OSS_{11}	Medical Practitioner	☐	☐	☐
OSS_{12}	Recreation Manager	☐	☐	☐
OSS_{13}	Trainer/Instructor	☐	☐	☐
OSS_{14}	Special Education Specialist	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to:

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		L	**I**	**D**
OBC_1	Buyer	☐	☐	☐
OBC_2	Advertising Agent	☐	☐	☐
OBC_3	Quality Controller	☐	☐	☐
OBC_4	Hospitality Manager	☐	☐	☐
OBC_5	Corporate Planner	☐	☐	☐
OBC_6	Master of Ceremonies	☐	☐	☐
OBC_7	Sales Person	☐	☐	☐
OBC_8	Real Estate Salesperson	☐	☐	☐
OBC_9	Politician	☐	☐	☐
OBC_{10}	Sales Manager	☐	☐	☐
OBC_{11}	Business Consultant	☐	☐	☐
OBC_{12}	Economist	☐	☐	☐
OBC_{13}	Tourism Agent	☐	☐	☐
OBC_{14}	Enterpreneur	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to:

....

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Please shade ☐ the preferred box L I D

		L	I	D
OBO_1	Customs Officer	☐	☐	☐
OBO_2	Typist/Stenographer	☐	☐	☐
OBO_3	Accountant	☐	☐	☐
OBO_4	Financial Controller	☐	☐	☐
OBO_5	Debt Collector	☐	☐	☐
OBO_6	Bank Teller	☐	☐	☐
OBO_7	Tax Expert	☐	☐	☐
OBO_8	Inventory Controller	☐	☐	☐
OBO_9	Private Secretary	☐	☐	☐
OBO_{10}	Administration Officer	☐	☐	☐
OBO_{11}	Financial Analyst	☐	☐	☐
OBO_{12}	Cost Estimator	☐	☐	☐
OBO_{13}	Payroll Manager	☐	☐	☐
OBO_{14}	Pensions Officer	☐	☐	☐

Please comment on each of the occupational preferences you are indifferent to:

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Self – Rating of Abilities(a+b)

Self-Estimates

Rate yourself on each of the following traits based on your ability to perform the function. Give the most accurate estimate of your competencies.

Circle the appropriate number and rate yourself once in each ability

	Engineering Ability	Scientific Ability	Artistic Ability	Social Service	Business Ability	Financial Ability
High	7	7	7	7	7	7
	6	6	6	6	6	6
	5	5	5	5	5	5
Average	4	4	4	4	4	4
	3	3	3	3	3	3
	2	2	2	2	2	2
Low	1	1	1	1	1	1

	Technical Ability	Mathematical Ability	Creative Ability	Customer Service	Entrepreneurial Ability	Office Skills
High	7	7	7	7	7	7
	6	6	6	6	6	6
	5	5	5	5	5	5
Average	4	4	4	4	4	4
	3	3	3	3	3	3
	2	2	2	2	2	2
Low 7	1	1	1	1	1	1

APPENDIX B

Exploratory factor Analysis Results for the Pilot Data

Table B 1

Exploratory Factor Analysis: Factor Loadings

	1	2	3	4	5	6
ATE 1	.330	-.118		-.302	-.174	**.374**
ATE 2	.157			-.235	-.177	**.309**
ATE 3		.256	.201	-.332		.287
ATE 4	.297		.177	-.244	-.164	**.415**
ATE 5				-.136		.200
ATE 6	.245		-.198		-.175	.230
ATE 7		.166	.249	.153		.118
ATE 8	**.309**	.270	.202		**.309**	.280
ATE 9	.210	.242			-.108	.216
ATE 10	**.386**	.238				.140
ATE 11	.184			-.156	-.276	
CTE 1		.227		**.377**	.196	
CTE 2	.257	-.119		.314		**.591**
CTE 3						**.609**
CTE 4						**.402**
CTE 5			.157			**.300**
CTE 6		**.421**		.242	.136	.115
CTE 7	.105			.157	.189	.245
CTE 8			.102	.178	.133	**.371**
CTE 9	-.174	.183	.294	-.119		**.471**
CTE 10		.244	.354		.116	**.430**
CTE 11	.147	.236				**.603**
OTE 1	**.424**			-.233		.291
OTE 2	.296	**.424**	-.106			
OTE 3		**.321**	.219	.102		.182
OTE 4	.346	**.383**		.149		

OTE 5	**.512**		-.161	.188		.234
OTE 6	**.474**	.149				-.125
OTE 7	**.526**			.185	-.196	
OTE 8	**.520**	-.115			-.159	**.344**
OTE 9	**.445**		.122			.237
OTE 10	**.551**					.201
OTE 11	**.420**	**.336**		.161	-.140	
OTE 12	**.542**		.113	.106		
OTE 13	**.590**		.240			.118
OTE 14	**.613**		.148			
SCI 1	.231			.156	**.372**	
SCI 2	.129	.235		.276		
SCI 3	**.316**					**.323**
SCI 4	**.358**	-.120	.118			
SCI 5	**.316**	-.284		.280		.256
SCI 6	**.467**	.129		**.319**		.114
SCI 7	**.326**	.183		**.437**		-.148
SCI 8	.276	.208	-.101	**.313**		.233
SCI 9	.200					..233
SCI 10	**.375**	.161		.207		
SCI 11	**.391**					**.494**
CSC 1	.180	.129		.160		**.323**
CSC 2	.257			.247	-.165	.226
CSC 3		.102		.126		.252
CSC 4	.259			**.343**		
CSC 5	**.438**	.276			.193	.266
CSC 6	.137		.125			.233
CS C 7	**.330**	-.132				**.427**
CSC 8						**.380**
CSC 9	**.346**	.183	-.295	.207	.189	.227
CSC 10		-.203	.160	.189		**.471**
CSC 11		.158		.126		**.612**
OSC 1	**.503**	.134	.129	.189		.111

OSC 2	**.516**	**.311**				**.306**
OSC 3	**.545**	.112				**.245**
OSC 4	**.605**	.295	.160	.157		
OSC 5	**.401**	**.478**				.104
OSC 6	**.606**	.162	-.108	.210		
OSC 7	**.562**	.286		.243	.149	.124
OSC 8	**.473**	.151				**.329**
OSC 9	**.677**					.279
OSC 10	**.403**	**.339**				.155
OSC 11	**.481**	.221			-.113	**.413**
OSC 12	**.511**	.217			.153	**.396**
OSC 13	**.553**	.140				.160
OSC 14	**.553**	**.421**				-.174
AAR 1	.251	**.490**		**.314**	-.158	
AAR 2		**.499**		.163		-.144
AAR 3	-.120	**.495**	.154		-.194	
AAR 4		**.370**	-.174	.143	.145	-.238
AAR 5		**.561**				
AAR 6	.193	**.524**				-.140
AAR 7	.132	**.408**	.198		-.126	
AAR 8	.127	**.485**		-.206	-.251	-.123
AAR 9	.266	**.576**				-.143
AAR 10	.241	**.407**		.197		-.213
AAR 11	**.428**	**.468**	.144		-.125	
CAR 1	.205	-.199	.112	.144		**.528**
CAR 2						**.311**
CAR 3	.251				.110	**.476**
CAR 4		**.454**				.264
CAR 5	-.222	**.559**				.272
CAR 6		**.420**	.147	.215	-.251	
CAR 7	.114	**.534**				
CAR 8		**.331**			.155	.249
CAR 9	.224	**.371**	-.192			.244

CAR 10	.190	.102		.205	.110	.201
CAR 11						.180
OAR 1	.251	**.638**			.245	.123
OAR 2	.174	**.639**				-.155
OAR 3	**.327**	**.493**	-.176	.179		-.119
OAR 4	.189	**.592**		.174		-.154
OAR 5	.208	**.597**		-.145	.134	
OAR 6	**.361**	**.519**	.139	-.172		.177
OAR 7		**.596**	.288	-.175		.133
OAR 8	.182	**.611**	.134	-.229	.205	.287
OAR 9		**.586**	**.343**	-.187		.137
OAR 10		**.614**	.293	-.132	.228	.170
OAR 11		**.594**	.158	-.275	.104	.157
OAR 12	.197	**.646**	.205			.143
OAR 13	**.318**	**.662**				
OAR 14	**.536**	.166				**.316**
ASS 1			.280		.230	-.107
ASS 2					**.367**	
ASS 3	.192	-.220			**.346**	
ASS 4			.106		**.457**	.101
ASS 5	-.109				**.605**	-.137
ASS 6	-.144			.254	**.538**	-.106
ASS 7	-.111	.161	.147		**.536**	
ASS 8	-.164	.110		.356	**.463**	-.105
ASS 9				.230	**.515**	-.181
ASS 10				.121	**.643**	
ASS 11		.243		-.124	.153	-.218
CSS 1			.103	.132	**.503**	
CSS 2		-.152			**.380**	
CSS 3			**.319**		.266	
CSS 4	.103		.137		**.594**	.151
CSS 5	.162	.103	.193	.139	**.434**	
CSS 6		.193			**.468**	.113

CSS 7			.170	-.131	**.411**	.125
CSS 8			.137	-.178	.207	
CSS 9	.159	-.201	.140	-.113	**.557**	.134
CSS 10			**.446**	.178	.272	
CSS 11			**.463**		.217	.110
OSS 1	.163		-.186	.140	.172	
OSS 2	.248	.166			**.465**	
OSS 3	**.447**				**.329**	
OSS 4	.224	.242	.201		.103	.159
OSS 5	**.362**	**.325**		-.143	**.366**	-.111
OSS 6	**.343**	**.331**	.109	-.120	.212	
OSS 7	**.301**	.161	.122		**.351**	-.110
OSS 8	**.391**	**.322**			**.360**	
OSS 9	.298	.132	.148	-.208	.104	.171
OSS 10	**.397**	.279	.143		.199	
OSS 11	**.541**		.170	.148	.285	
OSS 12	**.503**	.192	.136		**.423**	
OSS 13	**.402**				**.379**	-.218
OSS 14	**.495**		.237		.214	
ABC 1		-.141		**.542**	**.334**	.151
ABC 2			.131	**.422**	.210	.192
ABC 3	-.109		.182	**.434**	**.342**	.119
ABC 4		.154	**.339**	.251	.186	
ABC 5				**.415**	.264	
ABC 6	-.111		.258	**.400**		.185
ABC 7			.247		**.305**	
ABC 8	-.152	.107	.266	.109		.208
ABC 9	-.101		.258	**.420**		-.155
ABC 10				**.503**	**.562**	.189
ABC 11			.238	**.472**	.179	.186
CBC 1	.235	-.164	**.514**	**.368**	.170	
CBC 2			**.574**	.121		
CBC 3			.223		.156	.214

CBC 4	.125		**.511**	.166	.162	.231
CBC 5	.215		**.482**	**.349**		
CBC 6		.120	**.332**	-.103	.294	
CBC 7		.161	**.499**	.165	.156	.251
CBC 8	.189	.156	**.515**	.245		
CBC 9		.239	**.579**	.275	.157	
CBC 10	.128	.163		.117	**.320**	.168
CBC 11		.281	.191		.117	
OBC 1	**.333**	.288	**.323**	.198	-.196	.166
OBC 2	**.305**	**.424**	**.416**	.118	-.155	
OBC 3	**.487**	.163	**.315**	.272	-.114	
OBC 4	**.399**	**.436**	.284			
OBC 5	.187	.154	**.433**	.261		.220
OBC 6	.122	**.405**	**.456**	-.305		.279
OBC 7	**.324**	.237	**.578**			.128
OBC 8	**.334**	.132	**.613**		.152	.159
OBC 9	**.390**	**.362**	**.395**	-.117		.107
OBC 10		.150	**.596**			.107
OBC 11	**.334**	.299	**.523**	.189		
OBC 12	**.387**	.172	**.409**	.153		.205
OBC 13	**.439**	**.318**	.219			.285
OBC 14	**.379**	.260	**.363**	.123		.147
ABO 1	.232		.275	**.707**		
ABO 2				**.516**	**.420**	.214
ABO 3	.106	-.125		**.649**	.187	.277
ABO 4	.186	-.109		**.720**		
ABO 5	.202		.137	**.667**	-.142	
ABO 6		.131	.209	**.595**		
ABO 7	.234		.167	**.713**		
ABO 8	.225		.383	**.572**		.115
ABO 9		.105	**.359**	**.482**	-.208	
ABO 10	.213		.275	**.669**	-.100	.200
ABO 11	**.324**		**.320**	**.515**		

CBO 1		-.191	**.430**			
CBO 2	.168		**.613**			
CBO 3	**.366**		.120	.211		
CBO 4	**.343**		**.357**	.291	.176	
CBO 5	.117	.217		.156	.126	
CBO 6		-.153	**.373**	**.397**	.210	
CBO 7	.266		.151	.163	**.390**	-.100
CBO 8	.110	-.175	**.441**	.199	.123	
CBO 9	**.329**			.286	.140	-.258
CBO 10			**.457**	**.369**	-.129	
CBO 11	.126		.240	**.347**	-.148	.188
OBO 1	.292		.288	-.143	.170	.226
OBO 2				-.181		
OBO 3	**.534**		.225	**.386**		
OBO 4	**.622**		**.351**			-.186
OBO 5	**.622**		**.351**			-.186
OBO 6	**.567**	.182	**.309**		.127	
OBO 7	**.580**		**.499**	.101		-.142
OBO 8	**.516**		**.394**			
OBO 9	.221	.125	**.459**			
OBO 10	.206		.195	.131	.252	.259
OBO 11	**.490**		**.468**	**.360**		
OBO 12	**.467**		**.525**	.163		
OBO 13	**.447**	.175	**.584**	.168		
OBO 14	**.472**	.155	**.594**			

APPENDIX C

Table C 1

Item-Total correlation Results

REALISTIC		INVESTIGATIVE		ARTISTIC		SOCIAL		ENTERPRISING		CONVENTIONAL	
ATE1	0.4555	SCI1	0.2941	AAR1	0.3426	ASS1	0.3565	ABC1	0.3610	ABO1	0.4967
ATE2	0.4861	SCI2	0.4693	AAR2	0.3385	ASS2	0.4203	ABC2	0.3859	ABO2	0.4312
ATE3	0.0890	SCI3	0.4564	AAR3	0.2880	ASS3	0.3638	ABC3	0.5834	ABO3	0.4348
ATE4	0.3562	SCI4	0.2405	AAR4	0.2352	ASS4	0.5060	ABC4	0.4958	ABO4	0.4338
ATE5	0.4043	SCI5	0.4531	AAR5	0.3952	ASS5	0.5361	ABC5	0.4925	ABO5	0.4895
ATE6	0.2184	SCI6	0.4164	AAR6	0.2497	ASS6	0.4760	ABC6	0.5551	ABO6	0.4943
ATE7	0.4544	SCI7	0.4066	AAR7	0.3234	ASS7	0.4128	ABC7	0.4603	ABO7	0.2882
ATE8	0.4170	SCI8	0.3522	AAR8	0.3166	ASS8	0.5289	ABC8	0.0720	ABO8	0.3058
ATE9	0.1751	SCI9	0.2159	AAR9	0.4233	ASS9	0.5272	ABC9	0.4682	ABO9	0.1969
ATE10	0.4828	SCI10	0.3006	AAR10	0.3092	ASS10	0.5253	ABC10	0.5467	ABO10	0.5160
ATE11	0.2632	SCI11	0.3181	AAR11	0.3913	ASS11	0.0005	ABC11	0.5047	ABO11	0.5430

CTE1	0.0811	CSC1	0.2183	CAR1	0.1868	CSS1	0.3580	CBC1	0.1282	CBO1	0.1186
CTE2	0.4393	CSC2	0.2821	CAR2	0.2207	CSS2	0.4972	CBC2	0.4037	CBO2	0.2543
CTE3	0.5458	CSC3	0.1615	CAR3	0.2283	CSS3	0.4596	CBC3	0.4932	CBO3	0.2416
CTE4	0.4203	CSC4	0.2484	CAR4	0.3545	CSS4	0.5740	CBC4	0.4472	CBO4	0.3509
CTE5	0.4909	CSC5	0.3335	CAR5	0.3186	CSS5	0.4782	CBC5	0.4503	CBO5	0.2105
CTE6	0.2365	CSC6	0.1677	CAR6	0.3360	CSS6	0.2486	CBC6	0.4622	CBO6	0.4739
CTE7	0.1920	CSC7	0.4177	CAR7	0.4529	CSS7	0.2081	CBC7	0.1010	CBO7	0.3148
CTE8	0.3060	CSC8	0.3721	CAR8	0.3127	CSS8	0.4939	CBC8	0.4328	CBO8	0.4647
CTE9	0.1610	CSC9	0.1946	CAR9	0.1913	CSS9	0.4766	CBC9	0.5788	CBO9	0.2896
CTE10	0.1519	CSC10	0.1841	CAR10	0.1941	CSS10	0.4047	CBC10	0.5015	CBO10	0.4748
CTE11	0.1816	CSC11	0.3811	CAR11	0.2000	CSS11	0.3642	CBC11	0.4878	CBO11	0.2626
OTE1	0.4295	OSC1	0.4068	OAR1	0.4124	OSS1	0.5310	OBC1	0.4845	OBO1	0.3364
OTE2	0.3611	OSC2	0.4078	OAR2	0.4667	OSS2	0.5677	OBC2	0.4455	OBO2	0.1825
OTE3	0.1570	OSC3	0.4425	OAR3	0.3985	OSS3	0.4064	OBC3	0.4536	OBO3	0.4802
OTE4	0.2090	OSC4	0.3455	OAR4	0.2052	OSS4	0.1624	OBC4	0.4184	OBO4	0.5702

OTE5	0.5211	OSC5	0.2831	OAR5	0.4167	OSS5	0.4117	OBC5	0.4945	OBO5	0.3576
OTE6	0.2762	OSC6	0.4358	OAR6	0.4219	OSS6	0.2465	OBC6	0.3643	OBO6	0.4526
OTE7	0.4134	OSC7	0.3834	OAR7	0.4049	OSS7	0.1629	OBC7	0.5046	OBO7	0.5546
OTE8	0.4356	OSC8	0.4465	OAR8	0.5714	OSS8	0.5545	OBC8	0.3212	OBO8	0.5147
OTE9	0.4995	OSC9	0.4397	OAR9	0.3871	OSS9	0.3131	OBC9	0.0891	OBO9	0.1861
OTE10	0.5500	OSC10	0.4262	OAR10	0.3119	OSS10	0.4436	OBC10	0.1280	OBO10	0.4403
OTE11	0.2550	OSC11	0.4118	OAR11	0.4290	OSS11	0.2289	OBC11	0.5600	OBO11	0.5672
OTE12	0.3603	OSC12	0.4837	OAR12	0.4305	OSS12	0.3401	OBC12	0.6010	OBO12	0.5532
OTE13	0.4601	OSC13	0.4690	OAR13	0.4625	OSS13	0.4964	OBC13	0.5313	OBO13	0.5767
OTE14	0.0840	OSC14	0.3105	OAR14	0.2726	OSS14	0.3404	OBC14	0.4656	OBO14	0.4794
STEA	0.4882	SCIA	0.3783	SARA	0.2866	SSSA	0.3147	SBCA	0.1779	SBOA	0.2922
STEB	0.4572	SCIB	0.2417	SARB	0.2153	SCSB	0.2253	SBCB	0.1529	SBOB	0.2790