Chapter 6:
Empirical analysis: Instrument design and testing

6.1 Introduction

As briefly referred to in Chapter 1, Chapters 2 to 5 analysed the four main constructs of the thesis regarding the literature study and case studies. The empirical chapters, Chapter 6 for detailed methodology and instrument testing, and Chapter 7 for analysis, follow the same pattern. The four main hypotheses were formulated according to the constructs presented in Chapter 1 and developed in Chapters 3 and 4: (Each comprising of 9 statements or questions; in 3 groups also referred to as sub-constructs).

6.2 Instrument development

These four constructs led to the development of elements (sub-constructs) that are analysed and discussed in Chapter 7. The constructs and elements are the main reasons behind the formulation of questions 1 to 48 in the questionnaire.

Each chapter, from 2 to 5 is handling one of the main research dilemmas of SAWiC. These dilemmas were translated into the research questions stipulated in item 1.5 above. Each chapter is introduced by a literature study of the question, followed by Chapter 6, the empirical research and analysis based on sections of the questionnaire and then compared to NAWIC in the USA. The literature contains models that are helpful in analysing the case studies and informing the empirical research.

A comprehensive questionnaire was designed as part of the SAWiC Research Programme developed by the author with the SAWiC Management. The results from this questionnaire could also be used for further research on SAWiC and NAWIC. The SAWiC Research Programme is also investigating the opinions of service providers, (including contract sources and originators) on their needs regarding success, qualities and quantities of women entrepreneurs in construction.

The instrument is developed to analyse the following four constructs, each with three elements and three statements (See Table 6.1)

Table 6.2.1: Construct and element formulation from questions

	Yourself	Men	Women
C1: Construct 1: Positive pull factors why entrepreneurs are involved in construction			
C1.1: Element 1.1: The need for Achievement as important positive pull factor; as measured by the following individual questions:			
13. the need to be an achiever			
14. the need to be constructive			
15. the satisfaction gained from success			
C1.2: Element 1.2: New opportunities, challenges and ideas as positive pull factor; as measured by the following individual questions:			
16. enjoying new opportunities			
17. new challenges and horizons			
18. new ideas to be tested			
C1.3: Element 1.3: The need for independence and individualism as positive pull factor; as measured by the following individual questions:			
19. the need to do your own thing			
20. the desire to have an own business			
21. not being willing to work for a boss.			
C2: Construct 2: Negative push factors why entrepreneurs are involved in construction			
C2.1: Element 2.1: Negative family circumstances as push factors; as measured by the following individual questions:			
22. negative family circumstances			
23. being left single (e.g. widowed)			
24. a divorce that act as a push factor			
C2.2: Element 2.2: Previous job related circumstances as negative push factors; as measured by the following individual questions:			
25. resigning from a previous job			
26. rejoining after other failures			
27. dissatisfaction in a formal job			
C2.3: Element 2.3: Obligatory financial circumstances as negative push factors; as measured by the following individual questions:			
28. the necessity to have a job			
29. job loss or retrenchment			
30. the obligation to earn an income.			

	Yourself	Men	Women
C3: Construct 3: The experiencing of negative barriers Inhibiting performance as construction entrepreneurs			
C3.1: Element 3.1: The exploitation, discrimination and harassment <u>by society</u> as negative push factor; as measured by the following individual questions:			
31. Exploitation in society			
32. Abuse and discrimination in society			
33. Sexual harassment in society			
C3.2: Element 3.2: The exploitation, discrimination and harassment <u>at work</u> as negative push factor; as measured by the following individual questions:			
34. Exploitation in the workplace			
35. Abuse and discrimination at work			
36. Sexual harassment at work			
C3.3: Element: Sophisticated blaming, framing and unfair labour practices as negative push factor; as measured by the following individual questions:			
37. Sophisticated blaming and framing			
38. Unfair disciplinary practices			
39. Planned mismatch of tasks and skills			
C4: Construct 4: Experiencing positive motivational, planning and process success factors.			
C4.1: Element 4.1: Being successfully independent, in control, achieving goals and job satisfaction; as measured by the following individual questions:			
40. being independent and in control			
41. achievement of goals			
42. to job satisfaction			
C4.2: Element 4.2: Being successful by planning for growth factors; as measured by the following individual questions:			
43. increases in turnover annually			
44. competitive advantage			
45. changes in the environment			
C4.3: Element 4.3: Being successful by sustaining growth in their businesses; as measured by the following individual questions:			
46. adapting internal systems			
47. good communication links			
48. an organisation's culture			

6.3 Sampling

The SAWiC and NAWIC databases of ±600 and 6000 members respectively were used to identify the entrepreneurial members. Some 417 members including stakeholders completed questionnaires in workshops dedicated for this purpose. The results of each section of this research programme questionnaire are reflected in Chapter 7.

It was submitted in a workshop to delegates in the SAWiC (developing country) and NAWIC (developed country) databases. This method is called a ***convenience sample*** where workshop delegates complete the questionnaire in a workshop situation. After the questionnaire was filled out, a short individual interview with each respondent was done in order to limit rejected questionnaires.

6.4 Instrument implementation: Hard copies and interactive website

The questionnaire was designed as an instrument to answer the research questions. The data for this 'interrogative study' were collected in South Africa by means of workshops with participant members and stakeholders of SAWiC completing the questionnaire supported by interviews.

The workshops had on average 30 to 40 participants, but in the Gauteng province in SA there were more respondents because of the urban setting and population density. A total of 330 questionnaires were completed in SA and 87 in the USA, representing most of the states of the USA.

In the USA the same questionnaire was handled in a workshop with interviews and an internet interactive website, to be accessed using a password to prevent tampering or skewing of results by unauthorised persons. Only 7 responses were received through the web which was surprising. On checking with the World Bank Rist (2004) reported that they receive about a 5% return through the web and Breytenbach (2004) reported a 3% return at the University of North West. Theunissen (2004) reported that on a specific sector initiative they received about 300 responses from the USA on the web, as an exception.

Four and five point scales were used where possible. A pilot test was run to test the questionnaires. For a copy of the hard copy questionnaire, please see annexure.

6.5 Electronic Questionnaire for website: Development Methodology

For the development of the electronic/on-line questionnaire the author approached two software developers. The development commenced with a short planning and initial requirement solicitation session with the developers. From this session the developers were able to estimate the scope and complexity of the solution that was needed. Using the information gathered from the session the developers decided to follow a customised/derivative of the extreme programming (XP) software development methodology [Beck 2000, XP URL]. Furthermore the developers opted to primarily use open source software solutions (OSS) as part of the development effort. As such the code base of the questionnaire is licensed under the GNU General Public License (GPL) [GPL URL].

The practises of note that formed part of the development project were pair-programming and test driven development. These practises are briefly described below.

Pair-programming:

"All code to be included in a production release is created by two people working together at a single computer. Pair programming increases software quality without impacting time to deliver."[XP URL].

The two developers of the system used pair-programming when writing the production code. This enhanced the quality and correctness of the code and the system. In turn this practise insures redundancy on the knowledge of the system for future maintenance.

Test Driven Development:

Code to test the actual production code is written first and used throughout the development process to verify the correctness of the system. These include both functional test cases (to test the features available through the system) and unit tests (to test the low level code implementation).

Using this practise increases the quality and correctness of the system and provides insurance that the system functions as specified. Furthermore it ensures that when changes are made to portion of the system, these do not break another part of the system (this is known as regression testing).

Software development technologies used:

HTML (Hyper-Text Mark-up Language): Static web pages were used.

PHP (PHP: Hypertext Preprocessor): PHP "is a widely-used open-source programming language primarily for server-side applications and developing dynamic web content."[Wikipedia URL]. For the system under discussion PHP was used to process the input provided by respondents and in turn populate a database with the responses for further analysis.

For an open source relational database management system responses are captured in a MySQL database for analysis. See [MySQL URL].

A feature testing harness that is capable of testing dynamic websites. The system under discussion used Jameleon as the tool to enable Test Driven Development as prescribed by the software development methodology followed during the development of the system. See [Jameleon URL].

The developed system was deployed on a web-server during the duration of the study on a server that met the technological requirements of as indicated in the previous section. The respondents where then asked to access the system through the web-interface and complete the questionnaire.

After the conclusion of the request for response all the data was queried and a raw data report was generated for statistical analysis (Theunissen 2004).

6.6 Data editing and quality control

A short interview was held with each respondent to ensure that the questions were understood and all the questions answered in order to minimise missing data. The data was edited to ensure that it is accurate, consistent, uniformly entered, completed and arranged to simplify the coding and tabulation.

The feedback from the respondents via the internet was disappointing as only seven people made use of the electronic questionnaire.

6.7 Statistical tools applied in analysing the responses

6.7.1 Selection of statistical techniques by measurement level and testing situation

	One-Sample case	Two-Samples Case		*k*-Samples Case	
Measurement Level		**Related Samples**	**Independent Samples**	**Related Samples**	**Independent Samples**
Nominal	Binomial X^2 One-sample	McNemar	Fisher exact test X^2 Two-samples test	Cochran	X^2 for k-samples
Ordinal	Kolmogorov-Smirnov one-sample test Runs test	Sign test Wilcoxon matched pairs	Median test Mann-Whitney U Kolmogorov-Smirnov Wald-Wolfowitz	**Friedman two-way Anova**	Median extension Kruskal-Wallis One-way Anova
Interval and ratio	t-test Z-test	t-test for paired samples	t-test **Z test**	Repeated measures Anova	**One-way ANOVA** n-way ANOVA
Source: Cooper & Schindler (2001:498)					

6.7.2 Computer programme

To serve the purpose of this research, descriptive and inferential statistics were used to analyse the data. The data were analysed by using SAS computer programme (SAS 1988).

6.7.3 Means and standard deviations

The arithmetic mean ($\bar{X}$) comprises a point, which coincides with the sum of the scores divided by the number of scores. The standard deviation (S) shows the variation about the average of the data.

Arithmetic means ($\bar{X}$) and standard deviations (S) are reported in this research.

6.7.4 Chi-square

The chi-square test is probably the most widely used nonparametric test of significance that is useful for tests involving nominal data, but it can be used for higher scales as well like cases where persons, events or objects are grouped in two or more nominal categories such as 'yes-no' or cases A, B, C or D. This technique is used to test for significant differences between the observed distribution of data among categories and the expected distribution based on the null hypothesis. Chi–Square is also useful in cases of one-sample analysis, two independent samples or *k* independent samples. It must be calculated with actual counts rather that percentages (Cooper & Schindler, 2001:499)

By using the Anova ('Blom' transformation) and the Friedman two-way analysis of variance, dichotomous data have been accommodated in the analysis of significant differences between observations.

6.7.5 ANOVA (Analysis of Variance)

SAS (1988) works out a P-value that automatically incorporates the values in the F statistical tables. Least Square (LS) Means, similar to Tukey and Scheffè, will be used where p-values indicate the direction of the statistical significance.

The statistical method for testing the null hypothesis, that the means of several populations are equal, is analysis of variance (ANOVA). The distance from one value to its group's mean should be independent of the distances of other values to that mean (independence of error). ANOVA is reasonably robust and minor variations from normality and equal variance are tolerable. ANOVA uses squared deviations of the variance.

The test statistic for ANOVA is the *F* ratio. The F- ratio is computed by SAS into the P-value. Previously the P-value had to be obtained from tables. The F- ratio or translate P-value compares the variance from the last two sources:

$$F = \frac{\text{Between-groups variance}}{\text{Within-groups variance}} = \frac{\text{Mean square}_{\text{between}}}{\text{Mean square}_{\text{within}}}$$

where:

$$\text{Mean square}_{\text{between}} = \frac{\text{Sum of squares}_{\text{between}}}{\text{Degrees of freedom}_{\text{between}}}$$

$$\text{Mean Square}_{\text{within}} = \frac{\text{Sum of squares}_{\text{within}}}{\text{Degrees of freedom}_{\text{within}}}$$

The *F* distribution determines the size of ratio necessary to reject the null hypothesis for a particular sample size and level of significance (Cooper & Schindler, 2001:509).

6.7.6 Probability Values (*p* values) measuring statistical significance

SAS computes a P-value that automatically incorporates the F-values. Results will be regarded as significant if the *p*-values are smaller than 0.05, because this value presents an acceptable level on a 95% confidence interval ($p \leq 0.05$).

The *p*-value is the probability of observing a sample value as extreme as, or more extreme than, the value actually observed, given that the null hypothesis is true. This area represents the probability of a Type 1 error that must be assumed if the null hypothesis is rejected.

The *p*-value is compared to the significance level (α) and on this basis the null hypothesis is either rejected or not rejected. If the *p* value is less than the significance level, the null hypothesis is rejected (if *p* value< α, reject null). If *p* is greater than or equal to the significance level, the null hypothesis is not rejected (if *p* value> α, don't reject null). If the *p* value is less than 0.05, the null hypothesis will be rejected.

The *p* value is determined by using the standard normal distribution. The small *p* value represents the risk of rejecting the null hypothesis. It is the probability of a Type 1 error if the null hypothesis is rejected (Cooper & Schindler 2001:494).

A difference has statistical significance if there is good reason to believe the difference does not represent random sampling fluctuations only. While it is of statistical significance, whether it is of practical significance is another question. If the controller judges that this variation has no real importance, then it is of little practical significance (Cooper & Schindler 2001: 486, 487).

Results will be regarded as significant if the p-values are smaller than 0.05, because this value is used as cut-off point in most behavioural science research.

6.7.7 Friedman ANOVA (Analysis of variance)

For nonparametric tests, Cooper & Schindler (2001:519) found that when the data is at least ordinal, the Friedman two-way analysis of variance is appropriate. It tests matched samples, ranking each case and calculating the mean rank for each variable across all cases. It tests matched samples, ranking each case and calculating the mean rank for each variable across all cases. It uses ranks to compute a test statistic. The product is a two-way table where the rows represent subjects and the columns represent treatment conditions.

Many tests of univariate differences apply the theory of difference distributions. These distributions are analogous to sampling distributions but involve two populations, in this study the SA and USA samples. Because these distributions approximate the shape of the normal distribution, the power of this distribution can be used in the analysis. All group tests follow the general format of the difference scores of means or proportions divided by the standard error of the difference of means or proportions.

The z-test of proportions is one of the class of statistical tests. It is used when the data is dichotomous and the samples are assumed to be independent (Davis 2000:406).

6.7.8 ANOVA ('Blom' Transformation)

Data were transformed using the normal 'Blom' transformation in order to adhere to the assumptions for Anova, namely normality residuals and homogeneity of variances. Least square means (LS means) were used for post-hoc test with the Anova.

The 'Blom' method of compiling normal scores involves the inverse cumulative normal (PROBIT) function of the following:

$$\frac{(R_i - 3/8)}{(n+1/4)}$$

Where r_i is the rank and n is the number of non-missing rows.

The 'Blom' method appears to fit slightly better than Tukey. It is the default method if normal scores are requested (SAS 2003).

6.7.9 Kendall coefficient of concordance

When a subject that ranks higher on one variable also ranks higher on the other variable, the pairs of observations are said to be concordant. Whenever a pair is ordered oppositely, it is referred to as 'discordant' with a value of -1.0. Kendall's tau varies from -1.0 to +1.0. Kendall is used for measuring ordinal data (Cooper & Schindler, 2001:533).

6.7.10 Cohen-d values measuring practical significance

The most commonly used effect size estimates are Cohen's *d* (Becker 1999 quoting Cohen, 1988) and the effect size correlation. Cohen's *d* is found by dividing the mean difference by the pooled standard deviation. The effect size correlation for a *t* test is computed as the Pearson's product moment correlation between the independent variable with two groups and the dependent variable. By convention, effect size measures are positive if the mean difference supports the hypothesis, and negative if the mean difference is opposite to that predicted by the hypothesis.

The practical significance of the results (d-values) will be computed when the p-value was statistically significant ($p \leq 0.05$). According to Steyn (1998:13), Cohen (1977) recommends the following guidelines for practical significance:

d = 0.2 smaller effect;

d = 0.5 medium effect;

d = 0.8 large effect (Steyn 1998:13):

$$\text{Cohen d} = \frac{\mu_1 - \mu_2}{\sigma} \qquad \text{(Cohen 1988)}$$

6.8 Statistical tools used for the confirmation of validity and reliability

6.8.1 Factor analysis

A Factor analysis was done on the constructs. Factor analysis looks for patterns among the variables to discover whether an underlying combination of the original variables (a factor) can summarise the original set. Factor analysis attempts to reduce the number of variables and discover the underlying constructs that explain the variance (Cooper & Schindler 2001:214, 574, 575, 591 and 604).

Davis (2000: 432) regards the factorial analysis of variance as providing one solution to a research problem by allowing the effect of an independent variable to be averaged over levels of another relevant variable(s). One important form of factorial Anova is the two-way Anova. The classification variables in this form of Anova are called factors and the categories within the factors are referred to levels of a factor. In a two-way Anova there are two classification variables and one dependent variable.

According to Davis (200:432) the factorial design contains a very important analytical convention: an *interaction effect*. The estimation of the interaction effect is important for the researcher. Sometimes the researcher is not concerned with the effects of any one independent variable on a dependent variable. Therefore the estimation of main effects (differences across groups) is useless. The two-way analysis of variance enables the researcher to evaluate the combined effects of two independent variables on a dependent variable in one analysis. He concludes that the interaction effect is the focus of the two-way analysis.

A good factor solution should show invariance in structure when the factor loadings are derived from various solution techniques. Similarly solutions should be cross-validated by using split samples to estimate and rotate the initial factor structure. Good solutions require that various techniques should produce cross-validated samples. Generally factor analysis is a mathematical procedure not a statistical one, and often misused under this guise. The factor loadings are produced by sampling information, but they cannot be easily tested for significance. The user should have some idea of underlying patterns in the data before analysis begins (Davis 2000:484). In this instance the factors came out closely as the researcher envisaged as can be seen from the following tables:

Table 6.8.1: Yourself: Factor correlations for rotated factors (not yet equal to constructs)

Variables	1st Factor	2nd Factor	3rd Factor	4th Factor
Y35 Abuse & Discrimination at work	**0.837**	0.000	0.000	0.000
Y36 Sexual harassment @ work	**0.823**	0.000	0.000	0.000
Y33 Sexual harassment in society	**0.789**	0.000	0.000	0.000
Y34 Exploitation at work	**0.753**	0.000	0.000	0.000
Y38 Unfair disciplinary practices	**0.745**	0.000	0.000	0.000
Y32 Abuse & Discrim. in society	**0.744**	0.000	0.000	0.000
Y39 Planned mismatch: tasks, skills	**0.688**	0.000	0.000	0.000
Y37 Sophisticated blaming & framing	**0.687**	0.000	0.000	0.000
Y31 Exploitation in society	**0.546**	0.000	0.000	0.000
Y41 Achievement of goals	0.000	**0.780**	0.000	0.000
Y40 Being independent & in control	0.000	**0.755**	0.000	0.000
Y42 Job satisfaction	0.000	**0.736**	0.000	0.000
Y44 Competitive advantage	0.000	**0.724**	0.000	0.000
Y47 Good communication links	0.000	**0.690**	0.000	0.000
Y46 Adapting internal systems	0.000	**0.662**	0.000	0.000
Y45 Changes in environment	0.000	**0.629**	0.000	0.000
Y48 Organisation's culture	0.000	**0.574**	0.000	0.000
Y43 Increases in turnover annually	0.000	**0.556**	0.000	0.000
Y16 Enjoy new opportunities	0.000	0.000	**0.817**	0.000
Y17 New challenges / horizons	0.000	0.000	**0.798**	0.000
Y14 Need to be constructive	0.000	0.000	**0.727**	0.000
Y18 New ideas to be tested	0.000	0.000	**0.696**	0.000
Y13 The need to be an achiever	0.000	0.000	**0.669**	0.000
Y19 Need to do your own thing	0.000	0.000	**0.576**	0.000
Y15 Satisfaction from success	0.000	0.000	**0.531**	0.000
Y25 Resigning from previous job	0.000	0.000	0.000	**0.738**
Y26 Rejoining after failures	0.000	0.000	0.000	**0.723**
Y29 Job loss or retrenchment	0.000	0.000	0.000	**0.721**
Y27 Dissatisfaction formal job	0.000	0.000	0.000	**0.701**
Y28 Necessity to have a job	0.000	0.000	0.000	**0.554**
Y30 Obligation to earn income	0.000	0.000	0.000	**0.546**
Y21 Not willing to work for a boss	0.000	0.000	0.380 R	0.000
Y20 Desire to have an own business	0.000	0.000	0.494 R	0.000

Goodness-of-fit: Chi-sq=1723.767; Degrees of freedom=402; P-value=0.000* R=Rejected

The original Factor analysis was ranked from the highest 0.837, to the lowest value 0.546, as 1st Factor, 2nd Factor etc. Within each group the questions were also ranked from the highest to the lowest value. 1st Factor is therefore not the same as Factor 1. The Factors were later used to be equal to the Constructs, thus later became Factor 1 = Construct 1.

Table 6.8.2: Men: Factor correlations for rotated factors (not yet equal to constructs)

Variables	1st Factor	2nd Factor	3rd Factor	4th Factor
M36 Sexual harassment @ work	**0.853**	0.000	0.000	0.000
M35 Abuse & Discrimination at work	**0.832**	0.000	0.000	0.000
M34 Exploitation at work	**0.803**	0.000	0.000	0.000
M33 Sexual harassment in society	**0.773**	0.000	0.000	0.000
M37 Sophisticated blaming & fram.	**0.760**	0.000	0.000	0.000
M32 Abuse & Discrimination in soc	**0.756**	0.000	0.000	0.000
M38 Unfair disciplinary practices	**0.741**	0.000	0.000	0.000
M39 Planned mismatch tasks +skills	**0.715**	0.000	0.000	0.000
M31 Exploitation in society	**0.639**	0.000	0.000	0.000
M42 Job satisfaction	0.000	**0.796**	0.000	0.000
M44 Competitive advantage	0.000	**0.775**	0.000	0.000
M41 Achievement of goals	0.000	**0.756**	0.000	0.000
M40 Being independent & in control	0.000	**0.734**	0.000	0.000
M43 Increases in turnover annually	0.000	**0.724**	0.000	0.000
M45 Changes in environment	0.000	**0.705**	0.000	0.000
M46 Adapting internal systems	0.000	**0.686**	0.000	0.000
M47 Good communication links	0.000	**0.655**	0.000	0.000
M48 Organisation's culture	0.000	**0.587**	0.000	0.000
M17 New challenges / horizons	0.000	0.000	**0.865**	0.000
M16 Enjoy new opportunities	0.000	0.000	**0.824**	0.000
M18 New ideas to be tested	0.000	0.000	**0.800**	0.000
M15 Satisfaction from success	0.000	0.000	**0.696**	0.000
M14 Need to be constructive	0.000	0.000	**0.667**	0.000
M13 The need to be an achiever	0.000	0.000	**0.669**	0.000
M20 Desire to have an own business	0.000	0.000	**0.572**	0.000
M19 Need to do your own thing	0.000	0.000	**0.554**	0.000
M27 Dissatisfaction formal job	0.000	0.000	0.000	**0.768**
M29 Job loss or retrenchment	0.000	0.000	0.000	**0.738**
M26 Rejoining after failures	0.000	0.000	0.000	**0.704**
M28 Necessity to have a job	0.000	0.000	0.000	**0.690**
M25 Resigning from previous job	0.000	0.000	0.000	**0.673**
M30 Obligation to earn income	0.000	0.000	0.000	**0.663**
M21 Not willing to work for a boss	0.000	0.000	0.397 R	0.000

Goodness of fit: Chi-square=1704.901; Degrees of freedom=402; P-value=0.000*

R=Rejected questions not used in further analysis.

Table 6.8.3: Women: Factor correlations for rotated factors (not yet equal to constructs)

Variables	1st Factor	2nd Factor	3rd Factor	4th Factor
W44 Competitive advantage	**0.776**	0.000	0.000	0.000
W42 Job satisfaction	**0.744**	0.000	0.000	0.000
W46 Adapting internal systems	**0.739**	0.000	0.000	0.000
W45 Changes in environment	**0.738**	0.000	0.000	0.000
W40 Being independent & in control	**0.733**	0.000	0.000	0.000
W43 Increases in turnover annually	**0.726**	0.000	0.000	0.000
W47 Good communication links	**0.719**	0.000	0.000	0.000
W41 Achievement of goals	**0.702**	0.000	0.000	0.000
W48 Organisation's culture	**0.625**	0.000	0.000	0.000
W35 Abuse & Discrimination at work	0.000	**0.821**	0.000	0.000
W36 Sexual harassment @ work	0.000	**0.809**	0.000	0.000
W34 Exploitation at work	0.000	**0.780**	0.000	0.000
W33 Sexual harassment in society	0.000	**0.743**	0.000	0.000
W37 Sophisticated blaming & fram.	0.000	**0.730**	0.000	0.000
W32 Abuse & Discrimination in soc.	0.000	**0.696**	0.000	0.000
W38 Unfair disciplinary practices	0.000	**0.660**	0.000	0.000
W39 Planned mismatch tasks skills	0.000	**0.633**	0.000	0.000
W31 Exploitation in society	0.000	**0.507**	0.000	0.000
W16 Enjoy new opportunities	0.000	0.000	**0.895**	0.000
W17 New challenges / horizons	0.000	0.000	**0.878**	0.000
W18 New ideas to be tested	0.000	0.000	**0.751**	0.000
W14 Need to be constructive	0.000	0.000	**0.738**	0.000
W15 Satisfaction from success	0.000	0.000	**0.648**	0.000
W13 The need to be an achiever	0.000	0.000	**0.620**	0.000
W20 Desire to have own business	0.000	0.000	**0.600**	0.000
W19 Need to do your own thing	0.000	0.000	**0.557**	0.000
W21 Not willing to work for a boss	0.000	0.000	**0.512**	0.000
W25 Resigning from previous job	0.000	0.000	0.000	**0.806**
W26 Rejoining after failures	0.000	0.000	0.000	**0.767**
W27 Dissatisfaction formal job	0.000	0.000	0.000	**0.767**
W29 Job loss or retrenchment	0.000	0.000	0.000	**0.728**
W28 Necessity to have a job	0.000	0.000	0.000	**0.583**
W30 Obligation to earn income	0.000	0.000	0.000	**0.498**

Goodness of fit: Chi-square=1600.503; Degrees of freedom=402; P-value=0.000*

The factor analysis assumes that all the variables are caused by underlying factors (Kim & Mueller 1987:78). Factor analysis can be used to check out the meaning of a particular variable or element to see if it fits the construct. If it does not fit the element may be dropped (Kim & Mueller 1978a:10).

This happened in factor 3 (as underlined in tables above) where the element on negative family circumstances for men gave skewed results due to the perceptions of women, who are in the majority. Therefore Questions 22-24 were dropped because of the factor analysis.

Table 6.8.4: Factor analysis: Variance explained by factor

Factor	Yourself	Men	Women
1st Factor	8.5995	8.7767	10.2882
2nd Factor	4.0554	4.1769	3.6692
3rd Factor	2.3551	3.1727	2.6556
4th Factor	1.7765	2.0184	2.3040

The 'Eigen values of Factors Reported' derived one factor from each construct from the questions asked, and therefore represents good constructs.

6.8.2 Cronbach Alpha analysis

A Cronbach Alpha value of above 0.5 is regarded as an indication of reliability. Cronbach's Alpha is regarded as one of the most important reliability estimates. It measures internal consistency and the degree to which instrument items are homogeneous and reflect the same underlying construct(s) (Cooper & Schindler 2001:216-217).

Table 6.8.1 Cronbach Alpha results

Con-struct No	Constructs developed from the 36 five point Likert scale statements in Questionnaire	Yourself	Men	Women
C1	Positive pull factors why entrepreneurs are involved in construction	0.8756	0.8949	0.9092
C2	Negative push factors why entrepreneurs are involved in construction	0.8449	0.8618	0.8563
C3	The experiencing of negative barriers inhibiting performance as construction entrepreneurs	0.9174	0.9309	0.9081
C4	Experiencing positive motivational, planning and process success factors.	0.8966	0.9110	0.9177

From the 36 questions, grouped into 3 elements or sub-constructs the derived four constructs delivered excellent Cronbach Alpha results.

6.10 Conclusions

The instrument developed is reliable and viable. It can be used in other similar research. The constructs and propositions were formulated. Chapter 7 will now analyze the propositions as stipulated in Chapter 6.