

TABLE OF CONTENTS

DECLARATION.....	I
ABSTRACT.....	II
ACKNOWLEDGEMENTS.....	V
LIST OF TABLES.....	XVIII
LIST OF FIGURES.....	XXII
ABBREVIATIONS, ACRONYMS AND GLOSSARY	XXIV
CHAPTER ONE: DIAGRAMMATIC SYNOPSIS.....	1
1.1 INTRODUCTION AND BACKGROUND TO THE STUDY.....	2
1.2 BACKGROUND AND IMPORTANCE OF A STUDY ON ESTABLISHED ENTREPRENEURS	4
1.2.1 Contextualising the study	4
1.2.2 The importance of established entrepreneurs	5
1.2.3 The entrepreneurial environment	7
1.3 DEFINITION OF TERMS	10
1.3.1 Entrepreneurs	10
1.3.2 Entrepreneurship.....	12
1.3.3 The Big Five personality traits	12
1.3.4 Metacognition.....	13
1.3.5 Cognitive adaptability	13
1.4 LITERATURE REVIEW.....	13
1.4.1 Theoretical foundation for the research	13
1.4.2 The Big Five personality traits in entrepreneurship.....	14
1.4.3 Metacognitive theory and cognitive adaptability.....	16
1.4.4 The hypothesised model for personality traits and cognitive adaptability	17
1.5 THE RESEARCH PROBLEM.....	20
1.6 PURPOSE OF THE STUDY.....	21
1.7 RESEARCH OBJECTIVES	21
1.7.1 Primary objectives.....	22
1.7.2 Secondary objectives	22
1.8 HYPOTHESES.....	22
1.8.1 Openness to experience and the five dimensions of cognitive adaptability.....	22
1.8.2 Conscientiousness and the five dimensions of cognitive adaptability	22

1.8.3	Extraversion and the five dimensions of cognitive adaptability	23
1.8.4	Agreeableness and the five dimensions of cognitive adaptability	23
1.8.5	Neuroticism and the five dimensions of cognitive adaptability	23
1.9	RESEARCH DESIGN AND METHODOLOGY	24
1.10	IMPORTANCE AND CONTRIBUTION OF THE STUDY	24
1.11	DELIMITATION	27
1.12	OUTLINE OF THE STUDY	27
CHAPTER TWO: DIAGRAMMATIC SYNOPSIS: PERSONALITY TRAITS		30
2.1	INTRODUCTION	31
2.2	THE CONSTRUCTS OF PSYCHOLOGY, PERSONALITY AND PERSONALITY TRAITS	32
2.2.1	Psychology	32
2.2.2	Personality	32
2.2.3	Personality traits	33
2.3	HISTORICAL DEVELOPMENTS OF THE TRAIT THEORY	33
2.4	THE TRAIT APPROACHES TO PERSONALITY: ALLPORT, EYSENCK AND CATTELL	36
2.4.1	The trait theory of Gordon W. Allport	36
2.4.2	The factor-analytic trait approach of Raymond B. Cattell	38
2.4.3	The trait-type factor-analytic theory of Hans L. Eysenck	41
2.5	THE BIG FIVE PERSONALITY TRAIT MODEL	45
2.5.1	Openness to experience: Openness and intellect	50
2.5.1.1	Openness to experience and entrepreneurship	51
2.5.2	Conscientiousness: Industriousness and orderliness	52
2.5.2.1	Conscientiousness and entrepreneurship	54
2.5.3	Extraversion: Enthusiasm and assertiveness	55
2.5.3.1	Extraversion and entrepreneurship	57
2.5.4	Agreeableness: Compassion and politeness	58
2.5.4.1	Agreeableness and entrepreneurship	61
2.5.5	Neuroticism: Withdrawal and volatility	62
2.5.5.1	Neuroticism and entrepreneurship	64
2.6	A COMBINED BIG FIVE PERSONALITY TRAIT CONCEPTUAL MODEL OF AN ENTREPRENEUR	66
2.7	CONCLUSION	68

CHAPTER THREE: DIAGRAMMATIC SYNOPSIS: COGNITIVE ADAPTABILITY	70
3.1 INTRODUCTION.....	71
3.2 SOCIAL COGNITION THEORY: ORIGIN AND EVOLUTION.....	72
3.3 COGNITION AND ENTREPRENEURSHIP	75
3.3.1 The trait approach	75
3.3.2 The cognitive approach	76
3.4 THE CONSTRUCT OF ENTREPRENEURIAL COGNITIONS CONCEPTUALISED	77
3.5 THE CONSTRUCT OF METACOGNITION CONCEPTUALISED.....	78
3.6 METACOGNITIVE THEORY.....	80
3.6.1 Metacognitive theory and entrepreneurship.....	83
3.7 COGNITIVE ADAPTABILITY	85
3.7.1 Goal orientation.....	86
3.7.1.1 Goal orientation and entrepreneurship	86
3.7.2 Metacognitive knowledge	88
3.7.2.1 Metacognitive knowledge and entrepreneurship.....	89
3.7.3 Metacognitive experience.....	91
3.7.3.1 Metacognitive experience and entrepreneurship	94
3.7.4 Metacognitive choice.....	98
3.7.4.1 Metacognitive choice and entrepreneurship	99
3.7.5 Monitoring	100
3.7.5.1 Monitoring and entrepreneurship.....	101
3.8 A COMBINED CONCEPTUAL MODEL OF THE COGNITIVE ADAPTABILITY OF AN ENTREPRENEUR	102
3.9 CONCLUSION	103
CHAPTER FOUR: DIAGRAMMATIC SYNOPSIS: THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY	105
4.1 INTRODUCTION.....	106
4.2 THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY	107
4.2.1 Openness to experience and the five dimensions of cognitive adaptability.....	108
4.2.1.1 Openness to experience and goal orientation	108
4.2.1.2 Openness to experience and metacognitive knowledge	109
4.2.1.3 Openness to experience and metacognitive experience.....	110

4.2.1.4	Openness to experience and metacognitive choice.....	111
4.2.1.5	Openness to experience and monitoring	113
4.2.2	Conscientiousness and the five dimensions of cognitive adaptability	114
4.2.2.1	Conscientiousness and goal orientation	114
4.2.2.2	Conscientiousness and metacognitive knowledge.....	115
4.2.2.3	Conscientiousness and metacognitive experience	116
4.2.2.4	Conscientiousness and metacognitive choice	117
4.2.2.5	Conscientiousness and monitoring.....	118
4.2.3	Extraversion and the five dimensions of cognitive adaptability	119
4.2.3.1	Extraversion and goal orientation	120
4.2.3.2	Extraversion and metacognitive knowledge.....	121
4.2.3.3	Extraversion and metacognitive experience	122
4.2.3.4	Extraversion and metacognitive choice	123
4.2.3.5	Extraversion and monitoring.....	124
4.2.4	Agreeableness and the five dimensions of cognitive adaptability	125
4.2.4.1	Agreeableness and goal orientation	126
4.2.4.2	Agreeableness and metacognitive knowledge.....	127
4.2.4.3	Agreeableness and metacognitive experience	128
4.2.4.4	Agreeableness and metacognitive choice	130
4.2.4.5	Agreeableness and monitoring.....	130
4.2.5	Neuroticism and the five dimensions of cognitive adaptability	131
4.2.5.1	Neuroticism and goal orientation	132
4.2.5.2	Neuroticism and metacognitive knowledge.....	133
4.2.5.3	Neuroticism and metacognitive experience	133
4.2.5.4	Neuroticism and metacognitive choice	134
4.2.5.5	Neuroticism and monitoring.....	135
4.3	A COMBINED CONCEPTUAL FRAMEWORK OF THE PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY OF ESTABLISHED ENTREPRENEURS	136
4.4	CONCLUSION	139
CHAPTER FIVE: DIAGRAMMATIC SYNOPSIS: RESEARCH METHODOLOGY		141
5.1	INTRODUCTION.....	142
5.2	THE RESEARCH PROBLEM.....	143
5.3	RESEARCH OBJECTIVES	144
5.3.1	Primary objectives.....	144

5.3.2	Secondary objectives	144
5.4	HYPOTHESISED MODEL OF PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY	145
5.5	VARIABLE MEASUREMENT	145
5.6	HYPOTHESES TESTED.....	145
5.7	RESEARCH DESIGN.....	147
5.8	DEVELOPING THE OVERALL PERSONALITY AND COGNITIVE ADAPTABILITY MEASUREMENT INSTRUMENT	148
5.8.1	Reliability and validity of the personality traits scale	149
5.8.2	Reliability and validity of the cognitive adaptability scale	150
5.8.3	Operational definitions of personality trait dimensions and cognitive adaptability	151
5.9	MEASURES FOR BIG FIVE PERSONALITY TRAIT DIMENSIONS	156
5.9.1	Measures for openness to experience.....	156
5.9.2	Measures for conscientiousness	158
5.9.3	Measures for extraversion	159
5.9.4	Measures for agreeableness	159
5.9.5	Measures for neuroticism	160
5.9.6	Measures for goal orientation	161
5.9.7	Measures for metacognitive knowledge	162
5.9.8	Measures for metacognitive experience	163
5.9.9	Measures for metacognitive choice	164
5.9.10	Measures for monitoring.....	165
5.10	PRETESTING THE MEASUREMENT INSTRUMENT.....	165
5.11	SAMPLING AND SAMPLING SIZE	166
5.12	DATA COLLECTION.....	168
5.12.1	Data collection method.....	168
5.12.2	Limitations of the data collection method used	170
5.12.3	Ethical clearance.....	170
5.13	DATA ANALYSIS DESIGN	171
5.13.1	Data analysis software	171
5.13.2	Data cleaning and treatment of missing data.....	171
5.13.3	Data analysis techniques: CFA	171
5.13.4	Data analysis techniques: EFA.....	173
5.13.5	Data analysis techniques: Structural equation modelling.....	174

5.13.6	Data analysis techniques: Multiple linear regressions.....	176
5.14	CONCLUSION	177
CHAPTER SIX: DIAGRAMMATIC SYNOPSIS: RESEARCH FINDINGS		178
6.1	INTRODUCTION.....	179
6.2	DATA AND MEASURES	179
6.2.1	Personal demographics of established business owners.....	181
6.2.1.1	Gender	181
6.2.1.2	Age	182
6.2.1.3	Established business owners: Ethnic grouping.....	183
6.2.1.4	Highest level of education	184
6.2.1.5	Provincial spread of entrepreneurial activity in South Africa	185
6.2.2	Business venture demographics	186
6.2.2.1	Age of the business.....	187
6.2.2.2	Business sectors	187
6.3	VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT	188
6.3.1	Validity and reliability of cognitive adaptability	189
6.3.1.1	Goal orientation.....	189
6.3.1.1.1	CFA of goal orientation.....	189
6.3.1.1.2	The EFA of goal orientation.....	190
6.3.1.2	Metacognitive knowledge	191
6.3.1.2.1	CFA for metacognitive knowledge	191
6.3.1.2.2	EFA for metacognitive knowledge	192
6.3.1.3	Metacognitive experience.....	194
6.3.1.3.1	CFA for metacognitive experience.....	194
6.3.1.3.2	EFA for metacognitive experience.....	194
6.3.1.4	Metacognitive choice.....	196
6.3.1.4.1	CFA for metacognitive choice.....	196
6.3.1.4.2	EFA for metacognitive choice.....	196
6.3.1.5	Monitoring	197
6.3.1.5.1	CFA for monitoring	197
6.3.1.5.2	EFA for monitoring	198
6.3.2	Validity and reliability of the Big Five personality traits.....	200
6.3.2.1	Openness to experience	200
6.3.2.1.1	CFA for openness to experience	200
6.3.2.1.2	EFA of openness to experience	201

6.3.2.2	Conscientiousness	203
6.3.2.2.1	CFA for conscientiousness.....	203
6.3.2.2.2	EFA of conscientiousness	204
6.3.2.3	Extraversion	206
6.3.2.3.1	CFA for extraversion	206
6.3.2.3.2	EFA of extraversion.....	206
6.3.2.4	Agreeableness	208
6.3.2.4.1	CFA for agreeableness	208
6.3.2.4.2	EFA for agreeableness.....	209
6.3.2.5	Neuroticism	211
6.3.2.5.1	CFA for neuroticism	211
6.3.2.5.2	EFA for neuroticism.....	211
6.4	OPERATIONAL DEFINITIONS AND NEW HYPOTHESES OF THE SUBCOMPONENTS	213
6.4.1	Operational definitions of cognitive adaptability subcomponents	213
6.4.2	Operational definitions of the Big Five personality trait subcomponents and new hypotheses	214
6.4.2.1	Openness to experience	214
6.4.2.2	Conscientiousness	216
6.4.2.3	Extraversion subcomponents	217
6.4.2.4	Agreeableness subcomponents	219
6.4.2.5	Neuroticism subcomponents	221
6.5	DESCRIPTIVE STATISTICS.....	222
6.5.1	Cognitive adaptability	223
6.5.2	The Big Five personality trait subcomponents	224
6.5.2.1	Openness to experience subdimensions	224
6.5.2.2	Conscientiousness subcomponents	224
6.5.2.3	Extraversion subcomponents	225
6.5.2.4	Agreeableness subcomponents	226
6.5.2.5	Neuroticism subcomponents	226
6.6	STRUCTURAL EQUATION MODELLING (SEM) FOR THE FIVE PERSONALITY TRAIT DIMENSIONS	227
6.6.1	Evaluation of hypothesised model for openness to experience	227
6.6.1.1	Structural model for openness to experience subconstructs and the seven cognitive adaptability dimensions.....	227

6.6.1.2	Structural model for openness to experience as a single construct and the seven cognitive adaptability dimensions	229
6.6.2	Evaluation of hypothesised model for conscientiousness	233
6.6.2.1	Structural model for conscientiousness subconstructs and the seven cognitive adaptability dimensions	233
6.6.2.2	Structural model for conscientiousness as a single construct and the seven cognitive adaptability dimensions	235
6.6.3	Evaluation of hypothesised model for extraversion.....	239
6.6.3.1	Structural model for the extraversion subconstructs and the seven cognitive adaptability dimensions	239
6.6.3.2	Structural model for extraversion as a single construct and the seven cognitive adaptability dimensions	239
6.6.4	Evaluation of hypothesised model for agreeableness.....	242
6.6.4.1	Structural model for agreeableness subconstructs and the seven cognitive adaptability dimensions	242
6.6.4.2	Structural model for agreeableness as a single construct and the seven cognitive adaptability dimensions	244
6.6.5	Evaluation of hypothesised model for neuroticism.....	247
6.6.5.1	Structural model for neuroticism subconstructs and the seven cognitive adaptability dimensions	247
6.6.5.2	Structural model for neuroticism as a single construct and the seven cognitive adaptability dimensions	249
6.7	REGRESSION ANALYSIS.....	252
6.8	CONCLUSION	275
CHAPTER SEVEN: DIAGRAMMATIC SYNOPSIS: CONCLUSIONS AND RECOMMENDATIONS		278
7.1	INTRODUCTION.....	279
7.2	FINDINGS OF THE LITERATURE REVIEW: A SYNOPSIS.....	279
7.3	Research objectives revisited.....	282
7.3.1	Primary objectives.....	282
7.3.2	Secondary objectives	282
7.3.3	Measurement models and research hypotheses	283
7.3.4	Study hypotheses tested	283
7.3.4.1	Hypotheses surrounding openness to experience and cognitive adaptability.....	283

7.3.4.2	Hypotheses surrounding conscientiousness and cognitive adaptability	291
7.3.4.3	Hypotheses surrounding extraversion and cognitive adaptability	297
7.3.4.4	Hypotheses surrounding agreeableness and cognitive adaptability	303
7.3.4.5	Hypotheses surrounding neuroticism and cognitive adaptability	310
7.3.4.6	The Five Factors emerging from this study	316
7.4	CONTRIBUTION OF THE STUDY	317
7.4.1	Theoretical contribution	318
7.4.2	Practical contribution	320
7.5	LIMITATIONS OF THE STUDY	321
7.6	RECOMMENDATIONS FOR FUTURE RESEARCH	322
7.7	SUMMARY AND CONCLUSION	323
	REFERENCES	328
	APPENDIXES	381
	APPENDIX A: QUESTIONNAIRE	382
	APPENDIX B: STANDARDISED REGRESSION WEIGHTS FOR PERSONALITY TRAIT DIMENSIONS	390

LIST OF TABLES

Table 1.1:	Prevalence rates (%) of entrepreneurial activity amongst the adult population in South Africa, 2001–2014	6
Table 1.2:	Dimensions of uncertainty	9
Table 1.3:	Definitions of ‘entrepreneur’	10
Table 2.1:	Cattell’s description of bivariate, clinical and multivariate methods	39
Table 2.2:	Cattell’s 16 Personality Factors derived from questionnaire data	41
Table 2.3:	Traits associated with the three dimensions of Eysenck’s model of personality	44
Table 2.4:	Trait facets associated with the five domains of Costa and McCrae’s five-factor model of personality	47
Table 2.5:	NEO-FFI item clusters	48
Table 2.6:	The Big Five trait factors and illustrative scales	67
Table 3.1:	The facets of metacognition and their manifestations as a function of monitoring and control	80
Table 3.2:	A model representing phases of cognitive processing and corresponding metacognitive experiences and metacognitive skills	94
Table 5.1:	Descriptors of the research design	148
Table 5.2:	Cronbach alpha-coefficients for The Big Five personality traits	149
Table 5.3:	Cronbach alpha-coefficients for cognitive adaptability	150
Table 5.4:	Transitioning from the conceptual to the observational level	151
Table 5.5:	Measurement scale for openness to experience	157
Table 5.6:	Measurement scale for conscientiousness	158
Table 5.7:	Measurement scale for extraversion	159
Table 5.8:	Measurement scale for agreeableness	160
Table 5.9:	Measurement scale for neuroticism	161
Table 5.10:	Measurement scale for goal orientation	162
Table 5.11:	Measurement scale for metacognitive knowledge	163

Table 5.12:	Measurement scale for metacognitive experience	164
Table 5.13	Measurement scale for metacognitive choice	164
Table 5.14:	Measurement scale for monitoring.....	165
Table 5.15:	Sample size specifications for SEM	167
Table 6.1:	CFA fit indices of the goal orientation model.....	190
Table 6.2:	Goal orientation factor loadings	191
Table 6.3:	CFA fit indices of the metacognitive knowledge model	192
Table 6.4:	Metacognitive knowledge factor loadings.....	193
Table 6.5:	CFA fit indices of the metacognitive experience model.....	194
Table 6.6:	Metacognitive experience factor loadings	195
Table 6.7:	CFA fit indices of the metacognitive choice model.....	196
Table 6.8:	Metacognitive choice factor loadings	197
Table 6.9:	CFA fit indices of the monitoring model	198
Table 6.10:	Monitoring factor loadings.....	199
Table 6.11:	CFA fit indices of the openness to experience model.....	200
Table 6.12:	Openness to experience factor loadings	201
Table 6.13:	CFA fit indices of the conscientiousness model	204
Table 6.14:	Conscientiousness factor loadings.....	205
Table 6.15:	CFA fit indices of the extraversion model.....	206
Table 6.16:	Extraversion factor loadings.....	207
Table 6.17:	CFA fit indices of the agreeableness model.....	209
Table 6.18:	Agreeableness factor loadings.....	209
Table 6.19:	CFA fit indices of the neuroticism model.....	211
Table 6.20:	Neuroticism factor loadings.....	212
Table 6.21:	Cognitive adaptability descriptive stats and correlations	223
Table 6.22:	Correlation results for openness to experience subfactors with each of the cognitive adaptability factors.....	224

Table 6.23:	Correlation results for conscientiousness subfactors with each of the cognitive adaptability factors.....	225
Table 6.24:	Correlation results for the extraversion subfactors with each of the cognitive adaptability factors	225
Table 6.25:	Correlation results for the agreeableness subfactors with each of the cognitive adaptability factors.....	226
Table 6.26:	Correlation results for the neuroticism subfactors with each of the cognitive adaptability factors.....	226
Table 6.27:	Fit indices of the original openness to experience model (subconstructs)....	229
Table 6.28:	Fit indices of the original openness to experience model (single construct)	230
Table 6.29:	Standardised regression weights for openness to experience to each of the cognitive adaptability factors.....	232
Table 6.30:	Unstandardised regression weights for openness to experience to each of the cognitive adaptability factors.....	232
Table 6.31:	Fit indices of the original conscientiousness model (subconstructs).....	235
Table 6.32:	Fit indices of the original conscientiousness model (single construct).....	236
Table 6.33:	Standardised regression weights for conscientiousness to each of the cognitive adaptability factors.....	238
Table 6.34:	Unstandardised regression weights for conscientiousness to each of the cognitive adaptability factors.....	238
Table 6.35:	Fit indices of the original extraversion model (single construct)	239
Table 6.36:	Standardised regression weights for extraversion to each of the cognitive adaptability factors.....	241
Table 6.37:	Unstandardised regression weights for extraversion to each of the cognitive adaptability factors.....	241
Table 6.38	Fit indices of the original agreeableness model (subconstructs)	244
Table 6.39:	Fit indices of the original agreeableness model	244
Table 6.40:	Standardised regression weights for agreeableness to each cognitive adaptability factors.....	246
Table 6.41:	Unstandardised regression weights for agreeableness to each of the cognitive adaptability factors.....	246
Table 6.42:	Fit indices of the original neuroticism model (subconstructs)	249

Table 6.43:	Fit indices of the original neuroticism model (single construct).....	249
Table 6.44:	Standardised regression weights for neuroticism to each of the cognitive adaptability factors.....	251
Table 6.45:	Unstandardised regression weights for neuroticism to each of the cognitive adaptability factors.....	251
Table 6.46:	Regression results for openness to experience subfactors with each of the cognitive adaptability factors.....	253
Table 6.47:	Regression results for conscientiousness subfactors with each of the cognitive adaptability factors.....	257
Table 6.48:	Regression results for the extraversion subfactors with each of the cognitive adaptability factors.....	260
Table 6.49:	Regression results for the agreeableness subfactors with each of the cognitive adaptability factors.....	263
Table 6.50:	Regression results for the neuroticism subfactors with each of the cognitive adaptability factors.....	267
Table 6.51:	Summary of SEM and regression results for openness to experience	271
Table 6.52:	Summary of SEM and regression results for conscientiousness	272
Table 6.53:	Summary of SEM and regression results for extraversion	273
Table 6.54:	Summary of SEM and regression results for agreeableness.....	274
Table 6.55:	Summary of SEM and regression results for neuroticism.....	275
Table 7.1:	Summary of openness to experience and cognitive adaptability dimension results related to tested hypotheses.....	284
Table 7.2:	Summary of conscientiousness and cognitive adaptability dimension results related to tested hypotheses	292
Table 7.3:	Summary of extraversion and cognitive adaptability dimension results related to tested hypotheses.....	298
Table 7.4:	Summary of agreeableness and cognitive adaptability dimension results related to tested hypotheses.....	303
Table 7.5:	Summary of neuroticism and cognitive adaptability dimension results related to tested hypotheses.....	310
Table 7.6:	Big Five personality traits and the five factors emerging from this study	317

LIST OF FIGURES

Figure 1.1:	The entrepreneurial definitions within the entrepreneurship process.....	12
Figure 1.2:	Proposed model of personality traits and cognitive adaptability of established entrepreneurs	18
Figure 2.1:	Humoral schemes of temperament proposed by (a) Kant and (b) Wundt.....	35
Figure 2.2:	The relationship between two dimensions of personality derived from factor analysis to the four Greek temperament types	43
Figure 3.1:	The conceptualisation of metacognition following Nelson (1996)	79
Figure 3.2:	Conceptual model of entrepreneurial experiencing	97
Figure 4.1:	Proposed model of the personality traits and cognitive adaptability of established entrepreneurs	137
Figure 5.1:	Hierarchical dimensions of metacognitive awareness – 5 Factor Solutions..	156
Figure 6.1:	Gender of established business owners	182
Figure 6.2:	Age of established business owners	183
Figure 6.3:	Established business owners: Ethnic grouping	183
Figure 6.4:	Composition of established business owners by level of education	185
Figure 6.5:	South African provinces where established business owners were found to operate their businesses	186
Figure 6.6:	Composition of established business owners by business sector	188
Figure 6.7:	Structural model for openness to experience personality trait subconstructs and cognitive adaptability dimensions	228
Figure 6.8:	Structural model for openness to experience as a single construct and cognitive adaptability dimensions.....	231
Figure 6.9:	Structural model for conscientiousness subconstructs and cognitive adaptability dimensions	234
Figure 6.10:	Structural model for conscientiousness as a single construct and cognitive adaptability dimensions.....	237
Figure 6.11:	Structural model for extraversion as a single construct and cognitive adaptability dimensions	240

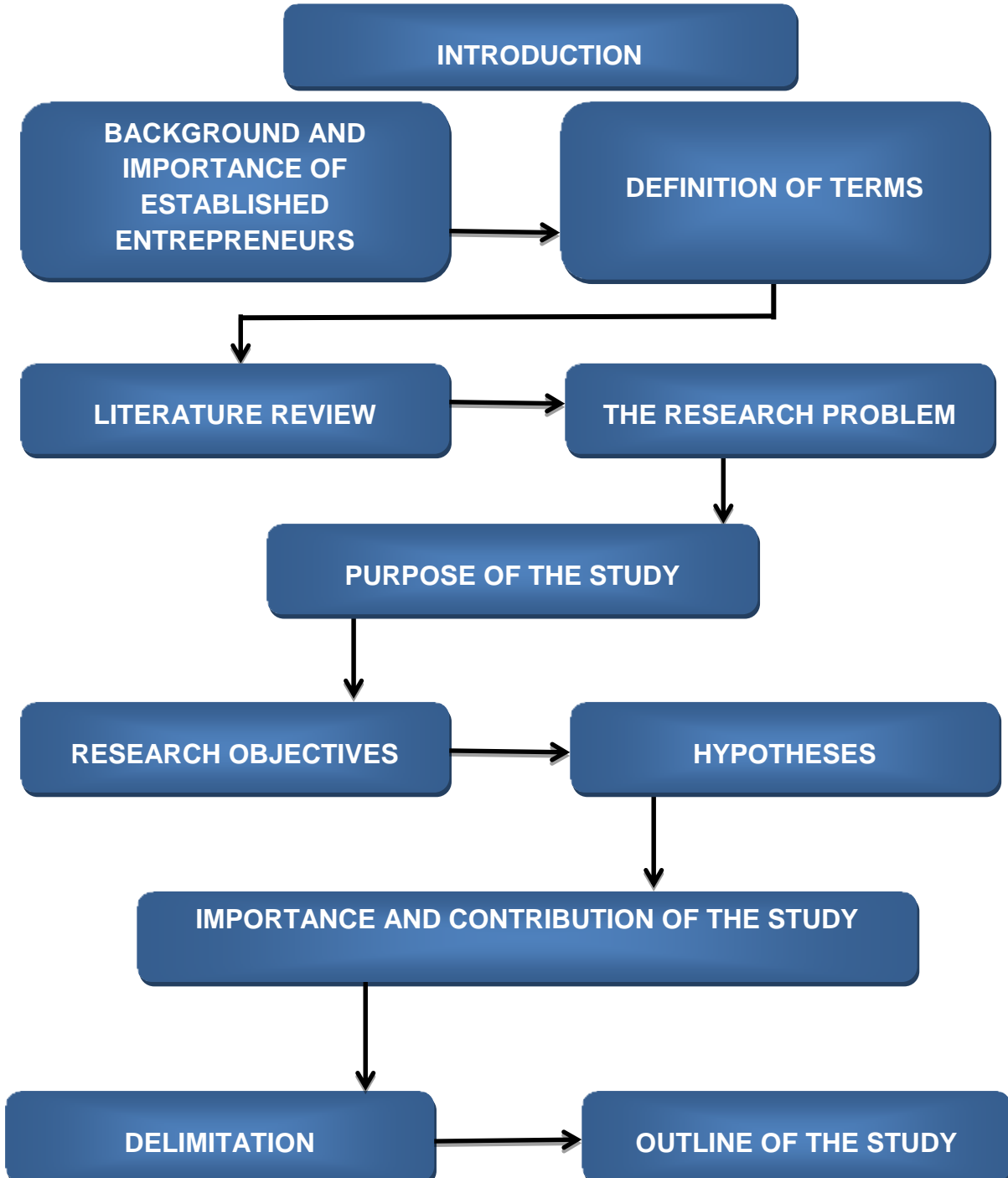
Figure 6.12:	Structural model for agreeableness subconstructs and cognitive adaptability dimensions	243
Figure 6.13:	Structural model for agreeableness as a single construct and cognitive adaptability dimensions	245
Figure 6.14:	Structural model for neuroticism subconstructs and cognitive adaptability dimensions	248
Figure 6.15:	Structural model for neuroticism as a single construct and cognitive adaptability dimensions	250

ABBREVIATIONS, ACRONYMS AND GLOSSARY

16PF	Sixteen Personality Factor
AMOS	Analysis of Motion Structures
ANOVA	Analysis of Variance
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
Choice	Metacognitive Choice
Current MK	Current Metacognitive Knowledge
DTI	Department of Trade and Industry
DV	Dependent Variable
EFA	Exploratory Factor Analysis
ENP	Extraversion, Neuroticism and Psychoticism
FFM	Five-Factor Model
FOK	Feeling-of-Knowing
GEM	Global Entrepreneurship Monitor
GO	Goal Orientation
GO	Goodness-of-Fit
IBM	International Business Machines
IFI	Incremental Fit Index
IV	Independent Variable
ME	Metacognitive Experiences
MLE	Maximum Likelihood Estimation
MPI	Maudsley Personality Inventory
NEO-FFI	Neuroticism-Extraversion-Openness Five Factor Inventory
NEO PI-R	Revised Personality Inventory (NEO) which includes Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness
OCEAN (Big Five)	Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism
(PNFI	Parsimony Normed Fit Index
Prior MK	Prior Metacognitive Knowledge
RMSEA	Root Mean Square Error of Approximation
SAS	Statistical Analysis System

SCT	Social Cognition Theory
SEM	Structural Equation Modelling
SME SA	Small- and Medium-Sized Enterprises South Africa
SPSS	Statistical Package for Social Sciences
SSA	Sub-Saharan Africa
TEA	Total Early-Stage Entrepreneurial Activity
TLI	Tucker-Lewis Coefficient
TOT	Tip-of-the-Tongue

CHAPTER ONE: DIAGRAMMATIC SYNOPSIS



1.1 INTRODUCTION AND BACKGROUND TO THE STUDY

Entrepreneurship is an important phenomenon and exemplifies a context where dynamism and uncertainty are typically high.

Metacognition is likely to influence the entrepreneur's development, evolution, and selection of cognitive strategies - promoting cognitive adaptability - and in turn influences entrepreneurial performance across a host of entrepreneurial behaviors and tasks.

(Haynie 2005:13)

The existing literature on organisational theory is concerned with the investigation and analysis of the psychological processes through which people make sense of their organisational world and decide on the course of action to pursue (Jost, Kruglanski & Nelson 1998:137; Bandura 1997; Neisser 1967). These studies attempted to enhance knowledge of organisational processes through investigation of the psychological factors (such as beliefs and attitudes) upon which employees draw in formulating their expectations and in choosing between competing behavioural alternatives (Ng & Sears 2010:676; Harris & Ogbonna 2001:744). With advances in social psychology and specifically in the area of social cognition, this perspective has now also gained currency in entrepreneurship research (Barbosa, Kickul & Smith 2008:411; Baron 2004:221).

Entrepreneurship scholars have embraced the notion that dynamic sense-making and decision processes are central to success in an entrepreneurial environment (Ireland, Hitt & Simon 2003:963; McGrath & McMillan 2000). Essentially, the entrepreneurial cognitions perspective assists researchers in their understanding of how entrepreneurs think and why they do some of the things they do (Carsrud, Brannback, Nordberg & Renko 2009:1; Krueger 2000:5). While cognitive approaches to entrepreneurship have devoted considerable energy to defining 'entrepreneurial cognitions' based on knowledge (Shane 2000:448), or heuristics (Busenitz 1999:325), cognitive adaptability as a process-orientated approach is new to entrepreneurship. Haynie and Shepherd (2009:695) conceptualise cognitive



adaptability as the ability to effectively and appropriately change decision policies (i.e. to learn) given feedback (inputs) from the environmental context in which cognitive processing is embedded. As for knowledge (Zahra, Jennings & Kuratko 1999:45), cognitive adaptability represents an individual difference variable that may help explain the assimilation of new information into new knowledge, and “enhance our understanding of the cognitive factors that influence key aspects of the entrepreneurial process” (Baron & Ward 2004:553).

Given the dynamism and uncertainty of entrepreneurial contexts, metacognition facilitates studying how entrepreneurs cognitively adapt to their evolving and unfolding context (Haynie 2005:21). Statistics reveal that 80% of start-up businesses in South Africa fail within the first three years of operation and that failure of an entrepreneur can be devastating in terms of psychological impacts. On the other hand, established business activity in South Africa is positive and has increased since 2001. The purpose of this study is to determine how established entrepreneurs in South Africa develop higher-order cognitive strategies to promote cognitive adaptability. Furthermore, it will determine the relationship between personality traits and cognitive adaptability of established entrepreneurs. The results of this study might shed light on the ‘black box’ of how entrepreneurs adapt to dynamic and uncertain entrepreneurial environments in South Africa. Therefore, this study proposes and tests a conceptual model for the relationship between personality and the cognitive adaptability of established entrepreneurs.

The focus of this study does not fall on failing businesses and the reasons for their failure, but rather on established entrepreneurs and how their personality traits and cognitive adaptability can shed light on the reasons for their business survival. A survey of the literature revealed that no former studies have focused on the relationship between individual personality traits and cognitive adaptability, specifically within the South African entrepreneurial context.

This chapter provides the background and literature review of the study. It sets out the problem statement, objectives, methodology and design of the study and the outline of Chapters 2 to 8. This is done to guide the flow of this study.

1.2 BACKGROUND AND IMPORTANCE OF A STUDY ON ESTABLISHED ENTREPRENEURS

1.2.1 Contextualising the study

Entrepreneurship is widely considered to be an important mechanism or driver of sustainable economic growth through job creation, innovation, its welfare effect and technological progress (Herrington, Kew & Kew 2015:19; Henry, Hill & Leitch 2003:3; Gorman, Hanlon & King 1997:56; Hisrich & Peters 1998:5; Kuratko & Hodgetts 2007:5). However, South Africa's established business rate is 2.9% compared to a weighted average of 16% for Sub-Saharan Africa, i.e. SSA (Herrington & Kew 2013:25). Although extremely low, the trend for established business activity in South Africa is positive and has increased since 2001. Of concern, however, is that the discontinuance rate also continues to increase, which means that more businesses in South Africa are closing than are starting up. Statistics reveal that 80% of start-ups in South Africa fail within the first three years of operation and this can largely be attributed to the lack of support (Small- and Medium-Sized Enterprises South Africa [SME SA] 2015). Therefore this study focuses on established entrepreneurs who have already moved beyond the start-up stage.

From the individual characteristics point of view, several studies have looked at constructs specific to the entrepreneur such as their status as a habitual entrepreneur or psychological attributes (Marvel, Davis & Sproul 2014:599). Scholars have focused their efforts on the success of entrepreneurs (Rauch & Frese 2000:101; Schmitt-Rodermund 2001:87; Caliendo & Kritikos 2008:189; Van Zuilenburg 2013:100). Other studies have explored which personality types are prone to successfully guide their ventures to long-term survival (Sandberg & Hofer 1987:5). Brockhaus (1980:368) as well as Hornaday and Aboud (1971:141) examined the

relationship between personality and venture success for three- and five-year periods respectively. In Brockhaus' study, successful and unsuccessful entrepreneurs were compared using measures of locus of control and risk-taking propensity; with only internal locus of control revealing significant differences between the two groups. Hornaday and Aboud's (1971:141) study measured several personality variables such as need for achievement, autonomy, aggression and independence, but found no significant differences between entrepreneurs and 'men in general' for any of the variables. However, Ciavarella *et al.* (2004:481) argue that it would be an oversimplification to conclude that the entrepreneur's personality is the only factor that affects the long-term viability of the venture: the entrepreneur's decision-making and behaviours also matter. This creates the rationale for launching a simultaneous focus on the entrepreneur's personality and behaviour.

1.2.2 The importance of established entrepreneurs

Metacognition is naturally suited to studying individuals engaged in a series of entrepreneurial processes and examining cognitive processes across entrepreneurial endeavours (Haynie 2005:21). Established entrepreneurs fall in this category. They are entrepreneurs who have been in business for longer than three and a half years (Herrington *et al.* 2015:15). In the South African economy and elsewhere, entrepreneurs are seen as the primary creators and drivers of new businesses and therefore they are clearly distinguished as economic actors (Botha 2015:24). Entrepreneurship plays a vital role in the survival and growth of any emerging economy. Owing to slow economic growth, high unemployment and an unsatisfactory level of poverty in South Africa, entrepreneurship becomes a critical solution (Botha 2015:24). To ensure economic prosperity in South Africa the number of entrepreneurs who successfully establish and develop small and micro-enterprises needs to increase significantly (Botha 2015:24).

The level of established businesses is important in any country as these businesses have moved beyond the nascent and start-up business phases and are able to make a greater contribution to the economy in the form of providing employment and

introducing new products and processes. Table 1.1 shows the prevalence rate of entrepreneurial activity amongst the adult population in South Africa from 2001 to 2014.

Table 1.1: Prevalence rates (%) of entrepreneurial activity amongst the adult population in South Africa, 2001-2014

Prevalence rates	2001	2004	2009	2013	2014	Ave SSA
Nascent entrepreneurial rate	5.3	3.3	3.6	6.6	3.9	14.1
New business ownership rate	1.4	1.7	2.5	4.1	3.2	13.0
TEA	6.5	5.2	5.9	10.7	7.0	26.0
Established business ownership rate		1.3	1.4	2.9	2.7	13.2
Discontinuance of businesses		2.9	3.5	3.9	3.9	14.0

Source: Herrington *et al.* (2015:23)

Table 1.1 shows that although there has been a sharp decline in South Africa's TEA rate since 2013, the established business level has remained relatively constant. The established business rate is also significantly lower than the average for efficiency-driven economies – which at 8.5% is more than three times South Africa's rate of 2.7%. The rates of all levels of early-stage entrepreneurial activity have dropped significantly compared to 2013. TEA has decreased by 34% (from 10.6% in 2013 to 7.0% in 2014) and the gap between South Africa and other SSA countries has widened. It appears that entrepreneurship in South Africa is regressing when compared with its counterparts in the rest of Africa (Herrington *et al.* 2015:28).

Established entrepreneurs have the insight to match technical discoveries with buyers' needs and the stamina, knowledge, skills, and abilities to fruitfully deploy their offerings in the market. This suggests that the main, but not the only tasks that entrepreneurs embark upon while creating new companies range from transforming technological discoveries into marketable items, working intensely despite

uncertainty and limited capital to establish market foothold, and fending off retaliatory actions from rivals in the marketplace. Another role that many entrepreneurs fulfil, particularly when launching high-growth ventures, is dealing with informed investors. While entrepreneurs deal with a small, homogeneous, and highly involved group of investors (e.g. business angels, venture capitalists, and bankers), incumbents are normally accountable to heterogeneous stockholders exhibiting diffused ownership (Shane & Venkataraman 2000:218).

The role and behaviours of entrepreneurs generally evolve as the firm becomes more and more established. For example, Hambrick and Crozier (1985:31) remarked that as their venture grows beyond the initial team, and evolves into a differentiated and systematic organisation, founders can expect important shifts in both their responsibilities and in what they expect of others. Along these lines, Hanks and Chandler (1994:23) suggested that entrepreneurs focus their attention on product development during the start-up stage, with a shift in priority toward sales and accounting during the growth stage. Later stage entrepreneurs had a significantly higher level of education, were more experienced, worked harder, and were more deeply involved in both strategic planning and the operational decision-making process. Later stage entrepreneurs also maintained richer and broader networks of ongoing relationships both inside and outside the firm (Van de Ven, Hudson & Schroeder 1984:87).

1.2.3 The entrepreneurial environment

Metacognitive processes may be important in dynamic environments. When environmental cues change, individuals adapt their cognitive responses and develop strategies for responding to the environment (Earley, Connolly & Ekegren 1989a). Entrepreneurship research describes the entrepreneurial task (and the environment surrounding that task) as inherently dynamic, risky and uncertain (Knight 1921; McGrath 1999:13; Zahra, Neubaum & El-Hagrassey 2002:3). Cognition has been studied as a mechanism that partially explains the entrepreneur's role in making sense of that uncertain, dynamic environment (Krueger 2000:5; Mitchell *et al.*

2000:974). Research suggests that the influence of the characteristics of the environment (uncertainty, task novelty, dynamism, etc.) on cognition is not static and objective, but dynamic and perceptual (Hilton 1995:248; Neuberg 1989:374; Schwarz 1996; Tetlock 1990:212). These findings imply that not only are the characteristics of the environment (as perceived) idiosyncratic to the individual actor, but also that as the environment evolves and unfolds, effective decision-making is dependent on the ability of the entrepreneur to evolve his/her sense-making mechanisms in concert with the environment.

The role of the environment in influencing individual and organisational decisions, in the context of cognitive theory, is not objective and readily 'measurable' because researchers have yet to find a reliable way to unpack the cognitive 'black box' responsible for sense-making and decision policies. The environment serves as an input to the 'black box' and its influences on cognitive processing and sense-making are understudied in both the strategy and entrepreneurship literatures (Haynie 2005). That said, in the context of a construct like the entrepreneurial mindset, the challenge becomes not only to understand how the dynamic, uncertain environment influences sense-making and decision policy, but also to investigate mechanisms to foster an individual's ability to adapt decision policies in the face of the changing environment. While this is a challenging research proposition, such a framework serves to highlight the 'other side of the cognitive coin' by asserting that there is a need for research investigating how the entrepreneur can think beyond existing heuristics and remain cognitively adaptable in an inherently uncertain and dynamic environment. While entrepreneurship research on cognition continues to proliferate, it has focused primarily on the cognitive processes and mechanisms that *inhibit* adaptability. Research on counterfactual thinking (Baron 2000:79), biases in scripts and schema (Mitchell *et al.* 2000:974), extensive use of heuristics (Alvarez & Busenitz 2001:755), an overconfidence bias (Busenitz & Barney 1997:9; Keh, Foo & Lim 2002:125), focus on cognitive rigidity in entrepreneurs, instead of exploring cognitive processes that promote adaptability and facilitate effective decision-making in dynamic environments.

Entrepreneurship researchers have attempted to articulate and, in some cases, empirically test the 'dimensions' of the entrepreneurial environment. It has been suggested that these dimensions offer a basis for understanding the underlying relationship between the entrepreneurial environment and how the entrepreneur makes sense of that environment. An abbreviated summary of the dimensions which define the entrepreneurial environment (as proposed by entrepreneurship scholars) is presented in Table 1.2.

Table 1.2: Dimensions of uncertainty

The source	Source of uncertainty
Gnyawaii & Fogel 1994:43	Government policies and procedures Socioeconomic conditions Individual level skills Financial support Non-financial support
Weaver <i>et al.</i> 2002:87	General uncertainty/environmental change Technological volatility Actions of competitors/customers International markets/expansion
Baum <i>et al.</i> 2001:292	Environmental predictability/dynamism Availability of outside resources/ munificence Many/few competitors / complexity

Source: Adapted from Haynie (2005:7)

The three most commonly cited definitions of 'environmental uncertainty' imply a perceptual phenomenon and therefore it would be difficult to dismiss the idea that how individuals make sense of a given environment is moderated by the uncertain nature of that environment. Those definitions are as follows:

- 'An inability to assign probabilities as to the likelihood of future events' (Duncan 1972:313; Pennings 1975:393)
- 'A lack of information about cause-effect relationships' (Duncan 1972:313; Lawrence & Lorsch 1967:1)

- ‘An inability to accurately predict what the outcomes of a decision might be’ (Downey, Hellriegel & Slocum 1975:613; Duncan 1972:313; Schmidt & Cummings 1976:447).

The idea of uncertainty is fundamental to entrepreneurship (Knight 1921). Most of the literature positioned to describe the entrepreneurial environment defines its characteristics based on 'applied' dimensions of uncertainty (technological change, government regulation, etc.).

1.3 DEFINITION OF TERMS

The study involves understanding a number of key concepts, namely entrepreneurs, entrepreneurship, the Big Five personality traits, metacognition, metacognitive awareness and cognitive adaptability.

1.3.1 Entrepreneurs

Defining entrepreneurs remains a problem, as academics and researchers never seem to be able to reach agreement on the exact definition (Nieman & Nieuwenhuizen 2015:9). Some definitions are provided in Table 1.3 below.

Table 1.3: Definitions of ‘entrepreneur’

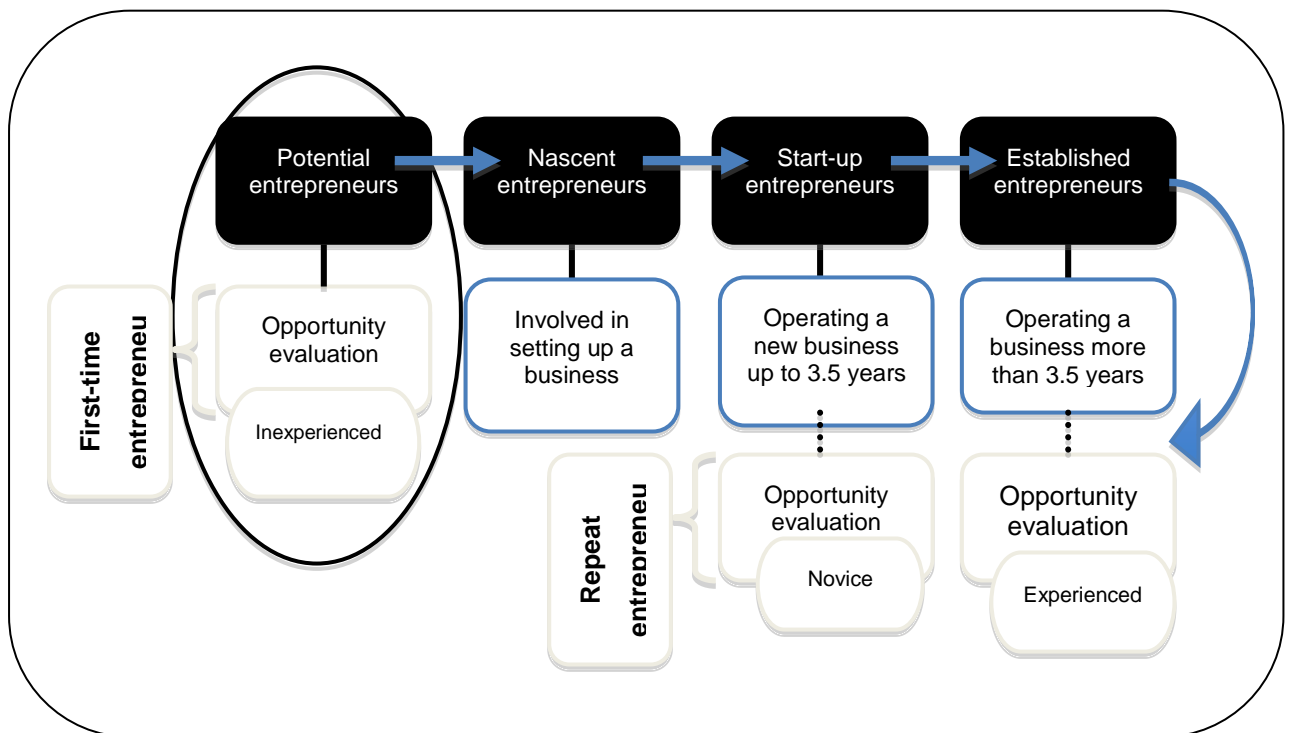
Definition	Reference
The entrepreneur is described as someone who carries out new combinations.	(Schumpeter 1934:75)
The entrepreneur’s role can be drawn in many forms and tends to appear different from different perspectives. For example, to an economist an entrepreneur is one who brings resources, labour, materials and other assets into combinations that make their value greater than before and also one who introduces changes, innovations and new order.	(Vesper 1980:2)
The entrepreneur is a catalyst for economic change that uses purposeful searching, careful planning and sound judgement when carrying out the entrepreneurial process. Uniquely	(Kuratko & Hodgetts 2007:47)

Definition	Reference
optimistic and committed, the entrepreneur works creatively to establish new resources or endow old ones with a new capacity, all for the purpose of creating wealth.	
The entrepreneur is a creator, innovator and leader who gives back to society, as a philanthropist, director and trustee and who, more than any others, changes how people live, work, learn, play and lead.	(Timmons & Spinelli 2009:28)
An entrepreneur is a person who sees an opportunity in the market, gathers resources and creates and grows a business venture to meet these needs. He or she bears the risk of the venture and is rewarded with profit if it succeeds.	(Nieman & Nieuwenhuizen 2015:10)
The entrepreneur is an individual who takes initiative to bundle resources in innovative ways and is willing to bear the risk and/or uncertainty to act.	(Hisrich, Peters & Shepherd 2010:6)
The entrepreneur is a creator, innovator and leader who gives back to society, as a philanthropist, director and trustee and who, more than any others, changes how people live, work, learn, play and lead. The entrepreneur also creates new technologies, products, processes and services. He or she creates value with high-potential, high-growth business ventures.	(Spinelli & Adams 2012:21)

Adapted from Moos (2014:16)

This study focuses on established entrepreneurs as defined by Herrington *et al.* (2015:15). A potential, then nascent entrepreneur becomes a start-up entrepreneur once they commence operations within the new business venture. The Global Entrepreneurship Monitor (GEM) report distinguishes clearly between start-up and established entrepreneurs. A start-up entrepreneur operates a new business that is less than three and a half years old. An established entrepreneur operates an established business that is older than three and a half years (Herrington *et al.* 2015:15). Figure 1.1 illustrates the link between the different types of entrepreneurship.

Fig. 1.1: The entrepreneurial definitions within the entrepreneurship process



Source: Adapted from Herrington, Kew and Kew (2010:10)

1.3.2 Entrepreneurship

Entrepreneurship is the emergence and growth of new businesses (Nieman & Nieuwenhuizen 2015:9). The motivation for entrepreneurial activities is to make profits. Entrepreneurship is also the process that causes changes in the economic system through innovations of individuals who respond to opportunities in the market. In the process, entrepreneurs create value for themselves and society (Nieman & Nieuwenhuizen 2015:9).

1.3.3 The Big Five personality traits

The Big Five model of personality traits is a framework that provides a valid, robust and comprehensive way of representing fundamental personality differences between individuals (Judge, Bono *et al.* 2002:767). The Big Five personality theory is

also referred to as the five-factor model of personality (Goldberg 1990:1217). The Big Five dimensions of personality are: openness to experience; conscientiousness; extraversion; agreeableness; and neuroticism.

1.3.4 Metacognition

Metacognition has been described as a higher-order, cognitive process that serves to organise what individuals know and recognise about themselves, tasks, situations and their environments in order to promote effective and adaptive cognitive functioning, in the face of feedback from complex and dynamic environments (Haynie & Shepherd 2009:696).

1.3.5 Cognitive adaptability

Cognitive adaptability has been defined as the ability to effectively and appropriately change decision policies, i.e. to learn given feedback (inputs) from the environmental context in which cognitive processing is embedded (Haynie & Shepherd 2007:2). The five dimensions of cognitive adaptability are goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

1.4 LITERATURE REVIEW

This section provides the theoretical underpinning surrounding the broad concepts of personality traits and cognitive adaptability. It streamlines the focus of this study to Big Five personality traits and cognitive adaptability and elaborates on their respective dimensions.

1.4.1 Theoretical foundation for the research

Career choice theory (e.g. Holland 1997; Lent, Brown & Hackett 1994) and person-environment fit theory (Judge & Kristof-Brown 2004; Kristof-Brown, Zimmerman & Johnson 2005) provide the theoretical basis for the hypotheses of the study.

Considerable empirical evidence derived from these theories shows that people choose work environments that match their personality, values, needs, and interests. Founding and managing a new business venture requires the entrepreneur to fulfil a number of unique task demands or work roles such as innovator, risk taker and bearer, executive manager, relationship builder, risk reducer, and goal achiever (Chen, Greene & Crick 1998). This academic view of entrepreneurial work is widely shared within the general population (e.g. Baron 1999; Locke 2000). Consistent with the processes identified by career choice and person-environment fit theory, we expect established entrepreneurs to learn and adapt their decisions based on the relationship between their personality traits and the cognitive adaptability in an entrepreneurial environment.

1.4.2 The Big Five personality traits in entrepreneurship

The relationship between personality and performance is well supported by several meta-analytical studies (Bergner, Neubauer & Kreuzthaler 2010:177; Barrick, Mount & Judge 2001:9) and personality traits are agreed to be valid predictors of managerial performance (Bergner *et al.* 2010:177). Personality traits influence occupational choice and are valid predictors of managerial success (Farrington 2012b:382). For example, Nadkarni and Herrmann (2010:1050) contend that the personality of a business leader influences the strategic decision processes and strategic actions of a firm, ultimately having implications for the firm's performance. Finkelstein and Hambrick (1996:1050) conclude that the personality of a business leader holds consequences for a firm. According to McCrae and Costa (1980:1179), personality traits influence a person's tendency to act, and different tendencies can enable or hinder a business owner's behaviour. In a study among project managers, Dvir, Sadeh and Malach-Pines (2006:36) found that when the personality type of the project manager matches the project type, more successful projects result. Similarly, Douglas (n.d.) suggests that personality has a great deal to do with being a successful entrepreneur.

Several developments have since occurred that have opened up the conversation surrounding the importance of personality studies in entrepreneurship. The emergence of the five-factor model (FFM) of personality (Digman 1990:417) allows for the organisation of a vast variety of personality variables into a small but meaningful set of personality constructs to search for consistent and meaningful relationships. The five-factor model of personality is measured by the revised NEO Personality Inventory (NEO PI-R) which includes Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness (McCrae & Costa 1997:512). The reason for deciding on this conceptualisation is because the validity of broad personality dimensions is superior to narrowly defined dimensions (Ashton 1998:295). Psychometric meta-analysis (Hunter & Schmidt 1990:101) allows for the production of a synthesised effect size estimate for each construct that accounts for research artefacts such as low reliability and sampling error that can mask the emergence of a true relationship.

Personality development is predominantly influenced by narrowly acting mechanisms that each affect a single Big Five domain, or a small cluster of related facets, rather than by broadly acting mechanisms that simultaneously affect previously independent traits (Soto & John 2012:881). In a study by Leutner *et al.* (2014:63) personality was found to predict entrepreneurial success outcomes beyond business creation and success. Narrow personality traits were found to be stronger predictors of these outcomes compared to broad traits. The importance of the findings is twofold. Firstly, it reveals that personality accurately predicts several entrepreneurial outcomes, thereby demonstrating personality's influence on entrepreneurial success. Given that the usefulness of personality traits as predictors of entrepreneurial success has been fiercely contested by some theorists (Chell 2008; Hisrich *et al.* 2007:576), the findings have theoretical and practical implications. Secondly, the findings established that traits matched to the task of entrepreneurship have incremental validity above and beyond that of the Big Five. Narrow traits matched to more specific entrepreneurial behaviours or outcomes produced higher correlations with business creation and success compared to broad, unmatched traits in Rauch and Frese's meta-analysis (2007b) (Leutner *et al.* 2014:6).

1.4.3 Metacognitive theory and cognitive adaptability

Metacognition has also been referred to as the ability to reflect upon, understand and control one's learning (Schraw & Dennison 1994:460). Metacognition describes a higher-order, cognitive process that serves to organise what individuals know and recognise about themselves, tasks, situations and their environments in order to promote effective and *adaptable* cognitive functioning in the face of feedback from complex and dynamic environments (Brown 1987a:65; Flavell 1979:906; Flavell 1987:21). Based on metacognition research and integrated with related work in social cognition (selectively reviewed below), cognitive adaptability has been conceptualised as the aggregate of metacognition's five theoretical dimensions: goal orientation; metacognitive knowledge; metacognitive experience; metacognitive control; and monitoring. Theory suggests that these five dimensions encompass metacognitive awareness (Griffin & Ross 1991:320; Schacter 1996; Flavell 1979:909; Flavell 1987:21; Nelson 1996:106).

Entrepreneurship scholars suggest that cognition research can serve as a process lens through which to 're-examine the people side of entrepreneurship' by investigating the memory, learning, problem identification and decision-making abilities of entrepreneurs (Mitchell *et al.* 2002:93). Several studies have focused on the decision-making and behavioural aspects of this issue by concentrating on the cognitive adaptability of entrepreneurs. This has been done by investigating the complex, dynamic, and inherent uncertainty of environments and impact on decision contexts (Earley & Ang 2003), individual self-regulation in entrepreneurship (Higgins 1997), decision frameworks of entrepreneurs (Melot 1998; Schraw & Dennison 1994), the range of strategies used by entrepreneurs (Ford *et al.* 1998; Staw & Boettger 1990), how individuals identify entrepreneurial opportunities and act upon them (McMullen & Shepherd 2006), ability to rapidly sense, act, and mobilise, even under uncertain conditions (Ireland *et al.* 2003:963-989), achieving desirable outcomes from entrepreneurial actions (Krauss *et al.* 2005:315), the influences of cognition on entrepreneurial tasks and subsequent outcomes (Haynie *et al.*

2010:217), as well as the relationship between cognitive adaptability and entrepreneurial intentions (Urban 2012:16).

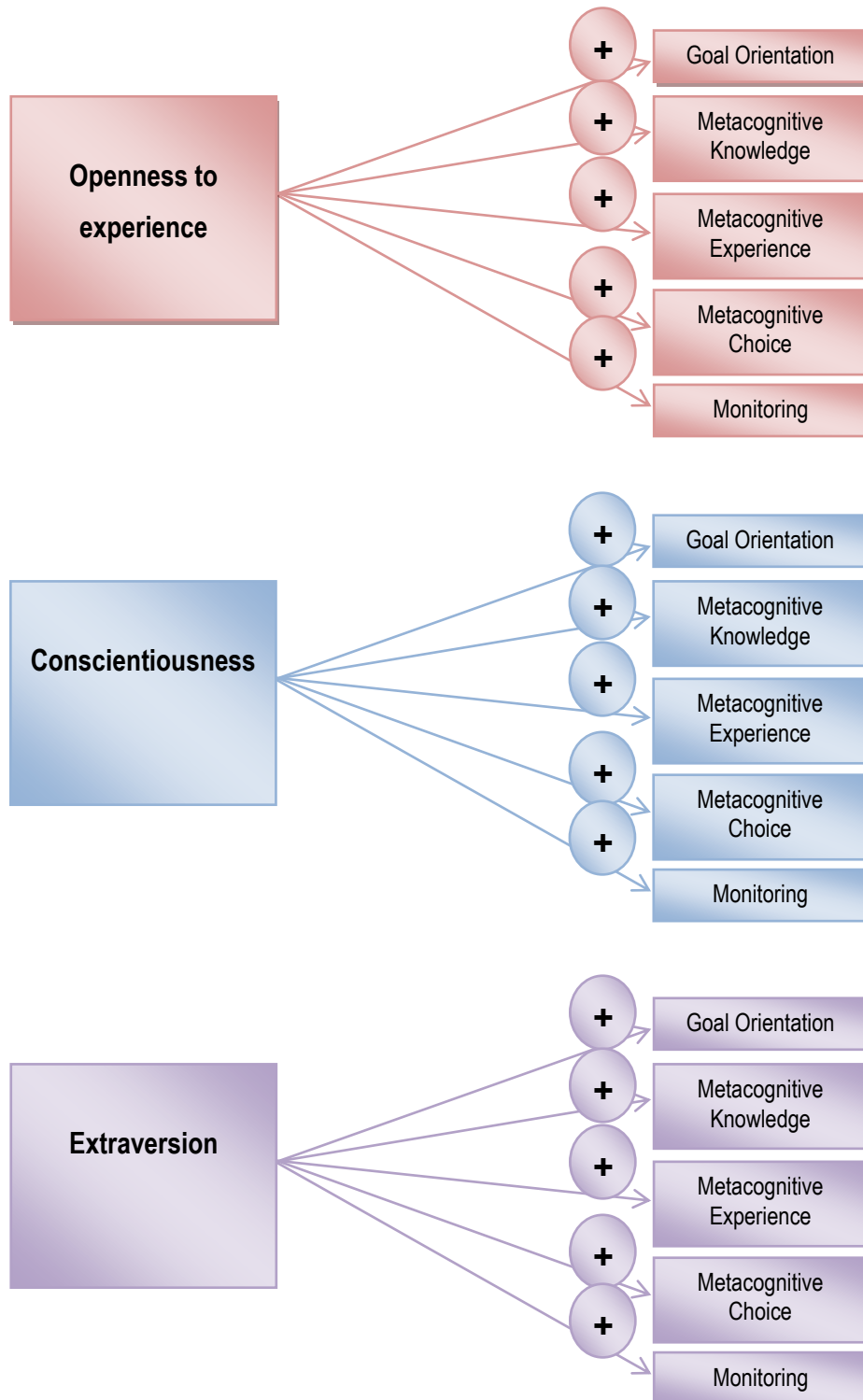
The present study is positioned to further such inquiry, through investigation of the individual differences in cognitive adaptability in an entrepreneurial context.

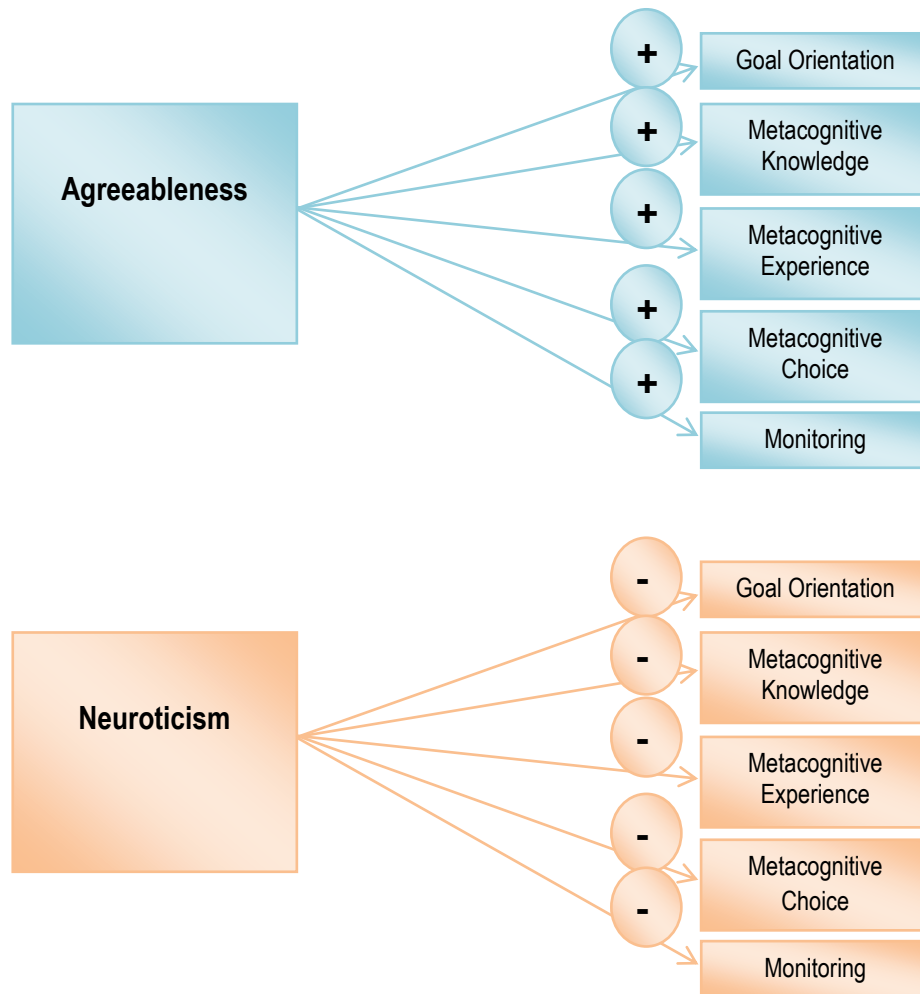
1.4.4 The hypothesised model for personality traits and cognitive adaptability

The hypothesised model for the study has 10 variables in total, comprising five independent variables (Big Five personality traits) and five dependent variables (cognitive adaptability). The five independent variables are openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. The five dependent variables are goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

The hypothesised model of the relationship between personality traits and cognitive adaptability of entrepreneurs is illustrated in Figure 1.2.

Fig. 1.2: Proposed model of personality traits and cognitive adaptability of established entrepreneurs





Source: Own compilation

Figure 1.2 illustrates that openness to experience is positively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are creative, imaginative, broad-minded and curious are likely to be able to adapt to dynamic and novel entrepreneurial environments. The second cluster within the figure illustrates that conscientiousness is positively related to goal orientation, metacognitive knowledge, metacognitive experience, and metacognitive choice and monitoring. Entrepreneurs who are dependable and strive for achievement are likely to be able to adapt to dynamic and novel entrepreneurial environments. The third cluster illustrates that extraversion is positively related to goal orientation, metacognitive knowledge, metacognitive experience, and metacognitive choice and monitoring. Entrepreneurs who are

sociable and assertive are likely to be able to adapt to dynamic and novel entrepreneurial environments.

The fourth cluster illustrates that agreeableness is positively related to goal orientation, metacognitive knowledge, metacognitive experience, and metacognitive choice and monitoring. Entrepreneurs who are cooperative, courteous and tolerant are likely to be able to adapt to dynamic and novel entrepreneurial environments. The fifth and final cluster illustrates that neuroticism is negatively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are characterised by a predisposition toward negative cognitions, intrusive thoughts and emotional reactivity are not likely to be able to adapt to dynamic and novel entrepreneurial environments.

1.5 THE RESEARCH PROBLEM

Research suggests that while cognitive adaptability is difficult to achieve, it is positively related to decision performance in contexts that can be characterised as complex, dynamic, and inherently uncertain (Earley & Ang 2003; Kirzner 1979; Rozin 1976). The entrepreneurial context exemplifies such a decision environment (Mason 2005:241). Furthermore, the ability to sense and adapt to uncertainty and be creative may characterise a critical entrepreneurial resource (Pretorius, Millard & Kruger 2006:2). Importantly, with age and experience, it is likely that people generally rely more heavily on automatic, heuristic-based processing than on purposeful “thinking about thinking” (Urban 2012:17).

From the background of the study, it is evident that the established business rate, although low, has been increasing positively since 2001. There could be many reasons for this positive increase. As entrepreneurs are required to make decisions with incomplete information, they sometimes make correct, and other times wrong decisions and they may think about these issues on a meta-cognitive level and decide how they would approach the decision-making task differently the next time they are faced with a similar situation. In a world of ever-increasing uncertainty and

unpredictability, having an entrepreneurial mindset (thinking innovatively and proactively, as well as taking risks, due to incomplete information when making decisions) is seen as more important. This study focuses on how established entrepreneurs adapt cognitively (i.e. learn) based on their decisions.

While the research problem is dealt with in detail in Chapter 6, the study sought to address the following:

- To determine whether there is a relationship between the individual dimensions of the personality traits and the individual dimensions of the cognitive adaptability of established entrepreneurs.

1.6 PURPOSE OF THE STUDY

The purpose of this study is to determine whether personality traits and cognitive adaptability contribute to the ability of established entrepreneurs to adapt their decision policies in the face of dynamic and novel entrepreneurial environments. More specifically, the study attempts to determine the relationship between the individual dimensions of the personality traits and the individual dimensions of the cognitive adaptability of established entrepreneurs.

The study aims to explore the following:

- personality traits and in particular the Big Five personality traits;
- cognitive adaptability and in particular the individual dimensions of cognitive adaptability; and
- the relationship between each of the five personality traits and the five cognitive adaptability dimensions of established entrepreneurs.

1.7 RESEARCH OBJECTIVES

The research study will be guided by primary and secondary research objectives.

1.7.1 Primary objectives

The primary objective of the study is to determine the relationship between:

- the personality traits and cognitive adaptability of established entrepreneurs in South Africa.

1.7.2 Secondary objectives

The secondary objective is to determine the relationship between:

- openness to experience and the five dimensions of cognitive adaptability.
- conscientiousness and the five dimensions of cognitive adaptability.
- extraversion and the five dimensions of cognitive adaptability.
- agreeableness and the five dimensions of cognitive adaptability.
- neuroticism and the five dimensions of cognitive adaptability.

1.8 HYPOTHESES

1.8.1 Openness to experience and the five dimensions of cognitive adaptability

H1: Openness to experience is POSITIVELY related to goal orientation.

H2: Openness to experience is POSITIVELY related to metacognitive experience.

H3: Openness to experience is POSITIVELY related to metacognitive knowledge.

H4: Openness to experience is POSITIVELY related to metacognitive choice.

H5: Openness to experience is POSITIVELY related to monitoring.

1.8.2 Conscientiousness and the five dimensions of cognitive adaptability

H6: Conscientiousness is POSITIVELY related to goal orientation.

H7: Conscientiousness is POSITIVELY related to metacognitive knowledge.

H8: Conscientiousness is POSITIVELY related to metacognitive experience.

H9: Conscientiousness is POSITIVELY related to metacognitive choice.

H10: Conscientiousness is POSITIVELY related to monitoring.

1.8.3 Extraversion and the five dimensions of cognitive adaptability

H11: Extraversion is POSITIVELY related to goal orientation.

H12: Extraversion is POSITIVELY related to metacognitive knowledge.

H13: Extraversion is POSITIVELY related to metacognitive experience.

H14: Extraversion is POSITIVELY related to metacognitive choice.

H15: Extraversion is POSITIVELY related to monitoring.

1.8.4 Agreeableness and the five dimensions of cognitive adaptability

H16: Agreeableness is POSITIVELY related to goal orientation.

H17: Agreeableness is POSITIVELY related to metacognitive knowledge.

H18: Agreeableness is POSITIVELY related to metacognitive experience.

H19: Agreeableness is POSITIVELY related to metacognitive choice.

H20: Agreeableness is POSITIVELY related to monitoring.

1.8.5 Neuroticism and the five dimensions of cognitive adaptability

H21: Neuroticism is NEGATIVELY related to goal orientation.

H22: Neuroticism is NEGATIVELY related to metacognitive knowledge.

H23: Neuroticism is NEGATIVELY related to metacognitive experience.

H24: Neuroticism is NEGATIVELY related to metacognitive choice.

H25: Neuroticism is NEGATIVELY related to monitoring.

1.9 RESEARCH DESIGN AND METHODOLOGY

This is a quantitative study grounded in the positivistic research paradigm. Methods associated with this paradigm include surveys and this study used an online survey to collect its data. The questionnaire used consists of a demographic section and the two measuring instruments, namely personality traits and cognitive adaptability. The large sample consisted of 90% established entrepreneurs and 10% start-up entrepreneurs. A decision was made to focus on established entrepreneurs only as the sample was much larger than the sample of start-up entrepreneurs. The questionnaire was tested for validity and reliability. In order to analytically test the relationship between personality traits and cognitive adaptability, the study used confirmatory factor analysis (CFA), exploratory factor analysis (EFA), structural equation modelling (SEM) and regression analysis. The measurement model was validated using CFA and EFA, while SEM was used to empirically examine the hypotheses through a structural model. SEM allows for simultaneous analysis of all the dependent variables in a model and takes measurement error into account. Thus SEM was used to investigate the relationship between the independent (personality constructs) and dependent variables (cognitive adaptability).

As none of the SEMs revealed an overall acceptable model fit, it was decided to conduct multiple linear regression analyses to establish the statistical significance, strength and direction of each hypothesised path.

1.10 IMPORTANCE AND CONTRIBUTION OF THE STUDY

First, this study makes a contribution to the fields of psychology and entrepreneurship. By bringing together literatures from personality psychology and cognitive psychology in one model of personality traits and cognitive adaptability, this study offers a robust, testable framework that serves to address two notable shortcomings of the extant entrepreneurial cognition literature: specifically 1) the inadequate treatment of the influences of personality on cognitive processing, and 2) the inadequate treatment of the cognitive mechanisms that promote adaptable

(rather than inhibit) thinking and cognitive processes in general given a dynamic environment. Why is it that entrepreneurs 'think' differently about a given entrepreneurial task (and subsequently behave differently)?

Second, by empirically investigating a series of relationships proposed by the theoretical model - specifically how monitoring of one's own cognitions relates to one's personality traits, this study demonstrates the utility of the model as a framework to be applied to the study of entrepreneurial cognitions. More significantly, the findings suggest that personality traits and normative differences in performance on entrepreneurial tasks may be explained by the role that metacognition plays in promoting cognitive adaptability.

Some of the findings represent an important step forward towards realising the stated goal of many entrepreneurship scholars, i.e. to 'open the black box' of entrepreneurial cognition so that we can fully understand the relationship between cognition and performance in an entrepreneurial environment. There are two significant findings:

- The aggregation of the seven dimensions as opposed to the five dimensions of cognitive adaptability found by Haynie and Shepherd (2009:703). This study found that metacognitive knowledge and metacognitive experience split. Metacognitive knowledge splits into current metacognitive knowledge and prior metacognitive knowledge, whereas metacognitive experience splits into current metacognitive experience and prior metacognitive experience. Established entrepreneurs in a South African or developing entrepreneurial environment draw on current metacognitive knowledge (and not on prior metacognitive knowledge) in their handling of entrepreneurial tasks.
- The popular revised NEO Personality Inventory (NEO PI-R) has a short form, i.e. the NEO Five-Factor Inventory (NEO-FFI) that taps the five broad factors with fidelity and reliability. However, conventional scoring of this short form does not provide scores on more specific aspects of the broad-bandwidth factors. Fourteen factor-analytically derived scales in the NEO-FFI emerged in

this study. Thirteen factor-analytically derived scales were found in Saucier's study (1998:263). This study contributes to the literature demonstrating that information gained from the NEO-FFI need not be limited to a single score from each of the five broad factor domains. On the practical level, researchers are afforded some degree of additional fidelity.

In terms of methodology, this study makes a significant contribution in entrepreneurship research by the focus on established entrepreneurs. Metacognition is naturally suited to studying individuals engaged in a series of entrepreneurial processes and examining cognitive processes across entrepreneurial endeavours (Haynie 2005:21). Entrepreneurship is commonly defined based on new products, new markets, and new ventures (e.g. Lumpkin & Dess 1996). As a result, entrepreneurship scholars are most interested in questions focused on opportunity recognition, exploitation, new venture creation, learning, knowledge, and entrepreneurial 'intent.' Understanding how established entrepreneurs utilise their cognitive adaptability and personality traits in analysing entrepreneurial tasks should benefit start-up and potential entrepreneurs in dealing with challenging entrepreneurial environments.

Entrepreneurs at the different phases of the entrepreneurial life cycle should be able to find this study beneficial. It will create awareness of what personality traits are related to cognitive adaptability in an established entrepreneurial environment. The ability to compare one's attributes with those of established entrepreneurs could assist aspiring entrepreneurs to make an important career decision even if they have no previous experience of working in an entrepreneurial environment.

The practical implications of this study can be brought into the classroom setting, where consideration of cognitive adaptability in the design of curriculum and teaching methodologies could enhance learning and promote adaptable thinking. The articulation of the aggregated metacognitive dimensions provides a meaningful categorisation, where there is ample opportunity for curriculum designers to develop skill-building exercises and activities that target the various metacognitive dimensions

(Urban 2012:28). If a certain type of personality is closely associated with entrepreneurship, the effort of developing entrepreneurs in South Africa could include the development of personality. Metacognition is not represented as a dispositional trait but rather as a dynamic, learned response that can be enhanced through experience and training (Haynie *et al.* 2010:217).

Venture capitalists and other funding agencies are frequently faced with the decision to fund or not to fund a start-up company. With large amounts of money at risk, this research would allow them to make sound decisions about the people involved, in addition to market analysis and evaluating the merits of the product/service. The NEO-FFI scale with its 14 theory-tested items offers additional fidelity to distinguish between two equally qualifying entrepreneurs when deciding on funding.

1.11 DELIMITATION

The study sought to study start-up and established entrepreneurs. Due to the large percentage of established entrepreneurs (90%) compared to start-up entrepreneurs, the choice was made to focus on established entrepreneurs only.

1.12 OUTLINE OF THE STUDY

The study consists of the following chapters:

Chapter 1: Introduction and background to the study

Chapter 1 focuses on the introduction and background to the study. It defines the research problem and clearly states the research objectives and hypotheses. The importance and benefits of the study are discussed and the key terms defined. Literature regarding the personality traits of entrepreneurs, the Big Five personality traits and the cognitive adaptability of entrepreneurs is briefly reviewed. Finally, the chapter presents the delimitations and assumptions of the study and outlines the research design and methodology.

Chapter 2: The Big Five personality traits

This chapter discusses the existing literature on personality, personality traits, the Big Five personality traits and entrepreneurial personality. The chapter begins with the trait concept in personality, the historical developments of the trait theory by Allport, Cattell and Eysenck, the Big Five personality trait model and the five factors – openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. It concludes with the Big Five and entrepreneurial personality.

Chapter 3: Cognitive adaptability

This chapter outlines the origins of cognition in social psychology, and the evolution of social cognition research covering the three major themes. The chapter focuses on situated cognition and the dual process model. It then covers cognition and entrepreneurship focusing on the trait approach, cognition and entrepreneurial cognitions. Cognitive adaptability, metacognitions and a measure of cognitive adaptability are discussed. Specifically, the chapter covers the five dimensions of cognitive adaptability (i.e. goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring).

Chapter 4: The relationship between personality traits and cognitive adaptability within the entrepreneurial context

Chapter 4 focuses on the significance of personality structure in entrepreneurship. It discusses the Big Five personality traits in terms of lower levels (facets) and descriptive words. Cognitive adaptability is discussed in terms of the various concepts embedded in the definition. The comparative analysis of the link between personality traits and cognitive adaptability is covered in detail at facet and descriptive word levels. A literature review on the link between the two constructs is also provided. The chapter ends with an example of a conceptual model of

entrepreneurship which encompasses the Big Five personality traits and cognitive adaptability.

Chapter 5: Research design and methodology of the study

This chapter discusses the research design and methodology in detail. The research objectives and hypotheses will be presented. The reliability and validity of the study and the design of the two questionnaires used to collect data will be dealt with. In the final section, the data processing and analysis will be explained by means of the statistical techniques that will be used.

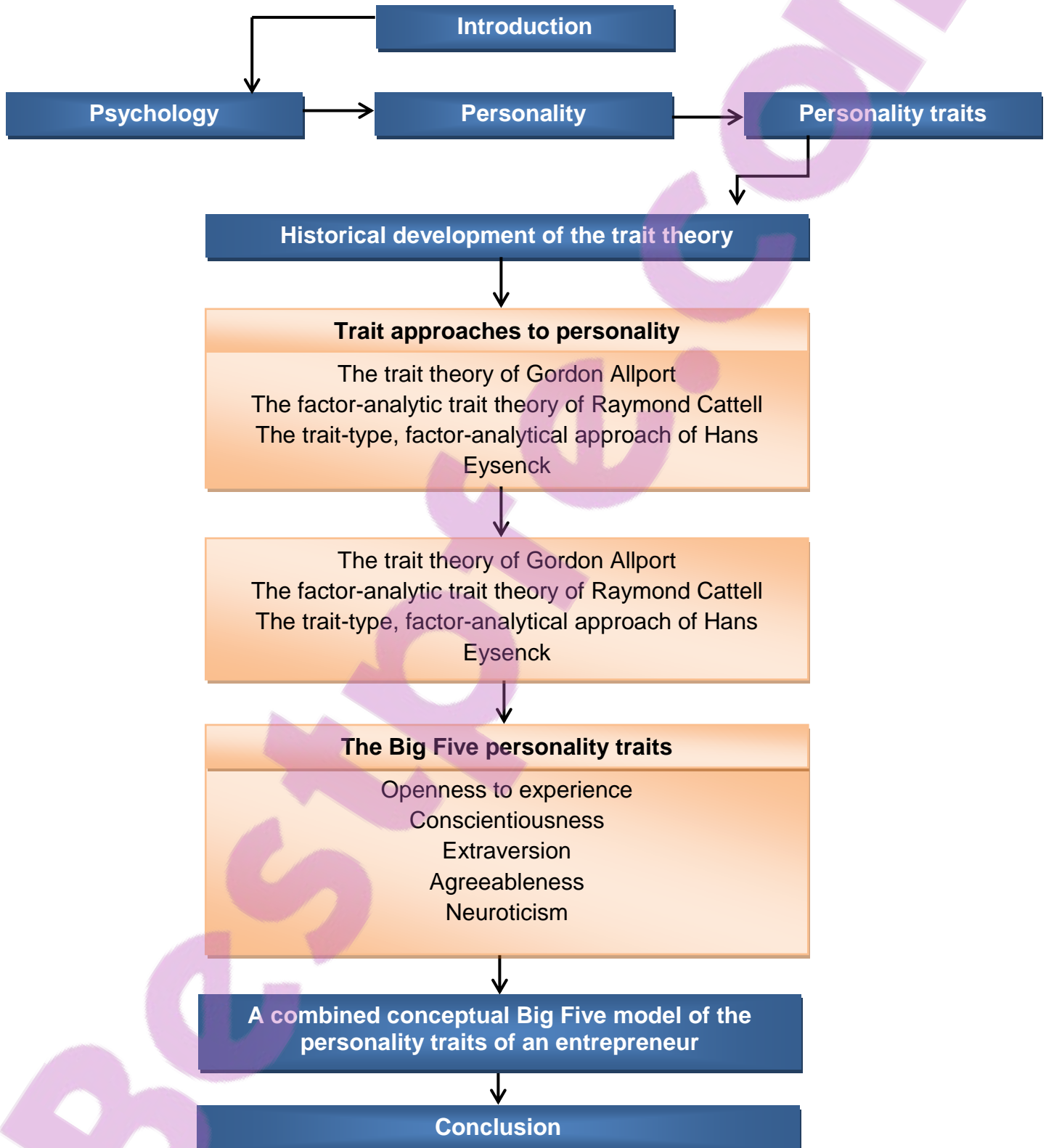
Chapter 6: Research findings

In this chapter all the research findings are presented based on the data analysis and the interpretation thereof. Factor analysis is done to confirm the validity and reliability of the questionnaires. The chapter presents the research findings obtained by means of descriptive research and inferential statistics, such as chi-square tests to identify statistically significant differences between the different target population groups. Structural Equation Modelling (SEM) is used.

Chapter 7: Conclusions and recommendations

Chapter 7 highlights the conclusions and recommendations of the study, and summarises its main findings. The research objectives and hypotheses are revisited and the limitations of the study, contribution of the study as well as future research avenues are discussed.

CHAPTER TWO: DIAGRAMMATIC SYNOPSIS: PERSONALITY



2.1 INTRODUCTION

Personality theorists agree that an individual's personality predicts his or her behaviour.

(Funder 1994:125)

This chapter is a review of the personality trait theories, entrepreneurial personality traits and how they relate to entrepreneurship. Behaviourists suggest that entrepreneurship is not simply a definition of the outcomes of an entrepreneurial venture, but rather a construct that describes either a set of personal characteristics (risk-taking, opportunity obsession, creativity), a set of behaviours (creating a new venture), or a combination of both (Llewellyn & Wilson 2003:341). Personality affects the odds of becoming an entrepreneur (Rauch & Frese 2007b:353; Zhao & Seibert 2006:259). Person-job fit research suggests a link between genes, personality and the decision to become an entrepreneur (Zhao & Seibert 2006:259). People select jobs appropriate for their personalities (Kristof 1996:1) and entrepreneurship is a more appropriate occupation for some personalities than for others (Baron & Markman 2004:45). Because personality characteristics are partly innate, job selection, including the decision to start a business, involves matching work activities to innate tendencies.

Recent convergence in personality theory has led to an overarching five-factor model of personality, i.e. the Big Five. The Big Five factors of personality are (1) openness to experience, (2) conscientiousness, (3) extraversion, (4) agreeableness and (5) neuroticism. The conceptual unit emphasised is the trait, a broad disposition to behave in a particular way (Pervin 1993:276).

In order to understand the origin of this approach, the historical developments of the trait theory from the progenitors to the trait approach, including the theories of Allport, Cattell and Eysenck are discussed (Pervin 1993:276). This is followed by a discussion of the Big Five model of personality followed by the description of the five factors. A discussion of the research findings and critiques of the model is also

provided to give a full appreciation of the theoretical analysis and debates around the Big Five personality model. The chapter concludes with a model of combined personality traits and a discussion of personality traits and their relationship to entrepreneurship.

2.2 THE CONSTRUCTS OF PSYCHOLOGY, PERSONALITY AND PERSONALITY TRAITS

2.2.1 Psychology

The field of psychology is concerned in part with individual differences. Although they recognise that all people are similar in some ways, psychologists interested in personality are particularly concerned with the ways people differ from one another (Pervin 1993:2). A truly scientific model of individual differences requires both a representative set of attributes as well as a model which categorises these attributes (Goldberg 1995:29). This view of studying personality is called the trait approach and is based on the assumption that descriptions of people, in implicitly specified situations, can be used as a means of predicting their behaviour (Funder 2001:199). Trait theorists consider an individual's personality to be composed of a characteristic set of fundamental personality traits that were derived from analyses of the natural-language terms people use to describe themselves. This is also known as the lexical approach, as early trait theorists used a lexicon to find all the terms that were related to personality traits (Digman 1990:420; Goldberg 1995:32).

2.2.2 Personality

The term 'personality' covers the qualities that form a person's character (Waite & Hawker 2009) and individuality (Haslam 2007). Burger (2008:4) describes personality as 'the consistent behaviour patterns and intrapersonal processes originating from within an individual' or the 'characteristic patterns of thoughts, feelings and behaviours that make a person unique'. Personality is a system defined by personality traits and dynamic processes that affects the way in which individuals

function socially as well as in a work context (Barrick & Mount 1991:20; Gatewood, Field & Barrick 2011:10).

2.2.3 Personality traits

Personality traits are more specific constructs that explain consistencies in the way people behave and help to explain why different people react differently to the same situation (Llewellyn & Wilson 2003:342). Personality traits determine a person's words, deeds and role in life (Cooper 1998:62), and as such, an individual's actions and thinking are derived from the personality traits they possess (Costa & McCrae 1992a:654). Personality traits differ in type and degree for everybody (Costa & McCrae 1992a:660). People's unique personalities can be captured by specifying their particular personality traits. The basic assumption of the trait point of view is that people possess broad predispositions, called traits, to respond in particular ways (Pervin 1993:276). In other words, people may be described in terms of the likelihood of them behaving in a particular way, for example being outgoing and friendly or dominant and assertive. Trait theories suggest that people have broad predispositions to respond in certain ways and that there is a hierarchical organisation to personality (Pervin 1993:276).

2.3 HISTORICAL DEVELOPMENTS OF THE TRAIT THEORY

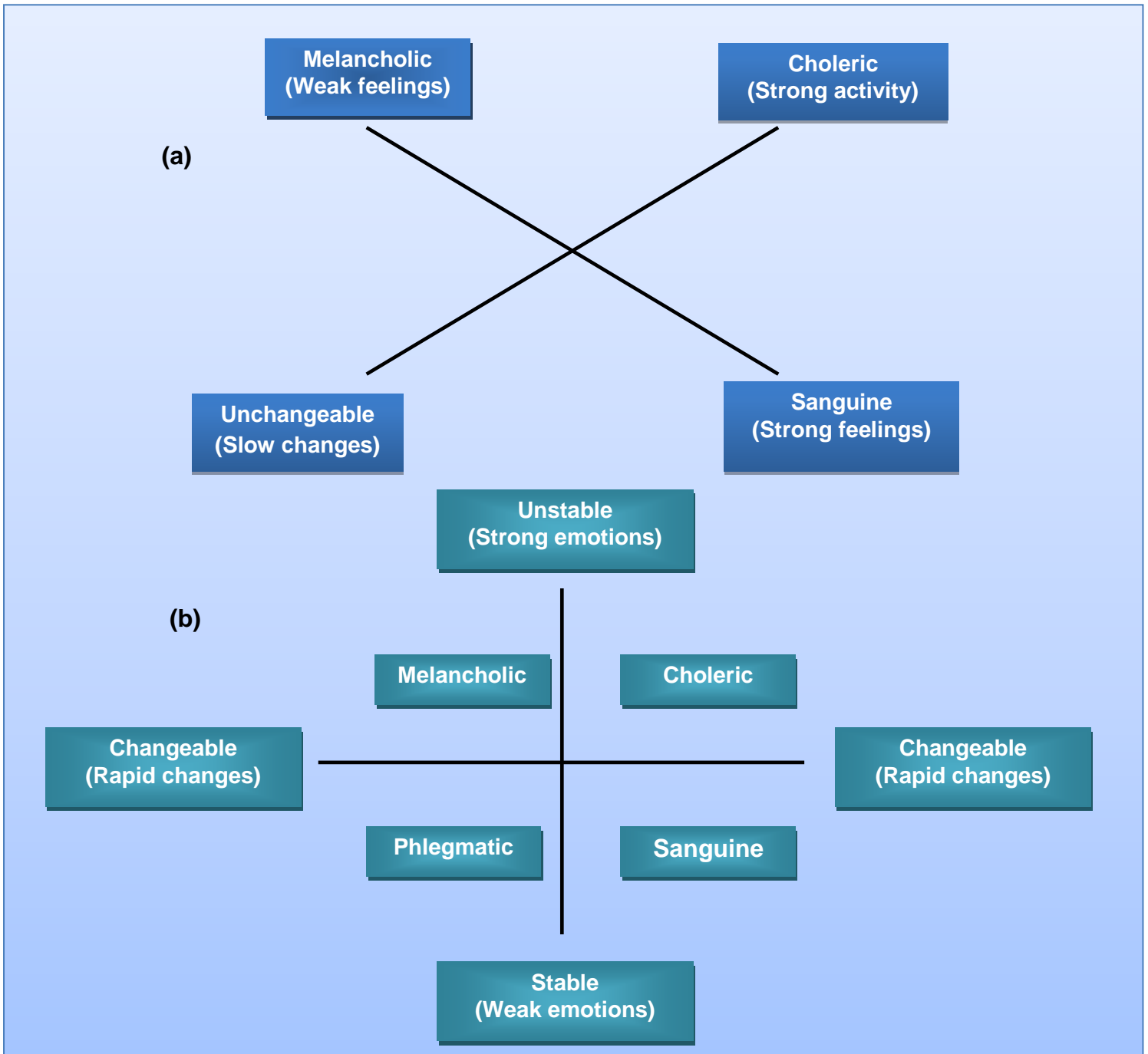
Aristotle, Theophrastus and Hippocrates are cited as progenitors to the trait approach of personality (Allport 1937:99; Matthews, Deary & Whiteman 2003:8). Aristotle, the renowned Greek philosopher and student of Plato, is celebrated for his arguments on moral conduct. Aristotle argued that moral behaviour is the product of dispositions. This argument is thoroughly explored in his theory of the Golden Mean (Matthews *et al.* 2003:9). Following the teaching of Aristotle, Theophrastus created character sketches, describing how a person is expected to act in most situations. The character descriptions were viewed as consistent across both time and place (Allport 1961:99). Centuries later, Hippocrates, who was regarded as the father of medicine due to his expertise in diagnoses and treatment of disease, described bodily humors

as causative agents in pathology (Stelmack & Stalikas 1991:257). Hippocrates argued that the human body contained four humors; phlegm, blood, yellow bile and black bile (Allport 1937:10; Friedman & Schustack 2003:62; Hergenhahn 2005:71).

Galen, expanding on Hippocrates's work, emphasised the relationship between the humors and character. According to Galen, there were four temperaments, each of which contained corresponding characteristics (Hergenhahn 2005:88; Matthews *et al.* 2003:27). These were phlegmatic temperament (phlegm), sanguine temperament (blood), choleric temperament (yellow bile), and melancholic temperament (black bile). The sanguine person, always full of enthusiasm, was said to owe his temperament to the strength of the blood; the sadness of the melancholic was supposed to be due to the over-functioning of black bile; the irritability of the choleric was attributed to the predominance of yellow bile in the body; and the phlegmatic person's apparent slowness and apathy were traced to the influence of the phlegm (Eysenck & Eysenck 1987:42). However, Stelmack and Stalikas (1991:259-260) caution that Galen's humors were 'not uniquely employed to describe character.'

The humoral terms are today merely descriptive metaphors. Immanuel Kant (1781) recast the four humoral temperaments along the dimensions of 'feeling' and 'activity' to yield a typology of four simple temperaments that emphasised their psychological nature. The four humors also appear in the writings of the father of modern psychology, Wilhelm Wundt. Wundt (1886) described the four temperamental types in terms of two dimensions: strong-weak emotions versus changeable-unchangeable activity (Figure 2.1).

Fig. 2.1: Humoral schemes of temperament proposed by (a) Kant and (b) Wundt



Source: Adapted from Matthews *et al.* (2003:9)

In the 19th century, Sir Francis Galton (1888) argued that differences in personality could be described by means of language. By employing the use of the lexical approach, Galton undertook a thorough examination of the Roget's Thesaurus,

searching for terms describing an individual character (Matthews *et al.* 2003:40). The lexical approach assumes that language terms used to describe individual differences exist in all languages (Goldberg 1990:1218). However, at this time, complex statistical techniques used to analyse data, such as factor analysis and correlation methods, had not yet been formulated. With the advent of these methods and the influence of Allport, Eysenck and Cattell, the modern conceptualisations of the trait approach flourished (Matthews *et al.* 2003:41).

2.4 THE TRAIT APPROACHES TO PERSONALITY: ALLPORT, EYSENCK AND CATTELL

There are three notable trait theorists who have influenced the study of traits - Gordon Allport, Hans Eysenck and Raymond Cattell. They share an emphasis on broad disposition to respond as being central to personality. However, their approaches differ in many ways, most importantly concerning the use of factor analysis to discover traits and the number of traits to be used in the description of personality.

2.4.1 The trait theory of Gordon W. Allport

What Sigmund Freud is to the psychoanalytical paradigm, Gordon Allport is to the trait paradigm (Peterson 1988:286). With his interest in language and aversion to psychoanalysis, Allport has contributed greatly to the study of personality (Pervin & John 2001:252). He defined personality as 'the dynamic organisation within the individual of those psychophysical systems that determine his unique adjustments to his environment'. Underlying this definition was Allport's belief in internal structures (traits) and neuropsychic structures (personal dispositions) which together produce human behaviour (Allport 1937:90). This belief led Allport to argue that traits are the core aspects of personality and that they exist in the nervous system (Allport 1937:90).

Allport and Odbert (1936) compiled a list of approximately 18,000 terms that could be used to distinguish an individual's behaviour. In an effort to impose some structure on their results, Allport and Odbert divided the list of terms into four categories of what they termed personality descriptors. The four categories were defined as: personality traits; temporary states, mood and activities; evaluative judgements of personal conduct; and physical characteristics, capacities and talents. This list and form of categorisation formed the basis for future studies from the trait perspective (John & Srivastava 1999:102). For a trait to qualify as such for any particular person, it is necessary for the behaviour it characterises to occur repeatedly in generally similar situations (Dumont 2010:158).

Allport differentiated the importance of traits for a person's personality with the concept of cardinal traits, central traits and specific dispositions. Cardinal traits in Allport's terminology are units of personality that are pervasive and highly influential in the life of the individual, so much so that much of the emotional life, the cognitions, self-image, interests, life goals and behaviour of the individual, both private and public, are imbued with this feature. A cardinal trait expresses a disposition that is so pervasive and outstanding in a person's life that virtually every act is traceable to its influence (Pervin 1993:279; Dumont 2010:161).

Central traits, such as honesty, kindness and assertiveness, express dispositions that cover a more limited range of situations than is true for cardinal traits. Central traits are like marginal traits except that several can coexist in the same individual. They give balance and richness to personality (unlike the cardinal traits that so dramatically shape the behaviour of the individuals who possess them) (Pervin 1993:279; Dumont 2010:162). Secondary traits are those that are found in 'thick descriptions' of people that appear in some situations but not in others, admit of greater or lesser vividness in the behaviour of the same individual, that are more subtle, varied and (perhaps) clinical, and that correspond to Allport's notion of the idiographic. Secondary traits represent dispositions that are least conspicuous, generalised and consistent. Thus, people possess traits with varying degrees of significance and generality (Dumont 2010:161; Pervin 1993:303).

As important as Allport is in the history of research on traits and trait theory, Raymond Cattell, Hans Eysenck and a large number of other influential theoreticians who have used correlational approaches to arrive at an understanding of traits have overshadowed him (Dumont 2010:162). This approach, one of the most important developments to have occurred in personality theory, is typified by the systematic and logical rigour of the procedures used. The contributions of the great psychiatric systems builders of the past were clearly important, but they lacked parsimonious theoretical foundation and the systematic, empirically controlled procedures that one finds in the work of Cattell and Eysenck.

2.4.2 The factor-analytic trait approach of Raymond B. Cattell

Many thinkers and researchers have studied human character and personality over the centuries, but none has done so as thoroughly, intensely and systematically as Raymond B. Cattell (Dumont 2010:167). He distinguished between bivariate, multivariate and clinical approaches to research in personality, favouring the multivariate study of interrelationships between many variables. The typical bivariate experiment which follows the classical experimental design of the physical sciences contains two variables; an independent variable that is manipulated by the experimenter and an independent variable that is measured to observe the effects of the experimental manipulation. In contrast to the bivariate experiment, the multivariate method studies the interrelationships between many variables at once. The method of factor analysis illustrates the multivariate method. Both the bivariate method and the multivariate method express a concern for scientific rigour (Pervin 1993:292). In summary Cattell found the multivariate method to possess the desirable qualities of the bivariate and clinical methods (Table 2.1).

Table 2.1: Cattell’s description of bivariate, clinical and multivariate methods

Bivariate	Clinical	Multivariate
Scientific rigour, controlled experiments	Intuition	Scientific rigour, objective and quantitative analysis
Attention to few variables	Consideration of many variables	Consideration of many variables
Neglect of important phenomena	Study of important phenomena	Study of important phenomena
Simplistic, piecemeal	Interest in global events and complex patterns of behaviour (total personality)	Interest in global events and complex patterns of behaviour (total personality)

Source: Pervin (1993:293)

Cattell also distinguished between ability, temperament and dynamic traits, as well as between surface and source traits. Ability traits relate to skills and abilities that allow the individual to function effectively. Intelligence is an example of an ability trait. Temperament traits relate to the emotional life of the person and the stylistic quality of behaviour. Dynamic traits relate to the striving, motivational life of the individual and the kinds of goals that are important to the person. Ability, temperament and dynamic traits are seen as capturing the major stable elements of personality. The distinction between surface and source traits relates to the levels at which we observe behaviour. Surface traits express behaviours that on a superficial level may appear to go together but in fact do not always move up and down (vary) together and do not necessarily have a common cause. Source traits represent an association of behaviours discovered through the use of factor analysis and are the building blocks of personality (Pervin 1993:294; Peterson 1988:315).

Cattell’s position on personality is described as a structured learning and systems-based approach (Cattell 1980:70; Ryckman 1993:59). This approach examines transactions occurring between personality and the environment (Ryckman 1993:59). Cattell attempted to account for the individual differences in personality by simplifying and objectifying the composition of personality. In order to achieve this, he made use

of mathematical and statistical techniques, wading through a plethora of words and terms used to describe personality. Raymond Cattell used Allport and Odbert's list as a starting point for his own research into the structure of personality by creating a reduced list of 4,500 terms that represented only the stable personality traits. Cattell then used semantic and empirical clustering techniques for reducing his original list to only 35 variables (John & Srivastava 1999). These variables were then subjected to several oblique factor analyses from which 12 factors were extracted. These 12 factors formed the basis of Cattell's 16-factor personality questionnaire (16PF), which is still in use (Cattell 1980:70; Friedman & Schustack 2003:62).

Cattell is commended for his attempt to provide an exhaustive theory of personality (Eysenck 1994:77). However, his theory has been subject to criticism. Cattell's reliance on factor analysis studies, limited validity of the measurements he employed and overestimation of his findings have led researchers to question the validity of these findings (Pervin & John 2001:252). In addition to these critiques, Eysenck (1994:77) contends that Cattell's theory provides an erroneous explanation of traits and, furthermore, that Cattell failed to explain the features of personality traits. Later studies have failed to replicate Cattell's factor structure, which has in part led to the diminished popularity of this model in personality research (Larsen & Buss 2005:51).

Originally Cattell began the factor analysis of Life-Outcome Data (L-data) and found 15 factors that appeared to account for most personality traits. Thousands of questionnaire items were written and administered to large numbers of people. Factor analysis was run to see which items went together. The main result of this research is a questionnaire known as the Sixteen Personality Factor Questionnaire (16PF). Although Cattell did not label his personality factors (traits) in standard terms, so as to avoid misinterpretation of them, the terms associated with these traits are presented in Table 2.2. They cover a wide variety of aspects of personality, particularly in terms of abilities and temperament (Pervin 1993:296).

Table 2.2: Cattell’s 16 personality factors derived from questionnaire data

Personality factors	Associated reverse terms
Reserved	Outgoing
Less intelligent	More intelligent
Stable, ego strength	Emotionality/Neuroticism
Humble	Assertive
Sober	Happy-go-lucky
Expedient	Conscientious
Shy	Venturesome
Tough-minded	Tender-minded
Trusting	Suspicious
Practical	Imaginative
Forthright	Shrewd
Placid	Apprehensive
Conservative	Experimenting
Group-dependent	Self-sufficient
Undisciplined	Controlled
Relaxed	Tense

Source: Pervin (1993:294)

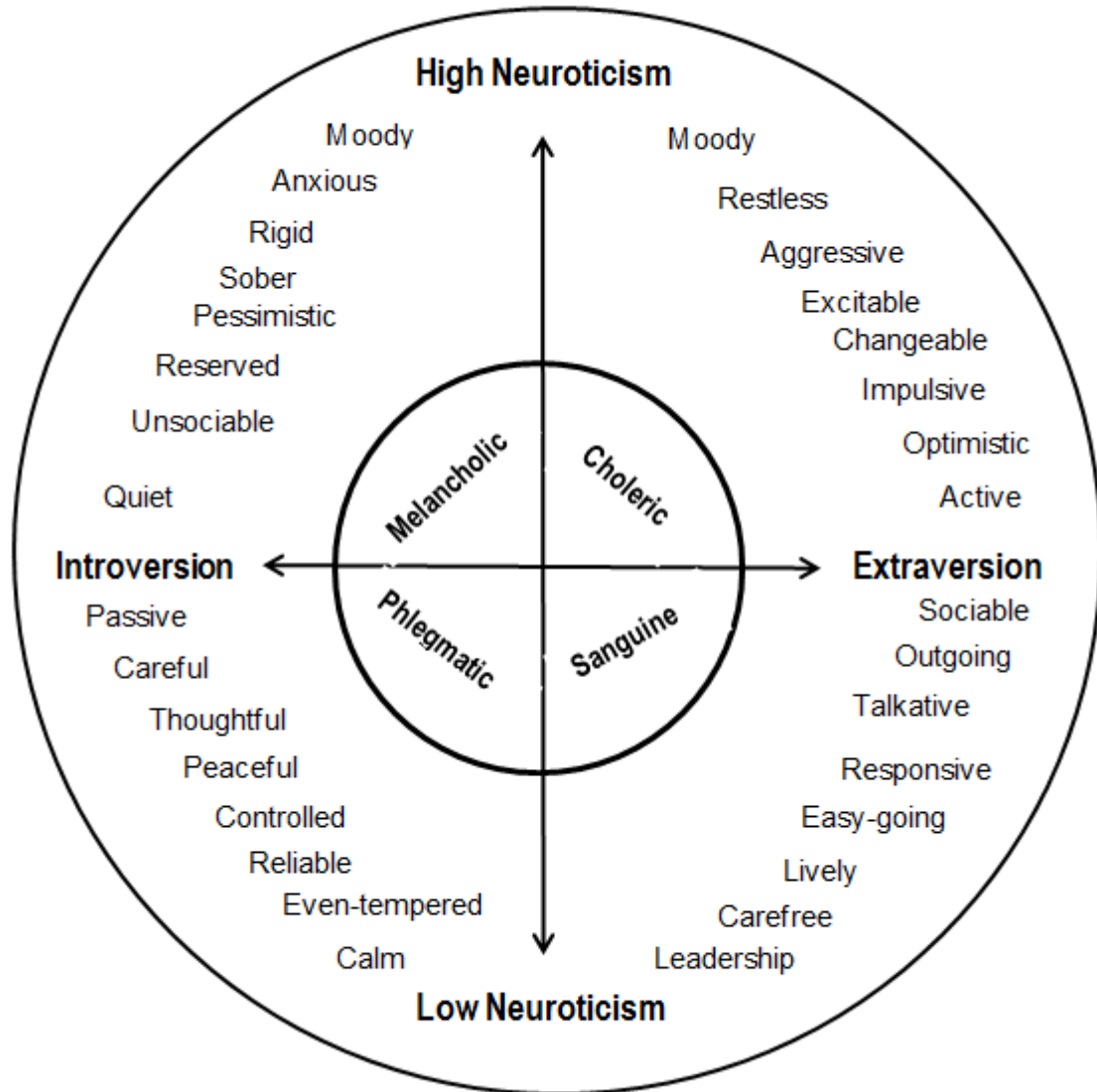
2.4.3 The trait-type factor-analytic theory of Hans L. Eysenck

Eysenck’s extensive interests included psycho-pedagogy, criminology, behaviour genetics, psychopathology and the science of personality. He devoted much of his prodigiously productive life to formulating dimensions of personality and developing measures for assessing those dimensions. Although Eysenck supports trait theory, he emphasised the need to develop adequate measures of traits, as well as the need to develop a theory that can be tested and is open to disproof and the importance of establishing biological foundations for the existence of each trait (Dumont 2010:174; Peterson 1988:319). The basis for Eysenck’s emphasis on measurement and the development of a classification of traits constitutes the statistical technique of factor analysis.

Eysenck suggests that individual differences in traits have a biological and genetic (inherited) basis. However, he also suggests that through behaviour therapy important changes in personality functioning can occur (Pervin 1993:303; Matthews,

Deary & Whiteman 2003:23). Eysenck placed great value on scientific pursuits and conceptual clarity (Pervin & John 2001:255). Quoting Kant, Eysenck stated that 'experiment without theory is blind; theory without experiment is lame' (Eysenck 1960:1). The value of scientific pursuits led Eysenck to search for the biological underpinnings of each trait, thereby allowing a theory open to testing and disproof (Eysenck 1990:250; Pervin & John 2001:250). In contrast to Cattell, Eysenck employed deductive rather than inductive reasoning to his understanding of personality structure because he felt that factors are meaningless unless they make sense from a theoretical point of view (Larsen & Buss 2005:99). He used a sample of 700 neurotic male soldiers for a large-scale factorial study of personality traits. Initially, he identified two factors, namely extraversion (E) and neuroticism (N), which formed the basis of the Maudsley Personality Inventory (MPI) (Eysenck 1955:28). Figure 2.2 illustrates the relationship between two dimensions of personality derived from factor analysis to four Greek temperament types.

Fig. 2.2: The relationship between two dimensions of personality derived from factor analysis to the four Greek temperament types



Source: Pervin (1993:284)

With further research and revision of the MPI, Eysenck uncovered a third super factor, psychoticism (P), which was included in the Eysenck Personality Inventory (Table 2.3). As a result Eysenck advocated the existence of only these three super factors, which formed the highest level of his theorised hierarchical organisation of personality structure.

Table 2.3: Traits associated with the three dimensions of Eysenck’s model of personality

Dimensions of personality	Associated traits
Neuroticism	Anxious, depressed, guilt feelings, low self-esteem, tense, irrational, shy, moody, emotional
Extraversion	Sociable, lively, active, assertive, sensation seeking, carefree, dominant, surgent, venturesome
Psychoticism	Aggressive, cold, egocentric, impersonal, impulsive, antisocial, un-empathic, creative, tough-minded

Source: Adapted from Matthews *et al.* (2005:22)

Eysenck’s model of personality consisted of three basic dimensions: introversion-extroversion, neuroticism (emotional stability-instability) and psychoticism (normal-psychotic continuum) (Eysenck 1960:251; Pervin & John 2001:232). These three dimensions are considered super factors, each of which consists of unique traits such as those identified by Cattell (Eysenck 1960:250; Eysenck 1994:101). However, Eysenck did not preclude the possibility of further personality dimensions being added to this model in future (Larsen & Buss 2005:55). Eysenck’s theory was critiqued. Pervin and John (2001:233) contended that Eysenck was inclined to disregard results that were contrary to his own, while simultaneously overestimating findings in accord with his nomenclature. In addition Eysenck’s notion of three dimensions in personality is considered to be unable to capture individual differences in personality (Pervin & John 2001). Eysenck’s three-factor structure is related to the five-factor model of personality with extroversion and neuroticism forming fundamental dimensions of this model. Despite the pioneering work conducted by Allport, Cattell and Eysenck, the trait approach became unpopular in later years (McAdams 1992:363; Pervin 1994:103).

2.5 THE BIG FIVE PERSONALITY TRAIT MODEL

The Big Five model of personality, known as the five-factor model (FFM), is a framework that provides a valid, robust and comprehensive way of representing fundamental personality differences between individuals (Judge, Bono *et al.* 2002:765). Since the mid-1980s, the Big Five model has been found to be a robust indicator of an individual's personality (Ciavarella *et al.* 2004:468). The five-factor models of personality trait structure began to gain prominence among students of trait psychology in the late 1980s and early 1990s (Digman 1990:417; Goldberg 1990:1216; McCrae & Costa 1987:81). Today, applied research on the Big Five far outpaces that on other models of trait structure, with hundreds of works being published in each of the past several years (Dietrich *et al.* 2012:197). Goldberg (1990:1220) is of the opinion that the five-factor model of personality is regarded as the most comprehensive taxonomy of personality in the work context.

Evidence is accumulating that suggests that virtually all personality measures can be reduced or categorised under the umbrella of a five-factor model of personality, which has subsequently been labelled the 'Big Five' (Goldberg 1990:1216). The five-factor structure has been recaptured through analyses of trait adjectives in various languages, factor-analytic studies of existing personality inventories and decisions regarding the dimensionality of existing measures made by expert judges (McCrae & John 1992:175). The five broad trait dimensions are: neuroticism; extraversion; openness; agreeableness; and conscientiousness (Judge *et al.* 1999:621; Mount & Barrick 1998:849; Hogan 1991:873; Matthews *et al.* 2005:23). The dimensionality of the Big Five broad dimensions has been found to be generalised across virtually all cultures. In a study by McCrae and Costa (1997:509), diverse samples were studied representing highly diverse cultures with languages from five distinct language families. Data strongly suggested that the personality trait structure was universal. The personality trait structure remains fairly stable over time. In addition, research suggests that the Big Five traits have a genetic basis (Digman 1989:195) and the heritability of its dimensions appears to be quite substantial.

Each of the broad dimensions is composed of six narrow traits called facets. A complete understanding of personality development requires consideration of facet-level traits. Personality predicts entrepreneurial success outcomes beyond business creation and success, and narrow personality traits are stronger predictors of these outcomes compared to broad traits. Personality accurately predicts several entrepreneurial outcomes, thereby demonstrating personality's influence on entrepreneurial success. Given that the usefulness of personality traits as predictors of entrepreneurial success has been fiercely contested by some theorists (Chell 2008; Hisrich, Langan-Fox & Grant 2007), this becomes an important observation. Traits matched to the task of entrepreneurship have incremental validity above and beyond that of the Big Five. Besides overwhelming empirical evidence for a five-factorial structure for describing individual differences, several approaches exist that outline specific facets for each global trait (Saucier & Goldberg 2003:1).

Costa and McCrae's (1992) hierarchical specification integrates six facets (narrow traits) for each broad (domain) factor. Although the Big Five factors demonstrate predictive value for life outcomes (Ozer & Benet-Martinez 2006:401), underlying facets provide incremental predictive ability (Paunonen 1998:538; Paunonen & Ashton 2001:524). There is value in using more nuanced facet-like dimensions in predicting life outcomes (Tackett *et al.* 2012:847). Table 2.4 illustrates the trait facets associated with the five domains of Costa and McCrae's five-factor model.

Table 2.4: Trait facets associated with the five domains of Costa and McCrae’s five-factor model of personality

Five factors	Trait facets
Neuroticism	Anxiety, angry, hostility, depression, self-consciousness, impulsiveness, vulnerability
Extraversion	Warmth, gregariousness, assertiveness, activity, excitement seeking, positive emotions
Openness	Fantasy, aesthetics, feelings, actions, ideas, values
Agreeableness	Trust, straightforwardness, altruism, compliance, modesty, tender-mindedness
Conscientiousness	Competence, order, dutifulness, achievement striving, self-discipline, deliberation

Source: Adapted from Matthews *et al.* (2005:24)

Discovery of the Big Five can be credited largely to researchers examining adjective descriptors (e.g. Goldberg 1993). However, in defining the more specific aspects, devisers of questionnaires have been in the lead (Saucier 1998:264). Costa and McCrae (1992) created a commercially published 240-item questionnaire, the revised NEO Personality Inventory (NEO PI-R), that likewise measures five broad personality factors. These questionnaire factors correspond quite closely to the Big Five factors gleaned from natural-language analyses, particularly with regard to the Neuroticism, Extraversion and Conscientiousness domains. On the NEO PI-R, more specific aspects of these broad factors are represented by 30 scales, each representing a distinct facet of one broad factor, e.g. Neuroticism has facet scales for Anxiety, Depression, Angry Hostility, and three other aspects, there being six facets for each broad factor. The constructs embodied in the facet scales were selected rationally by Costa and McCrae on the basis of a review of the literature: they were then refined using psychometric and factor-analytic methods (Saucier 1998:264).

However, conventional scoring of this short form does not provide scores on more specific aspects of the broad-bandwidth factors. Thirteen item clusters were found to replicate across half of a sample of self-descriptions by adults (N=735) (Saucier

1998:263). Thirteen factor-analytically derived scales were developed for the item clusters (Table 2.5). The scales demonstrated reliability and factor structure comparable to that of the 30 facet scales of the NEO PI-R. Correlation and multiple regression analyses showed that content coverage of the 13 scales has strong overlap with that of the NEO PI-R facet scales, but that representation of some facet scales is more moderate.

Table 2.5: NEO-FFI item clusters

DOMAIN	THEMES OF CLUSTER	Adjectives that are high correlates	Adjectives that are low correlates
Neuroticism	Negative affect	Depressed, sad, afraid, scared	Worried, anxious, not well adjusted, moody
	Self-reproach	Sad, afraid, insecure, depressed, scared, troubled	Not self-assured, ashamed, not self-confident
Extraversion	Positive affect	Enthusiastic, lively	Joyful, cheerful, laughing, happy, optimistic, good humoured, positive, glad
	Sociability	Warm, enthusiastic, lively	Sociability, social, outgoing, withdrawn, entertaining, talkative
	Activity	Lively	Energetic, active, busy, athletic, excited, powerful, awesome, influential
Openness to experience	Aesthetic interest	Open-minded, conservative	Artistic, imaginative, tolerant, expressive, curious, creative, not narrow-minded
	Intellectual interest	Unusual, complicated	Intellectual, philosophical, deep, thinking, complex, knowledgeable, intelligent, brilliant
	Unconventionality	Conservative, open-minded, unusual, complicated	Religious, traditional, rebellious, not strict

DOMAIN	THEMES OF CLUSTER	Adjectives that are high correlates	Adjectives that are low correlates
Agreeableness	Non-antagonistic orientation		Not grouchy, not arrogant, not irritable, not crabby, not hot tempered, not argumentative, not hostile, not rough, not harsh, not cranky
	Prosocial orientation	Warm	Friendly, kind-hearted, pleasant, kind, considerate, helpful, warm-hearted, not cold, caring
Conscientiousness	Orderliness	Efficient, organised, not procrastinating, systematic, thorough	Not messy, not sloppy, not inefficient
	Goal striving	Systematic, organised, not procrastinating, efficient, thorough,	Dedicated, ambitious, persistent, productive
	Dependability	Efficient, thorough, organised, inefficient, organised, not procrastinating	Reliable, dependable, consistent, practical

Source: Adapted from Saucier (1998:263)

Costa and McCrae (1992:54) noted that the NEO-FFI offers “speed and convenience” and it may be possible to gain more information from this measure than is obtained from its five broad-bandwidth factors. Because the NEO-FFI is commonly used by researchers, any such gain would benefit a variety of research endeavours. With only 60 items compared to 240, this inventory would obviously have fewer than 30 reliable measurement subcomponents. Indeed, 4 of the 30 NEO PI-R facets have no item representation whatsoever on the NEO-FFI. Therefore, these 60 items might, with acceptable psychometric reliability, tap more than five constructs, but certainly not as many as 30 (Saucier 1998:265).

2.5.1 Openness to experience: Openness and intellect

Openness/Intellect describes the general tendency to be imaginative, curious, perceptive, artistic and intellectual. Its compound label stems from an old debate about how best to name the trait, with some researchers favouring 'openness to experience' and others 'intellect' (Costa & McCrae 1992a; Goldberg 1990:1216). Although openness/intellect can be generally characterised as a dimension of personality reflecting the tendency toward cognitive exploration, it can also be meaningfully separated into distinct (but correlated) subtraits of openness to experience and intellect (DeYoung 2014:369; DeYoung, Quilty & Peterson 2007:880). Intellect reflects cognitive engagement with abstract and semantic information, primarily through reasoning, whereas openness reflects cognitive engagement with perception, fantasy, aesthetics and emotions (DeYoung, Grazioplene & Peterson 2012:63). These factors appear to be genetically as well as phenotypically distinct (DeYoung 2014:1; DeYoung *et al.* 2007:880).

Research has demonstrated that these two labels capture distinct but equally central aspects of the trait, with intellect reflecting engagement with abstract information and openness reflecting engagement with perceptual information (DeYoung *et al.* 2007:880; Johnson 1994:311). What is core to both aspects of the trait is cognitive exploration of the structure of experience (DeYoung, Peterson & Higgins 2005; Van Egeren 2009:92). Someone high on openness can be described as creative, innovative, imaginative, reflective and untraditional. Someone low on openness can be characterised as conventional, narrow in interests and unanalytical. Openness is positively correlated with intelligence, especially aspects of intelligence related to creativity, such as divergent thinking (McCrae 1987:1258).

The Big Five personality traits provide a useful taxonomy of personality traits and these traits predict many important life outcomes, including achievement in school and work, physical and mental health and social behaviour (Ozer & Benet-Martinez 2006:201). The Big Five factor labelled openness/intellect predicts outcomes in all of these categories and is also the only factor consistently and broadly related to

creativity, predicting creative achievement and divergent thinking, as well as creative hobbies, personal goals and thinking styles (Batey & Furnham 2006:355; Carson, Peterson & Higgins 2003:499; Feist 1998:290; Feist & Barron 2003:62; King, McKee-Walker & Broyles 1996:189; McCrae 1987:1258; Silvia *et al.* 2009:1087; Silvia *et al.* 2008:68).

2.5.1.1 Openness to experience and entrepreneurship

According to Zhao and Seibert (2006:259) entrepreneurs score substantially higher on openness than managers. Zhao *et al.* (2010:387) report higher correlations of openness with intention and performance than for the other Big Five dimensions. One can see some affinity to innovativeness for which Rauch and Frese (2007a:41) report positive effects on business creation and business success. Correlations between Big Five scales and cognitive styles, reported by Zhang and Huang (2001), are fully compatible with the link between innovativeness and openness (Brandstätter 2011:227). Barrick and Mount also found a weak positive relationship between openness and managerial performance.

A negative relationship is found between openness and the entrepreneur's ability to lead the new venture to long-term survival. Stuart and Abetti (1990:151) assert that venture capitalists (or any resource providers) should not be unduly influenced by the personality of the entrepreneur. However, results of the study by Ciavarella *et al.* suggest that venture capitalists, bankers, employees and other stakeholders of the venture would be wise to have some indication of the entrepreneur's personality. Certain personality factors seem to influence the entrepreneur's likelihood of taking the venture from the start-up stage to the maturity stage. Specifically, the findings indicate that once an individual high in conscientiousness and/or low in openness to experience decides to become an entrepreneur, he may be more committed to maintaining the operations of the venture during the critical first start-up years, resulting in a higher likelihood of venture viability into venture maturity and a longer venture life span. Obviously, some firms may continue to be entrepreneurial beyond the maturity stage, while others become lifestyle firms prior to this stage.

Entrepreneurs who possess higher levels of conscientiousness and lower levels of openness may have a greater ability to evolve into a managerial mindset and maintain the operations of either an entrepreneurial or lifestyle venture (Ciavarella *et al.* 2004:479).

Schumpeter (1942; 1976:1) argued that the defining characteristic of the entrepreneur is his or her emphasis on innovation. More recent scholarship has also noted the strong desire of entrepreneurs to be creative and to create something larger than themselves (Engle, Mah & Sadri 1997:45). Founding a new venture is likely to require the entrepreneur to explore new or novel ideas, use his or her creativity to solve novel problems and take an innovative approach to products, business methods, or strategies. Management, alternatively, has a greater emphasis on following established rules and procedures to coordinate activity and maintain current productivity (Weber 1947:8).

2.5.2 Conscientiousness: Industriousness and orderliness

Conscientiousness indicates an individual's degree of organisation, persistence, hard work and motivation in the pursuit of goal accomplishment. Some researchers have viewed this construct as an indicator of volition or the ability to work effectively (Barrick & Mount 1991:1). It has been the most consistent personality predictor of job performance across all types of work and occupations (Barrick *et al.* 2001:9). Many scholars regard conscientiousness as a broad personality dimension that is composed of two primary facets: achievement motivation and dependability (Mount & Barrick 1995:153). Achievement motivation has been widely studied in the context of entrepreneurship (Shaver 1995:20), but dependability has received much less explicit attention.

The trait of conscientiousness has been receiving increasing attention because of its role in promoting positive social and individual outcomes across the life course. For example, measures of conscientiousness have been shown to predict job performance (Hogan *et al.* 1998:189; Ones, Viswesvaran & Schmidt 1993:679) and

long-term career success (Judge *et al.* 1999:621). It also predicts college retention (Tross *et al.* 2000:323), marital stability (Kelly & Conley 1987:27; Tucker *et al.* 1998:211), healthy lifestyle behaviours (Booth-Kewley & Vickers 1994:281; Clark & Watson 1999:97), longevity (Friedman *et al.* 1993:176) and even eating habits (Goldberg & Strycker 2012:49).

Conscientiousness is positively associated with well-being (DeNeve & Cooper 1998:197; Steel, Schmidt & Shultz 2008:138). Conscientious individuals appear to be orientated towards life situations that are beneficial for well-being (McCrae & Costa 1991:227), set themselves higher goals (Barrick, Mount & Strauss 1993:715; DeNeve & Cooper 1998:197), and have high levels of motivation (Judge & Ilies 2002:797). Conscientious individuals are therefore more likely to attain higher achievement (McGregor & Little 1998:494) and enjoy greater well-being (DeNeve & Cooper 1998:494). Overall, this body of literature has led conscientiousness to be conceptualised as a positive, adaptive personality trait that is important for well-being, employment and personal functioning (DeNeve & Cooper 1998:197).

Although conscientiousness is generally positively related to well-being and functioning (Steel *et al.* 2008:138), there may be situations where this pattern is reversed and where high conscientiousness poses a risk for well-being and productivity. Whilst conscientious individuals may achieve more throughout their lives (Barrick *et al.* 1993), resulting in higher levels of well-being, during times of failure being conscientious can be detrimental (Boyce, Wood & Brown 2010:438). Given the strong links between conscientiousness and goal-setting, motivation and achievement, under conditions of failure conscientious people may experience sharper decreases in well-being (Boyce *et al.* 2010:535).

Increasing age has been found to correlate with a decrease in many cognitive abilities and an increase in the personality trait of conscientiousness. People become more self-motivated, organised and dutiful in order to maintain high levels of performance across the adult years. The relation between age and cognitive abilities, and between age and the personality trait of conscientiousness is associated with

lower levels of cognitive functioning and with higher levels of conscientiousness. After control of the age variance, the relations of conscientiousness with fluid ability and working memory ability were found to be negative and the relations of conscientiousness with speed and episodic memory were not significant (Soubelet & Salthouse 2011:303).

2.5.2.1 Conscientiousness and entrepreneurship

The dependability facet of conscientiousness reflects the extent to which one is organised, deliberate and methodical and can be relied on to fulfil one's duties and responsibilities. Like the overarching conscientiousness construct, this particular constellation of attributes would appear to be valuable in a manager or an entrepreneur. However, managers working within established organisations are likely to have their responsibilities, goals and work performance more closely structured and monitored by existing organisational systems and day-to-day interactions, somewhat mitigating the necessity of possessing dependability as an individual trait. Entrepreneurs, by contrast, operate in a more discretionary and self-directed environment, that is, a 'weak' situation in which individual traits are likely to play a more important role (Snyder & Ickes 1985:883). In addition, it seems that potential partners, venture capitalists and other agents will be more likely to select entrepreneurs who they judge to be dependable, such as those who develop detailed plans and strategies and demonstrate the tendency to fulfil their commitments.

Despite the common notion that conscientiousness is associated with cognitive abilities related to rigid control over impulses, i.e. inhibition, the cognitive ability most associated with conscientiousness is characterised by flexibility and the ability to adapt to changing environmental contingencies and task demands (Fleming, Heintzelman & Bartholow 2015:1). Meta-analytic work demonstrates that the relationship between conscientiousness and job task performance is found across a wide range of job types, suggesting that conscientiousness facilitates performance for a variety of tasks across many divergent contexts (Ones *et al.* 1993:679). The breadth and significance of the beneficial outcomes related to high levels of

conscientiousness have led some scholars to consider it the most important of the Big Five personality traits (Roberts *et al.* 2005:103).

Conscientiousness is reported by Zhao and Seibert (2006:259) as one of the Big Five dimensions where entrepreneurs are superior to managers. Looking at two facets of conscientiousness, i.e. achievement motivation and dependability, only achievement motivation differentiated entrepreneurs from managers. Obviously, it makes sense to look for lower level components (facets) of well-established global dimensions. For conscientiousness as global trait (without distinction of facets), Zhao *et al.* (2010:381) report a positive correlation both with intention to become an entrepreneur and with entrepreneurial performance (Brandstätter 2011:227). In Barrick and Mount's (1991:1), as well as Hertz and Donovan's (2000:869) meta-analyses, conscientiousness was found to be a consistent and valid predictor of managerial performance.

McClelland was the first to propose that a strong need for achievement would drive individuals to become entrepreneurs primarily because of their preference for situations in which performance is due to their own efforts rather than to other factors. McClelland also proposed that effective managers are not characterised by a strong need for achievement because managers in organisational environments must work with and through others. Narrative reviews of achievement motivation and entrepreneurship suggest that support for the association has been mixed or inconsistent (Johnson 1990:39). Collins, Hanges and Locke (2004:95), as well as Stewart and Roth (2004a:10) reported that entrepreneurs have higher achievement motivation than do managers in their meta-analyses. This hypothesis is a replication of the earlier meta-analyses but conducted here within the context of a broader model of personality.

2.5.3 Extraversion: Enthusiasm and assertiveness

Extraversion is a prominent factor in personality psychology, as evidenced by its appearance in most personality measures and its important role in major taxonomies

of personality, even those preceding the five-factor model (Judge *et al.* 1999:624). These arguments suggest that extraversion should predict behaviours that contribute to team effectiveness (Neal *et al.* 2012:179). Extraversion describes the extent to which people are assertive, dominant, energetic, active, talkative and enthusiastic (Costa & McCrae 1992a:653). People who score high on extraversion tend to be cheerful, like people and large groups and seek excitement and stimulation. People who score low on extraversion prefer to spend more time alone and are characterised as reserved, quiet and independent. Typically, extraversion is thought to consist of sociability. However, extraversion is a broad construct that also includes other factors. As Watson and Clark (1997a:767) note, 'extraverts are more sociable, but are also described as being more active and impulsive, less dysphoric and as less introspective and self-preoccupied than introverts'. Thus, extraverts tend to be socially oriented (outgoing and gregarious), but are also surgent (dominant and ambitious) and active (adventuresome and assertive). Extraversion is related to the experience of positive emotions and extraverts are more likely to take on leadership roles and to have a greater number of close friends (Watson & Clark 1997a:767).

Extraversion is considered a core higher-order trait of most personality taxonomies (Costa & McCrae 1992a; Depue & Collins 1999:491; Goldberg 1999:7; Watson & Clark 1997a:767) that is consistently associated with subjective well-being, particularly positive affect and life satisfaction. DeNeve and Cooper (1998), for example, found in a meta-analysis that extraversion was the strongest predictor of positive affect and happiness when personality traits were grouped according to the Big Five higher-order traits. Lucas and Fujita (2000:1039) similarly found a moderate correlation between extraversion and positive affect in a follow-up meta-analysis. Extraversion manifests itself in daily life in innumerable ways. Undoubtedly, extraverted people select their environments and organise their social experiences to support their view of themselves. Social connectedness appears to function as a mediator in how people organise and make sense of their social experiences and subsequently engage in relationship-enhancing behaviours, thereby contributing to greater subjective well-being (Lee, Dean & Jung 2008:415).

2.5.3.1 Extraversion and entrepreneurship

Extraversion is an aspect of personality that includes characteristics such as sociability, talkativeness, assertiveness and ambition (Barrick & Mount 1991:1). It is a valuable trait for entrepreneurs because they need to spend a lot of time interacting with investors, employees and customers and have to sell all of them on the value of the business (Shane 2003:56). Empirical research indicates that people who score high on extraversion are more likely than others to become entrepreneurs (Shane 2003:56). In fact, a study of a cohort of people who were all born in one week in March 1958 in Great Britain, who were given a psychological test measuring extraversion at age 11, indicated that those who went into business themselves in adulthood had higher extraversion scores when they were children (Burke, FitzRoy & Nolan 2000:565). Similarly, a study that used data from the National Longitudinal Survey of Youth in the United States showed that being outgoing as a child predicts working for oneself in adulthood (Van Praag & Ophem 1995:513).

Costa and McCrae (1992a:26) described salespeople as prototypical extraverts. Extraversion is positively related to interest in enterprising occupations (Costa, McCrae & Holland 1984:390). Although extraversion may be a valuable trait for managerial work, it is found to be even more important for entrepreneurs. Entrepreneurs must interact with a diverse range of constituents, including venture capitalists, partners, employees and customers. They are often in the role of a salesperson, whether they are persuading an investment banker or venture capitalist to back their idea or a client to buy their product or service. In addition to these external relations, the minimal structure of a new venture and the lack of a developed human resource function suggest that the entrepreneur can expect to spend considerable time in direct interpersonal interaction with their partners and employees.

Extraversion is primarily associated with the quantity and intensity of relationships and, as such, is manifested in sociability, higher energy levels, positive emotionality and excitement seeking (DeNeve & Cooper 1998:197). Research has shown that

extraverted people are more likely to take on leadership roles (Judge *et al.* 1999:621) and extraversion is a predictor of job performance for managers and salespeople (Vinchur *et al.* 1998:586; Barrick & Mount 1991:1). Indeed, basing arguments on this notion, Morrison (1997:39) found that extraversion was strongly correlated with the performance of franchisees. A trait of extraversion is the assertiveness of the individual (Barrick & Mount 1991:1). In a study of entrepreneurs from India, Malawi and Ecuador, assertiveness was found to be a differentiator between 'successful' and 'average' entrepreneurs (the categorisation was determined by judges' perceptions of whether the entrepreneurs were successful or average) (McClelland 1987:219).

Entrepreneurs are somewhat more extraverted than managers (Zhao & Seibert 2006:259), and extraversion shows weak but significant correlations with intentions (of setting up a business) and business performance (Zhao *et al.* 2010:381). One could think of a certain affinity between extraversion and proactive personality, i.e. initiating actions on opportunities, shaping the environment according to one's goals and being persistent in goal striving, for which Rauch and Frese (2007b:353) reported higher scores for entrepreneurs than for managers. There is indeed a substantial correlation between proactive personality and the assertiveness and activity facet of extraversion, but also with facets of openness (actions, ideas, values), conscientiousness (achievement striving, but not dutifulness) and neuroticism (vulnerability, negative correlation).

2.5.4 Agreeableness: Compassion and politeness

Within the Big Five model of personality, agreeableness is a trait dimension associated with the tendency to behave prosocially. Highly agreeable people tend to be highly cooperative and altruistic. Agreeableness assesses one's interpersonal orientation and individuals high on agreeableness can be characterised as trusting, forgiving, caring, altruistic and gullible. The high end of agreeableness represents someone who has cooperative values and a preference for positive interpersonal relationships. Someone at the low end of the dimension can be characterised as manipulative, self-centred, suspicious and ruthless (Costa & McCrae 1992a:653;

Digman 1990:417). Although agreeableness may lead one to be seen as trustworthy and may help one form positive, cooperative working relationships, high levels of agreeableness may inhibit one's willingness to drive hard bargains, look out for one's own self-interest and influence or manipulate others for one's own advantage. McClelland and Boyatzis's (1982:737) research has also shown that a high need for affiliation, a component of agreeableness, can be a detriment to the careers of managers, apparently because it interferes with the manager's ability to make difficult decisions affecting subordinates and co-workers. Seibert and Kraimer (2001:1) also found agreeableness to be negatively related to salary level and career satisfaction in a managerial sample.

During the emotion attribution task, participants decided which of two social-emotional scenes they believed caused another person's emotional reaction. Converging evidence indicated that highly agreeable people tend to make emotional attribution decisions more quickly and exhibit greater temporoparietal junction activity during emotion attribution decisions, compared to people with low agreeableness (Haas *et al.* 2015:26). Agreeableness is a trait that measures the tendency to be kind, sympathetic, cooperative, warm and considerate with others. A central feature of agreeableness is the tendency to be cooperative and accommodating with other people with the goal of maintaining smooth interpersonal relationships (Graziano & Tobin 2013:347).

There is empirical evidence that agreeableness is associated with social-cognitive functions that include empathy, theory of mind and perspective taking. For example, in terms of empathic accuracy, highly agreeable people are more accurate when inferring the emotional states of other people as compared to people with low agreeableness. Agreeableness represents a wide range of interpersonal, affective and social-cognitive factors. This study shows that agreeableness is associated with the way people decide the cause of another person's emotional reaction. The ability to decide why another person is reacting emotionally may in part facilitate highly agreeable people being more empathic and cooperative with others as compared to less agreeable people (Haas *et al.* 2015:26).

Big Five agreeableness relates to numerous beneficial life outcomes. Agreeableness positively relates to academic achievement. In the workplace, agreeableness is beneficial in occupations requiring considerable interpersonal interaction and helping others (Barrick *et al.* 2001), though it is inversely associated with wealth and income (Duckworth *et al.* 2012). At work, team players are seen as likeable, cooperative and even-tempered (Hogan 2007).

Agreeableness is particularly important in social domains (Jensen-Campbell, Knack & Gomez 2010:1042). Numerous studies have linked low agreeableness with psychopathy, risky sexual behaviour, crime and aggression (Decuyper *et al.* 2009:531; Hoyle, Fejfar & Miller 2000:1203; Miller *et al.* 2001:253). In children, agreeableness has been related to harmonious interpersonal relationships, positive school performance, healthier eating habits and lower levels of depression, bullying and victimisation (Jensen-Campbell *et al.* 2010:1942), and low agreeableness relates to delinquency and aggression (Gauthier *et al.* 2009:76; Le Corff & Toupin 2009:1105; Lynam *et al.* 2005:431; Salekin, Debus & Barker 2010:501). In their review of agreeableness and various life outcomes, Jensen-Campbell *et al.* (2010:1042) concluded that 'agreeableness may be the path to enduring interpersonal relationships, happiness, success and well-being'.

Although the Big Five factors demonstrate predictive value for life outcomes (Ozer & Benet-Martinez 2006:401), underlying facets provide incremental predictive ability (Paunonen 1998:538; Paunonen & Ashton 2001:524). Theoretical models of adult Big Five personality split agreeableness into various dimensions. The NEO PI-R breaks agreeableness into trust, straightforwardness, altruism, compliance, modesty and tender-mindedness facets (Costa & McCrae 1995:21). DeYoung *et al.* (2007:880) propose politeness and compassion factors. The HEXACO model splits agreeableness into honesty-humility and agreeableness factors (Ashton & Lee 2008:1952).

There is considerable value in estimating the effect of Big Five agreeableness on consequential life outcomes at the facet level: Compliance may be more predictive than compassion in terms of objective measures of success. Paunonen and Jackson (2000:823) note: 'if one can identify theoretically meaningful, internally consistent classes of behaviour that are able to predict socially and personally significant life criteria, then such personality dimensions are important'. Studying personality at the facet- rather than at the Big Five factor level can yield important and clarifying insights.

2.5.4.1 Agreeableness and entrepreneurship

Individuals high in agreeableness tend to be courteous, forgiving, and flexible in dealing with others. It is an interpersonal factor that focuses on the quality of relationships through cooperation and trust (DeNeve & Cooper 1998:197; Judge *et al.* 1999:621). As such, it is plausible that a level of agreeableness is necessary to receive the required support to get a new venture started. Entrepreneurs who establish trusting, flexible, and courteous relationships with their customers should expect to reap the profits of repeat business. According to Judge *et al.* (1999:625) the cooperative nature of agreeable individuals may lead to more successful careers, particularly in occupations where customer service is relevant. Within the entrepreneurial realm, Cable and Shane (1997:142) propose that cooperation is a key factor in the entrepreneur's ability to secure capital and future support from venture capitalists, increasing the chance for long-term survival of the venture.

Although occupationally related, agreeableness was not found to be a predictor of job performance for managers or salespeople (Hurtz & Donovan 2000:869; Barrick & Mount 1991:1). However, it may be that this factor has more of an effect on interpersonal relations than task performance (Van Scotter & Motowidlo 1996:525; Hurtz & Donovan 2000:869). Baron and Markman (2000:106) infer that entrepreneurs who are trusting and cooperative in their business relationships are more likely to develop alliances with larger companies, resulting in new product development, shareholder wealth, and venture survival.

Although the negative effects of agreeableness appear to predominate for those performing managerial work in established organisations, negative effects are more detrimental for those in an entrepreneurial role. The entrepreneur often operates with diminished access to legal protections and with a thin financial margin of error due to limited resources. They are even more likely than managers to suffer serious consequences from even small bargaining disadvantages. In addition, managers in established organisations who operate in an overly self-interested and disagreeable manner are likely to eventually suffer negative consequences from peers and supervisors. Entrepreneurs work in smaller organisations and they are less likely to be constrained by dense and interlocking social relationships (Burt 1992:10). This suggests that there may be fewer negative repercussions associated with the opportunistic behaviour of entrepreneurs.

Entrepreneurs score lower on this dimension than managers (Zhao & Seibert 2006:259), while Zhao *et al.* (2010:381) found no significant correlation between agreeableness and intentions (of setting up a business) or business performance. Only in the context of a special mode of multiple regression analysis (adapted for meta-analyses), low significant negative beta-coefficients were found for both dependent variables. Support of rather negative effects of agreeableness can be seen in the positive effects of the need for autonomy in business creation and (to a lesser degree) in business success reported by Rauch and Frese (2007b:353), since Koestner and Losier (1996:465) provided evidence for a strong negative correlation between the need for autonomy, i.e. to act independently of others or of social values and expectations, and agreeableness (Brandstätter 2011:227).

2.5.5 Neuroticism: Withdrawal and volatility

Recently, it has been suggested that each of the five dimensions of the five-factor model comprises two facets (Chapman 2007:220; DeYoung *et al.* 2007:880; Jang *et al.* 2002:83; Saucier 1998:263; Saucier & Goldberg 2001). Focusing on neuroticism, two correlated facets have been identified: withdrawal and volatility. The withdrawal

facet (Davidson *et al.* 2001:191) refers to a tendency for internal representations of negative affect. High-scoring individuals readily worry and feel easily threatened, are uncomfortable with themselves, have intrusive thoughts and pessimistic views, and tend towards negative interpretations of events. This facet of neuroticism is closely linked to clinical conceptualisations of neuroticism that typically highlight a strong tendency to interpret ambiguous stimuli in a negative way (Luminet *et al.* 2000:471). The withdrawal facet also corresponds to the anxiety perspective on neuroticism (Smillie *et al.* 2006:139).

The second facet of neuroticism is labelled volatility and is related to the outward expression of negative affect. Individuals scoring high on this facet have difficulty keeping their emotions under control, are sensitive to stimuli from the environment and become easily angry and irritated (DeYoung *et al.* 2007:880; Saucier 1998:263). The author proposes that this facet represents a separate disposition and interacts with effort in a fundamentally different way. In developing our theoretical arguments we begin by describing Smillie and colleagues' original theoretical ideas regarding the relation between withdrawal, effort and performance.

Using an anxiety perspective on neuroticism, Smillie and colleagues argued that the regulation of effort does not function effectively in individuals scoring high on neuroticism (Smillie *et al.* 2006:139; Wallace & Newman 1997:135). This notion includes the idea that neurotic individuals differ in two ways from stable individuals regarding the regulation of mental energy. First, neurotic individuals are more capable of turning their attention towards relevant signals. Second, neurotic individuals also have a tendency to automatically orient toward task-irrelevant cues, which also makes them more vulnerable to distraction (Avila 1995; Wallace & Newman 1998:253). The latter tendency explains why neurotic individuals often focus on negative stimuli and become trapped in circles of dysfunctional regulation of maladaptive cognitions. This idea makes sense as these individuals are often characterised by having persisting negative thoughts and worries. It implies that the automatic orientation that in itself does not consume effort is followed by effortful mental activity in the form of negative thoughts and worries. This entails a disruption

of the functional allocation of effort to the task at hand. Thus the general view is that neurotic individuals tend to allocate mental effort to task-irrelevant mental processes related to often intrusive negative affect at the expense of effective task performance (Wallace & Newman 1997:135; Wallace & Newman 1998:253).

According to Zhao and Seibert (2006:260) neuroticism represents individual differences in adjustment and emotional stability. Individuals high on neuroticism tend to experience a number of negative emotions including anxiety, hostility, depression, self-consciousness, impulsiveness and vulnerability (Costa & McCrae 1992a:653). People who score low on neuroticism can be characterised as self-confident, calm, even-tempered and relaxed. Individuals scoring high on withdrawal should benefit from a more demanding task environment. In such an environment all effort is allocated to task performance, which prevents the dysfunctional effort allocation to task-irrelevant negative cognitions and emotions (Wallace & Newman 1997:135; Wallace & Newman 1998:253). A practical implication of these theoretical ideas is that organisations can help support persons high in withdrawal by placing them in highly demanding work environments. According to Smillie and co-workers (2006:139) individuals high in the withdrawal facet will perform relatively better when a task is more demanding and they invest more effort.

2.5.5.1 Neuroticism and entrepreneurship

Managers, by definition, work within an established business organisation with work processes supported by established organisational procedures and practices. Entrepreneurs, by contrast, work within a relatively unstructured environment where they have primary responsibility for all aspects of a venture. They work more hours than do managers and often lack the level of separation between work and life spheres typical of managerial work (Dyer 1994:7). They also typically have a substantial financial and personal stake in the venture and lack the security of benefits typically provided to middle- and upper-level managers, such as a severance package or an independently funded retirement programme. Thus the work environment, workload, work-family conflict and financial risk of starting and running

a new business venture can produce physical and psychological stress beyond that typical of managerial work. At the same time, entrepreneurs have been described as highly self-confident (Chen *et al.* 1998:295; Crant 1996:42), with a strong belief in their ability to control outcomes in the environment (Simon, Houghton & Aquino 2000:113). Remarkable self-confidence and resilience in the face of stress therefore appear to be much more important for entrepreneurs than managers. These are traits that define low levels of neuroticism.

The relation between neuroticism and performance expresses itself under specific task circumstances such as increased demand (Smillie *et al.* 2006:139). Individuals high in withdrawal, as compared to individuals high in volatility, deal differently with demanding task environments. Individuals who score high on withdrawal improve their performance when they allocate more effort as a task becomes more demanding. High withdrawal individuals often have negative thoughts and worries. These mental activities automatically draw attention, which tends to stick and then leads to a dysfunctional regulation that in effect redirects effort to off-task mental activity at the expense of effective task performance (Wallace & Newman 1997:135). This dysfunctional regulation is typically prevented when the task becomes more demanding and thus requires all available effort on-task so that none remains to nurture the task-unrelated mental activities.

An opposite result was found concerning individuals who score high on the neuroticism facet of volatility. The performance of these individuals declined relatively when the task became more demanding and the individuals reported investing more effort. As the effort investment did not lead to performance improvement, the additional resources were not used to directly aid task performance as would be expected for individuals high in neuroticism (DeShon, Brown & Greenis 1996:595; Kanfer & Ackerman 1989:657; Kanfer *et al.* 1994:826; Smillie *et al.* 2006:139). Volatile individuals are susceptible to environmental signals; they may view extra task demands negatively.

Zhao and Seibert (2006:259) reported lower neuroticism scores for entrepreneurs than for managers, and Zhao *et al.* (2010:381) reported negative effects of neuroticism both on intention to establish a private business and on performance. This corresponds to the effects of those personality scales, reported by Rauch and Frese (2007b:353), whose labels suggest a certain affinity to emotional stability (reverse of neuroticism), i.e. generalised self-efficacy, stress tolerance and locus of control (for empirical evidence of this affinity see Hartman & Betz 2007:145; Judge, Erez *et al.* 2002:693).

2.6 A COMBINED BIG FIVE PERSONALITY TRAIT CONCEPTUAL MODEL OF AN ENTREPRENEUR

Several conclusions can be drawn from the above discussion. Entrepreneurs scoring high in conscientiousness are organised, reliable, hard-working, self-disciplined, punctual, scrupulous, neat, ambitious and preserving. Entrepreneurs scoring high in extraversion are sociable, active, talkative, person-oriented, optimistic, fun-loving and affectionate. Entrepreneurs scoring low on openness to experience are conventional, down-to-earth, have narrow interests, are unartistic and unanalytical. Entrepreneurs scoring high in agreeableness are soft-hearted, good-natured, trusting, helpful, forgiving, gullible and straightforward. Entrepreneurs scoring low in neuroticism are calm, relaxed, unemotional, hardy, secure and self-satisfied (Costa & McCrae 1985:2). Table 2.6 shows the difference between the Big Five personality trait characteristics as relating to high and low scorers.

Established entrepreneurs should have the following combination of high levels of openness to experience, conscientiousness, extraversion, agreeableness and low levels of neuroticism.

Table 2.6: The Big Five trait factors and illustrative scales

Characteristics of the Higher Scorer	Trait scales	Characteristics of the Lower Scorer
NEUROTICISM (N)		
Worrying, nervous, emotional, inadequate, hypochondriacal	Assess adjustment vs emotional stability. Identifies individuals prone to psychological distress, unrealistic ideas, excessive cravings or urges and maladaptive coping responses.	Calm, relaxed, unemotional, hardy, secure, self-satisfied.
EXTRAVERSION (E)		
Sociable, active, talkative, person-oriented, optimistic, fun-loving, affectionate	Assess quantity and intensity of interpersonal interaction; activity level; need for stimulation; and capacity for joy.	Reserved, sober, unexuberant, aloof, task-oriented, retiring, quiet.
OPENNESS TO EXPERIENCE (O)		
Curious, broad interests, creative, original, imaginative, untraditional	Assess proactive seeking and appreciation of experience for its own sake; toleration for exploration of the unfamiliar.	Conventional, down-to-earth, narrow interests, unartistic, unanalytical.
AGREEABLENESS (A)		
Soft-hearted, good-natured, trusting, helpful, forgiving, gullible, straightforward	Assess the quality of one's interpersonal orientation along a continuum from compassion of antagonism in thoughts, feelings and actions.	Cynical, rude, suspicious, uncooperative, vengeful, ruthless, irritable, manipulative.
CONSCIENTIOUSNESS (C)		
Organised, reliable, hard-working, self-disciplined, punctual, scrupulous, neat, ambitious, preserving	Assess the individual's degree of organisation, persistence and motivation in goal-directed behaviour. Contrasts dependable, lackadaisical and sloppy.	Aimless, unreliable, lazy, careless, lax, negligent, weak-willed, hedonistic.

Source: Costa and McCrae (1985:2)

2.7 CONCLUSION

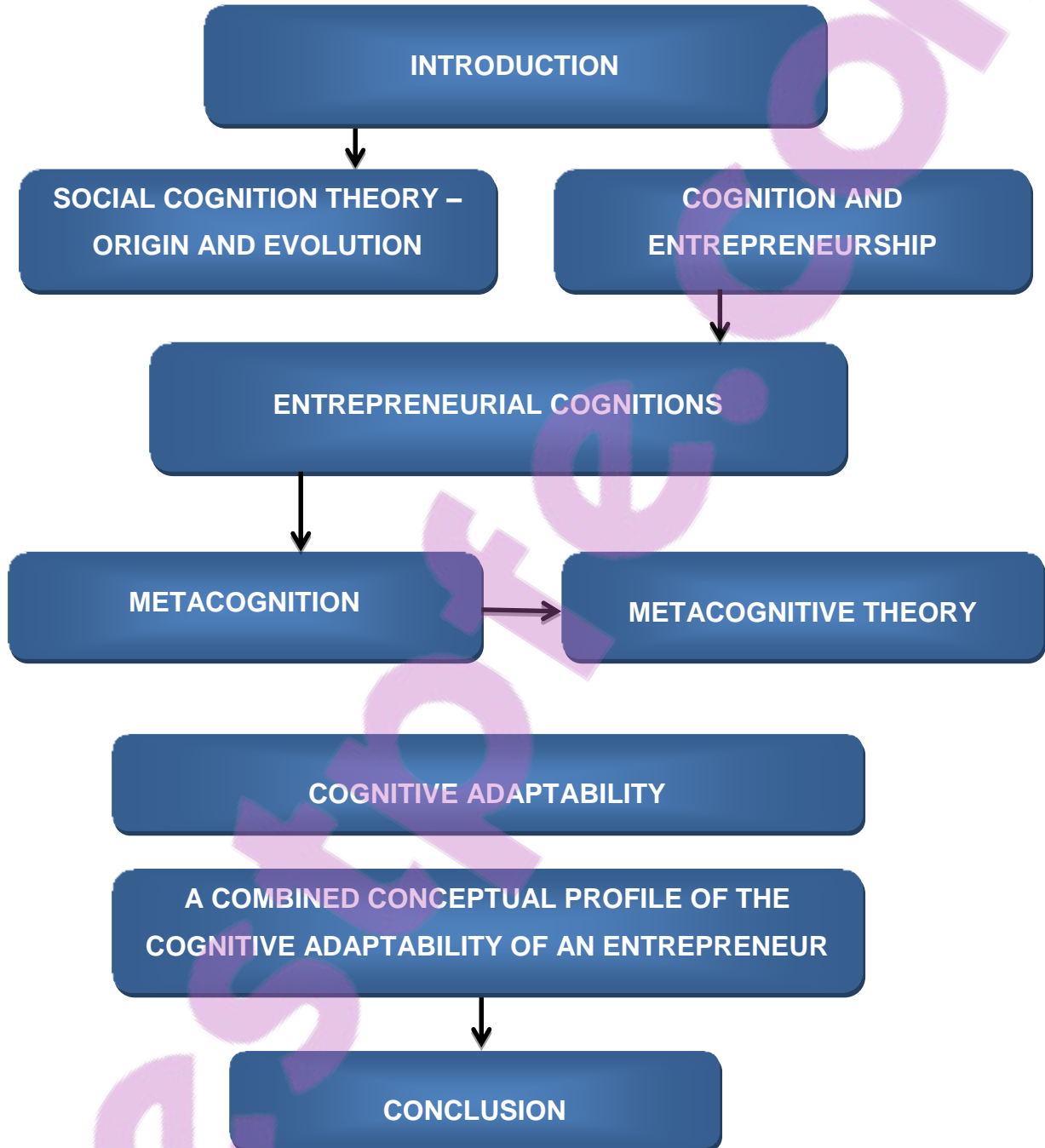
This chapter focused on the construct of personality traits and how they relate to the field of personality and psychology. Although there are many theories that relate to personality traits, the focus fell on the Big Five personality theory. The historical development of the trait theory shows that a concerted effort was made to embark on the desirable number of factors that would be able to measure and capture personality traits. The Big Five broad dimensions have six narrow facets each which have been found to be stronger predictors of behaviour. The Big Five dimensions are measured by the NEO PI-R 240-item questionnaire. There is also a shorter version, the 60-item NEO-FFI questionnaire which garners information at a greater level of specificity. The chapter was concluded with a combined conceptual personality trait model of a successful entrepreneur (high scores in openness to experience, conscientiousness, extraversion, and agreeableness, with low scores in neuroticism).

The five-factor model (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism) has become popular in recent years due to its comprehensiveness and replicability across methods. The claim that these five factors represent basic dimensions of personality is based on four lines of reasoning and evidence: (a) longitudinal and cross-observer studies demonstrate that all five factors are enduring dispositions that are manifest in patterns of behaviour; (b) traits related to each of the factors are found in a variety of personality systems and in the natural language of trait description; (c) the factors are found in different age, sex, race and language groups, although they may be somewhat differently expressed in different cultures; and (d) evidence of heritability suggests that all have some biological basis (Costa & McCrae 1992a:653).

It should be pointed out that some researchers have reservations about the five-factor model, particularly the imprecise specification of these dimensions (Briggs 1989; John 1989; Livneh & Livneh 1989; Waller & Ben-Porath 1987).

Some researchers suggest that more than five dimensions are needed to encompass the domain of personality. Hogan (1986) advocates six dimensions (sociability, ambition, adjustment, likeability, prudence and intellectance). The principal difference seems to be splitting the extraversion dimension into sociability and ambition.

CHAPTER THREE: DIAGRAMMATIC SYNOPSIS: COGNITIVE ADAPTABILITY



3.1 INTRODUCTION

By recognising well-established psychological constructs relevant to understanding entrepreneurs, researchers have extended the on-going work in different disciplines by seeking to augment and create closer conceptual links between entrepreneurship and cognitions. The central premise of the cognitive perspective is that entrepreneurial behaviour emerges as a result of the entrepreneur's underlying cognitions.

(Markman, Balkin & Baron 2002:149)

Entrepreneurship is a relatively new field of inquiry (Sánchez 2011:427). The first studies in the field were carried out from the perspective of personality traits (Van Den Broeck *et al.* 2005:369); which made important contributions but also had its limitations in attempting to explain entrepreneurial behaviour. Faced with these limitations, certain authors chose to use the cognitive approach as an alternative (e.g. Vecchio 2003:303). The cognitive approach is characterised by the study of certain types of cognitions that could explain aspects such as how to define and differentiate an entrepreneur, entrepreneurial behaviour and business success, among others (Sánchez 2011:427). Researchers using this approach believe that cognitive aspects are the elements that differentiate entrepreneurs from non-entrepreneurs. These cognitive aspects can range from beliefs to values, cognitive styles and mental processes.

In the last decade the field of cognitive psychology has made important contributions to understanding the field of entrepreneurship in areas such as the cognitive styles of entrepreneurs (Bridge, O'Neil & Cromie 2003:1), enterprising self-efficacy (Markman, Baron & Balkin 2005:1), decision-making heuristics (Mitchell *et al.* 2007:1), the knowledge structures of entrepreneurs (Smith, Mitchell & Mitchell 2009:815), etc. Knowing how these cognitive elements function has helped us to understand how

entrepreneurs perceive and interpret information and how they use it to make the decision to start a successful business.

One of the most developed and fertile cognitive constructs is metacognition (Garcia *et al.* 2014:311). One product of metacognition is cognitive adaptation, understood as the ability to evolve or to adapt decisions in a suitable and effective way based on feedback from the context (inputs) in which the cognitive processing takes place (Haynie & Shepherd 2009:695). This ability to adapt is made possible through strategies that promote the process of thinking about thinking, i.e. metacognition. In the context of entrepreneurship, cognitive adaptability is a key competency. For this reason, this chapter seeks to understand the construct of metacognition and cognitive adaptability in the context of an entrepreneurial environment.

The chapter starts with a discussion of the origin and evolution of social cognition theory. The trait and cognition approaches are explored in the context of entrepreneurial cognitions. The entrepreneurial environment exemplifies the dynamic and challenging environment which needs to be understood in context. Entrepreneurial cognition research investigates entrepreneurs' ways of thinking and thus places the entrepreneur as the research focus (Mitchell *et al.* 2007:1). Metacognitive theory forms the foundation of the study. According to the influential model developed by Nelson and Narens (1990a:1; 1994:1), metacognition is defined as the monitoring and control of cognitive processes. By this view, metacognition is essential for the supervision of our perceptions, thoughts, memories and actions. The individual dimensions of cognitive adaptability are discussed in the context of entrepreneurship. The chapter concludes with a combined conceptual framework of cognitive adaptability in an entrepreneurial environment.

3.2 SOCIAL COGNITION THEORY: ORIGIN AND EVOLUTION

The Social Cognition Theory represents an approach to the study of human cognition and information processing that assumes the motivations, emotions and other attributes of the individual impact cognition and subsequently how the individual

interprets the social world (Showers & Cantor 1985:275; Tetlock 1990:212). It has been the subject of thoughtful research since the time of Aristotle and there are generally two approaches to the study of human cognition that have dominated the last century of theoretical and methodological development: the elemental and holistic approaches (Haynie 2005:28). Those who subscribe to the 'elemental' approach describe the study of the mind as being akin to the study of chemistry, where ideas, memories and attributions are analogous to elements. Individual elements (e.g. memories) are associated with other elements (e.g. attributions) to facilitate cognition and sense. Currently this approach dominates the domain of cognitive science research.

The 'holistic' approach to studying human cognition has its origins with Kant (1781:58). Kant argued for studying the mind holistically because 'perception is furnished by the mind and is not inherent in the stimulus'. Gestalt psychology adopted this perspective and Lewin (1951:101) brought these ideas into *social psychology* emphasising the environment as perceived by the individual, with a further emphasis on the total situation. These ideas represent the origins of social cognition and a domain of inquiry and research within the field of social psychology (Haynie 2005:28).

Social cognition provides a foundation for studying the broad spectrum of social psychological topics. Generally defined, social cognition investigates how people think about themselves and how they view other people, for example addressing people's mental capacity and resources, their judgement and inferential tactics and even their cognitive architecture, as related to human behaviour and interaction. Although this definition appears somewhat broad, it indeed captures the heterogeneity within social cognition's empirical domain. Insight into people's intrapsychic processes gives social psychologists considerable insight into human relations and social interactions (Operario & Fiske 1999:63).

Research in social cognition shares three basic features: a commitment to mentalist interpretations, a commitment to process analysis and cross-fertilisation between

cognitive and social psychology (Lewin 1951:99). At the core of social cognition research is the idea that the individual exists within a *psychological field* composed of two component pairs. Pair 1 describes the *person-situation*. The *person* brings values, beliefs and perceptions which act on the environment (*situation*) to constitute the field. The second pair of factors cuts across this field to determine behaviour and consists of *cognition-motivation*. Cognition contributes the person's interpretation of the world, and motivation (its strength) predicts whether behaviour will occur (Lewin 1951:99). While the dominant theoretical paradigms around which scholars have based social cognitive research have evolved through improvements in neuroscience, technology, advances in linguistics, memory systems and research methodologies, the widespread use of the computer in the late 1960s fundamentally altered the focus of cognition research and spawned the 'cognitive revolution' (Haynie 2005:29).

To appreciate the insights that social cognition has given the field, the study needs to trace the scientific development that led to the contemporary perspectives in social cognition. There are three general themes that have characterised the evolution of social cognition from its early beginnings in the 1970s to contemporary research throughout the 1990s. The individual as a *Consistency Seeker* proposed that individuals are motivated to resolve perceived discrepancies between cognitions. This is a major emphasis of the first-generation models (Tetlock 1990:212). The individual as a *Naive Scientist* proposed that, given time, people will gather data and arrive at a logical conclusion. This is a major emphasis of the second-generation models (Tetlock 1990:212). The individual as *Cognitive Miser* proposed that individuals are limited in their processing capacity so they take short-cuts where they can. This is a major emphasis of the third-generation models (Tetlock 1990:212). The individual as a *Motivated Tactician* proposes that individuals respond to multiple contextual moderators of information processing in a theoretically principled and creative way. This is a major emphasis of the fourth-generation model (Tetlock 1990:214), which is linked to the dual-process model.

Based on the research problem, it is likely that cognitive miser individuals generally rely more heavily on automatic, heuristic-based processing than on purposeful “thinking about thinking”. This study seeks to find the bridge between cognitive misers and motivated tacticians.

3.3 COGNITION AND ENTREPRENEURSHIP

At present, there still does not appear to be a satisfactory answer to the question: Why are some people and not others able to discover and exploit particular entrepreneurial opportunities? It has been asserted that two broad categories of factors influence the probability that particular people will discover particular opportunities: 1) the possession of the information necessary to identify an opportunity; and 2) the cognitive properties necessary to exploit it (Shane & Venkataraman 2000:220). According to these criteria, then, research that contributes to a better understanding of information processing and entrepreneurial cognition has an important role to play in the development of the entrepreneurship literature. The field of entrepreneurship seeks to understand how opportunities are discovered, created and exploited, *by whom* and with what consequences (Shane & Venkataraman 2000:218). Although the person - the entrepreneur - is central to the creation of new ventures, entrepreneurs themselves are seldom explicitly taken into account in formal models of new venture formation. For example, notwithstanding the important role that entrepreneurs play in forging new ventures and creating new jobs, research to identify attitudes, traits, behaviours, or other characteristics that distinguish entrepreneurs from others remains questionable. Trait and cognition are two major approaches to distinguish entrepreneurs from non-entrepreneurs and to understand how people make decisions (Das & Teng 1997:70).

3.3.1 The trait approach

The belief that entrepreneurs have distinctive personality characteristics has a long tradition in entrepreneurship studies, and research based on this premise is generally known as the trait approach (Das & Teng 1997:69). Several psychological traits have

been studied in an attempt to differentiate entrepreneurs and non-entrepreneurs (Brockhaus & Horwitz 1986:25). Some of the more important ones include need for achievement, locus of control, tolerance of ambiguity and risk propensity. The trait approach asserts that entrepreneurs can be recognised by traits such as risk propensity, need for achievement and locus of control (Palich & Bagby 1995:426). However, research using the trait approach has had limited success in explaining entrepreneurial behaviours and perceptions. For instance, some studies have shown that risk propensity, the personality trait that determines the tendency and willingness of the individual to take risks, does not explain why entrepreneurs are willing to undertake a business venture. The failure of past 'entrepreneurial personality'-based research to clearly distinguish the unique contributions to the entrepreneurial process of entrepreneurs as people, has created a vacuum within the entrepreneurship literature that has been waiting to be filled (Das & Teng 1997:70).

3.3.2 The cognitive approach

Given the limited success achieved with the trait approach, some researchers have turned to a more cognition-oriented approach to studying entrepreneurial risk behaviour (Palich & Bagby 1995:425). Recent evidence suggests that this approach more effectively explains entrepreneurial behaviour and perception. The cognitive approach is concerned with the entrepreneur's preferred way of gathering, processing and evaluating information (Das & Teng 1997:71). For example, researchers have shown that entrepreneurs exhibit systematic cognitive biases and overestimate their chances of success. The application of ideas and concepts from cognitive science has gained currency within entrepreneurship research, as evidenced by the growing accumulation of successful studies framed in entrepreneurial cognition terms. The cognitive perspective provides us with some useful lenses through which to explore entrepreneur-related phenomena and to address some of the meaningful issues that, up until this point, have remained largely underexplored.

Despite researchers' disillusionment with the trait approach in entrepreneurship that began in the 1980s and continued throughout much of the 1990s, the fundamental idea that entrepreneurs are members of a homogeneous group that is somehow unique has not dissipated. Entrepreneurs themselves, writers in the popular press, as well as those who have worked with entrepreneurs persistently ignore the recent findings that fail to confirm the trait approach and continue to openly assume and act upon the idea that entrepreneurial uniqueness exists among individuals (Brockhaus & Horowitz 1986:25). Until the cognition view emerged it was somewhat ironic that entrepreneurship researchers could not clearly identify systematic (theoretical) reasons for the uniqueness of entrepreneurs, while those who were immersed within the entrepreneurship world *knew* that these people were somehow distinct. The assertions of the cognitive view of entrepreneurship represent a refreshing change: the articulation of a theoretically rigorous and empirically testable approach that systematically explains the role of the individual in the entrepreneurial process (Mitchell *et al.* 2002:95).

3.4 THE CONSTRUCT OF ENTREPRENEURIAL COGNITIONS CONCEPTUALISED

Entrepreneurial cognitions are defined to be 'the knowledge structures that people use to make assessments, judgements or decisions involving opportunity evaluation, venture creation and growth' (Mitchell *et al.* 2002:97). During the last decade, research on entrepreneurial cognition has seen substantial developments in theory and empirical testing. For example, researchers have found that entrepreneurs have knowledge structures that are different from non-entrepreneurs and that these differences influence the Value Chain Development (VCD) (Baron 2000:79; Busenitz & Barney 1997:9; Chen *et al.* 1998:295; Keh *et al.* 2002:125; Krueger 1993:5; Markman *et al.* 2002:149; Mitchell *et al.* 2000:974; Mitchell *et al.* 2002).

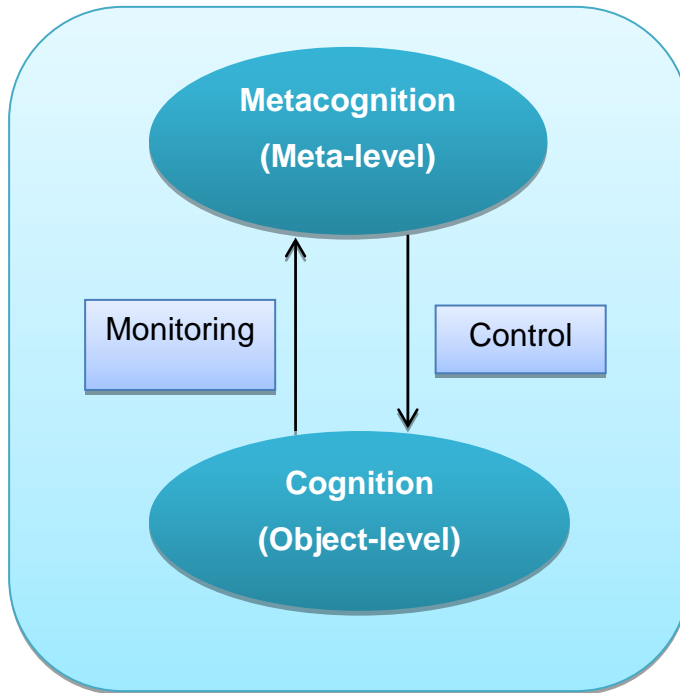
The cognitive view sees entrepreneurship as a 'way of thinking' and advances a fundamental theoretical assertion that entrepreneurial cognitions (as independent variables) are associated with various outcomes of interest (dependent variables)

(Meyer, Gartner & Venkataraman 2000:7). Entrepreneurial cognitions have been shown to be useful in explaining (non-exhaustively): differentiation between entrepreneurs and non-entrepreneurs (Baron 1998:275); systematic variation of cognition by type of entrepreneurial involvement rather than by culture (McGrath & MacMillan 1992:249; McGrath, MacMillan & Scheinberg 1992:115); opportunity identification (Krueger 2000:5); optimistic perception of opportunity outcomes (Palich & Bagby 1995:425); success in the start-up process (Gatewood, Shaver & Gartner 1995:372); and making the venture-creation decision (Mitchell *et al.* 2000:974).

3.5 THE CONSTRUCT OF METACOGNITION CONCEPTUALISED

It has been repeatedly argued that metacognition is a fuzzy concept and needs to be 'refined, clarified and differentiated' (Flavell 1987:28). Following Nelson (1996:102; Nelson & Narens 1990a:1), metacognition is defined as a model of cognition which acts at a meta-level and is related to the object-world, i.e. cognition, through the monitoring and control function. The meta-level is informed by the object-world through the monitoring function (Figure 3.1).

Fig. 3.1: The conceptualisation of metacognition following Nelson (1996)



Source: Adapted from Nelson (1996:2)

Besides metacognition the person's self-concept in the knowledge domain (Dermitzaki & Efklides 2000:643), affect and motivation also contribute to the exercise of control processes, as research on self-regulation has shown (Borkowski, Chan & Muthukrishna 2000:1; Georgiadis & Efklides 2000:1; Pintrich *et al.* 1991). This viewpoint places strategy use in a self-regulation context and this is correct. Nevertheless, what is still missing is the understanding of the mechanism that underpins the self-regulation process.

There are various facets of metacognition. In the relevant literature one can identify three distinct facets of metacognition, namely metacognitive knowledge, metacognitive experiences and metacognitive skills (Table 3.1).

Table 3.1: The facets of metacognition and their manifestations as a function of monitoring and control

Monitoring		Control
Metacognitive knowledge	Metacognitive experience	Metacognitive skills
Ideas, beliefs, 'theories' of: - Person - Task - Strategies - Goals - Cognitive functions, e.g. memory, attention - Validity of knowledge - Theory of mind	Feelings: - Feelings of familiarity - Feelings of difficulty - Feelings of knowing - Feelings of confidence - Feelings of satisfaction Judgements/estimates: - Judgement of learning - Source memory information - Estimate of effort - Estimate of time Online task-specific knowledge - Task features - Procedures employed	Conscious, deliberate activities and use of strategies for: - Effort allocation - Time allocation - Orientation/monitoring of task requirements/demands - Planning - Check and regulation of cognitive processing - Evaluation of the processing outcome

Source: Efklides (2006:4)

Metacognitive knowledge is declarative knowledge about cognition. It is knowledge derived from long-term memory (Flavell 1979:906; Hertzog & Dixon 1994:227). Metacognitive experiences (ME) are what the person experiences during a cognitive endeavour. Metacognitive experiences form the online awareness of the person as he is performing a task (see also 'concurrent metacognition' in Hertzog and Dixon (1994:227). Metacognitive skills are what the person deliberately does to control cognition. It is procedural knowledge and involves executive processes of metacognition (Brown 1978:77; Veenman & Elshout 1999:509).

3.6 METACOGNITIVE THEORY

Historically there have been two main lines of research on metacognition that proceeded almost independently of each other, one within developmental psychology and the other within experimental memory research. The work within developmental

psychology was spurred by Flavell (Flavell 1979:906; Flavell & Wellman 1977:3) who argued for the critical role that metacognitive processes play in the development of memory functioning (Flavell 1979:906). Within memory research, the study of metacognition was pioneered by Hart's (1965:208) studies on the feeling-of-knowing (FOK) as well as Brown and McNeill's (1966:325) work on the tip-of-the-tongue (TOT).

There is a difference in goals and methodological styles between these two research traditions. The basic assumption among developmental students of metacognition is that learning and memory performance depend on monitoring and regulatory proficiency. This assumption has resulted in attempts to specify the components of metacognitive abilities, to trace their development with age and to examine their contribution to memory functioning. Hence a great deal of the work is descriptive and correlational (Schneider 1985:57). The focus on age differences and individual differences in metacognitive skills has also engendered interest in specifying 'deficiencies' that are characteristic of children at different ages and in devising ways to remedy them. This work has expanded into the educational domain: the increasing awareness of the critical contribution of metacognition to successful learning (Paris & Winograd 1990:15) has resulted in the development of educational programmes (Scheid 1993) designed to make the learning process more 'metacognitive.' Several authors have stressed the importance of metacognition to transfer of learning (De Corte 2003:142).

The conception of metacognition by developmental psychologists is more comprehensive than that underlying much of the experimental work on metacognition. It includes a focus on what children know about the functioning of memory and particularly about one's own memory capacities and limitations. Developmental work has also placed heavy emphasis on strategies of learning and remembering (Bjorklund & Douglas 1997:201; Brown 1987b:144; Pressley, Borkowski & Schneider 1987:89). In addition, many of the issues addressed in the area of theory of mind (Perner & Lang 1999:337) concern metacognitive processes.

These issues are, perhaps, particularly important for the understanding of children's cognition.

In contrast, the experimental-cognitive study of metacognition has been driven more by an attempt to clarify basic questions about the mechanisms underlying monitoring and control processes in adult memory (Koriat & Levy-Sadot 1999:483; Nelson & Narens 1990b:125; Schwartz 1994:19). This attempt has led to the emergence of several theoretical ideas as well as specific experimental paradigms for examining the monitoring and control processes that occur during learning, during the attempt to retrieve information from memory and following the retrieval of candidate answers (Metcalfe 2000:197; Schwartz 2002).

In addition to the developmental and the experimental-memory lines of research, there has been considerable work on metacognition in the areas of social psychology and judgement and decision-making. Social psychologists have long been concerned with questions about metacognition although their work has not been explicitly defined as metacognitive (Jost *et al.* 1998:137). In particular, social psychologists share the basic tenets of metacognitive research (see below) regarding the importance of subjective feelings and beliefs as well as the role of top-down regulation of behaviour (Koriat & Levy-Sadot 1999:483). In recent years, social psychologists have been addressing questions that are at the heart of current research in metacognition (Winkielman *et al.* 2003:189; Yzerbyt, Lories & Dardenne 1998; Metcalfe 1998:100). Within the area of judgement and decision-making, a great deal of the work concerning the calibration of probability judgements (Fischhoff 1975:288; Lichtenstein, Fischhoff & Phillips 1982:306; Winman & Juslin 2005) is directly relevant to the issues raised in metacognition.

3.6.1 Metacognitive theory and entrepreneurship

There has been a recent surge of interest in metacognitive processes with the topic of metacognition drawing many researchers from disparate areas of investigation. These areas include memory research (Kelley & Jacoby 1998:287; Metcalfe & Shimamura 1994; Nelson & Narens 1990b:125; Reder 1996:106), developmental psychology (Schneider & Pressley 1997), social psychology (Bless & Forgas 2000; Jost *et al.* 1998:137; Schwarz 2004:332), judgement and decision-making (Gilovich, Griffin & Kahneman 2002; Winman & Juslin 2005), neuropsychology (Shimamura 2000:213), forensic psychology (Pansky, Koriat & Goldsmith 2005:93; Perfect 2002:95), educational psychology (Hacker, Dunlosky & Graesser 1998) as well as problem solving and creativity (Davidson & Sternberg 1998:47; Metcalfe 1998:100). The establishment of metacognition as a topic of interest in its own right is already producing synergies between different areas of investigation concerned with monitoring and self-regulation (Fernandez-Duque, Baird & Posner 2000:324).

Furthermore, because some of the questions discussed touch upon traditionally ostracised issues in psychology such as the issues of consciousness and free will (Nelson 1996:103), a lively debate has been going on between metacognitive researchers and philosophers (Nelson & Rey 2000). In fact, it appears that the increased interest in metacognition research derives in part from the feeling that perhaps this research can bring us closer to dealing with (certainly not resolving) some of the meta-theoretical issues that have been the province of philosophers of the mind.

Recently entrepreneurship scholars (Haynie & Shepherd 2009:695; Haynie *et al.* 2010:217; Haynie, Shepherd & Patzelt 2012:237) have focused on the concept of metacognition. Metacognition refers to individuals' understanding and knowledge of their own cognitive process and performance (Baron & Henry 2010:49). It differs from cognition in the way that it describes the higher-order cognitive process through which individuals recognise multiple ways of framing a problem or decision task and consciously consider the alternatives to address a decision task (Haynie & Shepherd

2009:695; Haynie *et al.* 2012:237). Individuals vary in their metacognitive abilities. One source of such differences can be presented through capturing the variability between individuals with respect to their metacognitive resources, i.e. metacognitive knowledge and metacognitive experience (Flavell 1979:906; Flavell 1987:21; Haynie *et al.* 2012:237).

Metacognition differs from cognition and is considered to be, at least in part, a conscious process referred to as 'metacognitive awareness' (Nelson 1996:102). This metacognitive awareness is situated within a social context (Jost *et al.* 1998:137; Allen & Armour-Thomas 1993:203), where an individual's development and application of metacognitive processes cannot be predicted 'with even a moderate degree of accuracy' from domain knowledge (Haynie & Shepherd 2009:697; Glenberg & Epstein 1987:84). To study metacognition is not to study why an entrepreneur selected a particular strategy (cognition) but instead to study the higher-order cognitive process that resulted in the entrepreneur's effectual framing of the task and subsequently the particular strategy being included in a set of alternative responses to a decision task (metacognition).

Metacognitive awareness allows individuals to plan, sequence and monitor their learning in a way that directly improves performance (Schraw & Dennison 1994:460). A metacognitively aware entrepreneur reflects upon a range of strategies (or creates new strategies) appropriate to apply to a given task and considers each relative to its utility in addressing the decision task at hand (Ford *et al.* 1998:223). Metacognitive awareness and cognitive-based feedback are positively related to effective adaptation, given a dynamic environment. Metacognitively aware individuals use cognitive-type feedback more effectively than individuals who are less metacognitively aware (Haynie & Shepherd 2007:1).

3.7 COGNITIVE ADAPTABILITY

Considering the dynamic and unstable environment of entrepreneurship, metacognition also plays a role in how people adapt to their developing and changing circumstances (Haynie & Shepherd 2007:10). Scholars have suggested that 'the successful future strategists will exploit an entrepreneurial mindset ... the ability to rapidly sense, act and mobilise, even under uncertain conditions' (Ireland *et al.* 2003:963). This conceptualisation implies that the ability to sense and adapt in response to uncertainty characterises a core competence of the successful entrepreneur. The foundation of this competence is, in part, cognitive in its origins. Specifically, from the perspective of cognitive theory, the 'entrepreneurial mindset' is analogous to what is described more generally as cognitive adaptability (Haynie 2005:1).

Haynie and Shepherd (2009:695) conceptualise cognitive adaptability as the ability to effectively and appropriately change decision policies, i.e. to learn, given feedback (inputs) from the environmental context in which cognitive processing is embedded. It represents the ability, if appropriate given the decision context and the goals and motivations of the decision-maker, to overcome – or 'think outside' – the bias embedded in existing sense-making mechanisms, such as schema, scripts and other knowledge structures. Cognitive adaptability is conceptualised to include a normative implication, such that adaptable decision-making implies effective decisions in the face of a dynamic environment (Haynie 2005:1). While cognitive approaches to entrepreneurship have devoted considerable energy to defining 'entrepreneurial cognitions' based on knowledge (Shane 2000:448), or heuristics, cognitive adaptability as a process-orientated approach is new to entrepreneurship. As for knowledge, cognitive adaptability represents an individual difference that may help explain the assimilation of information into new knowledge and 'enhance our understanding of the cognitive factors that influence key aspects of the entrepreneurial process' (Baron & Ward 2004:553).

3.7.1 Goal orientation

Goal orientation refers to the following individual tasks, i.e. defining goals; understanding how the accomplishment of a task relates to goals; setting specific goals before beginning a task; asking how well goals are accomplished; and when performing a task, frequently assessing progress against set objectives (Haynie & Shepherd 2009:697). Motives influence how context is perceived and interpreted and at the same time, context may define an individual's motives. As such, the origins of cognitive adaptability result from the conjoint effect of the context in which the individuals function and the motivations of that individual through which the context is interpreted (Haynie & Shepherd 2009:698).

Modern goal theories hold the view that whether people meet their goals depends on how goal content is framed, for instance in a specific versus abstract way (Locke & Latham 1990:240); proximal versus distal (Bandura & Schunk 1981:586), or performance goals versus learning goals (Dweck 1996:69) and how people regulate the respective goal-directed actions, through various action control strategies (Kuhl 1984:99); effort mobilisation (Wright & Brehm 1989:169); compensation of failures and shortcomings (Wicklund & Gollwitzer 1982); or negotiating conflict between goals (Cantor & Fleeson 1994:125). In addition, modern goal theories assume that goals are selected and put into operation primarily through deliberate, conscious choice and guidance. Bargh *et al.* (2001:1014) criticised this view and proposed that goal pursuit might greatly benefit from automatic processes as well. They argued that activation of goals can become automated if a prior, consciously set goal is repeatedly and consistently acted on in the same situational context.

3.7.1.1 *Goal orientation and entrepreneurship*

An entrepreneur's goals should be relevant for the type of venture they create. The way in which people experience events is influenced by what they are trying to accomplish (Magnusson 1981). Events that are important for goal accomplishment will be experienced as more emotionally involving. Yet, as experiences are

processed, goals are subject to modification (Harlow & Cantor 1994:386). The adaptive nature of goals establishes parameters around the kind of venture that satisfies the entrepreneur. This likelihood in an entrepreneurial context is reinforced by the findings of Kuratko, Hornsby and Naffziger (1997:24). Streams of experiences resulting in higher engagement and more positive affect can lead to more ambitious goals for the activity or behaviour in question (Harlow & Cantor 1994:386). Thus, experience-informed goals have much to do with whether what was intended as a lifestyle venture becomes a high-growth firm or vice versa. Such temporally based changes in growth orientation are common though not well understood (Stoica & Schindehutte 1999:1).

To illustrate the interaction between context and goal orientation, two broad types of challenges can be identified for ecosystem entrepreneurs. These are managing multiple, discrepant goals and recognising opportunities within and outside the ecosystem (Nambisan & Baron 2012:1075). Both of these derive from the three characteristics that underlie innovation ecosystems (dependencies, common goals and shared capabilities) and the consequent need for entrepreneurs to play two potentially conflicting roles in the ecosystem – as a *follower* of the ecosystem and its innovation platform, and as *the leader* of an independent company.

In managing multiple and often discrepant goals, the need for entrepreneurs to play dual roles (as ecosystem follower and new venture leader) implies challenges related to potentially discrepant multiple goals - some of which are set by the entrepreneur and some by the hub firm. Prior studies on collaborative product development (Weisenfeld, Reeves & Hunck-Meiswinkel 2001:91) have focused on the challenges associated with addressing different types of partner goals in innovation projects. While much of this literature is focused on dyadic partnerships in product development, the nature of the partner goals extends also to the ecosystem context.

Three types of goals that assume relevance are *success or performance goals*; *technology development goals*; and *relational goals*. The *performance/success goals* and metrics for the new venture and the ecosystem may differ in terms of both scope

and time horizon. For example, as an independent company the new venture's success may be defined in terms of the growth in revenue and profits, number of new offerings, increase in number of employees, market share/size of customer base, reputation of the firm, etc. The dual roles faced by entrepreneurs in ecosystems also imply conflicting sets of *technology development goals*. As a member of the ecosystem, an entrepreneur must follow the technological trajectory delineated by the hub firm (Gawer & Cusumano 2002). The entrepreneur's need to relate to other ecosystem partners both as competitor and collaborator presents a third set of discrepant goals, namely *relational goals*. In an innovation ecosystem, the technologies, processes and other innovation assets of a member firm, such as design libraries in the semiconductor industry or assaying stations in the pharmaceutical industry, can often be leveraged (reused or redeployed) by multiple other members to facilitate or enable their innovation (Nambisan & Sawhney 2011:40).

3.7.2 Metacognitive knowledge

Metacognitive knowledge is declarative knowledge about cognition (Flavell 1979:906). It is knowledge we derive from long-term memory (Hertzog & Dixon 1994:227). It comprises of knowledge of beliefs about the person him/herself and others as cognitive beings and relations with various cognitive tasks, goals, actions or strategies. It also comprises knowledge of tasks, i.e. categories of tasks and their processing, as well as knowledge of strategies, i.e. when, why and how to deal with a task (Flavell 1979:906). Besides this it evokes knowledge, i.e. beliefs and theories about the various cognitive functions such as memory or thinking, regarding what they are and how they operate (for metamemory, see Flavell 1979:906 and Wellman 1983:31; for theory of mind, see Fabricius & Schwanenflugel 1994:111). Finally it comprises of criteria of validity of knowledge, what is called 'epistemic cognition' (Kitchener 1983:222).

One could argue that theory of mind is also an instance of metacognitive knowledge, although the theorists in the field do not make this connection (Bartsch & Wellman

1995). The importance of metacognitive knowledge is that it provides a framework for understanding one's own as well as others' cognition and thus guides the interpretation of situational data so that proper control decisions are made (Nelson, Kruglanski & Jost 1998:69). Schraw (1998:113) describes two aspects of metacognition, i.e. knowledge of cognition and regulation of cognition, and how they are related to domain-specific knowledge and cognitive abilities. Schraw argues that metacognitive knowledge is multidimensional, domain-general in nature and teachable. Four instructional strategies are described for promoting the construction and acquisition of metacognitive awareness. These include promoting general awareness, improving self-knowledge and regulatory skills and promoting learning environments that are conducive to the construction and use of metacognition.

3.7.2.1 Metacognitive knowledge and entrepreneurship

Recently proposed theoretical frameworks (Haynie & Shepherd 2009:695; Haynie *et al.* 2010:217) suggest the significance of both entrepreneurs' metacognitive awareness and metacognitive resources in adopting cognitive strategies that lead to desirable outcomes related to specific entrepreneurial goals. Furthermore, evidence reported recently by Baron *et al.* (2011) indicates that one aspect of metacognitive knowledge – knowing when to withdraw from a failing course of actions - has significant effects on the strategies founding entrepreneurs choose for their new ventures.

To sense and adapt to uncertainty by leveraging prior entrepreneurial knowledge is a critical ability. However, for many individuals prior entrepreneurial knowledge is absent or underdeveloped (Haynie *et al.* 2010:237). Is it simply the case that the entrepreneurial success of an individual without prior entrepreneurial knowledge or experience can be written off to the old saying that 'sometimes even a blind squirrel finds a nut?' Or can it be argued that in some contexts, or for some individuals, a lack of prior knowledge might be overcome (at least in part) by the use of cognitive mechanisms to facilitate expeditious and effective learning and adaptation? This proposition remains to be addressed in entrepreneurship because, as we have

highlighted, few researchers have purposefully considered what might differentiate those entrepreneurs with no prior experience who are successful at an entrepreneurial task, from those who are not. This is a critical question for entrepreneurship scholars, given the importance of new entry and venture creation for economic growth (Wiklund & Shepherd 2003:1920).

Haynie *et al.* (2010:256) identified one possible explanation for normative differences between individuals without prior entrepreneurial experience - metacognitive abilities. One of the foundational tenets of metacognitive theory is the idea that employing metacognitive resources promotes the ability to relate knowledge learned in one context to problem solving in another context. In a sense metacognitive resources facilitate an analogical reasoning process that, for those inexperienced in the entrepreneurial process, may serve as a partial substitute for prior entrepreneurial knowledge. These findings represent a first step toward opening the door to consider the cognitive origins of entrepreneurial sense-making for those individuals without prior entrepreneurial experience.

Metacognition may represent an important resource for entrepreneurs - above and beyond prior knowledge - given that often they are required to perform dynamic and novel tasks (Hill & Levenhagen 1995:1057). When environmental cues change, decision-makers adapt their cognitive responses and develop strategies for responding to the environment (Earley, Connolly & Lee 1989b:589). Given the dynamism and uncertainty of many entrepreneurial tasks, metacognition can be a source of improved understanding as to why some entrepreneurs cognitively adapt to their dynamic context while others do not, or are slow in doing so. Individuals with strong metacognitive knowledge use feedback more effectively than individuals who have less metacognitive knowledge and this performance difference is greater for cognitive feedback than for outcome feedback.

3.7.3 Metacognitive experience

Metacognitive experiences (MEs) are what the person experiences during a cognitive endeavour. They form the online awareness of the person as he or she is performing a task (see also ‘concurrent metacognition’ in Hertzog & Dixon 1994:227). They comprise feelings, judgements or estimates, as well as online specific knowledge, i.e. awareness of the instructions and features of a task at hand associated with metacognitive knowledge that pertains to processing of the task (Efklides 2001:297; Flavell 1979:906). Metacognitive experiences differ from metacognitive knowledge because they are present at working memory, they are specific in scope, and they are affectively charged. The affective character of ME is particularly evident in metacognitive feelings. Metacognitive feelings and metacognitive judgements or estimates are the exemplars of ME par excellence (Efklides 2001:297).

A series of single-item measures tapping different features of task processing have been recommended (Efklides 2002a:163) at different points of task processing. These items refer to the following ME: *Feeling of familiarity* (this regards the previous occurrence of a stimulus and denotes fluency of processing) (Nelson *et al.* 1998:69; Whittlesea 1993:1235); *feeling of difficulty* (Efklides *et al.* 1997:225; Efklides *et al.* 1998:207; Efklides, Samara & Petropoulou 1999:461), which monitors the conflict of responses (Van Veen & Carter 2002:593) or the interruption of processing, i.e. whether there is an error or lack of available response (Mandler 1984). It ensures that the person needs to invest more effort, to spend more time on task processing or to reorganise his/her response. Thus, whereas feeling of familiarity is associated with positive affect arising from the fluency in the accessibility of the respective information, feeling of difficulty is associated with negative affect (Efklides & Petkaki 2005:415) arising from lack of fluency due to interruption of processing.

Feeling of difficulty is the product of the interaction of a variety of factors. These factors include the objective task difficulty, in terms of task complexity or of conceptual demands (Efklides *et al.* 1997:225; Efklides *et al.* 1998:207); conceptual demands have to do with the content of the task and are a function of one’s

developmental level and/or of domain-specific knowledge; cognitive load (Sweller, Van Merriënboer & Paas 1998:251) is also a factor that has an impact on objective task difficulty and task context, i.e. presence of other tasks (Efklides *et al.* 1997:225; Efklides *et al.* 1998:207). They also include a person's characteristics, such as cognitive ability (Efklides *et al.* 1997:225; Efklides *et al.* 1998:207), one's self-concept (Dermitzaki & Efklides 2001:271; Efklides & Tsiora 2002:222), affective factors such as mood (Efklides & Petkaki 2005:415) and the affective tone of instructions, such as 'interesting' or 'difficult' (Efklides & Aretouli 2003:287) and extrinsic feedback valence (Efklides & Dina 2004:179), i.e. whether it is positive or negative form part of this interaction.

Furthermore, as task processing proceeds, initial feeling of difficulty ratings change because they get updated depending on processing features such as fluency or interruption of processing. Thus the reported feeling of difficulty during or after task processing can be similar to or higher or lower than the initial one (Efklides 2002a:163; Efklides, Samara & Petropoulou 1996:1). It is also important that there can be 'illusions of feeling of difficulty', meaning that objectively easy or difficult tasks are felt respectively as difficult or easy (Efklides 2002a:163). One source of such an illusion of feeling of difficulty is feeling of familiarity, which leads to an expectation of fluency of processing despite the objective task difficulty.

Two metacognitive judgements associated with feeling of difficulty are *estimate of effort* and *estimate of time* required for problem solving. The estimate of effort is mainly influenced by a feeling of difficulty as well as by individual difference factors regarding effort allocation policy and mood (Efklides & Petkaki 2005:415). Other MEs present in a problem-solving situation are *judgement of solution correctness* along with *feeling of confidence* (Costermans, Lories & Ansay 1992:142) and *feeling of satisfaction* (Efklides 2002a:163; Efklides 2002b:19). These three MEs monitor the outcome of processing. Specifically, judgement of solution correctness focuses on the quality of the answer (correct or incorrect), while feeling of confidence monitors how the person reached the answer (fluently or with interruptions). Feeling of

satisfaction monitors if the answer meets the person's criteria and standards regarding the quality of the answer (Efklides 2002b:19).

The above description of MEs suggests that they form clusters around the three basic phases of cognitive processing, which are: *initiation*; *planning and execution*; and *output* (Efklides 2002a:163; Efklides 2002b:19). Specifically, feeling of familiarity is interrelated with the estimate of recency and of frequency of previous encounters with the stimulus as well as with other source memory judgements (Efklides, Pantazi & Yazkoulidou 2000:207; Efklides *et al.* 1996:1; for source memory see also Mitchell & Johnson 2000:179). Feeling of difficulty correlates with the estimate of effort expenditure and time (to be) spent on the task, while the estimate of solution correctness correlates with feelings of confidence and satisfaction (Efklides 2002a:163). Furthermore, feeling of familiarity is negatively related to prospective feeling of difficulty ratings and retrospective feeling of difficulty is negatively related to the estimate of solution correctness and feelings of confidence (Efklides *et al.* 1996:1).

To summarise, metacognitive experiences form a distinct facet of metacognition and this is present when the person is processing a task. Our evidence suggests that MEs are influenced by person, task and context characteristics and, despite their interrelations, each of them conveys different information about features of cognitive processing. Thus they form the interface between the task and the person and inform the person on his progress on task processing and on the outcome produced.

All the above metacognitive experiences are the expressions of the monitoring of cognitive processing from the moment the task is presented to its conclusion.

Table 3.2: A model representing phases of cognitive processing and corresponding metacognitive experiences and metacognitive skills

Cognitive processing	Metacognitive experiences	Metacognitive skills
Stimulus recognition	- Familiarity	- Monitoring of comprehension
Processing of task instructions	- Knowing - Estimates of when and where the information was acquired (source memory)	
Planning	- Difficulty	- Planning - Allocation of resources
Use of cognitive strategies/carrying out planned action	- Difficulty - Estimate of effort - Estimate of time spent on task	- Checking - Regulation of processing - Use of metacognitive strategies
Response	- Judgement of learning - Judgement of solution correctness - Confidence - Satisfaction	- Evaluation of outcome

Source: Adapted from Meyer and Land (2005:373)

3.7.3.1 Metacognitive experience and entrepreneurship

Metacognitive experiences allow entrepreneurs to more effectively interpret their social world and therefore, along with metacognitive knowledge, serve to frame how the entrepreneur will interpret a given entrepreneurial task. As such, metacognitive experience represents a stock of cognitive resources representative of the entrepreneur's intuitions, affective experiences and emotions, which can be brought to bear on formulating a metacognitive strategy to realise a desired outcome (Earley & Ang 2003:33).

Entrepreneurial experience is often considered an important component of an entrepreneur's human capital and hence subsequent activities. The extent to which entrepreneurs can translate previous ownership experience into higher subsequent entrepreneurial (and organisational) performance is likely to depend on a number of

intangible considerations such as cognition and learning (Katz & Shepherd 2003:253). Entrepreneurs may adopt different cognitive approaches when interpreting events and making decisions.

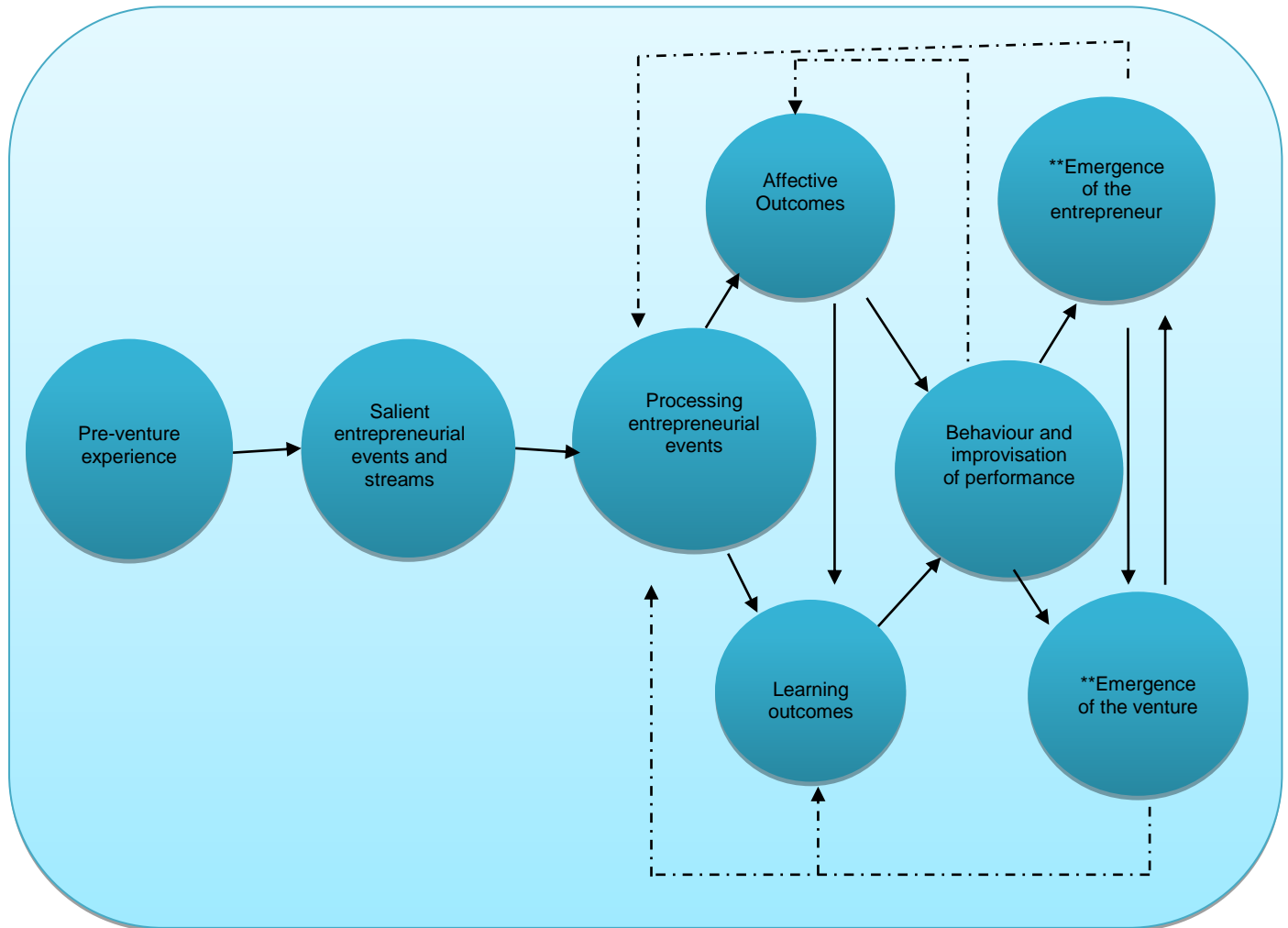
The term 'experience' has been used by entrepreneurship scholars in five ways: the outcome of involvement in previous entrepreneurial activities (Baron & Ensley 2006:1331); the experientially acquired knowledge and skills that result in entrepreneurial know-how and practical wisdom (Corbett 2007:97); the sum total of things that have happened to a founder over his or her career (Shane & Khurana 2003:519); the collective set of events that constitute the entrepreneurial process (Bhave 1994:223); and the direct observation of or participation in activities associated with an entrepreneurial context (Cope & Watts 2000:104). Of these, the most common usage is to describe prior knowledge and skills gained either in business or when creating ventures. As an antecedent condition researchers have emphasised the role of prior experience as a factor in explaining self-efficacy (Baron & Ensley 2006), entrepreneurial intentions (Krueger 2007:123), information processing (Cooper & Folta 1995:107), business practices (Cliff, Jennings & Greenwood 2006:633), learning from failure (Shepherd 2003:318), habitual entrepreneurs (Westhead, Ucbasaran & Wright 2005:393) and metacognition in decision-making (Haynie *et al.* 2010:237).

The greatest amount of attention has been devoted to prior experiences in corporate management and venture creation within particular industries, each of which has been associated with venture performance (Gimeno *et al.* 1997:750). Especially noteworthy in this regard is work on serial entrepreneurs. Prior entrepreneurial experience enhances both the ability to recognise viable opportunities and to overcome the liability of newness challenges as a venture is created (Politis 2005:399). As with the study of metacognition, prior experience can be expected to play a role both in determining which events are processed and the manner in which they are processed. The significance attached to a given experience, no matter how novel, is influenced by one's stock of previous experiences (Reuber & Fischer 1999:365). Based on affective events theory this significance is tied to the degree to

which an event is perceived to be beneficial or harmful to the entrepreneur's well-being (Weiss & Cropanzano 1996:1). Thus the relatively higher success rates that habitual entrepreneurs demonstrate may be tied to their ability to better interpret and place saliency on particular events, suggesting that novice entrepreneurs are less able to place a particular event in its proper context (Mitchell *et al.* 2007:1).

Figure 3.2 represents a model that shows the link between pre-venture experience, key events, experiential processing, learning, affective outcomes and decision-making. The entrepreneur and the venture emerge as a function of ongoing experience, with the venture creating the entrepreneur as the entrepreneur creates the venture. According to Morris *et al.* (2011:17) the entrepreneur comes to the venture with cumulative stock of life experiences. As the venture unfolds, it produces any number of salient events and event streams. These can vary in terms of volume (number), velocity (rate at which they are processed) and volatility (degree or intensity). These events are subject to experiential processing, resulting in affective reactions and social learning, both of which influence the decision-making behaviours of the entrepreneur. Affective outcomes and ongoing behaviours, in turn, impact the development of the entrepreneur and the kind of venture that emerges.

Fig. 3.2: Conceptual model of entrepreneurial experiencing



Source: Morris *et al.* (2011:18)

In Figure 3.2 the solid arrows between the emergence of the entrepreneur and the emergence of the venture demonstrate the connection between the two. Emergence does not follow the preceding circles but is continuous and ongoing, happening in tandem with the circles (variables). Solid lines show direct relationships and dotted lines show the feedback loop (Morris *et al.* 2011:20).

It is important to note that knowledge and experiences can only be characterised as metacognitive in cases where the individual has an awareness of how that knowledge or experience relates to formulating a strategy to process the task at hand. The extent to which the entrepreneur will draw upon these metacognitive

resources (metacognitive knowledge and experience) is a function of metacognitive awareness. The more metacognitively aware, the more the entrepreneur will work to consciously control their cognitions to employ mechanisms such as analogical reasoning, think-aloud protocols and counterfactual thinking - each mechanism positioned to allow the entrepreneur to draw knowledge and experiences to the metacognitive level and apply those resources toward the formulation of a metacognitive strategy (Morris *et al.* 2011:20).

3.7.4 Metacognitive choice

Metacognitive choice is defined as the extent to which the individual engages in the active process of selecting, from multiple decision frameworks, the one that best interprets, plans and implements a response for the purpose of ‘managing’ a changing environment (Haynie & Shepherd 2009:699). It is then, in the context of the individual’s goal orientation, that a specific decision framework (drawn from the available set of alternatives) is selected and used by the individual to plan and implement goals to ‘manage’ a changing environment. Items used in operationalising this dimension include: considering all the options when solving a problem; seeking an easier way to do things after the completion of a task; considering all the options after solving a problem; re-evaluating assumptions when confused; and asking if one has learned as much as one could have when finished with the task (Urban 2012:21). Metacognitive knowledge and experience develop over time and regulate the use of heuristics in making choices (Melot 1998:75; Flavell 1976:231). Metacognitive knowledge and experience serve to inform strategies to ‘think about thinking,’ such as specific types of reasoning, memory retrieval processes, or accessing of specific schema or heuristics.

3.7.4.1 *Metacognitive choice and entrepreneurship*

The dimension of metacognitive choice has also been operationalised as metacognitive strategy (Haynie *et al.* 2010:223). Metacognitive resources serve to inform the development of a metacognitive strategy, which is most simply defined as one's strategic approach to 'thinking' about the entrepreneurial task at hand in light of the entrepreneur's motivation and the perceived attributes of the environment. More specifically, metacognitive strategy refers to the framework formulated by the entrepreneur through which to evaluate multiple, alternative responses to processing the entrepreneurial task. For example, for processing a particular task the entrepreneur may typically rely upon a strategy based on a purely empirical, data-driven approach. When this entrepreneur is faced with a task in the context of a highly ambiguous situation – one where the data is unclear or unavailable – a metacognitively aware individual will draw upon metacognitive resources to formulate a metacognitive strategy positioned to generate alternatives to the original cognitive strategy (data analysis), such as the use of analogies. Metacognitive strategies define the selection of what is perceived to be the most appropriate cognitive response (based on motivation and the environment) from a set of available cognitive responses (Fiske & Taylor 1991). Therefore an individual high in metacognitive choice will be able to adapt to changing environmental conditions for long-term venture survival.

Consider an experienced entrepreneur faced with the challenge of deciding the most appropriate avenue through which to secure funding for his or her venture. The entrepreneur has knowledge of various strategies for securing such funding (angels, friends and family, venture capital, etc.), as well as past experiences funding similar ventures. The entrepreneur also has intuitions as to the most appropriate funding source given the nature of the particular venture. This knowledge is enacted through the development of a metacognitive strategy - a strategy for 'thinking about thinking' given the task at hand - focused on the most appropriate cognitive response so as to secure funding for the venture. An entrepreneur can use any particular cognitive

response depending upon the entrepreneurial context (his or her motivations and perceived external environment), and his or her stock of metacognitive resources (Haynie *et al.* 2010:223).

The conscious and controlled cognition inherent in the development of a metacognitive strategy is positively related to a desirable outcome for the task at hand. This is because the development of metacognitive strategies in response to a novel, uncertain, and/or dynamic entrepreneurial task, by definition, represents controlled (rather than heuristic-based) processing, allowing for the evaluation of multiple, competing alternative responses to the task. Employing a metacognitive strategy is likely to help an individual to avoid using the wrong strategy to address a problem given their motivations and the perceived external environment (Staw & Boettger 1990; Staw, Sandelands & Dutton 1981).

3.7.5 Monitoring

Monitoring refers to one's online awareness of comprehension and task performance. The ability to engage in periodic self-testing while learning is a good example. Research indicates that monitoring ability develops slowly and is quite poor in children and even adults (Glenberg *et al.* 1987:119; Pressley & Ghatala 1990:19). However, several recent studies have found a link between metacognitive knowledge and monitoring accuracy. For example, Schraw (1994:143) found that adults' ability to estimate how well they would understand a passage prior to reading was related to monitoring accuracy on a post-reading comprehension test (Slife & Weaver 1992:1). Studies also suggest that monitoring ability improves with training and practice. For example, Delclos and Harrington (1991:35) examined fifth- and sixth-graders' ability to solve computer problems after assignment to one of three conditions. The first group received specific problem-solving training, the second received problem-solving plus self-monitoring training, while the third received no training. The monitored problem-solving group solved more of the difficult problems than either of the remaining groups and took less time to do so. The group receiving problem-

solving and monitoring training also solved complex problems faster than the control group.

The monitoring of a wide variety of cognitive enterprises occurs through the actions of and interactions among four classes of phenomena: (a) metacognitive knowledge, (b) metacognitive experiences, (c) goals (or tasks) and (d) actions (or strategies). The implementation of the selected decision framework will lead to action that provides feedback to further adapt cognitions (Flavell 1987:25). Monitoring is operationalised as seeking and using feedback to re-evaluate goal orientation, metacognitive knowledge, metacognitive experience and metacognitive choice for the purposes of 'managing' a changing environment. Monitoring refers to one's online awareness of comprehension and task performance. Specific items for this dimension include: periodically reviewing to help understand important relationships; stopping and going back over information that is not clear; being aware of what strategies are used when engaged in a given task; analysing the usefulness of a given strategy while engaged in a given tasks; pausing regularly to check comprehension of the problem or situation at hand; questioning how well one is doing while performing a novel task; and stopping and re-reading when getting confused (Urban 2012:21).

3.7.5.1 Monitoring and entrepreneurship

Metacognitive monitoring represents the process of seeking and using feedback to re-evaluate and adapt motives, metacognitive resources and the formulation of metacognitive strategies appropriate for 'managing' a changing environment. Flavell (1987:23) noted that 'while a cognitive strategy is simply one to get the individual to some cognitive goal or sub goal ... the purpose [of a metacognitive strategy] is no longer to reach the goal, but rather to feel confident that the goal has been accomplished'. Monitoring of an entrepreneur's own cognitions can occur both during attention to a particular entrepreneurial task and also in response to some outcome that results from the decision-making process.

Metacognitive monitoring allows the entrepreneur to reflect on how, why and when to use certain strategies (as opposed to others), given a changing environment and his or her own motivations. For example, one aspect of metacognitive monitoring is recognition of task demands, such as the complexity of a perceived business opportunity. A serial entrepreneur with considerable expertise at identifying and evaluating business opportunities might quickly peruse possible ideas and return to certain ones for in-depth study and analysis, instead of evaluating each idea carefully the first time. After glancing over different ideas, the entrepreneur might notice that one idea for a new business relates to a business idea that he or she had already successfully implemented. This may result in the entrepreneur changing the specific evaluation strategy and delving into the specifics of this idea more carefully, because the entrepreneur is already familiar with the material (monitoring) (Haynie *et al.* 2010:223).

Monitoring serves to inform how an entrepreneur perceives the interaction between his or her environment and motivations both across and within cognitive endeavours. Depending on the cognitive outcome, the performance monitoring mechanism will cue the entrepreneur to re-assess their metacognitive knowledge and/or metacognitive experience. Depending on the relation of current performance and an entrepreneur's motives, the performance monitoring mechanism will cue the entrepreneur to re-evaluate their motivation (Locke *et al.* 1984:241; Nelson 1996:106). It is expected that the information provided through monitoring serves to adapt and define subsequent metacognition and lead to subsequent adaptation congruent with a changing entrepreneurial environment and motivation.

3.8 A COMBINED CONCEPTUAL MODEL OF THE COGNITIVE ADAPTABILITY OF AN ENTREPRENEUR

From the discussion above, several conclusions can be made. Melot (1998) indicates that individuals who are metacognitive in the way that they approach a task or a situation are more likely to recognise the fact that there are multiple decision frameworks available to formulate a response; to engage in the conscious process of

considering multiple alternatives; and to be sensitised and receptive to feedback from the environment, and to incorporate that feedback into subsequent decision frameworks (Schraw & Dennison 1994).

Thus, a metacognitively aware entrepreneur will recognise a fact, and engage in the process of identifying alternative strategies that maximise the likelihood of achieving their goal in this case, identifying the most appropriate strategy (Haynie & Shepherd 2009).

Established entrepreneurs should be metacognitively aware, i.e. they should have an aggregate of all five dimensions of cognitive adaptability. The five dimensions are goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

3.9 CONCLUSION

The five dimensions operationalised in this chapter form the basis of existing theoretical and empirical research. The five dimensions of metacognition may also be viewed as a set of interrelated processes that together describe metacognitive functioning and offer insights into personality traits and behaviours (Haynie *et al.* 2010). Indeed all five dimensions represent the causal chain of the entrepreneurial mindset, and are representative of an iterative process. By relying on such a process-orientated approach to personality traits, a metacognitive study situated in the entrepreneurial context is likely to have greater explanatory power - and practical importance - than a study developed in contexts where adaptability is less central, and the task involves less uncertainty and novelty (Earley & Ang 2003; Kirzner 1979; Rozin 1976).

To measure cognitive adaptability in the field of entrepreneurship, Haynie and Shepherd (2009:695) developed an instrument based on previous research. Some studies have adapted this instrument to the different contexts. Garcia *et al.* (2014:318) found three factors. Their results show the tri-dimensionality of cognitive

adaptability as opposed to the five dimensions proposed by Haynie and Shepherd (2009:695), and the resulting instrument has been shown to have good psychometric properties, as seen in its factor structure and its validity. This instrument opens new opportunities for assessing cognitive adaptability in different entrepreneurial contexts and could help to improve the competencies needed for successful enterprising. Since the factor structure proposed by Haynie and Shepherd could not be confirmed, more studies are needed in this respect and in different contexts so as to allow the structure of cognitive adaptability to be validated, improved or modified (Garcia *et al.* 2014:318).

CHAPTER FOUR: DIAGRAMMATIC SYNOPSIS: THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY

INTRODUCTION

OPENNESS TO EXPERIENCE AND FIVE DIMENSIONS OF COGNITIVE ADAPTABILITY

CONSCIENTIOUSNESS AND THE FIVE DIMENSIONS OF COGNITIVE ADAPTABILITY

EXTRAVERSION AND THE FIVE DIMENSIONS OF COGNITIVE ADAPTABILITY

AGREEABLENESS AND THE FIVE DIMENSIONS OF COGNITIVE ADAPTABILITY

NEUROTICISM AND THE FIVE DIMENSIONS OF COGNITIVE ADAPTABILITY

A CONCEPTUAL MODEL OF PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY

CONCLUSION

4.1 INTRODUCTION

Relationships between personality traits and entrepreneurial behaviour are frequently addressed in entrepreneurship theorizing and research.

(Rauch & Frese 2007a:353)

The results of the literature review found in Chapters 2 and 3 have provided insights into the importance of personality traits and cognitive adaptability in an entrepreneurial environment. Individuals who have high levels of the personality traits of extraversion, conscientiousness, openness to experience and agreeableness, and low levels of neuroticism are more likely to have successful businesses. Although metacognitive awareness has been defined as the aggregate of the five dimensions of cognitive adaptability, this study has focused on the individual dimensions of cognitive adaptability, to establish their applicability in an entrepreneurial environment. Each dimension has been found to be related to success and survival in an entrepreneurial environment.

The closer the match between entrepreneurs' personal characteristics and the requirements of being an entrepreneur (e.g. creating new companies by transforming discoveries into marketable items), the more successful they will be (Markman & Baron 2003:281). The higher entrepreneurs rate on a number of distinct individual-difference dimensions (e.g. self-efficacy, ability to recognise opportunities, personal perseverance, human and social capital, superior social skills), the closer is the person-entrepreneurship fit and, consequently, the greater the likelihood or magnitude of their success. Person-organisation fit research suggests that the closer the match between individuals' attitudes, values, knowledge, skills, abilities, and personality, the better their job satisfaction and performance (Markman & Baron 2003:281). This framework offers potentially valuable new avenues for assisting entrepreneurs in their efforts to exploit opportunities through the founding of new ventures because the dimensions of individual differences we identify are readily open to modification (e.g. through appropriate, short-term training).

The entrepreneur is the central actor in the creation of a new venture. Although economic circumstances, social networks, and even the assistance of public agencies can all play an important role in the emergence of new business ventures, it is ultimately the entrepreneur who identifies and shapes a business opportunity, and who must sustain the motivation to persist until the job is done (Shaver & Scott 1991:23).

The chapter begins with the importance of established entrepreneurs. It then proceeds to discuss the relationships between each of the personality traits and the five dimensions of cognitive adaptability. It concludes with a proposed conceptual model of personality traits and cognitive adaptability of established entrepreneurs.

4.2 THE RELATIONSHIP BETWEEN PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY

A deep-rooted scepticism prevails in the entrepreneurship literature about the presence and the strength of the relationship between personality traits and entrepreneurial behaviour. While some narrative reviews have concluded that there is indeed a positive relationship between personality traits and both business creation and business success (Chell, Haworth & Brearley 1991:12; Cooper & Gimeno-Gascon 1992:301; Rauch & Frese 2000:101), other narrative reviews have concluded that there is no such relationship (Brockhaus & Horwitz 1986:25; Gartner 1989:47; Low & MacMillan 1988:139). Recent meta-analysis studies provide evidence for the predictive validity of personality traits in entrepreneurial research (Stewart & Roth 2001; Collins *et al.* 2004:95:401; Stewart & Roth 2004b; Zhao & Seibert 2006:259) and suggest further analysis of contingencies that impact the size of the relationship.

Each of the five dimensions of personality traits and the five individual dimensions of cognitive adaptability will be discussed in this section. Each broad personality trait has several inter-correlated narrow traits or facets (Ghaemi & Sabokrouh 2015:11).

In some instances, these specific facets within each of five broad domains will be discussed to provide more evidence to support the stated hypotheses.

4.2.1 Openness to experience and the five dimensions of cognitive adaptability

The first dimension of the Big Five is openness to experience. To date, this dimension is the least understood aspect of personality in the literature on the five-factor model (Digman 1990:417). Openness to experience is defined broadly in the literature as being imaginative, creative, cultured, original, broad-minded, intelligent, and artistically sensitive (McCrae 1996:323). Unlike the other Big Five factors, openness to experience has the stigma of being the only factor in the Big Five that is often not related to work outcomes (Barrick & Mount 1991:1; LePine & Van Dyne 2001:326). In some cases, this lack of strong relationships has led some researchers to raise questions about the utility of this personality trait (Barrick, Mitchell & Stewart 2003:60). Farrington (2012a:1) found that individuals who have high levels of the personality trait openness to experience are more likely to have successful small businesses. Openness to experience is of specific importance as it demonstrates the strongest influence, and is the only trait that has a positive influence on both the financial and growth performance of the business.

4.2.1.1 Openness to experience and goal orientation

Among all the personality traits, openness to experience has been found to be consistently related to creativity (Feist 1998:290; McCrae 1987:81; Scratchley & Hakstian 2001:367; George & Zhao 2001:513). The relationship of openness to experience to creativity has been seen as a predictor and moderator. Thus, people who have a high level of openness to experience are characterised as being imaginative, artistic, cultured, curious, original, broad-minded, and intelligent (Klein & Lee 2006:43). They are also highly motivated and seek new and diverse experiences, and they engage themselves in unfamiliar situations rather than being passive (Costa & McCrae 1992a:1). Alternatively, people who have a low level of

openness to experience are found to be more conservative and are more likely to prefer familiar and conventional ideas (Costa & McCrae 1992a:1).

Learning goal orientation was found to be positively related to creativity, and avoiding goal orientation was negatively related to creativity (Borlongan 2008:34). The level of openness to experience is irrelevant if individuals have either learning or avoiding goal orientation. However, openness to experience should be considered for individuals who have a proving goal orientation. Openness to experience has been argued to positively relate to performance in training programmes because people who rate high on openness have a willingness and interest to learn new job-relevant information (Barrick & Mount 1991:1). In addition, individuals with a learning goal orientation demonstrate behaviours and hold beliefs that are consistent with those who rate high on openness to experience (Zweig & Webster 2004:1693). Using the same logic, it is expected that people who rate high on openness to experience would be more willing to learn task-related information, and therefore be more likely to have a strong learning goal orientation at work (Wang & Erdheim 2007:1496). Based on the above literature, it is proposed that:

H1: Openness to experience is POSITIVELY related to goal orientation.

4.2.1.2 Openness to experience and metacognitive knowledge

Lofti *et al.* (2016:241) conducted a study to examine the influence of the Big Five personality dimensions on an individual's knowledge sharing behaviour. Openness to experience appeared to be the most significant factor influencing knowledge sharing. Openness to experience was the strongest predictor of knowledge sharing (Cabrera, Collins & Salgado 2006:245; Matzler & Müller 2011:317; Matzler *et al.* 2011:296; Wang & Yang 2007:1427). Knowledge sharing could be described as the major process of knowledge management which encompasses the process of identifying the outflow and inflow of knowledge in activities that involve the transfer or dissemination of knowledge resources from one person to another or from one group to another within the organisation (Gupta & Govindarajan 2000:473). Based on this

review, we posit that openness to experience is positively related to cognitive adaptability dimensions. In sum, it is proposed that:

H2: Openness to experience is POSITIVELY related to metacognitive knowledge.

4.2.1.3 Openness to experience and metacognitive experience

Metacognitive experiences are those that are affective, based on cognitive activity, and serve as a conduit through which previous experiences, memories, intuitions, and emotions may be employed as resources given the process of making sense of a given decision context (Flavell 1987). Of the traits featured by the five-factor model of personality, openness to experience is the one that is most associated with having a rich inner mental life. Basically, openness describes a tendency to being open to explore one's fantasies, ideas and feelings. People who are rated high on openness may therefore subjectively experience their memories with a stronger sense of sensory reliving, vividness and emotion (Rasmussen & Berntsen 2010:775). Rubin and Siegler (2004:913) examined the relationship between the five-factor model of personality and basic properties related to the subjective experience of autobiographical memories and found support for the special role of openness.

Openness may be especially associated with the directive function of autobiographical memories, since this trait has been linked to both academic achievement (e.g. Harms, Roberts & Winter 2006:851; Poropat 2009:322) and creativity (e.g. King *et al.* 1996:189; McCrae 1987:1258; Silvia 2007:247; Silvia *et al.* 2008:1012). People with higher ratings on openness not only reflect more on their inner experiences, but are also more inclined to act on them and to use them for problem solving. In addition, McAdams *et al.* (2004:761) found that openness was strongly related to the structural complexity of self-defining memories. This may suggest that people who score high on openness reflect more on their memories for self-defining purposes. Consistent with these ideas, Webster (1993:256) found that a combined factor addressing the directive (i.e. problem solving) and self-functions of

overall autobiographical memory usage correlated positively with openness, whereas Cappeliez and O'Rourke (2002:116) found a positive relationship between openness and the self-function.

The relationship between openness and the overall usage of autobiographical memory is partly consistent with findings regarding the relationship between openness and the basic properties of autobiographical memories: openness has been found to correlate with one or more of three assumed memory functions (i.e. the directive and self-functions). This agrees with studies revealing an association between openness and increased sensory imagery and rehearsal of autobiographical memories (Rasmussen & Berntsen 2010:776). Dispositional personality traits and the experience and usage of autobiographical memory are linked to each other through the life story. People who score high on openness tend to use their memories more for problem-solving and behaviour guidance as well as for self- and identity-defining purposes, consistent with their enhanced intellectual, creative, and narrative abilities. They also experience their memories with a stronger sense of life story relevance. This may be because the ability to remember past events as well as the related ability of imagining possible future scenarios in a broader sense concerns the ability and propensity to acknowledge realities that present alternatives to our immediately present lives (Rasmussen & Berntsen 2010:774). In sum, it is hypothesised that:

H3: Openness to experience is POSITIVELY related to metacognitive experience.

4.2.1.4 *Openness to experience and metacognitive choice*

Within the context of entrepreneurship, metacognitive strategy can be described as the framework formulated by an entrepreneur through evaluating alternative responses to the entrepreneurial task process (Haynie *et al.* 2010:217). "Metacognitive strategy" can be defined as the selection of the most suitable cognitive response from a set of available cognitive responses (Fiske & Taylor 1991). The openness domain stands for a willingness to experience inner and outer worlds

(Costa & McCrae 1992a). It consists of six facets: fantasy, aesthetics, feelings, actions, ideas, and values. Ghaemi and Sabokrouh (2015:11) conducted a study on the personality traits and metacognitive listening strategies among Iranian students. Openness was found to be positively correlated to metacognitive strategies. This result implies that students who were curious about their own worlds and welcoming of unconventional values and novel ideas showed more frequent use of these strategies than the students who were more conventional and conservative in behaviour, and who maintained a narrow outlook and scope of interests. Thus, the students who rated high on openness utilised strategic approaches in storing and retrieving information on filling the knowledge gap; controlling their own cognition; regulating their emotions, motivations, and attitudes; and interacting with others (Ghaemi & Sabokrouh 2015:11).

In a study amongst students by Ayhan and Turkyilmaz (2015:56), the openness domain was found to be in a positively significant relationship with metacognitive strategy type. This result showed that Bosnian students who are open to novel ideas and unconventional values and are curious about their inner worlds, as well as inquiring to discover inner and outer worlds, showed a higher tendency to use all types of metacognitive strategies more frequently than those who scored low on the openness scale. This means that students high in openness control their own learning and coordinate this learning process by different means, such as centring, arranging, planning and evaluating; learning through interactions; knowing how to regulate their emotions, lower their anxiety and motivate themselves; making use of their mental processing of the language in different ways, such as storing and retrieving the new information, grouping and using imagery; reasoning deductively, guessing, or using synonyms (Ayhan & Turkyilmaz 2015:56). Based on the above, it is hypothesised that:

H4: Openness to experience is POSITIVELY related to metacognitive choice.

4.2.1.5 Openness to experience and monitoring

Snyder (1974:526) defines self-monitoring as the extent to which individuals monitor, adjust, and control their behaviour based on how it is perceived by others. At its core, self-monitoring relates to status-oriented impression management motives (Gangestad & Snyder 2000:547). High self-monitors are socially ambitious and have a strong desire to project positive images of themselves with the objective of impressing others. Because they attach strong psychological meaning to the image that they portray, there is an ongoing feedback process between high self-monitors and the situation. High self-monitors continually scan the social climate around them and adapt their behaviour so that it is appropriate to the situation. Consequently, high self-monitors are motivated to engage in those behaviours that will help them be accepted and/or gain status (Gangestad & Snyder 2000:547; Turnley & Bolino 2001:351).

In contrast, low self-monitors attach low psychological meaning to image enhancement in social situations. They are more interested in self-validation than in status or prestige. They emphasise being true to themselves and find it important to behave in a fashion consistent with their core values and beliefs. Because their behaviour is not influenced by how they are perceived by others (Day & Kilduff 2003:205; Gangestad & Snyder 2000:547), they are less willing to put forward false images in social situations. In fact, low self-monitors have difficulty carrying off appearances and engaging in impression management (Day *et al.* 2002:390; Gangestad & Snyder 2000:547; Turnley & Bolino 2001:351). Thus, in situations where individuals have the opportunity to engage in discretionary behaviour, low self-monitors are less likely to change their behaviour in order to impress others. Consequently, there is greater fidelity between their personality traits and the behaviours they exhibit.

Yet, although much of this research portrays high self-monitors favourably, there is evidence that they exhibit less desirable behaviours as well. For example, they engage in more impression management (Turnley & Bolino 2001:351), exhibit less

organisational commitment (Day *et al.* 2002:390), and change employers more frequently than low self-monitors (Jenkins 1993:83; Kilduff & Day 1994:1047). Employees high in openness to experience who were also low in self-monitoring achieved the highest levels of interpersonal performance. Thus, high levels of self-monitoring appear to compensate for low openness to experience (Barrick, Parks & Mount 2005:745). In sum, it is proposed that:

H5: Openness to experience is POSITIVELY related to monitoring.

4.2.2 Conscientiousness and the five dimensions of cognitive adaptability

People who score high on conscientiousness generally perform better at work than those who score low on conscientiousness (Barrick & Mount 1991:1). Conscientious individuals are dependable (responsible, careful, and reliable), efficient (planful, orderly, punctual, and disciplined), and industrious (hardworking, persistent, energetic, and achievement striving). They are predisposed to take initiative in solving problems and are methodical and thorough in their work (Gellatly 1996:474; Witt *et al.* 2002:164). According to Barrick *et al.* (1993:715), conscientious individuals perform more effectively because their organised, and purposeful approach leads them to set goals (which are often difficult). Farrington (2012a:1) found that individuals who have high levels of the personality trait of conscientiousness are more likely to have successful small businesses.

4.2.2.1 Conscientiousness and goal orientation

Conscientiousness is strongly and positively related to mastery-approach goals across all facets and is positively linked to goal-setting (Barrick *et al.* 1993:715) and self-efficacy motivation (Judge & Ilies 2002:797). Given that individuals who score high on high conscientiousness tend to set high performance goals and believe they can achieve them by exerting effort (Barrick *et al.* 1993:715), it is likely that they will also set high learning goals and strive to attain them as well. In addition, individuals who score high on conscientiousness tend to be more dutiful and hard-working

(Judge *et al.* 2002:765), and therefore may invest more effort in learning job-related skills and knowledge. Supporting this notion, Barrick and Mount (1991:1) found conscientiousness to be positively related to performance in training settings which may at least be partially mediated by the degree of learning that has occurred during the training programme (Wang & Erdheim 2007:1496).

Certain other traits under the conscientiousness dimension, such as work goal orientation and perseverance are also likely to be associated with the entrepreneurial role. For example, Markman and Baron (2003:281) suggest that perseverance is called for by entrepreneurial work, while others have emphasised the importance of motivation, persistence, and hard work (Chen *et al.* 1998:677; Baum & Locke 2004:587). Work goal orientation, hard work, and perseverance in the face of daunting obstacles to achieve one's goals are closely associated with entrepreneurship in the popular imagination (Locke 2000). All these traits can be associated with conscientiousness. Based on the proposition that individuals are attracted to roles that match their personality and interests, it is proposed that:

H6: Conscientiousness is POSITIVELY related to goal orientation.

4.2.2.2 *Conscientiousness and metacognitive knowledge*

Knowledge sharing research emphasises several areas including environmental factors such as organisational context (e.g. organisational climate, team characteristics, etc.) and individual characteristics. One of those individual characteristics is personality. Indeed, prior research has found that personality traits can be used to explain and predict attitudes and performance in organisations (e.g. Ones *et al.* 2007:995). Conscientiousness, which is known as a good predictor of work performance, was found to be related to knowledge sharing (Matzler *et al.* 2008:154; Mooradian, Renzl & Matzler 2006:523; Wang & Yang 2007:1427). It appears that conscientiousness also influences learning orientation, which in turns affects knowledge sharing (Matzler & Müller 2011:317). This suggests that learning-oriented individuals who believe they can develop abilities will be more likely to share

knowledge to achieve that objective. Based on this review, the hypothesis is stated as:

H7: Conscientiousness is POSITIVELY related to metacognitive knowledge.

4.2.2.3 *Conscientiousness and metacognitive experience*

Metacognitive experiences are those that are affective, based on cognitive activity, and serve as a conduit through which previous experiences, memories, intuitions, and emotions may be employed as resources given the process of making sense of a given decision context (Flavell 1987). Recent meta-analyses reveal that conscientiousness is inversely associated with general negative affect (Fayard *et al.* 2012), as well as with mental health problems such as anxiety and depression (Kotov *et al.* 2010) that are characterised by high levels of negative affect (Clark & Watson 1991). Conscientiousness has also been strongly linked to emotions related to attentiveness, a facet of positive affect (Watson 2000; Watson & Clark 1992:441).

The lower order structure of conscientiousness reveals five replicable facets of order, industriousness, responsibility, impulse control, and conventionality (Roberts, Walton & Bogg 2005:156), which are predominantly behavioural in their manifestations. People who are conscientious tend to organise their lives, work hard to achieve goals, meet the expectations of others, avoid giving in to temptations, and uphold norms and rules of life more than others. Conversely, people low in conscientiousness lead more spontaneous, disorganised lives in which they will more often fail to meet interpersonal responsibilities and control temptations (Roberts *et al.* 2009:369). The types of behaviours contained in each of these facets of conscientiousness clearly hold important affective consequences. For example, people low in responsibility, industriousness, and impulse control will engage in behaviours that may hurt others (e.g. cheating on a partner) or undermine their success (e.g. failing to study for an important exam). The unpleasant situations that follow from not being conscientious, such as damaged interpersonal relationships and failure to achieve goals, should cause individuals to experience more negative

affect. Alternatively, individuals who are responsible, organised, industrious, and controlled should be able to avoid these negative outcomes, and thus experience less negative affect, through upholding interpersonal responsibilities and following the rules essential for success (Noftle & Robins 2007:116). Based on this review, the hypothesis is stated as:

H8: Conscientiousness is POSITIVELY related to metacognitive experience.

4.2.2.4 *Conscientiousness and metacognitive choice*

The conscientiousness domain stands for a tendency to show self-discipline and an aim for accomplishment (Costa & McCrae 1992a). It consists of six facets: competence, order, dutifulness, achievement striving, self-discipline, and deliberation. Conscientiousness was found to be strongly correlated to metacognitive strategies (Ghaemi & Sabokrouh 2015:11). This result implies that the students who were more purposeful, strong-willed, and determined to achieve their goals more frequently used these strategies than the students who were more lackadaisical in accomplishing their goals. This finding is in accordance with the majority of previous studies that have revealed conscientiousness as the most important personality factor related to academic performance and success (Chamorro-Premuzic & Furnham 2003a; Wolfe & Johnson 1995).

The most outstanding domain of Ayhan and Turkyilmaz' (2015:40) study was undoubtedly conscientiousness, with its strict relationship to metacognitive strategy use among the Bosnian university students. The university students who were self-disciplined, well-organised in their tasks, and goal-oriented in their lives tended to use language learning strategies more than those less reliable and disorganised. In general, conscientious individuals are considered efficient time users who report time management and effort regulation (Bidjerano & Dai 2007:69); they schedule in the context of exercise adherence (Courneya & Hellsten 1998:625), set high standards for their learning (Little *et al.* 1992:501), and prefer methodic and analytic learning. According to Costa and Piedmont (2003:262), highly conscientious individuals have a

clear sense of their own goals and the ability to work toward them even under unfavourable conditions. Those low in conscientiousness see little need to exert rigorous control over their behaviour.

As with metacognition, there are clear conceptual links between a strategic approach to learning and conscientiousness. Diseth's empirical work (2003) found a strong correlation between conscientiousness and a strategic/achieving approach. There is also evidence to suggest that conscientiousness is associated with learning attainment in a way that is independent of deep and surface approaches to learning. For example, by combining Biggs' approaches (1992) to learning inventory and the five-factor personality model, Chamorro-Premuzic and Furnham (2008) found a significant independent effect of conscientiousness on attainment, which was stronger than the effect of a deep approach to learning. Thus, conscientiousness was found to perform the function expected of a strategic approach to learning. A meta-analysis of studies of the relationship between attainment and the five-factor personality model identified that, of "the Big Five factors, conscientiousness has been the most consistently linked to post-secondary academic success" (O'Connor & Paunonen 2007:974). In the context of entrepreneurship, metacognitive choice is conceptualised as the extent to which the individual engages in the active process of selecting from multiple decision frameworks, the one that best interprets, plans and implements a response for the purpose of 'managing' a changing environment (Haynie & Shepherd 2009:700). In sum, it is proposed that:

H9: Conscientiousness is POSITIVELY related to metacognitive choice.

4.2.2.5 *Conscientiousness and monitoring*

The fundamental motive that underlies high self-monitors' behaviour across situations is the desire to enhance their status and maximise their self-interests (Gangestad & Snyder 2000:530). They are described as chameleons because they monitor the environment in order to adapt their behaviour to be the person the situation wants them to be (Snyder 1979). They are highly motivated to adapt their

behaviour to meet those expectations. Relevant to this study, high self-monitors are also social pragmatists and are clearly aware that engaging in negative interpersonal behaviour could hinder their chances of achieving their personal goals (e.g. high status, maximum self-interests). However, in non-interpersonal situations, high self-monitors adapt their behaviour differently in order to maximise their self-interest. When the interactions are mostly with tasks, rather than other people, there is no instrumental value for high self-monitors to engage in impression management tactics, as no one will likely see their behaviour, good or bad, but themselves.

As pointed out by Day and Schleicher (2006:685) as well as Brown and Treviño (2006:954), high self-monitors are ethically pragmatic as well as socially pragmatic. Thus, the opportunistic tendencies (i.e. win-at-all-costs) of self-monitoring are activated in non-interpersonal and task-based situations, amplifying the natural/trait-relevant expression of low conscientiousness (e.g. lack of discipline, disregard for rules, lack of integrity). That is, in private settings, high self-monitors low in conscientiousness are more likely to prefer expediency to principle and do whatever it takes to get what they want (e.g. more money, more break time). Entrepreneurs are expected to score high in conscientiousness and high in monitoring. In sum, it is proposed that:

H10: Conscientiousness is POSITIVELY related to monitoring.

4.2.3 Extraversion and the five dimensions of cognitive adaptability

People who score high in extraversion are generally sociable, assertive, active, bold, energetic, adventuresome, and expressive (Barrick, Stewart & Piotrowski 2002:43; Costa & McCrae 1992b; Goldberg 1992:26). They are self-confident, talkative, gregarious, spontaneous, outgoing, warm, and friendly; they are energetic, active, assertive, and dominant in social situations; they experience more positive emotions and are optimistic; and they seek excitement and stimulation. In contrast, those who score low in extraversion (highly introverted people) are timid, submissive, unassured, silent, and inhibited. People high on extraversion are gregarious.

Assertiveness, energy, a high activity level, and optimism are traits that have been associated with people's perception of entrepreneurs (e.g. Baron 1999; Locke 2000). Given that organisations tend to value the expression of positive emotions (Shaubroek & Jones 2000:163), extraverts may be advantaged when it comes to emotional regulation. Although there is some debate about the core dimensions of extraversion (e.g. reward sensitivity, see Lucas *et al.* 2000:452; or sociability, see Ashton, Lee & Paunonen 2002:285), there is general agreement that the experience and expression of positive emotions is at the core of extraversion (Watson & Clark 1997a:767). Farrington (2012a:1) found that individuals who have high levels of the personality trait of extraversion are more likely to have successful small businesses.

4.2.3.1 Extraversion and goal orientation

When engaging in skill/knowledge acquisition tasks, individuals with a proving goal orientation have been identified as focusing on demonstrating good competency appearance (VandeWalle 1997:249), and, therefore, proving goal orientation can be construed as a motivation of impression management. This reasoning has implications for extraversion because its defining characteristics include being assertive (Barrick & Mount 1991:1) and ambitious (Hogan 1986) and having a desire to obtain rewards (Stewart 1996). Therefore, an extravert may highlight personal strengths and past accomplishments more than someone who is introverted. In support of this logic, previous research has found that extraverts are more likely to use self-promotion tactics in job-related communications to serve impression management purposes (e.g. Kristof-Brown, Barrick & Franke 2002:27). Therefore, it is conceivable that extraverts may be more likely than introverts to adopt the proving goal orientation. Furthermore, extraverts tend to be subsumed by positive emotionality (Watson & Clark 1997a:267), which should give them the confidence to move toward achieving their desirable competency appearance (Judge & Ilies 2002:797) and make them show a higher approaching tendency (Wang & Erdheim 2007:1496).

Extraversion was found to serve as a strong correlate of goal orientation, which suggests that goal orientation is, at least partially, dispositionally based (Wang & Erdheim 2007:1502). Extraversion was found to be positively related to both learning and proving goal orientation. Research has demonstrated that extraversion is significantly related to motivational concepts such as goal-setting and self-efficacy (Judge & Ilies 2002:797). Because extraverted individuals tend to set high performance goals and attain them, they are likely to set active skill/knowledge acquisition goals. In addition, Elliot and Thrash (2002) found that extraversion loaded onto a latent construct, general approach temperament, which predicted learning goal orientation. In sum, it is proposed that:

H11: Extraversion is POSITIVELY related to goal orientation.

4.2.3.2 *Extraversion and metacognitive knowledge*

Extraversion has been found to have a positive influence on knowledge sharing (De Vries, Van den Hoof & De Ridder 2006:115; Ferguson, Paulin & Bergeron 2010). A survey was used in the empirical study to explore the relationship between individuals' personality and the intention to share knowledge. The results of the statistical analysis showed that extraversion is positively related to individuals' intention to share knowledge (Wang & Yang 2007:1427). With extraversion showing a positive influence on knowledge sharing attitude and behaviour, this reveals that teachers are influenced by extraversion traits to share knowledge. These results also corroborate Gupta's (2008) assertion that the extraverts' social skills and the wish to work with others implies that they could be more involved in knowledge sharing, as there was a significant positive influence on knowledge-sharing attitude and behaviour among teachers who exhibited the extraversion traits (Agyemang, Dzandu & Boateng 2016:64).

Extraverted individuals tend to share knowledge whether or not they would be held accountable and be rewarded for it (Wang & Noe 2010:115). A possible explanation for this finding may be that there is a relationship between extraversion and the need

to gain status (Barrick *et al.* 2005), which has been identified as a motivating factor for knowledge sharing (e.g. Ardichvili 2008). Based on this review, it is expected that extraversion would be positively related to metacognitive knowledge. In sum, it is proposed that:

H12: Extraversion is POSITIVELY related to metacognitive knowledge.

4.2.3.3 *Extraversion and metacognitive experience*

When extraverts are faced with emotional regulation demands that call for enthusiasm, they should be able to draw on past experiences and elicit the required positive emotion, allowing them to both experience and express genuine enthusiasm (Bono & Vey 2007:180). Individuals who score high on extraversion may have greater ability than introverts to respond to organisational demands for positive emotions by deep acting. Trait-behaviour congruence theories suggest that individuals who score high on extraversion will experience less distress when asked to express enthusiasm than would low scorers (Bono & Vey 2007:180). Extraversion is characterised by positive feelings and experiences and is therefore seen as a positive affect (Clark & Watson 1991:56). Existing research on extraversion also suggests that extraverts may be more willing and able to engage in positive emotions on demand.

In a laboratory study, Larsen and Ketelaar (1991:132) attempted to induce a positive mood. Consistent with their expectations, they found a stronger positive mood effect in extraverts than in introverts. A review by Wilson (1981:210) reports that extraverts are more open to social influences, suggesting they may also be more willing to engage in the emotions prescribed by their job roles. Furthermore, extraverts may have the ability to better regulate their emotional expressions, as they have been found to be more effective at communicating emotions (Wilson 1981:201). Studies have also found a relatively stable relationship between extraversion and the social function of autobiographical memory (e.g. McLean & Pasupathi 2006:1219; Webster 1993:256; Rasmussen & Berntsen 2010:776). Extraversion was significantly related

to positive emotions (Turban, Stevens & Lee 2009:553). Extraversion shows a relatively consistent relationship with the social functions of autobiographical memory (Rasmussen & Berntsen 2010:776).

Extraversion is linked to the tendency to experience positive emotions (Clark & Watson 2008:265; Costa & McCrae 1992a), which typically stems from experiences of reward or the promise of reward. Experiences in the work environment can subsequently change personality (Scollon & Diener 2006:1152). That is, as Scollon and Diener (2006:1152) showed, job satisfaction at one time corresponds to subsequent increases in extraversion. The mechanisms that underpin this change in extraversion have not been investigated extensively. Conceivably, if employees enjoy their role, they experience more positive emotions. These positive emotions tend to override concerns and doubts. Individuals are willing to embrace risks in social settings, manifesting as confidence and extraversion. Alternatively, if employees enjoy their role, they might flourish at the organisation. They will thus be granted more opportunities and experiences to develop their social competence, sometimes increasing extraversion (Moss 2012). Given the link between extraversion and the experience and expression of positive emotions and memory, we expect that:

H13: Extraversion is POSITIVELY related to metacognitive experience.

4.2.3.4 *Extraversion and metacognitive choice*

The extraversion domain references a tendency to prefer stimulation, company of others, and engagement with the external world (Costa & McCrae 1992a). It consists of six facets: warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions. Extraversion was found to be positively correlated to metacognitive strategies. Ghaemi and Sabokrouh (2015:11) found that students who rated high in extraversion more frequently used these strategies than the students low in extraversion. In comparison, the students who were shy, reserved, independent, and even-paced did not employ these strategies as often. This indicates that the students high in extraversion are good at lowering their anxiety

level, encouraging themselves, and taking their emotional temperature. They are willing to ask questions, cooperate with others, and empathise with others in their learning processes.

There is a positively significant relationship between metacognitive strategies and extraversion (Ayhan & Turkyman 2015:40). The results imply that extraverted learners are affectionate in the usage of metacognitive skills. Learners who are much warmer, more social, more effective in teamwork, leaders in groups, friendly, etc., are more efficient in the use of strategies than those who let the others talk or keep themselves in the background. More social learners are not just interested in receiving knowledge directly, but also in practicing it in social gatherings and developing effective usage of the target language. Additionally, students with high extraversion can manage to create social interactions for the use of the target language, coordinate their own learning and encourage themselves, overcome affective barriers to their learning, and control their emotional temperature. Furthermore, they can easily collaborate with others, empathise with them, ask questions, etc. These findings mirror Fazeli's (2012:2651) study on the relationship between the extraversion trait and use of the English language learning strategies among students. Ehrman and Oxford (1990:311) also found that introverted students were more interested in using the metacognitive strategies. Sharp (2008:17) replicated this study and found similar results. Extraversion is expected to be positively related to metacognitive choice. In sum, it is proposed that:

H14: Extraversion is POSITIVELY related to metacognitive choice.

4.2.3.5 *Extraversion and monitoring*

Self-monitoring plays an instrumental role in predicting work-related outcomes in jobs with a large interpersonal component. Employees high in extraversion who were also low in self-monitoring achieved the highest levels of interpersonal performance. These findings are noteworthy because they show that these FFM personality traits are important predictors of interpersonal performance but only for those individuals

who are low self-monitors. However, the results also show that individuals who scored high on self-monitoring had relatively strong interpersonal performance when the person had relatively low levels of, for example, extraversion. It should also be noted, of course, that the reverse would also be true, i.e. that extraversion would moderate the relationship between self-monitoring and performance (Barrick *et al.* 2005:745).

The results showed that the largest interaction effect was with self-monitoring and extraversion. This makes sense given that both extraversion and self-monitoring are related to a desire to attain status, and to status-seeking behaviour (Barrick *et al.* 2005:745). For example, the meta-analysis by Judge *et al.* (2002:765) showed that extraversion was the strongest Big Five correlate of leadership and leadership emergence. As a key disposition underlying social behaviour, extraversion is the primary personality trait influencing an individual's attempts to obtain power and dominance within a status hierarchy (Barrick, Stewart & Piotrowski 2002:43). Similarly, individuals who score high on self-monitoring see social situations as a way to make a favourable impression on others and to gain status in groups (Gangestad & Snyder 2000:530). The significant interaction reported in this study illustrates that the nature of the relationship between these two attributes is a multiplicative interaction, such that one must have either high scores on self-monitoring *or* extraversion to be successful in settings where status is important. Based on this, we expect that the interaction between extraversion and self-monitoring will be critical in social situations that reward status-seeking behaviour or require negotiation and leadership, such as sales, management, or executive positions (Barrick & Mount 1991:1; Judge *et al.* 2002:765). In sum, it is proposed that:

H15: Extraversion is POSITIVELY related to monitoring.

4.2.4 Agreeableness and the five dimensions of cognitive adaptability

People who score high on agreeableness are generally friendly, good-natured, cooperative, soft-hearted, non-hostile, helpful, courteous, and flexible (Barrick &

Mount 1991; Hogan 1986; McCrae & Costa 1985; Witt *et al.* 2002). Agreeable individuals are warm, likable, emotionally supportive, and nurturing. In work contexts, agreeable employees show higher levels of interpersonal competence (Witt *et al.* 2002) and collaborate effectively when joint action is needed (Mount, Barrick & Stewart 1998). In contrast, those who score low in agreeableness (disagreeable) are generally cold, oppositional, hostile, and/or antagonistic in their behaviours toward others (Carver & Sheier 2000; Digman 1990). When people score low in agreeableness, they often use power as a way of resolving social conflict more than those who score higher in agreeableness (Graziano, Jensen-Campbell & Hair 1996). They also experience more conflict (Asendorpf & Wilpers 1998). Agreeableness is a dimension that assesses one's attitude and behaviour toward other people. People who score high on agreeableness are characterised as trusting, altruistic, cooperative, and modest. They show sympathy and concern for the needs of others and tend to defer to others in the face of conflict. Someone who scored low on agreeableness can be characterised as manipulative, self-centred, suspicious, and ruthless. Farrington (2012a:1) found that individuals who have high levels of the personality trait of agreeableness are more likely to be satisfied with, and committed to small-business ownership.

4.2.4.1 Agreeableness and goal orientation

Agreeableness is positively related to mastery-approach goals and negatively related to performance-approach goals (McCabe *et al.* 2013:698). Mastery-approach goals emphasise self-improvement in competence, and they are associated with positive constructs, including intrinsic motivation and task interest (Harackiewicz *et al.* 2008; Van Yperen 2006), cooperative behaviour while working with others (Janssen & Van Yperen 2004; Poortvliet *et al.* 2009), and less cheating behaviour (Van Yperen, Hamstra & Van der Klauw 2011).

Barrick *et al.* (2003) reported that people who score high on agreeableness are most likely to have career interests in social occupations such as social work and teaching, rather than business, because those occupations provide frequent interpersonal

interactions where they can work for the benefit of others. Entrepreneurship involves withdrawing from or eschewing traditional employment settings where trusting and helping relationships may be formed. Entrepreneurship involves establishing a for-profit enterprise that is built around the entrepreneur's own needs and interests (Singh & DeNoble 2003). The entrepreneur must fight hard for the survival of the new business, sometimes to the detriment of previous employers, partners, suppliers, and even one's own employees. Given the limited leeway for altruistic behaviour and the high likelihood of guarded and even conflictual interpersonal relationships associated with entrepreneurship, highly agreeable people tend to be imaginative, broad-minded and curious in dealing with stakeholders. Based on the above discussion, it is proposed that:

H16: Agreeableness is POSITIVELY related to goal orientation.

4.2.4.2 *Agreeableness and metacognitive knowledge*

People who score high on the agreeableness scale are friendly, generous, and willing to help (Matzler *et al.* 2008:296). According to De Vries *et al.* (2006:115), teams with members who scored high on the agreeableness scale were more likely to share knowledge than those whose members had lower scores. Similarly, Matzler *et al.* (2008:301) found that agreeableness was positively related to knowledge sharing. On the other hand, Wang *et al.* (2011) found that agreeableness had no influence on the relationship between knowledge sharing and accountability supported by management practices (i.e. situations where employees are held accountable for knowledge sharing and rewarded for it). Overall, several studies show that agreeableness is likely to positively influence knowledge sharing (e.g. Ferguson *et al.* 2010). People who score high on agreeableness are characterised as trusting, altruistic, cooperative, and modest. They show sympathy and concern for the needs of others and tend to defer to others in the face of conflict.

Researchers have also examined the link between personality trait and trust. Trust plays a key role in one's attitude toward knowledge sharing. According to Ardichvili

(2008), within the community of practice context, trust is a prerequisite for the successful sharing of knowledge. Communities of practice are groups of people 'who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis' (Wenger, McDermott & Snyder 2002:4). Participants will be more inclined to use the knowledge made available through the community of practice if they trust it to be a reliable and objective source of information. Research has shown that extraversion, openness to experience, propensity to trust, agreeableness, neuroticism and conscientiousness are antecedents to trust (Usono, Majewski & Kuofie 2009). Based on this review, we posit that agreeableness will be positively related to cognitive adaptability dimensions. In summary, it is proposed that:

H17: Agreeableness is POSITIVELY related to metacognitive knowledge.

4.2.4.3 *Agreeableness and metacognitive experience*

Metacognitive experiences are those that are affective, based on cognitive activity, and serve as a conduit through which previous experiences, memories, intuitions, and emotions may be employed as resources given the process of making sense of a given decision context (Flavell 1987). Agreeableness appears to identify the collection of traits related to altruism: one's concern for the needs, desires, and rights of others (as opposed to one's enjoyment of others, which appears to be related primarily to extraversion). The positive pole of agreeableness describes prosocial traits, such as cooperation, compassion, and politeness, whereas its negative pole describes antisocial traits such as callousness and aggression. Agreeableness has been linked to psychological mechanisms that allow the understanding of others' emotions, intentions, and mental states, including empathy, theory of mind, and other forms of social information processing (e.g. Graziano *et al.* 2007:583; Nettle & Liddle 2008:323) (DeYoung *et al.* 2010:820).

Agreeableness contrasts a pro-social and communal orientation towards others and is associated with being unselfish, compliant, trusting, modest, and helpful (Tobin *et*

al. 2000). Previous studies have observed a robust inverse relationship between self-reports of agreeableness and self-reports of anger and aggression (Watson 2000). That is, individuals reporting higher levels of agreeableness generally report lower levels of anger and aggression and vice versa. This has been attributed to impression management concerns. Meier and Robinson (2004:856) found that accessible hostile thoughts predicted anger and aggression only at low levels of agreeableness. Conversely, at high levels of agreeableness, accessible hostile thoughts did not predict anger or aggression. Additionally, Meier, Robinson and Wilkowski (2006:136) found that individuals high in agreeableness were able to mitigate the primed influence of hostile thoughts in an implicit cognitive paradigm and in regards to a behavioural measure of laboratory aggression.

Researchers have identified a term called effortful control that appears to be substantial in moderating the negative emotions. That is, the ability of individuals high in agreeableness to regulate negative emotions has been significantly associated with increased effort (Tobin *et al.* 2000:656). An emotion has been described as a complex psychological state that involves three distinct components: a subjective experience, a psychological response, and a behavioural or expressive response (Hockenbury & Hockenbury 2007). Meier *et al.* (2006:136) propose that the ability of highly agreeable individuals to regulate negative affect does not have to be effortful, but instead can be automatic in implicit task paradigms. That is, it is suggested that when individuals high in agreeableness are exposed to negative stimuli they automatically engage emotion regulation. Higher levels of agreeableness have been linked to lower levels of anger and aggression. This has in part been attributed to the ability of individuals with higher levels of agreeableness to self-regulate unwanted hostile thoughts and feelings (Meier & Robinson 2004:856). Furthermore, previous research has suggested that agreeableness may be a contributing factor in regulating negative emotions (Ode & Robinson 2009:436). Consistent with this logic, it is proposed that:

H18: Agreeableness is POSITIVELY related to metacognitive experience.

4.2.4.4 Agreeableness and metacognitive choice

The agreeableness domain stands for a tendency to build harmony in social situations (Costa & McCrae 1992a). It consists of six facets: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. The agreeableness domain has a relationship with the use of metacognitive strategies. Usually, cooperation with others and making use of social contexts seem like activators of target language use and, therefore, agreeableness might be a prerequisite through other requirements. Accordingly, more agreeable Bosnian learners seem to employ more metacognitive strategies. However, the influence of this trait seems less effective than the other three traits. Therefore, together with other factors, it might play a role in the learning process. Komarraju *et al.* (2011:472) reported a significantly positive relationship between agreeableness and academic achievement and learning styles in their study, which was conducted among European American, African American, Latin American, Asian American, and Native American undergraduate students. This is in accordance with previous findings of a study by Ayhan and Turkylmaz (2015:40). A couple of previous studies have also found a positive relationship between agreeableness and self-reported academic performance (Heaven *et al.* 2002) and in-class performance and overall Grade Point Average (GPA) (Rothstein *et al.* 1994; Ghaemi & Sabokrouh 2015:11). Based on the above, it is hypothesised that agreeableness will be positively related to metacognitive choice. Therefore, it is hypothesised that:

H19: Agreeableness is POSITIVELY related to metacognitive choice.

4.4.4.5 Agreeableness and monitoring

Low self-monitors tend to be more reliable and consistent and less manipulative than high self-monitors, who tailor their behaviour to fit a given situation. In addition, high self-monitors generally seek different friends for different settings and tend to change their behaviour across situations. Low self-monitors could be less sensitive and less concerned with their impact on others, since they are guided more by other internal

feelings around attitude than by situational cues. They hardly pay attention to verbal and non-verbal cues, which makes them form more stable and less shallow relationships with others than high self-monitors (D'Souza & Tanchaisak 2007:47).

Barrick *et al.* (2005:745) found that self-monitoring moderated the relationships between several relevant interpersonal personality traits (e.g. low agreeableness) and performance in interpersonal settings, in that relevant personality traits had stronger correlations with interpersonal performance among low self-monitors than among high self-monitors. Accordingly, interpersonal situations activate the impression management (interpersonal potency) aspect of high self-monitors so that they can actively engage in behaviours that make them look good to others, thereby suppressing the natural/trait-relevant expression of low agreeableness (i.e. avoiding behaving badly to others, see Barrick *et al.* 2005:745 as well as Turnley & Bolino 2001:351). Thus, in interpersonal situations where behaviours are highly observable (and displays of negative behaviours hinder the achievement of social status), high self-monitors' desire to look good to others is strong enough to inhibit the expression of low agreeableness that would ordinarily predict counter-productive work behaviour towards employees and towards the organisation (Oh *et al.* 2014:92). In essence, people who score high on self-monitoring are expected to score low on agreeableness (disagreeable). On the contrary, people who score low on self-monitoring are expected to score high on agreeableness. Based on this aspect, it is expected that for entrepreneurs, agreeableness will be positively related to monitoring. It is thus posited that:

H20: Agreeableness is POSITIVELY related to monitoring.

4.2.5 Neuroticism and the five dimensions of cognitive adaptability

Neurotic individuals have an excitable quality to their behaviour. Neuroticism is the opposite pole of emotional stability. People who are high in emotional stability are generally calm and even-tempered in the way they cope with daily life (Barrick & Mount 1991; Eysenck & Eysenck 1985; Ones & Viswesvaran 1997). Those who are

emotionally stable usually do not express much emotion. They tend to be less anxious, depressed, angry, embarrassed, worried and insecure.

4.2.5.1 Neuroticism and goal orientation

By their nature, those high on neuroticism are anxious and tend to question their own ideas and behaviours (Digman 1990). Therefore, they are more likely to seek avoidance of failure than to directly move toward achieving a goal. Neuroticism is negatively related to goal-setting motivation, expectancy motivation, and self-efficacy motivation (Judge & Ilies 2002), and positively related to avoidance motivation (Elliot & Thrash 2002). Neuroticism was found to serve as a strong correlate of goal orientation, which suggests that goal orientation is, at least partially, dispositionally based (Wang & Erdheim 2007:1502). Neuroticism was found to be positively related to avoidance of goal orientation.

Both avoidance goals and performance goals were found to be positively related to neuroticism, which is reflected across most of its facets. The trait-goal relations indicated that mastery-approach goals are clearly positive and performance-avoidance goals are clearly negative, while both performance-approach and mastery-avoidance goals showed a hybridity of positive and negative qualities in their trait-goal relations (McCabe *et al.* 2013:698). Mastery-approach goals emphasise self-improvement in competence, and they are associated with positive constructs, including intrinsic motivation and task interest (Harackiewicz *et al.* 2008; Van Yperen 2006), cooperative behaviour while working with others (Janssen & Van Yperen 2004; Poortvliet *et al.* 2009), and less cheating behaviour (Van Yperen *et al.* 2011). In sum, it is proposed that:

H21: Neuroticism is NEGATIVELY related to goal orientation.

4.2.5.2 *Neuroticism and metacognitive knowledge*

Lofti *et al.* (2016:241) did not find a significant relationship between neuroticism and intention to share knowledge (e.g. Wang & Yang 2007; Amaya 2013). Neuroticism is the opposite of emotional stability. Neurotic individuals are depressed, anxious and unstable, so this dimension may be irrelevant to the intention of sharing knowledge (Wang & Yang 2007:1429). Neuroticism exercised a negative significant influence on knowledge sharing. Based on this review, we posit that neuroticism is negatively related to cognitive adaptability dimensions. In sum, it is proposed that:

H22: Neuroticism is NEGATIVELY related to metacognitive knowledge.

4.2.5.3 *Neuroticism and metacognitive experience*

Metacognitive experiences are those that are affective, based on cognitive activity, and serve as a conduit through which previous experiences, memories, intuitions, and emotions may be employed as resources given the process of making sense of a given decision context (Flavell 1987). Neuroticism has shown a consistent relationship with a basic memory property, namely with negative affect (e.g. Rubin, Boals & Berntsen 2008:591; Sutin 2008:1060), consistent with the idea of a special role for openness. Extraversion shows a relatively consistent relationship with social functions of autobiographical memory, whereas neuroticism shows a relatively consistent relationship with negative affect (Rasmussen & Berntsen 2010:776). Consistent with previous findings (Rubin *et al.* 2008:591), higher ratings on neuroticism were found to be related to having emotionally more negative memories. Consistent with previous work, neuroticism correlated negatively with emotional valence (Rasmussen & Berntsen 2010:780). Neuroticism is linked to the tendency to experience negative emotions (Clark & Watson 2008:265; Costa & McCrae 1992a), and includes such traits as anxiety, self-consciousness, and irritability (DeYoung *et al.* 2010:820). Neuroticism represents the primary manifestation in personality of sensitivity to threat and punishment, encompassing traits that involve negative emotion and emotional dysregulation (DeYoung *et al.* 2010:820).

Those who scored high on a measure of the personality trait of anxiety reported more negative affect than those who scored low, and at the end of the study they recalled having felt even worse than the average of their reports. Similarly, Feldman-Barrett (1997:1100) found that participants who scored high on neuroticism overestimated the average intensity of their previously recorded negative emotional states. Among clients terminating psychotherapy, people who scored high on measures of negative traits such as neuroticism tended to overestimate their pre-therapy emotional distress; those with high scores on positive traits such as ego strength tended to underestimate their pre-therapy distress (Safer & Keuler 2002:162). Thus, enduring personality traits, as well as current emotions and appraisals, are associated with bias in memory for emotions (Levine & Safer 2002:169). Based on this discussion, it is expected that neuroticism is negatively related to metacognitive experiences. In sum, it is proposed that:

H23: Neuroticism is **NEGATIVELY** related to metacognitive experience.

4.2.5.4 *Neuroticism and metacognitive choice*

The neuroticism domain stands for a tendency to experience negative emotional affects (Costa & McCrae 1992a). It consists of six facets: anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. Neuroticism was found to be significantly negatively correlated only to metacognitive strategies out of the six strategy groups. This result indicates that learners who tended to easily experience anxiety, anger, depression, frustrations, or intense reactions used the strategic approaches of coordinating the learning process less frequently than students low in neuroticism or emotionally stable. This finding is in accordance with the majority of previous studies that reported a negative influence on educational outcomes and language learning (Ackerman & Heggestad 1997; Bandura 1986; Costa & McCrae 1992a; De Barbenza & Montoya 1974; Entwistle 1988; Lathey 1991; Miculincer 1997; Nahl 2001; Schouwenburg 1995; Ghaemi & Sabokrouh 2015:11).

McCrae and Costa define the first domain of the five-factor model, neuroticism, as ‘a tendency to experience negative emotional affects’. No statistically significant relationship was found between meta-cognitive strategy use and neuroticism (Ayhan & Turkyman 2015:40). Many researchers have found a reported negative impact of neuroticism on educational outcomes and language acquisition (Bandura 1986; Costa & McCrae 1992a:1; Kang 2012:1; Nahl 2001:1). No statistically significant correlation was found between the language learning strategies and the neuroticism domain among the Bosnian university students. Even though most other studies found a negative relationship between learning outcomes and neuroticism in education, there are some other studies which could not find any significant relevance, like the present study. Dewaele (2007:169) carried out a study among Flemish high school students and found no significant relationship whatsoever between neuroticism and foreign language outcomes, performance, or grades. In another study in 2011, he found a stronger significant relationship between them among university students in the UK and Spain (Dewaele 2011:23). It is proposed that:

H24: Neuroticism is **NEGATIVELY** related to metacognitive choice.

4.2.5.5 Neuroticism and monitoring

Low self-monitors are not motivated to enhance status and self-interest. Consequently, they do not adapt or change their behaviour to match the expectations of others. Because they strive to behave in ways that are genuine and consistent with their core values and beliefs (behavioural consistency), low self-monitors behave in a trait-relevant way, which results in greater fidelity between relevant personality traits and subsequent behaviour. Supporting this sentiment, the results revealed that disagreeable individuals engage in higher levels of Counterproductive Work Behaviour – interpersonal deviance (CWB-I), and individuals with low conscientiousness engage in higher levels of Counterproductive Work Behaviour – organisational deviance (CWB-O), so long as they are low self-monitors (Oh *et al.* 2014:92). Barrick *et al.* (2005) found that self-monitoring moderated the relationships

between several relevant interpersonal personality traits (e.g. neuroticism) and performance in interpersonal settings, in that relevant personality traits had stronger correlations with interpersonal performance among high self-monitors than among low self-monitors. Based on the above, people who score high on neuroticism tend to be self-conscious and are expected to also score high on self-monitoring. In sum, it is proposed that:

H25: Neuroticism is **NEGATIVELY** related to monitoring.

4.3 A COMBINED CONCEPTUAL FRAMEWORK OF THE PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY OF ESTABLISHED ENTREPRENEURS

Based on the discussion above, this study hypothesises that there is a positive relationship between openness to experience, conscientiousness, extraversion and agreeableness and the five dimensions of cognitive adaptability in established entrepreneurs; and a negative relationship between neuroticism and the five dimensions of the cognitive adaptability of entrepreneurs. The theoretical framework of the relationship between personality traits and the cognitive adaptability of entrepreneurs is illustrated in Figure 4.1 below. It is hypothesised that:

Openness to experience is **POSITIVELY** related to the five dimensions of cognitive adaptability;

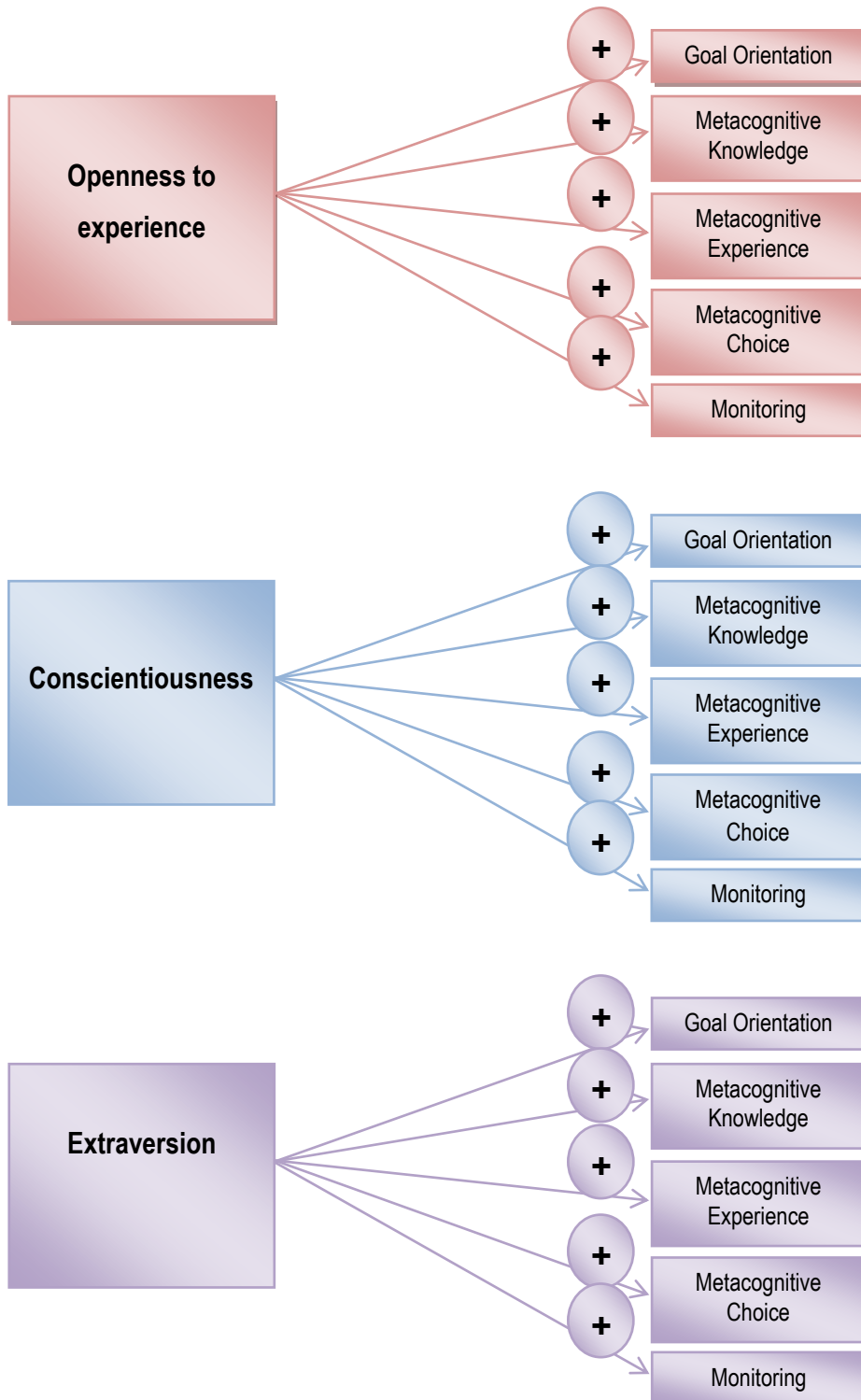
Conscientiousness is **POSITIVELY** related to the five dimensions of cognitive adaptability;

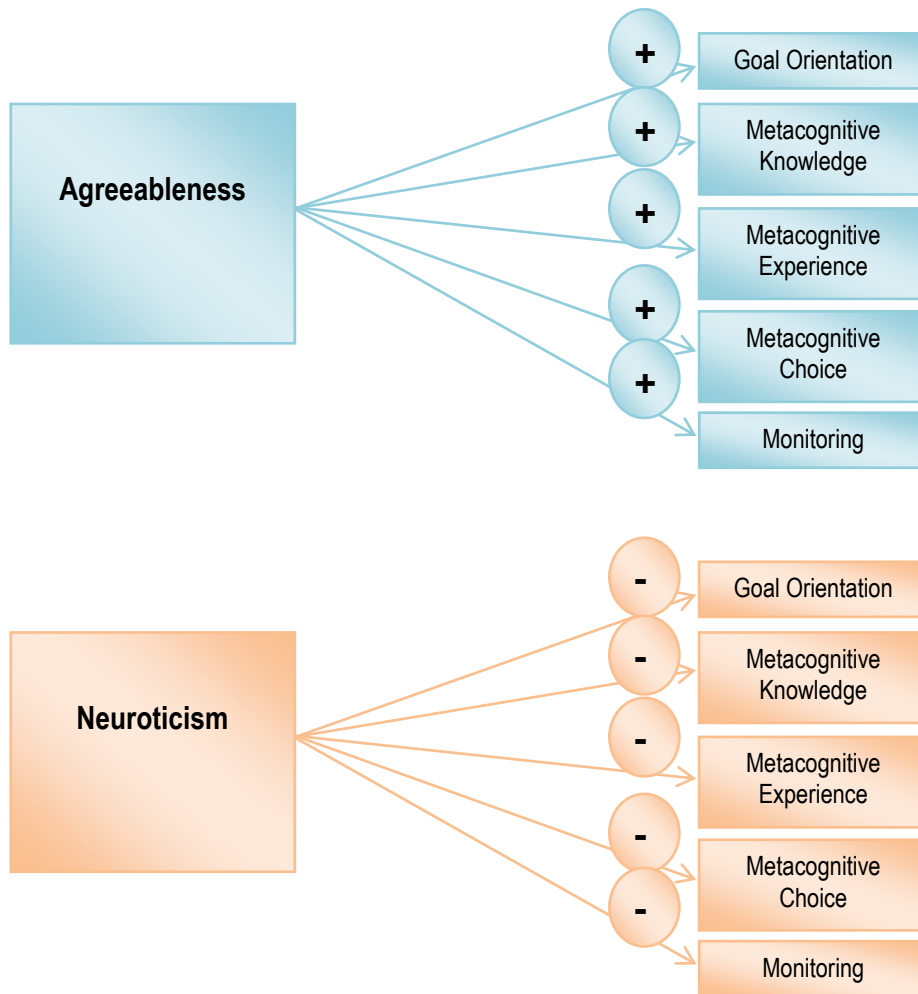
Extraversion is **POSITIVELY** related to the five dimensions of cognitive adaptability;

Agreeableness is **POSITIVELY** related to the five dimensions of cognitive adaptability; and

Neuroticism is **NEGATIVELY** related to the five dimensions of cognitive adaptability.

Fig. 4.1: Proposed hypothesised model of the personality traits and cognitive adaptability of established entrepreneurs





Source: Own compilation

Entrepreneurs who are creative, imaginative, broad-minded and curious are likely to be able to adapt to dynamic and novel entrepreneurial environments. The second cluster in the figure illustrates that conscientiousness is positively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are dependable and strive for achievement are likely to be able to adapt to dynamic and novel entrepreneurial environments. The third cluster illustrates that extraversion is positively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are sociable and assertive are likely to be able to adapt to dynamic and novel entrepreneurial environments.

The fourth cluster illustrates that agreeableness is positively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are cooperative, courteous and tolerant are likely to be able to adapt to dynamic and novel entrepreneurial environments.

The fifth and final cluster illustrates that neuroticism is negatively related to goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Entrepreneurs who are characterised by a predisposition toward negative cognitions, intrusive thoughts and emotional reactivity are not likely to be able to adapt to dynamic and novel entrepreneurial environments.

4.4 CONCLUSION

The discussion of the role and importance of established and successful entrepreneurs has shed meaningful insights. In this dynamic business world entrepreneurship has acquired special significance, as it is a key driver to economic development. The objectives of industrial development, regional growth, and employment generation depend upon entrepreneurship. Entrepreneurship and entrepreneurs have altered the pathways of economies and markets; they have developed new products and services. Furthermore, they lead to innovation and creativity, which are vital tools for economic development and prosperity. Since economists have highlighted the crucial role of entrepreneurs in economic and social growth, the entrepreneur has often been considered a mechanism for transforming and improving the economy. Insights into the role of entrepreneurs in the economy have been described by various scholars, such as the uncertainty-bearing role of the entrepreneur (Cantillon 1755), the coordination function (Say 1845:99), as well as the innovation function (Knight 1921:1; Schumpeter 1934:42; Marshall 1961; Kirzner 1981; Bosman *et al.* 2000; Sexton & Bowman 1985:129).

This chapter explored the relationships between the Big Five personality factors and the cognitive adaptability of established entrepreneurs. The conceptual relationships revealed that four of the Big Five personality traits (openness to experience, conscientiousness, extraversion and agreeableness) are positively related to the five dimensions of cognitive adaptability, whereas neuroticism was found to be negatively related to the five dimensions of cognitive adaptability.

CHAPTER FIVE: DIAGRAMMATIC SYNOPSIS: RESEARCH METHODOLOGY



5.1 INTRODUCTION

Research methodology is a systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.

(Rajasekar, Philominathan & Chinnathambi 2013:1)

This chapter introduces the research methodology followed in the study and the research methods used. A detailed review of the Big Five personality traits and cognitive adaptability dimensions was provided in Chapters 2, 3 and 4, constituting the theoretical aspect of the study. The literature review indicated the need to conduct an empirical study on the relationship between personality traits and cognitive adaptability. The purpose of the study is to determine whether there are any significant relationships between any of the five personality traits and the five dimensions of cognitive adaptability of established entrepreneurs. Conducting research in this area is likely to benefit entrepreneurs at the various stages of their entrepreneurial process, academics in entrepreneurship education, policy makers, enterprise support agencies, venture capitalists and bankers.

In this study the Independent Variable (IV) constitutes the Big Five personality traits and the Dependent Variable (DV) constitutes the cognitive adaptability dimensions. The study hypothesised about the relationships between the independent variable and the dependent variables. Personality theorists agree that an individual's personality predicts his or her behaviour (Funder 1994:125). It is for this reason that this study has identified the independent variable as the Big Five personality traits and the dependent variable as cognitive adaptability.

The present study is a formal investigation highlighting research problems and hypothesis statements. The study's problem statement, objectives of the study,



hypotheses, data collection procedures and analysis methods are explained and discussed. It also explains how the research questionnaires were designed and measured to ensure that the valid responses were obtained. Chapters 6 and 7 will cover the data analysis and interpretation of the research findings.

5.2 THE RESEARCH PROBLEM

The research problem was triggered by the 2013 GEM report. The report showed that South Africa's established business rate is 2.9% compared with a weighted average of 16% for SSA (Herrington & Kew 2013:25). Although extremely low, the trend for established business activity in South Africa is positive and has increased since 2001. Of concern, however, is that the discontinuance rate also continues to increase, which means that more businesses in South Africa are failing and closing than new businesses are starting. In an effort to understand why some of the established businesses are surviving, this study focuses on their personality traits and their behaviour in an entrepreneurial environment. Personality traits are more predictive of venture survival than industry, start-up experience, or the age and gender of the entrepreneur (Ciavarella *et al.* 2004:465).

Ciavarella *et al.* (2004:465) examined the relationship between the entrepreneur's personality and long-term venture survival. The entrepreneur's conscientiousness was found to be positively related to long-term venture survival. Contrary to expectations, a negative relationship between the entrepreneur's openness and long-term venture survival was found. Furthermore, extraversion, emotional stability, and agreeableness were found to be unrelated to long-term venture survival. Personality theorists agree that an individual's personality predicts his or her behaviour (Funder 1994:125). It follows, then, that the personality traits of entrepreneurs may have important implications for the long-term success of ventures inasmuch as the entrepreneur's behaviour is likely to influence venture success (Hunt & Adams 1998:33). Entrepreneurs with personalities that enhance their ability to perform in various situations should have a greater probability of sustaining the operations of the venture for the long term when compared with entrepreneurs with personalities

that are not suited for venture ownership (Ciavarella *et al.* 2004:465). Cognitive adaptability represents the behaviour of entrepreneurs. Moreover, this study seeks to determine the relationship between the personality traits and cognitive adaptability of established entrepreneurs.

5.3 RESEARCH OBJECTIVES

The study formulated primary and secondary objectives to guide the direction of the study.

5.3.1 Primary objectives

The primary objective of the study is to:

- Determine the relationship between the personality traits and cognitive adaptability of established entrepreneurs in South Africa.

5.3.2 Secondary objectives

The secondary objectives are to:

- Determine the relationship between openness to experience and the five dimensions of cognitive adaptability;
- Determine the relationship between conscientiousness and the five dimensions of cognitive adaptability;
- Determine the relationship between extraversion and the five dimensions of cognitive adaptability;
- Determine the relationship between agreeableness and the five dimensions of cognitive adaptability; and
- Determine the relationship between neuroticism and the five dimensions of cognitive adaptability.

5.4 HYPOTHESISED MODEL OF PERSONALITY TRAITS AND COGNITIVE ADAPTABILITY

The hypothesised model for the study, as shown in Figure 1.2 is based on the conceptual framework that incorporates the dimensions of personality traits and cognitive adaptability. The model depicts the hypothesised theoretical relationships, i.e. the basis for the hypotheses to be tested. The variables for the hypothesised model are presented in the next section.

5.5 VARIABLE MEASUREMENT

The hypothesised model for the study has 10 variables in total, comprising five independent variables and five dependent variables. The five independent variables are openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. The five dependent variables are goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring.

5.6 HYPOTHESES TESTED

Hypotheses rather than propositions are stated in this study. Propositions are statements concerned with the relationships between concepts that may be judged as true or false if it refers to observable phenomena (Cooper & Schindler 2011:62). When a proposition is formulated for empirical testing, this is called a 'hypothesis' (Blumberg, Cooper & Schindler 2005:36). A hypothesis has to be subjected to empirical scrutiny and testing (Bryman & Bell 2011:1; Zikmund *et al.* 2013:40). A research hypothesis is a consequence of a research problem and can therefore be defined as a reasonable conjecture, an educated guess (Leedy & Ormrod 2013:297). Hypotheses are more tentative in nature. They provide the researcher with a logical framework that guides the collection and analysis of data.

The study aimed at testing the following research hypotheses and their respective sub-hypotheses:

Openness to experience and the five dimensions of cognitive adaptability

- H1: Openness to experience is POSITIVELY related to goal orientation.
- H2: Openness to experience is POSITIVELY related to metacognitive experience.
- H3: Openness to experience is POSITIVELY related to metacognitive knowledge.
- H4: Openness to experience is POSITIVELY related to metacognitive choice.
- H5: Openness to experience is POSITIVELY related to monitoring.

Conscientiousness and the five dimensions of cognitive adaptability

- H6: Conscientiousness is POSITIVELY related to goal orientation.
- H7: Conscientiousness is POSITIVELY related to metacognitive knowledge.
- H8: Conscientiousness is POSITIVELY related to metacognitive experience.
- H9: Conscientiousness is POSITIVELY related to metacognitive choice.
- H10: Conscientiousness is POSITIVELY related to monitoring.

Extraversion and the five dimensions of cognitive adaptability

- H11: Extraversion is POSITIVELY related to goal orientation.
- H12: Extraversion is POSITIVELY related to metacognitive knowledge.
- H13: Extraversion is POSITIVELY related to metacognitive experience.
- H14: Extraversion is POSITIVELY related to metacognitive choice.
- H15: Extraversion is POSITIVELY related to monitoring.

Agreeableness and the five dimensions of cognitive adaptability

- H16: Agreeableness is POSITIVELY related to goal orientation.
- H17: Agreeableness is POSITIVELY related to metacognitive knowledge.
- H18: Agreeableness is POSITIVELY related to metacognitive experience.
- H19: Agreeableness is POSITIVELY related to metacognitive choice.
- H20: Agreeableness is POSITIVELY related to monitoring.

Neuroticism and the five dimensions of cognitive adaptability

H21: Neuroticism is **NEGATIVELY** related to goal orientation.

H22: Neuroticism is **NEGATIVELY** related to metacognitive knowledge.

H23: Neuroticism is **NEGATIVELY** related to metacognitive experience.

H24: Neuroticism is **NEGATIVELY** related to metacognitive choice.

H25: Neuroticism is **NEGATIVELY** related to monitoring.

5.7 RESEARCH DESIGN

A research design is the strategy for a study and a plan by which the strategy is to be carried out. It specifies the methods and procedures for the collection, measurement and analysis of data (Cooper & Schindler 2008:156). The proposed research is a scientific study grounded in the positivistic research paradigm. In positivist / scientific research, the researcher is concerned with gaining knowledge in a world which is objective using scientific methods of enquiry. Methods associated with this paradigm include experiments and surveys where quantitative data is the norm. This study uses questionnaires as survey method to collect data.

Analysis methods using statistical or mathematical procedures are used, and conclusions drawn from the research setting will be used to provide evidence to support or dispel hypotheses generated at the start of the research process; in other words by deduction rather than induction. The emphasis will be on measurement, of attitudes, behaviours and opinions through the use of questionnaires. Some major descriptors are classified in Table 5.1.

Table 5.1: Descriptors of the research design

Category	Options	This Study
The degree to which the research question has been crystallised	<ul style="list-style-type: none"> • Exploratory • Formal study 	<ul style="list-style-type: none"> • Formal study
The method of data collection	<ul style="list-style-type: none"> • Monitoring • Communication study 	<ul style="list-style-type: none"> • Communication study
The power of the researcher to produce effects in the variables under study	<ul style="list-style-type: none"> • Experimental • <i>Ex post facto</i> 	<ul style="list-style-type: none"> • <i>Ex post facto</i>
The purpose of the study	<ul style="list-style-type: none"> • Reporting • Descriptive • Causal <ul style="list-style-type: none"> ○ Explanatory ○ Predictive 	<ul style="list-style-type: none"> • Causal (predictive)
The time dimension	<ul style="list-style-type: none"> • Cross-sectional • Longitudinal 	<ul style="list-style-type: none"> • Cross-sectional
The topical scope – breadth and depth – of the study	<ul style="list-style-type: none"> • Case • Statistical study 	<ul style="list-style-type: none"> • Statistical study
The research environment	<ul style="list-style-type: none"> • Field setting • Laboratory research • Simulation 	<ul style="list-style-type: none"> • Field setting
The participants’ perception of research activity	<ul style="list-style-type: none"> • Actual routine • Modified routine 	<ul style="list-style-type: none"> • Actual routine

Source: Adapted from Cooper and Schindler (2008:282)

5.8 DEVELOPING THE OVERALL PERSONALITY AND COGNITIVE ADAPTABILITY MEASUREMENT INSTRUMENT

The measurement instrument used to diagnose the relationship between personality traits and cognitive adaptability was derived from reputable sources reporting other research, and therefore comprised of original questions. Previous research that used these respective questionnaires phrased in the same manner includes the Big Five personality traits (Costa & McCrae 1992b) and cognitive adaptability (Haynie & Shepherd 2009). In this study, latent variables are represented by multiple measures

of the same underlying construct. Nunnally and Bernstein (1994) postulated that multi-item scales enhance minimisation of random measurement error as well as maximisation of measurement reliability and validity.

5.8.1 Reliability and validity of the personality traits scale

The revised NEO Personality Inventory (NEO PI-R) developed by Costa and McCrae (1992a) was used to measure the personality of individuals, based on the five-factor model of personality (includes the dimensions of extraversion, neuroticism, agreeableness, openness to experience, and conscientiousness). The five personality dimensions are each divided into six facets. The NEO PI-R consists of 240 items (Costa & McCrae 1992a:11). The Cronbach alpha-coefficients of the personality dimensions vary from 0.86 (openness) to 0.92 (neuroticism), and those of the personality facets from 0.56 (tender-minded) to 0.81 (depression). Costa and McCrae (1992a) reported test-retest reliability coefficients (over six years) for extraversion, neuroticism and openness, varying from 0.68 to 0.83, and for agreeableness and conscientiousness (over three years) at 0.63 and 0.79 respectively. Table 5.2 shows the Cronbach alpha-coefficients of the personality trait dimensions.

Table 5.2: Cronbach alpha-coefficients for The Big Five personality traits

Dimensions	Cronbach's Alpha
Openness to experience	0.86
Conscientiousness	0.79
Extraversion	0.68
Agreeableness	0.63
Neuroticism	0.92

Costa and McCrae (1992a) demonstrated construct validity of the NEO PI-R for different gender, race and age groups (Rothman & Coetzer 2003:73).

5.8.2 Reliability and validity of the cognitive adaptability scale

Internal consistency was tested by using Cronbach alpha-coefficients for cognitive adaptability which are calculated based on the average inter-item correlations (Haynie & Shepherd 2009:695). There is no standard cut-off point for the alpha-coefficient, but the generally agreed-upon lower limit for Cronbach alpha-coefficients is 0.70 (Nunnally 1978). As stated by Straub (1989:151), “high correlations (0.80) between alternative measures or large Cronbach alpha-coefficients are usually signs that the measures are reliable. Increasing reliabilities beyond 0.80 in basic research is often wasteful of time and money.” Nunnally and Bernstein (1994:264) adopted a more lenient criterion when they stated that “in the early stages of predictive or construct validation research, time and energy can be saved using instruments that have only modest reliability, e.g. 0.70.” The Cronbach alpha-coefficient for cognitive adaptability (across all items) was 0.885, indicating a high degree of internal consistency in this measure (Haynie & Shepherd 2009:706). Table 5:3 shows the Cronbach alpha-coefficients for each of the five dimensions of cognitive adaptability.

Table 5.3: Cronbach alpha-coefficients for cognitive adaptability

Dimension	Cronbach's Alpha
Goal orientation	0.82
Metacognitive knowledge	0.72
Metacognitive experience	0.72
Metacognitive choice	0.74
Monitoring	0.76

Robust tests of validity focus on validity both within the measure (between factors) and between measures (through comparisons with other, distinct measures). Tests of validity that were performed focus on both within cognitive adaptability (between factors) and through comparison between cognitive adaptability and other measures. The ultimate solution demonstrated both within and between structural validity (Haynie & Shepherd 2009:706).

5.8.3 Operational definitions of personality trait dimensions and cognitive adaptability

The full questionnaire (Annexure A) consisted of 102 items divided into three sections. The first section contained six biographic questions which enquired after gender, age, race, and education level, age of business, industry sector and province. Section B held a 36-item five-dimensional cognitive adaptability scale adapted from Hayne and Shepherd (2009). In order to measure and evaluate abstract concepts used for the predicting model of this study, the concepts were operationalised or moved from conceptual to empirical level as shown in Table 5.4. As the concepts cannot be directly observed or measured, operationalising them helps to identify their main dimensions and to represent them with observable or measurable items (Cooper & Schindler 2008:59). Section C held a 60-item five-dimensional scale adapted from Costa and McCrae (1992b). For both sections, the response format of a 4-point Likert-type scale was used.

Table 5.4: Transitioning from the conceptual to the observational level

Theory level			Research level	
Conceptual Level	Conceptual Components	Conceptual Definitions	Operational Definitions – Appendix A (questionnaire items number)	Observational Level
Big Five personality traits	Openness to experience	A propensity to be imaginative, broad-minded and curious.	45, 50, 55, 60R, 65R, 70R, 75R, 80, 85, 90R, 95, 100	Response to questionnaire
	Conscientiousness	A propensity to be dependable and to strive for achievement.	47, 52, 57R, 62, 67, 72R, 77, 82, 87R, 92, 97R, 102	
	Extraversion	A propensity to be sociable, gregarious and assertive.	44, 49, 54R, 59, 64, 69R, 74, 79, 84R, 89, 94, 99R	

Theory level			Research level	
Conceptual Level	Conceptual Components	Conceptual Definitions	Operational Definitions – Appendix A (questionnaire items number)	Observational Level
	Agreeableness	A propensity to be cooperative, courteous and tolerant.	46, 51R, 56R, 61R, 66R, 71, 76, 81R, 86R, 91, 96R, 101R	
	Neuroticism	A predisposition toward negative cognitions, intrusive thoughts and emotional reactivity.	43R, 48, 53, 58R, 63, 68, 73R, 78, 83, 88R, 93, 98	
Cognitive adaptability	Goal orientation	The extent to which the individual interprets environmental variations in light of wide variety of personal, social and organisational goals.	11, 16, 21, 26, 31	Response to questionnaire
	Metacognitive knowledge	The extent to which the individual relies on what is already known about oneself, other people, tasks and strategy when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goals to 'manage' a changing	8, 13, 18, 23, 28, 33, 36, 38, 40, 41, 42	

Theory level			Research level	
Conceptual Level	Conceptual Components	Conceptual Definitions	Operational Definitions – Appendix A (questionnaire items number)	Observational Level
		environment.		
	Metacognitive experience	The extent to which the individual relies on idiosyncratic experiences, emotions and intuitions when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goals to ‘manage’ a changing environment	12, 17, 22, 27, 32, 35, 37, 39	
	Metacognitive choice	The extent to which the individual engages in the active process of selecting from multiple decision frameworks the one that best interprets, plans and implements a response for the purpose of ‘managing’ a changing environment	9, 14, 19, 24, 29	
	Monitoring	A process of seeking and using feedback to re-	10, 15, 20, 25, 30, 34	

Theory level			Research level	
Conceptual Level	Conceptual Components	Conceptual Definitions	Operational Definitions – Appendix A (questionnaire items number)	Observational Level
		evaluate goal orientation, metacognitive knowledge, metacognitive experience and metacognitive choice for the purposes of ‘managing’ a changing environment.		

Openness to experience has been operationalised as a propensity to be imaginative, broad-minded and curious (Barrick & Mount 1991:20).

Conscientiousness has been operationalised as a propensity to be dependable and to strive for achievement (Barrick & Mount 1991:24).

Extraversion has been operationalised as a propensity to be sociable, gregarious and assertive (Barrick & Mount 1991:23).

Agreeableness has been operationalised as a propensity to be cooperative, courteous and tolerant (Barrick & Mount 1991:21).

Neuroticism has been operationalised as a predisposition toward negative cognitions, intrusive thoughts and emotional reactivity (Smillie *et al.* 2006:136).

Goal orientation is operationalised as the extent to which the individual interprets the environmental variations in light of a wide variety of personal, social and organisational goals.

Metacognitive knowledge is operationalised as the extent to which one relies on what is already known about oneself, other people, tasks, and strategy, when engaging in the process of generating multiple decision frameworks.

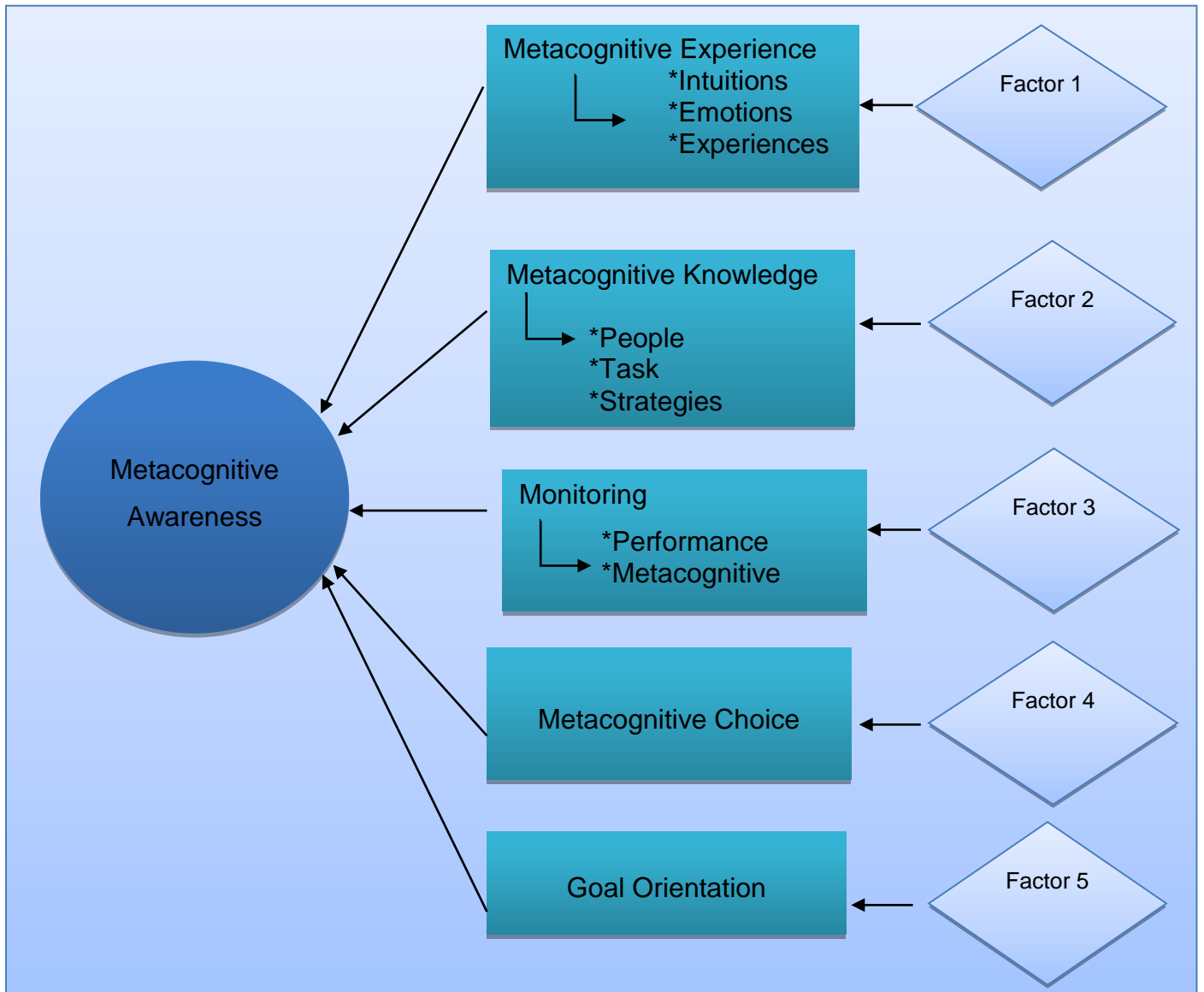
Metacognitive experience is operationalised as the extent to which the individual relies on idiosyncratic experiences, emotions, and intuitions when engaging in the process of generating multiple decision frameworks focused on interpreting, planning, and implementing goals.

Metacognitive choice is operationalised as the extent to which the individual engages in the active process of selecting from multiple decision frameworks the one that best interprets, plans, and implements a response.

Metacognitive monitoring is operationalised as seeking and using feedback to re-evaluate goal orientation, metacognitive knowledge, metacognitive experience, and metacognitive choice.

Based on metacognitive research and integrated with related work in social cognition, cognitive adaptability is conceptualised as the aggregate of metacognition's five theoretical dimensions: goal orientation, metacognitive knowledge, metacognitive experience, metacognitive control, and monitoring. Theory suggests that these five dimensions encompass metacognitive awareness (Haynie & Shepherd 2009:697). Figure 5.1 illustrates the hierarchical dimensions of metacognitive awareness.

Fig. 5.1: Hierarchical dimensions of metacognitive awareness - 5 Factor solutions



Source: Haynie and Shepherd (2009:703)

5.9 MEASURES FOR BIG FIVE PERSONALITY TRAIT DIMENSIONS

5.9.1 Measures for openness to experience

Openness to experience was measured by 12 items some of which were reversed, as shown in Table 5.5.

Table 5.5: Measurement scale for openness to experience

Latent factor	Observed variable	Item statement	Developed by
Openness to experience	V45	45. I enjoy concentrating on a fantasy or day dream exploring all its possibilities, let it grow and develop.	Costa and McCrae (1992)
	V50	50. I think it's interesting to learn and develop new hobbies.	
	V55	55. I am intrigued by patterns I find in art and nature.	
	V60R*	60. I believe letting students hear controversial speakers can only confuse and mislead them.	
	V65R*	65. Poetry has little or no effect on me.	
	V70R*	70. I would have difficulty just letting my mind wonder without control or guidance.	
	V75R*	75. I seldom notice the moods or feelings that different environments produce.	
	V80	80. I experience a wide range of emotions or feelings.	
	V85	85. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.	
	V90R*	90. I have little interest in speculating on the nature of the universe or the human condition.	
	V95	95. I have a lot of intellectual curiosity.	

*R = Reversed item

5.9.2 Measures for conscientiousness

Table 5.6 shows the 12 items which measured conscientiousness. The reverse scores are also indicated.

Table 5.6: Measurement scale for conscientiousness

Latent factor	Observable variable	Item statement	Developed by
Conscientiousness	V47	47. I keep my belongings neat and clean.	Costa and McCrae (1992)
	V52	52. I'm pretty good about pacing myself so as to get things done on time.	
	V57R*	57. I often come into situations without being fully prepared.	
	V62	62. I try to perform all the tasks assigned to me conscientiously.	
	V67	67. I have a clear set of goals and work toward them in an orderly fashion.	
	V72	72. I waste a lot of time before settling down to work.	
	V77	77. I work hard to accomplish my goals.	
	V82	82. When I make a commitment, I can always be counted on to follow through.	
	V87R*	87. Sometimes I'm not as dependable or reliable as I should be.	
	V92	92. I am a productive person who always gets the job done.	
	97R*	97. I never seem to be able to get organised.	
	102	102. I strive for excellence in everything I do.	

*R = Reversed item

5.8.3 Measures for extraversion

The study used 12 items to probe extraversion, as shown in Table 5.7. The reversed scores are indicated.

Table 5.7: Measurement scale for extraversion

Latent factor	Observable variable	Item statement	Developed by
Extraversion	V44	44. I like to have a lot of people around me.	Costa and McCrae (1992)
	V49	49. I laugh easily.	
	V54R*	54. I prefer jobs that let me work alone without being bothered by other people.	
	V59	59. I really enjoy talking to people.	
	V64	64. I like to be where the action is.	
	V69R*	69. I shy away from crowds of people.	
	V74	74. I often feel as if I'm bursting with energy.	
	V79	79. I am a cheerful, high-spirited person.	
	V84R*	84. I don't get much pleasure from chatting with people.	
	V89	89. My life is fast-paced.	
	V94	94. I am a very active person.	
	V99R*	99. I would rather go my own way than be a leader of others.	

*R = Reversed score

5.9.4 Measures for agreeableness

The study used 12 agreeableness items as shown in Table 5.8. Reverse scores are indicated by R.

Table 5.8: Measurement scale for agreeableness

Latent factor	Observable variable	Item statement	Developed by
Agreeableness	V46	46. I try to be courteous to everyone I meet.	Costa and McCrae (1992)
	V51R	51. At times I bully or flatter people into doing what I want them to.	
	V56R	56. Some people think I'm selfish and egotistical.	
	V61R	61. If someone starts a fight, I'm ready to fight back.	
	V66R	66. I'm better than most people, and I know it.	
	V71	71. When I've been insulted, I just try to forgive and forget.	
	V76	76. I tend to assume the best about people.	
	V81R	81. Some people think of me as cold and calculating.	
	V86R	86. I'm hard-headed and tough-minded in my attitudes.	
	V91	91. I generally try to be thoughtful and considerate.	
	V96R	96. If I don't like people, I let them know it.	
	V101R	101. If necessary, I am willing to manipulate people to get what I want.	

*R = Reversed item

5.9.5 Measures for neuroticism

The study used 12 neuroticism items as shown in Table 5.9. The reverse scores are indicated by R.

Table 5.9: Measurement scale for neuroticism

Latent factor	Observable variable	Item statement	Developed by
Neuroticism	V43R*	43. I am not a worrior.	Costa and McCrae (1992)
	V48	48. At times I have felt bitter and resentful.	
	V53	53. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.	
	V58R*	58. I rarely feel lonely or blue.	
	V63	63. I often feel tense and jittery.	
	V68	68. Sometimes I feel completely worthless.	
	V73R*	73. I rarely feel fearful or anxious.	
	V78	78. I often get angry at the way people treat me.	
	V83	83. Too often, when things go wrong, I get discouraged and feel like giving up.	
	V88R*	88. I am seldom sad or depressed.	
	V93	93. I often feel helpless and want someone else to solve my problems.	
	V98	98. At times I have been so ashamed I just wanted to hide.	

*R = Reversed item

5.9.6 Measures for goal orientation

The study used 5 items as shown in Table 5.10.

Table 5.10 Measurement scale for goal orientation

Latent factor	Observable variable	Item statement	Developed by
Goal orientation	V11	11. I often define goals for myself.	Haynie and Shepherd (2009)
	V16	16. I understand how accomplishment of a task relates to my goals.	
	V21	21. I set specific goals before I begin a task.	
	V26	26. I ask myself how well I've accomplished my goals once I've finished.	
	V31	31. When performing a task, I frequently assess my progress against my objectives.	

5.9.7 Measures for metacognitive knowledge

The study used 11 items as shown in Table 5.11.

Table 5.11: Measurement scale for metacognitive knowledge

Latent factor	Observable variable	Item statement	Developed by
Metacognitive knowledge	V8	8. I think of several ways to solve a problem and choose the best one.	Haynie and Shepherd (2009)
	V13	13. I challenge my own assumptions about a task before I begin.	
	V18	18. I think about how others may react to my actions.	
	V23	23. I find myself automatically employing strategies that have worked in the past.	
	V28	28. I perform best when I already have knowledge of the task.	
	V33	33. I create my own examples to make information more meaningful.	
	V36	36. I try to use strategies that have worked in the past.	
	V38	38. I ask myself questions about the task before I begin.	
	V40	40. I focus on the meaning and significance of new information.	
	V41	41. I try to translate new information into my own words.	
	V42	42. I try to break problems down into smaller components.	

5.9.8 Measures for metacognitive experience

The study used 8 items as shown in Table 5.12.

Table 5.12: Measurement scale for metacognitive experience

Latent factor	Observable item	Item statement	Developed by
Metacognitive experience	V12	12. I think about what I really need to accomplish before I begin a task.	Haynie and Shepherd (2009)
	V17	17. I use different strategies depending on the situation.	
	V22	22. I organise my time to best accomplish my goals.	
	V27	27. I am good at organising information.	
	V32	32. I know what kind of information is most important to consider when faced with a problem.	
	V35	35. I consciously focus my attention on important information.	
	V37	37. My 'gut' tells me when a given strategy I use will be most effective.	
	V39	39. I depend on my intuition to help me formulate strategies.	

5.9.9 Measures for metacognitive choice

The study used 5 items as shown in Table 5.13.

Table 5.13 Measurement scale for metacognitive choice

Latent factor	Observable variable	Item statement	Developed by
Metacognitive choice	V9	9. I ask myself if I have considered all the options when solving a problem.	Haynie and Shepherd (2009)
	V14	14. I ask myself if there was an easier way to do things after I finish a task.	
	V19	19. I ask myself if I have considered all the options after I solve a problem.	
	V24	24. I re-evaluate my assumptions when I get confused.	
	V29	29. I ask myself if I have learned as much as I could have when I finished the task.	

5.9.10 Measures for monitoring

The study used 5 items as shown in Table 5.14.

Table 5.14: Measurement scale for monitoring

Latent item	Observable variable	Item statement	Developed by
Monitoring	V10	10. I periodically review to help me understand important relationships.	Haynie and Shepherd (2009)
	V15	15. I stop and go back over information that is not clear.	
	V20	20. I am aware of what strategies I use when engaged in a given task.	
	V25	25. I find myself pausing regularly to check my comprehension of the problem or situation at hand.	
	V30	30. I ask myself questions about how well I am doing while I am performing a novel task.	
	V34	34. I stop and reread when I am confused.	

5.10 PRETESTING THE MEASUREMENT INSTRUMENT

It is recommended that when a model has scales borrowed from various sources reporting on other research, a pre-test should be conducted using respondents similar to those from the population to be studied in order to screen items for appropriateness (Hair, Black, Babin & Anderson 2010:664). The main focus of the pilot phase was to ensure face validity and content validity of the questionnaire. Face validity evaluates whether the questionnaire measures what it intends to measure, content validity deals with whether the content of the instrument accurately assesses all fundamental aspects of the topic (Nunnally & Bernstein 1994; Rattray & Jones 2007). However, face validity deals with subjective judgement, and is concerned with the extent to which the researcher believes the instrument is appropriate (Frankfort-

Nachmias & Nachmias 1996). Content validity in this study was largely guided by theory pertaining to the proposed measurement model.

The final questionnaire was sent via survey monkey to 22 start-up and established entrepreneurs. Survey monkey is a web-based electronic survey which is the fastest route for pilot testing. The questionnaire had a cover letter containing instructions for the completion of the questionnaire and the deadline for returning completed questionnaires. Face validity showed that all the subscales were generally deemed appropriate. Minimal changes were suggested by the respondents and the general feedback was positive. Minor modifications were made towards clarifying certain questions. The results of the pilot confirmed that the instrument was fit for use in the intended study, to predict the relationship between personality traits and cognitive adaptability.

5.11 SAMPLING AND SAMPLING SIZE

The respondents considered in this study were start-up and established entrepreneurs based in South Africa. A sampling frame could not be designed due to the large sample size required. In order to attain the goal of the study, potential entrepreneurs' organisations were identified through membership lists of the Chamber of Commerce, South African national business directories, business incubators, eco-systems, business financing houses and online databases. Government entrepreneurs support agencies such as Small Enterprise Agency (SEDA) Skills Education Training Authorities (SETA), National Youth Development Agency (NYDA) were contacted for assistance with membership lists. Some of these organisations were contacted and requested to distribute the surveys to their members. In particular, the South African Women Entrepreneurs Network (SAWEN) invited the researcher to attend its national and regional networking forums for manual data collection. Although this opportunity afforded the researcher direct contact with entrepreneurs, the members were mostly Small, Medium and Micro Entrepreneurs (SMMEs) who were running subsistence enterprises. Most of them required assistance with completion of the questionnaires. At least 301 manual

questionnaires were completed by SAWEN members in Cape Town and Durban which were ultimately not used in this study.

McQuitty (2004) suggests that it is important to determine the minimum sample size required in order to achieve a desired level of statistical power with a given model before data is collected. According to Schreiber, Nora, Stage, Barlow and King (2006), although the needed sample size is affected by the normality of the data and method of estimation used by researchers, it is generally agreed that a sample size of 10 participants for every free parameter estimated is ideal. However, although according to Sivo, Fan, Witta and Willse (2006) there seems to be little consensus on the recommended sample size for SEM, Garver and Mentzer (1999) as well as Hoelter (1983) propose a critical sample size of 200. According to Hair *et al.* (2010:661-664), the minimum sample size for a particular SEM model depends on several factors, including the ones indicated in Table 5.15. Further, Hair *et al.* (2010:662) suggest there are additional circumstances that may require sample size to be increased. These are deviations of data from multivariate normality, use of sample-intensive estimation techniques when missing data exceeds 10%, need for group analysis (each group should meet the sample size requirements), and need for sample size to adequately represent the population of interest (this is often the researcher's overriding concern).

Table 5.15: Sample size specifications for SEM

Type of Model	Minimum sample size
Models containing five or fewer constructs, each with more than three items (observed variables), and with high item communalities (0.6 or higher)	100
Models with seven or fewer constructs, modest communalities (0.5), and no under-identified constructs.	150
Models with seven or fewer constructs, lower communalities (below 0.45), and/or multiple under identified (fewer than three items) constructs.	300
Models with larger number of constructs, some of which have fewer than three measured items as indicators, and multiple low communalities.	500

Source: Adapted from Mungule (2015:188)

Taking into account the various research published on determining the sample size for SEM, it was decided to use the general rule of 10 observations per free parameter. As most of the models have approximately 140 distinct parameters to be estimated, a minimum sample of 1400 would meet this requirement.

5.12 DATA COLLECTION

Data collection was done through the use of a questionnaire carefully developed to adequately capture all the relevant research question dimensions as well as facilitate testing of the hypotheses.

5.12.1 Data collection method

Due to the large sample size required, the collection of data was done through survey monkey over a four-month contracted period. Survey monkey was the preferred choice for this study because it is suitable for large sample sizes and the results can be analysed continuously. There were many other advantages that were considered. Survey monkey offers high levels of customisation and sophistication, which was needed for this study, and it allows for the automation of data capturing. Given the time dimension of this study, a short turn-around of results was required. With survey monkey, visuals can be used, numerous surveys can be done over time, and international participants can be recruited. It was a costly but valuable investment as evidenced in the large sample size acquired in this study.

The questionnaire included an introductory letter from the Department of Business Management of the University of Pretoria containing explanations of what is meant by personality traits and cognitive adaptability (see Appendix A). The simplified brief on the two constructs was for the purpose of ensuring that all respondents had at least some basic understanding the phenomenon in order to assist them to complete the questionnaire. It was emphasised that the questionnaire should be completed by start-up and established entrepreneurs only. A question regarding the age of their

business was added to make the distinction between start-up and established entrepreneurs. All participants were informed of the strict confidentiality of their responses to the questionnaire, which would be used only for the intended research purpose.

To ensure that only start-up and established entrepreneurs participated, the questionnaire was sent to business owners only. If by some rare occurrence a survey was sent to a participant who was not a business owner, a disqualification question was added into the survey to ensure that they did not complete the survey. Once they had been disqualified, even if they attempted to complete the survey again, the tool did not allow them access since it linked a unique identifier to a specific email address. The unique identifier was not linked to the IP address since they could attempt to complete the survey again from another device.

The participants were from all 9 South African provinces. This was done to ensure equal, unbiased representation across the country. Details such as age, race, education level, gender and industry of the participants were not known in advance, but these unknown characteristics were compensated for by ensuring that the list of participants demonstrated national representativity. The mailing list which was used had no invalid emails, no duplicates and no blanks.

In total, 2,958 start-up and established entrepreneurs participated in the survey. Of this amount, 308 were start-up entrepreneurs and 2,650 were established entrepreneurs. A decision was made to concentrate on the established entrepreneur samples only, due to the size and possible strength of the findings. As highlighted, the GEM report indicated the encouraging and positive growth of established businesses. This could contain important lessons for nascent and start-up entrepreneurs and other relevant stakeholders.

5.12.2 Limitations of the data collection method used

Web-based surveys are good for large sample sizes but often no sampling frame exists as was the case in this study. It was not possible to predict how many respondents were going to take part in the survey. The contract could be signed monthly but this was more expensive. In the end a decision was taken to sign up for a six-month contract which was very expensive. The development of survey monkey is technically sophisticated and requires technical and research skills. A research assistant was hired at a significantly high cost to help with the procurement and administration of the tool for the period of the survey. This entailed finding email addresses of respondents and the right sample, which was costly and time-consuming. Web-based surveys exclude individuals who do not have access to email. For those who have email addresses, respondents are asked to follow a web link to a site that allows for the completion of the survey. Some respondents may find this cumbersome and opt out.

5.12.3 Ethical clearance

As part of the requirements for a doctorate study, an application for ethical clearance was submitted and subsequently approved by the University of Pretoria. The requirements included completion of the literature review, approved title registration, completion of a research proposal and data collection instrument. Ethical clearance was obtained to emphasise that the study was anonymous, meaning that names would not appear on the questionnaire. The answers given were treated as strictly confidential as one could not be identified in person based on the answers given. Although participation in this study was very important, the participants could choose not to participate and could also stop participating at any time without any negative consequences. Respondents were asked to answer the questions as comprehensively and honestly as possible. It was highlighted that the results of the study would be used for academic purposes only and may be published in an academic journal. A summary of study findings would be made available on request.

The participants were given the study leader's contact details if they had any questions or comments regarding the study.

5.13 DATA ANALYSIS DESIGN

5.13.1 Data analysis software

Data analysis was done using the International Business Machines (IBM) Statistical Package for Social Science (SPSS) software version 20. CFA and SEM were conducted using AMOS (Analysis of Motion Structures), version 20, a visual SEM technique for the IBM SPSS. Important techniques used for data analysis included reliability and validity measures as well as factor analysis. At the empirical stage of data analysis, variables were used for the purposes of testing and measuring postulated relationships according to Cooper and Schindler (2008:61).

5.13.2 Data cleaning and treatment of missing data

A data cleaning process was undertaken to identify and remove any errors or inconsistencies from the data in order to improve data integrity or quality and to produce better study results (Burns & Burns 2011). Data with missing values or with errors were not included in the final data. There were no missing values in the data. All questions were mandatory to ensure that errors were avoided. Partially completed questionnaires were eliminated. Only clean and completed surveys were used. All respondents were found to be established entrepreneurs.

5.13.3 Data analysis techniques: CFA

The study attempted to determine the relationship between:

- the personality traits and cognitive adaptability of established entrepreneurs in South Africa;
- openness to experience and the five dimensions of cognitive adaptability;

- conscientiousness and the five dimensions of cognitive adaptability;
- extraversion and the five dimensions of cognitive adaptability;
- agreeableness and the five dimensions of cognitive adaptability; and
- neuroticism and the five dimensions of cognitive adaptability.

The postulated model of predictors of personality traits and cognitive adaptability is theory driven, based on previous study findings. Therefore to empirically address the above research objectives, as well as the attendant hypotheses, it was necessary for the study to firstly use a confirmatory technique that would enable construct validation on the basis of *a priori* stated theoretical relationships between the observed measures and the underlying latent variable structure (Byrne 2004). CFA was therefore deemed the appropriate technique as the researcher already had knowledge of the underlying measurement structure based on theory as well as empirical research (Byrne 2004). Basically CFA forms part of the statistical technique known as structural equation modelling and is used for measurement model validation in path or structural analysis (Brown 2006). CFA examines the nature of relationships between constructs based on simple correlations (Hair *et al.* 2010), and according to Brown (2006) it is used for four main purposes. These are psychometric evaluation of assessment, construct validation, testing method effects and testing instrument invariance, such as across groups and populations.

According to Harrington (2009) and Koeske (1994), CFA is appropriate for measuring structural (or factorial) construct validity, such as whether the construct is unidimensional or multidimensional and what the relationships are between the measurement items and the hypothesised latent variables. CFA provides evidence of construct validity, such as the model's overall fit, which makes it useful to test a measurement theory (Hair *et al.* 2010:727). However, it is important to note that CFA has a stringent requirement of zero cross-loading, which often leads to model modification to find a well-fitting model (Asparouhov & Muthen 2009).

5.13.4 Data analysis techniques: EFA

Secondly, EFA was used. In EFA the factors are not derived from theory but from the underlying structure of the data studied. This means that factors can only be named after the factor analysis has been performed (Hair *et al.* 2010:693).

The first step is assessment of suitability for the data. Sample size and the strength of the relationship among the variables are two main issues to consider in determining whether this particular data set was suitable for factor analysis. While there is little agreement among authors concerning how large a sample should be, when conducting a factor analysis, a larger sample size is generally recommended (Pallant 2011:18). Tabachnick and Fidell (2007:613) review this issue and suggested having at least 300 cases for factor analysis. The sample size of the current study is 2650. It can therefore be considered suitable for factor analysis. The second issue to be addressed concerns the strength of the inter-correlations among the items. The relationships among the variables, which were measured with a Likert-type scale in sections B and C of the questionnaire were investigated by calculating Pearson product-moment correlation coefficients. An inspection of the correlation matrix revealed, as recommended, the presence of many coefficients of 0.3 and above, thus sufficient to justify the application of factor analysis (Hair *et al.* 2010:103; Tabachnick & Fidell 2007:613).

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were used to aid in diagnosing the factorability of the correlation matrix. These measures indicate the suitability of the data for factor analysis, as well as the overall significance of all correlations within each of the identified dimensions (Pallant 2011:182). These measures indicated suitability for the current study.

The second step comprises deriving factors. Factor extraction involves determining the smallest number of factors that can be used to best represent the interrelationships among the set of variables (Pallant 2011:183). Patterns of correlation among the variables were examined by subjecting the set of items to

common factor analyses, more specifically, principal axis factoring (PAF) using SPSS23.0. Factors with Eigen values greater than 1.0 were retained (Pallant 2011:184; Hair *et al.* 2010:111). Once the number of factors had been determined, the next step was to interpret the factors (Pallant 2011:184).

The third step is factor rotation and interpretation. The process of manipulation or adjusting the factor axes to achieve a simpler meaningful factor solution is called factor rotation (Hair *et al.* 2010:92), thus presenting the pattern of loadings in a manner that is easier to interpret (Pallant 2011:184). The subscales for the extracted factors were obtained by calculating the mean of the items loading on each of the subscales or factors. This resulted in factors being calculated and named.

The last step in the EFA process was to assess the reliability of the factors. Reliability is an assessment of the degree of consistency between multiple measurements of a variable (Hair *et al.* 2010:127). The internal consistency of each extracted factor was determined by calculating Cronbach's alpha-coefficient. The generally agreed upon limit for Cronbach's alpha-coefficient is 0.70, although it may decrease to 0.60 in exploratory research (Hair *et al.* 2010:127).

5.13.5 Data analysis techniques: Structural equation modelling

The term SEM describes a large number of statistical models that are used for empirically evaluating the validity of substantive theories, and the technique is the most appropriate multivariate procedure for testing both construct validity and theoretical relationships between a set of concepts represented by variables that are measured with multiple items (Hair *et al.* 2010:627). Basically SEM "allows separate relationships for each of a set of dependent variables" thereby providing the best "estimation technique for a series of separate multiple regression equations estimated simultaneously" (Hair *et al.* 2010:19).

SEM components

Basically SEM involves the evaluation of the following two models, which are the components that characterise the technique (Blunch 2013:10; Hair *et al.* 2010:19; Schreiber *et al.* 2006:34):

1. The measurement model: This specifies or describes the links between the latent (observed) variables and their respective manifest (observed) indicators, and enables the assessment of construct validity.
2. The path model (also known as the structural model): This represents the structural theory or conceptual aspects of the structural relationships between stated constructs. It is the path model that relates exogenous variables to endogenous variables and is backed by theory, the researcher's prior experience, or other guidelines. In other words the structural model represents interrelationships between constructs in the model.

According to Kline (2011:11-12), SEM is a large-sample technique (N=200), as using a small sample may result in technical problems in the analysis, as certain statistical estimates such as standard errors may be inaccurate.

This study used Likert scale (ordinal) data, which can also be analysed using SEM provided the number of Likert categories is four or higher, the skewness and kurtosis are within normal limits and sample size is reasonably large (Garson 2012).

Goodness-of-fit indices

A number of goodness-of-fit indices, which reflect the extent to which a model can be considered an acceptable means of data representation, are suggested. The following goodness-of-fit indices were used in this study (Hair *et al.* 2010:665-669):

- Root mean square error of approximation (RMSEA): RMSEA takes model complexity into account, but has less rigid requirements for degree of fit. The

primary principle of the RMSEA is that it evaluates the extent to which the model fails to fit the data. It is generally recommended that RMSEA should be less than 0.05. RMSEA should be less than 0.05 for the fitted model to indicate a good approximation. Values between 0.05 and 0.08 indicate acceptable fit, values between 0.08 and 0.10 marginal fit, and values above 0.10 poor fit.

- Comparative fit index (CFI): CFI compares a proposed model with the null model assuming no relationships between measures. CFI is defined as the ratio of improvement in non-centrality, moving from null to the proposed model, to the non-centrality of the null model. CFI which ranges between 0 and 1 is also recommended to be greater than 0.90 to indicate a good fit.
- Tucker-Lewis index (TLI): TLI compares T (chi-square value) against a baseline model or the independence model, which assumes that all the covariances are zero. TLI indices should ideally be greater than 0.9 for acceptable fit.
- Incremental fit index (IFI): IFI also compares T (chi-square value) against a baseline model or the independence model, which assumes that all the covariances are zero. IFI indices should ideally be greater than 0.9 for acceptable fit.

5.13.6 Data analysis techniques: Multiple linear regressions

SEM allows for simultaneous analysis of all the dependent variables in a model. As SEM takes measurement error into account, it is not aggregated in a residual error term. As none of the SEMs revealed acceptable fit, multiple linear regression techniques will be used to establish statistical significance, strength and direction of each path coefficient.

Regression analysis is a statistical tool for the investigation of relationships between variables (Sykes 1993). Regression is primarily used for prediction and causal inference. Regression thus shows us how variation in one variable co-occurs with variation in another.

5.14 CONCLUSION

Chapter 5 explained the detailed research design and methodology of the study. A cross-sectional research design consisting of a structured questionnaire with closed questions only was administered to start-up and established entrepreneurs. The sample of this study consisted of two groups, i.e. start-up and established entrepreneurs located in all the nine provinces in South Africa. The sample size of the established entrepreneurs (2650) was exponentially larger than that of the start-ups (308). A decision was taken to focus only on the established entrepreneurs, as a need to focus on this specific entrepreneurial stage arose from the results of the GEM survey. Simple random probability sampling was used in this study.

The methodology for the empirical part of the study was presented, with specific descriptions of the measurement instrument used, the descriptive statistics, and the inferential statistics applied to investigate and summarise the research constructs. Data collection was primarily based on an online survey (Annexure A). Factor analysis and descriptive statistics were executed in this study, and inferential statistics were calculated by means of CFA and SEM. However, when the model showed poor fit, multilinear regression analysis was used. Chapter 6 subsequently presents, explains and interprets the most significant findings.

CHAPTER SIX: DIAGRAMMATIC SYNOPSIS: RESEARCH FINDINGS

INTRODUCTION

DATA AND MEASURES

PERSONAL DEMOGRAPHICS OF
ESTABLISHED BUSINESS
OWNER SAMPLE

BUSINESS VENTURE
DEMOGRAPHICS OF
ESTABLISHED BUSINESS
OWNER SAMPLE

DESCRIPTIVE STATISTICS OF THE ESTABLISHED BUSINESS OWNER SAMPLE

RESPONDENTS' RATING OF
PERSONALITY TRAIT
DIMENSIONS

RESPONDENTS' RATING OF
COGNITIVE ADAPTABILITY
DIMENSIONS

VALIDITY AND RELIABILITY OF MEASURING INSTRUMENTS

EXPLORATORY FACTOR
ANALYSIS OF COGNITIVE
ADAPTABILITY DIMENSIONS

CONFIRMATORY FACTOR
ANALYSIS AND EXPLORATORY
FACTOR ANALYSIS OF
PERSONALITY TRAIT
DIMENSIONS

STRUCTURAL EQUATION MODELLING (SEM)

STRUCTURAL MODEL OF THE RELATIONSHIPS BETWEEN PERSONALITY
TRAITS AND THE COGNITIVE ADAPTABILITY DIMENSIONS

REGRESSION ANALYSIS

CONCLUSION

6.1 INTRODUCTION

Another indicator of the need for better delineation of specific aspects of the Big Five comes from applied research. A larger set of more specific constructs is likely to provide multiple-regression predictions superior to those provided by the Big Five alone.

(Mershon & Gorsuch 1988)

The literature review of cognitive adaptability and personality traits revealed a relationship between the two constructs. This chapter presents the findings of the study on the basis of the research questions and objectives, as well as the postulated hypotheses. These findings are based on the responses of the respondents who participated and completed the quantitative research questionnaires. The in-depth exploration of the literature on the personality traits and cognitive adaptability of entrepreneurs enabled the development of a research questionnaire (Annexure A) to be used as the study's measuring instrument. The questionnaire was completed online by 2650 established entrepreneurs spread across South Africa.

The descriptive statistics for the study include details about the personal demographics as well as the business venture demographics of the sample. The EFA and CFA as well as Cronbach alpha-coefficients will be discussed to illustrate the reliability and validity of the measuring instrument utilised for purposes of extracting data. This is followed by structural modelling of the relationships between the personality traits and cognitive adaptability. Finally, due to model fit results, regression models were also conducted to determine the nature of these relationships.

6.2 DATA AND MEASURES

Before any analysis was conducted, the following items pertaining to the measurement scale for the Big Five personality traits were reverse-coded:

Openness to experience – V60R (I believe letting students hear controversial speakers can only confuse and mislead them), 65R (Poetry has little or no effect on me), 70R (I would have difficulty just letting my mind wander without control or guidance), 75R (I seldom notice the moods or feelings that different environments produce), 90R (I have little interest in speculating on the nature of the universe or the human condition).

Conscientiousness – 57R (I often come into situations without being fully prepared), 72R (I waste a lot of time before settling down to work), 87R (Sometimes I'm not as dependable or reliable as I should be), 97R (I never seem to be able to get organised).

Extraversion – 54R (I prefer jobs that let me work alone without being bothered by other people), 69R (I shy away from crowds of people), 84R (I don't get much pleasure from chatting with people), 99R (I would rather go my own way than be a leader of others).

Agreeableness – 56R (Some people think I'm selfish and egotistical), 61R (If someone starts a fight, I'm ready to fight back), 66R (I'm better than most people, and I know it), 81R (Some people think of me as cold and calculating), 86R (I'm hard-headed and tough-minded in my attitudes), 96R (If I don't like people, I let them know it), 101R (If necessary, I am willing to manipulate people to get what I want).

Neuroticism – 58R (I rarely feel lonely or blue) and 73R (I rarely feel fearful or anxious).

The analysis of the characteristics of the sample and measures is presented below.

6.2.1 Personal demographics of established business owners

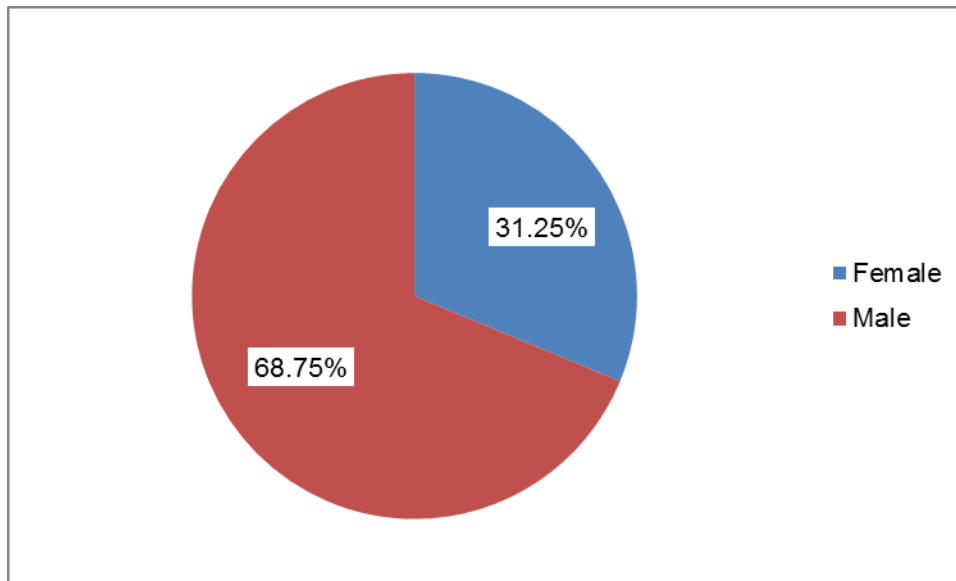
These findings are reported in relation with GEM South Africa reports and other South African entrepreneurship studies, where applicable. The GEM studies focus on individual-level participation which enables them to reveal a range of demographic and other characteristics about entrepreneurs. These studies also make it possible to assess the level of inclusiveness in an economy and the extent to which various groups (e.g. age, gender or education level) engage in entrepreneurial activity. This information can assist policy makers in targeting effective interventions aimed at increasing participation, as well as productivity in the economy (Herrington *et al.* 2015:29).

A descriptive analysis is provided to describe the sample of established entrepreneurs' personal demographic information, which relates to the respondents' gender, age, race, level of education and the province where they reside. The business venture demographic information included in the questionnaire relates to the age of the venture as well as the industrial sector in which the venture operates. The demographic results of the empirical study are represented in the figures and tables that follow. The following abbreviations are used in the tables: Frequency = (n); and Percentage = (%).

6.2.1.1 Gender

The gender of the sample of established entrepreneurs is illustrated in Figure 6.1. A total of 1822 respondents who completed the survey were males (68.75%) and 828 of the respondents were females (31.25%).

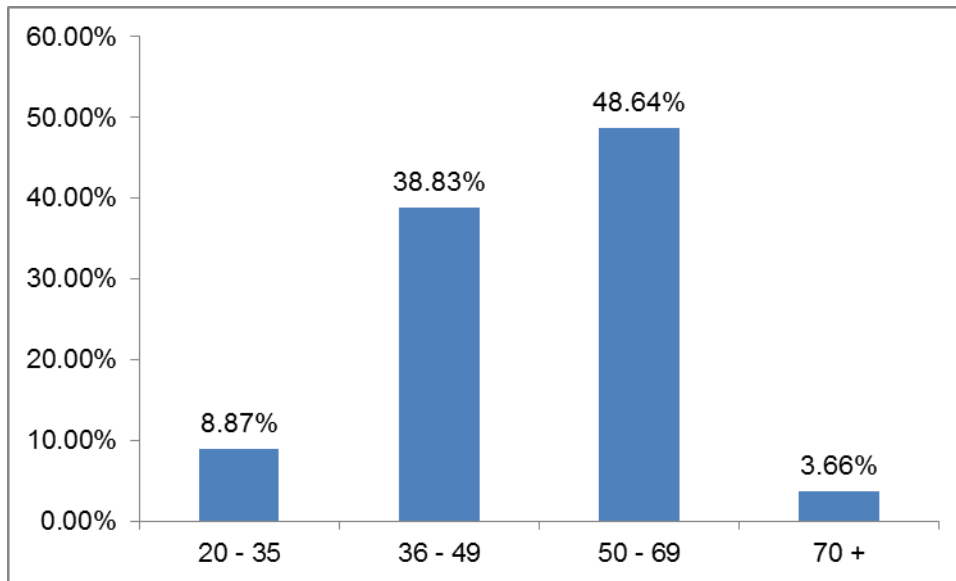
Fig. 6.1: Gender of established business owners



6.2.1.2 Age

The age distribution of the sample of established entrepreneurs is illustrated in Figure 6.2. From a sample of 2650 respondents who completed and indicated their age, the majority subgroup constituted respondents in the 50-69 age group (48.64%), followed by those in the 36-49 age group (38.83%), 20-25 age group (8.87%), and the over 70 age group (3.66%).

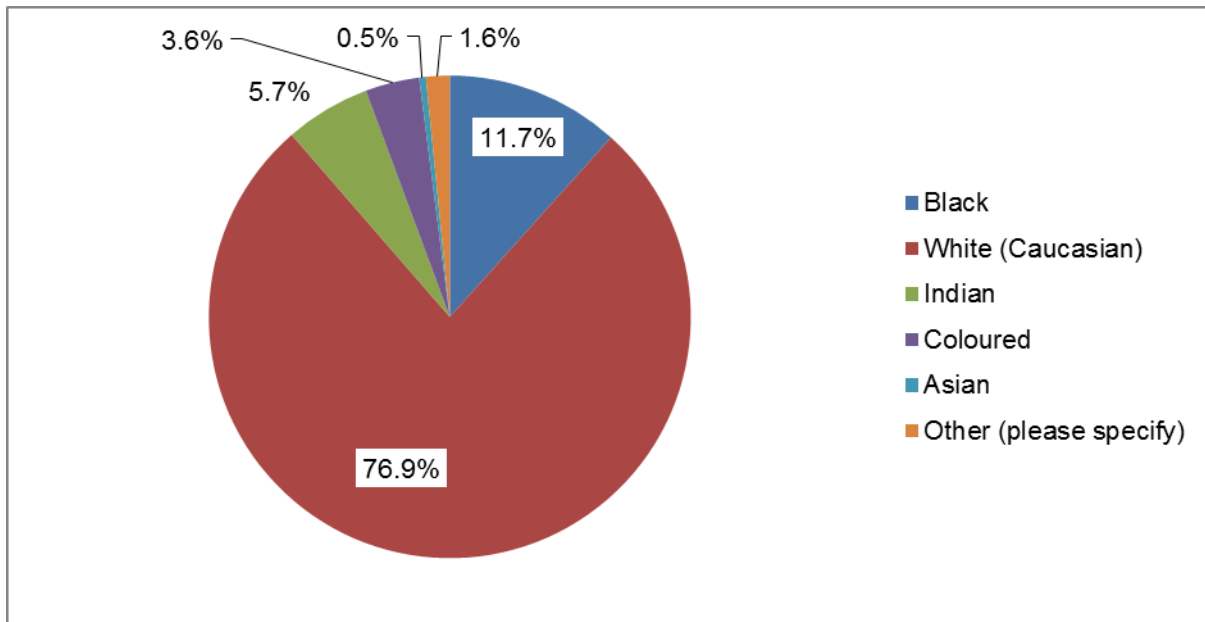
Fig. 6.2: Age of established business owners



6.2.1.3 Established business owners: Ethnic grouping

Figure 6.3 indicates that 2039 respondents were white (Caucasian) (77%), followed by 309 black Africans (11.7%), 152 Indians (5.7%), 96 coloureds (3.6%), 42 indicated 'Other' (1.6%), and 12 were Asian (0.5%). The sample is representative of a South African entrepreneur where most established businesses are run by Caucasians.

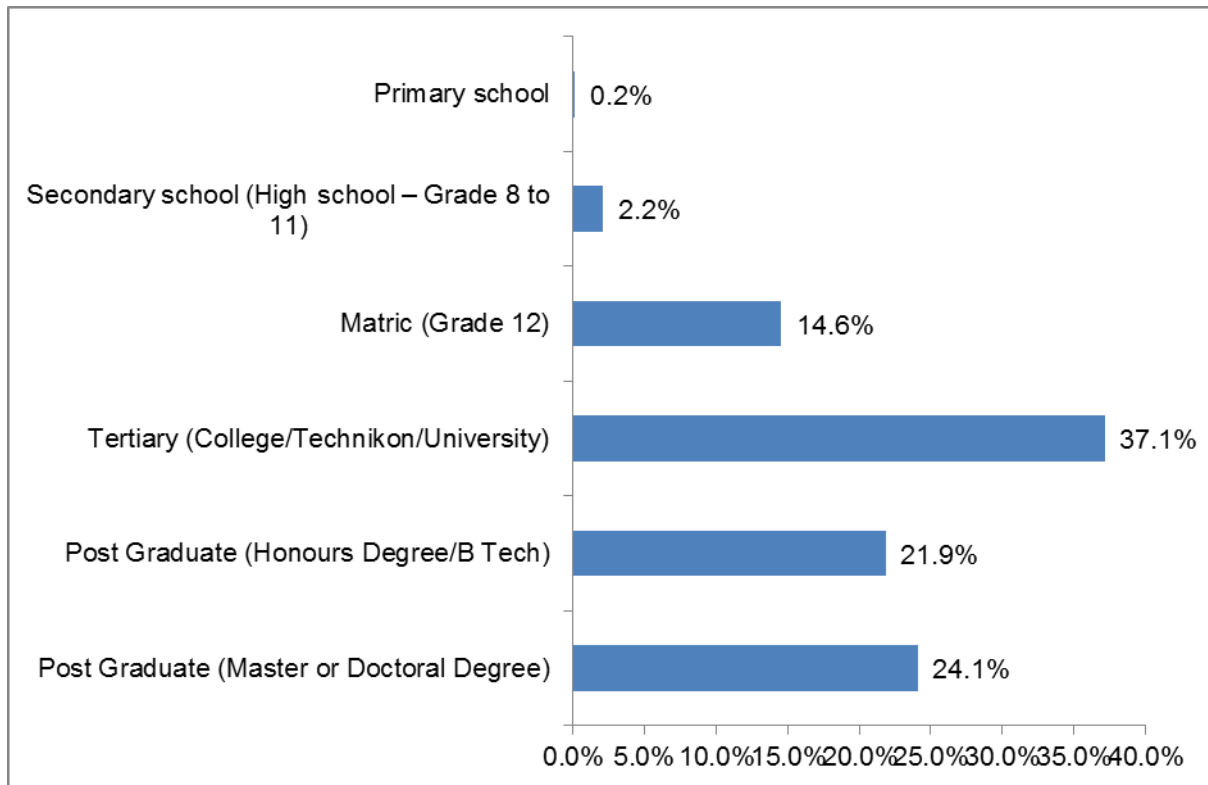
Fig. 6.3: Established business owners - Ethnic grouping



6.2.1.4 Highest level of education

The education level of the sample is illustrated in Figure 6.4. This figure indicates that 984 of the respondents held a diploma from a college or what were formally known in South Africa as technikons (now known as universities of technology). This is followed by 638 respondents in possession of Master's and doctorate degrees (24.1%), 580 holding an honours degree or a B Tech qualification (21.9%), 386 having matriculated from secondary school (14.6%), 57 having entered but who had not completed their secondary schooling, i.e. the period spanning Grade 8-12 (2.2%), and 5 who had only advanced to a grade in the primary schooling sector (0.2%). In South Africa a positive correlation has been found between opportunity-driven entrepreneurship and level of education (Herrington & Kew 2014:28).

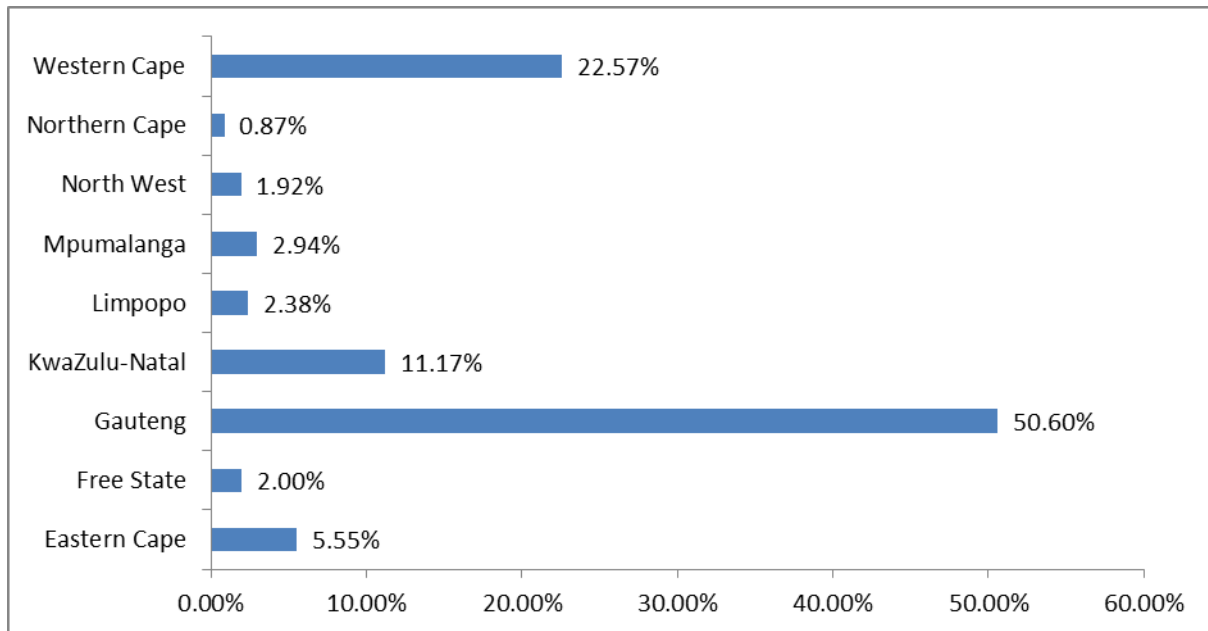
Fig. 6.4: Composition of established business owners by level of education



6.2.1.5 Provincial spread of entrepreneurial activity in South Africa

The study was conducted in all nine provinces of South Africa, namely: Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West and Western Cape. As depicted in Figure 6.5, 1341 respondents (50.60%) were located in Gauteng, 598 in the Western Cape (22.57%), 296 in KwaZulu-Natal (11.17%), 147 in the Eastern Cape (5.55%), 78 in Mpumalanga (2.94%), 63 in Limpopo (2.38%), 51 in North West (1.92%), 53 in the Free State (2.0%), and 28 in the Northern Cape (0.87%).

Fig. 6.5: South African provinces where established business owners were found to operate their businesses



6.2.2 Business venture demographics

This section describes the business venture demographics of the established business respondents.

6.2.2.1 Age of the business

All 2650 respondents reported having owned their businesses for longer than three and a half years, and thus are classified as being established entrepreneurs operating established businesses. In South Africa entrepreneurs are classified according to the GEM report (Herrington *et al.* 2015:15) (see section 1.5.1).

The level of established businesses is important in any country as these businesses have moved beyond the nascent, new and start-up business phases and are able to make a greater contribution to the economy in the form of providing employment and introducing new products and processes (Herrington & Kew 2014:25). It is for this reason that only established businesses were included in the sample (see Chapter 5, section 5.6.4 for the sampling frame).

6.2.2.2 Business sectors

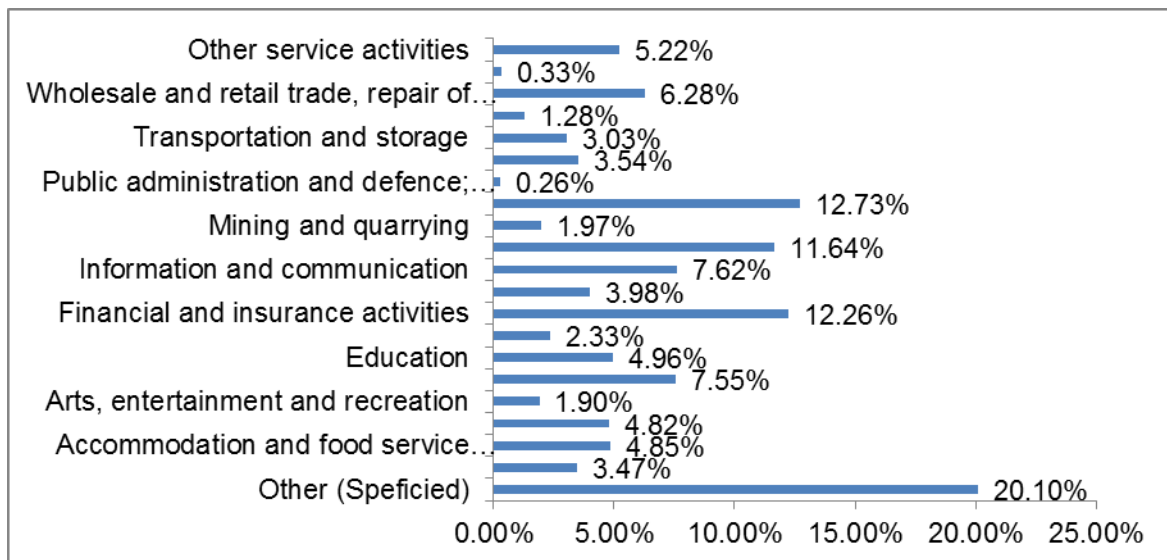
As indicated in Figure 6.6, the respondents were found to operate their businesses in several and varied business sectors. The different sectors were classified in the survey according to the Department of Trade and Industry (DTI) standard. 'Other' represents business sectors where respondents could not link their sectors to the categories provided. This category represented the majority of the businesses at 20% and included businesses such as security business systems, digital marketing and travel businesses.

The Top 10 business sectors apart from those businesses classified as "Other" (20%) are:

1. Professional, scientific and technical activities (12.73%)
2. Finance and insurance service activities (12.26%)
3. Manufacturing (11.64%)
4. Construction (7.55%)
5. Information and communication (7.62%)

6. Wholesale and retail trade, as well as repair of motor vehicles and motorcycles (6.28%)
7. Other service activities (5.22%)
8. Education (4.96%)
9. Accommodation and food service activities (4.85%)
10. Administration and support service activities (4.82%)

Fig. 6.6: Composition of established business owners by business sector



The values for the established business owners' industry sector add up to 100% and above because respondents were provided with multiple choice questions to respond to. In some cases the established entrepreneurs were found to operate in more than one industry. The majority of the respondents fell in a category not listed by the DTI; this could mean that more South African entrepreneurs are starting and managing businesses that fall in less traditional sectors. This finding could assist the DTI to elaborate and update their business sector list.

6.3 VALIDITY AND RELIABILITY OF THE MEASURING INSTRUMENT

Before testing for the significance of any relationship in the structural model, researchers should firstly demonstrate that respective measurement models used in

the study have a satisfactory level of validity and reliability (Bollen & Arminger 1991; Fornell & Larcker 1981:45; Hair *et al.* 2010:693; Jackson, Gillapsy & Pure-Stephenson 2009:6). This study assessed each of the measurement models to determine their validity and reliability, and then proceeded to analyse the proposed overall structural model. Usually when conducting SEM, prior to assessing the structural model, the first step would be to evaluate the measurement model using CFA and to determine whether the measured variables accurately reflect the desired constructs or factors (Jackson *et al.* 2009:6; Bollen & Arminger 1991). In this respect, CFA essentially deals with the measurement model issues (pre-specified relationships between the measurement items and underlying factors), while SEM can be looked at as an extension of CFA and deals with relationships between several constructs on the basis of *a priori* stated measurement structure (Yang 2003:157). Therefore, the study proceeded with the analysis by conducting CFA, and if the analysis did not show adequate fit, EFA was conducted to determine the underlying factor structure of the data.

To assess reliability, the Cronbach alpha-coefficient, a measure of internal consistency was used. A threshold value of 0.7 was used.

6.3.1 Validity and realibility of cognitive adaptability

6.3.1.1 Goal orientation

The results of the CFA and EFA of goal orientation are presented below.

6.3.1.1.1 CFA of goal orientation

The model fit results of the initial CFA indicated that the goal orientation dimension is not a single construct in the case of this study (Table 6.1).

Table 6.1: CFA fit indices of the goal orientation model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	89.323	5	0.000	17.865	0.974	0.080	0.947	0.974

Acceptable model fit is normally decided upon by considering a set of fit indices. Furthermore, acceptable model fit is indicated by a Comparative Fit Index (CFI) value of 0.90 or greater, a Tucker-Lewis Index (TLI) value of 0.90 or greater, and an Incremental Fit Index (IFI) value of 0.90 or greater (Hu & Bentler 1999:1). CFI, TLI and IFI values for this CFA model are more than the recommended 0.90. Finally, acceptable model fit is indicated by an RMSEA value of 0.08 or less (Hu & Bentler 1999:1). The 0.090 RMSEA value is the same as 0.08 or less criterion. Taken the fit indices information into account, it indicated that the fit was acceptable. The single factor structure is thus confirmed.

6.3.1.1.2 *The EFA of goal orientation*

The Kaiser-Meyer-Olkin measure of sampling adequacy for goal orientation was 0.811, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the five items dealing with goal orientation, thus indicating that the factor analysis was appropriate.

The analysis confirmed uni-dimensionality for the goal orientation construct, as the analysis identified one factor based on the Eigen value criterion (Eigen value greater than 1) and the factor explains 52.913 of the variance. The factor loadings are shown in Table 6.2 below.

Table 6.2: Goal orientation factor loadings

CONSTRUCT	Items	Factor loadings	Cronbach's alpha
GOAL ORIENTATION	V11. I often define goals for myself.	0.595	0.776
	V16. I understand how accomplishment of a task relates to my goals.	0.604	
	V21. I set specific goals before I begin a task.	0.747	
	V26. I ask myself how well I've accomplished my goals once I've finished.	0.599	
	V31. When performing a task, I frequently assess my progress against my objectives.	0.659	

Using Cronbach's alpha-coefficient, the internal consistency (reliability) for goal orientation is 0.776. As this value is above the acknowledged threshold of 0.6 (Field 2009:675; Saunders *et al.* 2012:430) it was deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.1.2 Metacognitive knowledge

The results of the CFA and EFA of metacognitive knowledge are presented below.

6.3.1.2.1 CFA for metacognitive knowledge

The model fit results of the initial CFA indicated that the metacognitive knowledge dimension is not a single construct in the case of this study (Table 6.3).

Table 6.3: CFA fit indices of the metacognitive knowledge model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	1614.997	44	0.000	36.704	0.710	0.116	0.638	0.711

The CFI, TLI and IFI values for this CFA model were less than the recommended 0.90. Furthermore, the 0.116 RMSEA value is larger than the 0.08 or less criterion, thus resultin in an unacceptable model fit. The single factor structure is thus not confirmed.

6.3.1.2.2 EFA for metacognitive knowledge

The Kaiser-Meyer-Olkin measure of sampling adequacy for metacognitive knowledge was 0.788, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 10 items dealing with metacognitive knowledge, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the metacognitive knowledge construct, as the analysis identified two factors based on the Eigen value criterion (Eigen value greater than 1) and the factor explains 46.994% of the variance. The factor loadings are shown in Table 6.4 below.

Table 6.4: Metacognitive knowledge factor loadings

CONSTRUCT	Items	Loadings		Cronbach's alpha
		Factor 1	Factor 2	
CURRENT METACOGNITIVE KNOWLEDGE	V8. I think of several ways to solve a problem and choose the best one.	0.428		0.750
	V13. I challenge my own assumptions about a task before I begin.	0.529		
	V33. I create my own examples to make information more meaningful.	0.518		
	V38. I ask myself questions about the task before I begin.	0.581		
	V40. I focus on the meaning and significance of new information.	0.612		
	V41. I try to translate new information into my own words.	0.617		
	V42. I try to break problems down into smaller components.	0.566		
PRIOR METACOGNITIVE KNOWLEDGE	V23. I find myself automatically employing strategies that have worked in the past.		0.697	0.670
	V28. I perform best when I already have knowledge of the task.		0.397	
	V36. I try to use strategies that have worked in the past.		0.866	

Two factors were thus identified and labelled as: 1. Current metacognitive knowledge; and 2. Prior metacognitive knowledge. Using Cronbach's alpha-coefficient, the internal consistency (reliability) for current metacognitive knowledge is 0.750 and for prior metacognitive knowledge is 0.670 (Field 2009:675; Saunders *et al.* 2012:430). As these values were above the exploratory research threshold of 0.6,

it was deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.1.3 *Metacognitive experience*

The results of the CFA and EFA of metacognitive experience are represented below.

6.3.1.3.1 *CFA for metacognitive experience*

The model fit results of the initial CFA indicated that the metacognitive experience dimension is not a single construct in the case of this study (Table 6.5).

Table 6.5: CFA fit indices of the metacognitive experience model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	1411.641	20	0.000	70.582	0.638	0.162	0.494	0.639

The CFI, TLI and IFI values for this CFA model were less than the recommended 0.90. Furthermore, the 0.162 RMSEA value is larger than the 0.08 or less criterion, thus resulting in an unacceptable model fit. The single factor structure is thus not confirmed.

6.3.1.3.2 *EFA for metacognitive experience*

The Kaiser-Meyer-Olkin measure of sampling adequacy for metacognitive experience was 0.728, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the eight items dealing with metacognitive experience, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the metacognitive experience construct, as the analysis identified two factors based on the Eigen value criterion

(Eigen value greater than 1) and the factor explains 52.154% of the variance. The factor loadings are shown in Table 6.6 below.

Table 6.6: Metacognitive experience factor loadings

CONSTRUCT	Items	Loadings		Cronbach's alpha
		Factor 1	Factor 2	
CURRENT METACOGNITIVE EXPERIENCE	V12. I think about what I really need to accomplish before I begin a task.	0.556		0.716
	V17. I use different strategies depending on the situation.	0.413		
	V22. I organise my time to best accomplish my goals.	0.603		
	V27. I am good at organising information.	0.574		
	V32. I know what kind of information is most important to consider when faced with a problem.	0.517		
	V35. I consciously focus my attention on important information.	0.588		
PRIOR METACOGNITIVE EXPERIENCE	V37. My 'gut' tells me when a given strategy I use will be most effective.		0.797	0.762
	V39. I depend on my intuition to help me formulate strategies.		0.769	

Two factors were thus identified and labelled as: 1. Current metacognitive experience; and 2. Prior metacognitive experience. Using Cronbach's alpha-coefficient, the internal consistency (reliability) for current metacognitive experience is 0.716 and for prior metacognitive experience is 0.762. As these values were above the exploratory research threshold of 0.6 (Field 2009:675; Saunders *et al.* 2012:430), it was deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.1.4 *Metacognitive choice*

The results of the CFA and EFA of metacognitive choice are presented below.

6.3.1.4.1 *CFA for metacognitive choice*

The model fit results of the initial CFA indicated that the metacognitive choice dimension is not a single construct in the case of this study (Table 6.7).

Table 6.7: CFA fit indices of the metacognitive choice model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	62.314	5	0.000	12.463	0.970	0.066	0.941	0.970

The CFI, TLI and IFI values for this CFA model are larger than the recommended 0.90. Furthermore, the 0.066 RMSEA value is less than the 0.08 or less criterion, thus resulting in an acceptable model fit. The single factor structure is thus confirmed.

6.3.1.4.2 *EFA for metacognitive choice*

The Kaiser-Meyer-Olkin measure of sampling adequacy for metacognitive choice was 0.754, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the five items dealing with metacognitive choice, thus indicating that the factor analysis was appropriate.

The analysis confirmed uni-dimensionality for the metacognitive choice construct, as the analysis identified one factor based on the Eigen value criterion (Eigen value greater than 1) and the factor explains 44.742% of the variance. The factor loadings are shown in Table 6.8 below.

Table 6.8: Metacognitive choice factor loadings

CONSTRUCT	Items	Factor loadings	Cronbach's alpha
METACOGNITIVE CHOICE	V9. I ask myself if I have considered all the options when solving a problem.	0.519	0.688
	V14. I ask myself if there was an easier way to do things after I finish a task.	0.525	
	V19. I ask myself if I have considered all the options after I solve a problem.	0.716	
	V24. I re-evaluate my assumptions when I get confused.	0.451	
	V29. I ask myself if I have learned as much as I could have when I finished the task.	0.564	

Using Cronbach's alpha-coefficient, the internal consistency (reliability) for metacognitive choice is 0.688. As this value was above the exploratory research threshold of 0.6 (Field 2009:675; Saunders *et al.* 2012:430) it was deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.1.5 Monitoring

The results of the CFA and EFA of monitoring are presented below.

6.3.1.5.1 CFA for monitoring

The model fit results of the initial CFA indicated that the monitoring dimension is not a single construct in the case of this study (Table 6.9).

Table 6.9: CFA fit indices of the monitoring model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	157.489	9	0.000	17.499	0.944	0.967	0.907	0.945

The CFI, TLI and IFI values for this CFA model are larger than the recommended 0.90. Furthermore, the 0.0967 RMSEA value is not less than the 0.08 or less criterion, thus resulting in an unacceptable model fit. The single factor structure is thus not confirmed.

6.3.1.5.2 EFA for monitoring

The Kaiser-Meyer-Olkin measure of sampling adequacy for monitoring was 0.805, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the six items dealing with monitoring, thus indicating that the factor analysis was appropriate.

The analysis confirmed uni-dimensionality for the metacognitive choice construct, as the analysis identified one factor based on the Eigen value criterion (Eigen value greater than 1) and the factor explains 42.975% of the variance. The factor loadings are shown in Table 6.10 below.

Table 6.10: Monitoring factor loadings

Construct	Items	Factor loadings	Cronbach's alpha
MONITORING	V10. I periodically review to help me understand important relationships.	0.507	0.733
	V15. I stop and go back over information that is not clear.	0.590	
	V20. I am aware of what strategies I use when engaged in a given task.	0.525	
	V25. I find myself pausing regularly to check my comprehension of the problem or situation at hand.	0.600	
	V30. I ask myself questions about how well I am doing while I am performing a novel task.	0.579	
	V34. I stop and reread when I get confused.	0.570	

Using Cronbach's alpha-coefficient, the internal consistency (reliability) for monitoring is 0.733. As this value is above the exploratory research threshold of 0.6 (Field 2009:675; Saunders *et al.* 2012:430), it was deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

In summary, seven factors resulted from the cognitive adaptability dimension and were labelled as follows:

- Goal orientation
- Metacognitive knowledge
 - Current metacognitive knowledge
 - Prior metacognitive knowledge
- Metacognitive experience
 - Current metacognitive experience
 - Prior metacognitive experience
- Metacognitive choice
- Monitoring

6.3.2 Validity and reliability of the Big Five personality traits

CFA and EFA were executed to measure the validity and reliability of the measuring instrument. Firstly, CFA was conducted to confirm the uni-dimensionality of the constructs. If the fit was not acceptable, EFA was conducted using principal axis factoring extraction and promax rotation, to determine the factor structure of each of the Big Five factor model of personality constructs.

6.3.2.1 Openness to experience

The results of the CFA and EFA of openness to experience are presented below.

6.3.2.1.1 CFA for openness to experience

The model fit results of the initial CFA indicated that the openness to experience dimension is not a single construct in the case of this study (Table 6.11).

Table 6.11: CFA fit indices of the openness to experience model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	1218.711	53	0.000	22.269	0.768	0.090	0.716	0.768

Acceptable model fit is indicated by a chi-square probability greater than or equal to 0.05. For this CFA model, the chi-square value is less than the recommended 0.05 and $p = 0.000$. Furthermore, as already indicated, acceptable model fit is indicated by a Comparative Fit Index (CFI) value of 0.90 or greater, a Tucker-Lewis Index (TLI) value of 0.90 or greater, and an Incremental Fit Index (IFI) value of 0.90 or greater (Hu & Bentler 1999:1). The CFI, TLI and IFI values for this CFA model are less than the recommended 0.90. Finally, since acceptable model fit is indicated by an RMSEA value of 0.08 or less (Hu & Bentler 1999:1), the 0.090 RMSEA value is larger than

the 0.08 or less criterion, resulting in an acceptable model fit. The single factor structure is thus not confirmed.

6.3.2.1.2 EFA of openness to experience

The Kaiser-Meyer-Olkin measure of sampling adequacy for openness to experience was 0.793, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 11 items dealing with openness to experience, thus indicating that the performance of a factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the openness to experience construct as the analysis identified four factors based on the Eigen value criterion (Eigen value greater than 1) and these four factors explain 55.193% of the variance. The factor loadings are shown in Table 6.12 below.

Table 6.12: Openness to experience factor loadings

Construct	Items	Loadings				Cronbach's alpha
		Factor 1	Factor 2	Factor 3	Factor 4	
Aesthetic Interest	V55: I am intrigued by patterns I find in art and nature.	0.340				0.710
	V65: Poetry has little or no effect on me.	0.600				
	V85: Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.	0.982				
Intellectual Interest	V50: I think it's interesting to learn and		0.339			0.544

Construct	Items	Loadings				Cronbach's alpha
		Factor 1	Factor 2	Factor 3	Factor 4	
	develop new hobbies.					
	V95: I have a lot of intellectual curiosity.		0.761			
	V100: I often enjoy playing with theories or abstract ideas.		0.550			
Unconventionality	V60: I believe letting students hear controversial speakers can only confuse and mislead them.			0.365		0.516
	V70: I would have difficulty just letting my mind wander without control or guidance.			0.367		
	V75: I seldom notice the moods or feelings that different environments produce.			0.529		
	V90: I have little interest in speculating on the nature of the universe or the human condition.			0.401		
Other (V45 loaded alone)	V45: I enjoy concentrating on a fantasy or daydream and exploring				0.696	

Construct	Items	Loadings				Cronbach's alpha
		Factor 1	Factor 2	Factor 3	Factor 4	
	all its possibilities, letting it grow and develop.					

Three factors were thus identified and labelled as: 1. Aesthetic interest; 2. Intellectual interest; and 3. Unconventionality. Using Cronbach's alpha-coefficient, the internal consistencies (reliabilities) for aesthetic interest, intellectual interest and unconventionality were found to be 0.710, 0.544 and 0.516 respectively. Although the last two values were below 0.6, which is considered acceptable for exploratory purposes, it was decided to retain them since authors such as Cortina (1993), Kline (1999) and Field (2005) still deem 0.5 acceptable. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.2.2 Conscientiousness

The results of the CFA and EFA of conscientiousness are presented below.

6.3.2.2.1 CFA for conscientiousness

The model fit results of the initial CFA indicated that the conscientiousness dimension is not a single construct in the case of this study (Table 6.13). With a chi-square value of 908.793, $df = 54$ resulting in a p-value of 0.00, and CFI, TLI and IFI values lower than the recommended threshold of 0.90, the model is on the low side. The 0.077 RMSEA value is smaller than the 0.08 or less criterion. The factor structure is not confirmed.

Table 6.13: CFA fit indices of the conscientiousness model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	908.793	54	0.000	16.829	0.891	0.077	0.842	0.891

6.3.2.2.2 EFA of conscientiousness

The Kaiser-Meyer-Olkin measure of sampling adequacy for conscientiousness was 0.896, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 12 items dealing with conscientiousness, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the conscientiousness construct, as the analysis identified two factors based on the Eigen value criterion (Eigen value greater than 1) and the factors explain 44.930% of the variance. The factor loadings are shown in Table 6.14 below.

Table 6.14: Conscientiousness factor loadings

Construct	Item	Loadings		Cronbach's alpha
		Factor 1	Factor 2	
Goal striving	V62: I try to perform all the tasks assigned to me conscientiously.	0.429		0.787
	V67: I have a clear set of goals and work toward them in an orderly fashion.	0.389		
	V77: I work hard to accomplish my goals.	0.718		
	V82: When I make a commitment, I can always be counted on to follow through.	0.542		
	V92: I am a productive person who always gets the job done.	0.672		
	V102: I strive for excellence in everything I do.	0.792		
Orderliness	V52: I'm pretty good about pacing myself so as to get things done on time.		0.428	0.659
	V57: I often come into situations without being fully prepared.		0.467	
	V72: I waste a lot of time before settling down to work.		0.644	
	V87: Sometimes I'm not as dependable or reliable as I should be.		0.395	
	V97: I never seem to be able to get organised.		0.560	
Other (V47 did not load)	V47: I keep my belongings neat and clean.			

Two factors were thus identified and labelled as: 1. Goal striving; and 2. Orderliness. Using Cronbach's alpha-coefficient, the internal consistency (reliability) for goal striving and orderliness were found to be 0.787 and 0.659 respectively. As both these values were found to be above the exploratory research threshold of 0.6, they were

deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.2.3 Extraversion

The results of the CFA and EFA of extraversion are presented below.

6.3.2.3.1 CFA for extraversion

The model fit results of the initial CFA indicated that the extraversion dimension is not a single construct in the case of this study (Table 6.15). With a chi-square value of 1521.229, $df = 54$ and a p-value of 0.00, as well as CFI, TLI and IFI values lower than the recommended threshold of 0.90, the model is on the low side. The 0.101 RMSEA value is larger than the 0.08 or less criterion. The factor structure is not confirmed.

Table 6.15: CFA fit indices of the extraversion model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	1521.229	54	0.000	28.171	0.762	0.101	0.709	0.762

The factor structure is not confirmed.

6.3.2.3.2 EFA of extraversion

The Kaiser-Meyer-Olkin measure of sampling adequacy for extraversion was 0.830, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 14 items dealing with extraversion, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the extraversion constructs as the analysis identified three factors based on the Eigen value criterion (Eigen value

greater than 1) and the factors explain 51.283% of the variance. The factor loadings are shown in Table 6.16 below.

Table 6.16: Extraversion factor loadings

Construct	Item	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
Sociability	V44: I like to have a lot of people around me.	0.479			0.673
	V54. I prefer jobs that let me work alone without being bothered by other people.	0.608			
	V59. I really enjoy talking to people.	0.387			
	V64. I like to be where the action is.	0.329			
	V69. I shy away from crowds of people.	0.591			
	V84. I don't get much pleasure from chatting with people.	0.398			
	V99. I would rather go my own way than be a leader of others.	0.445			
Positive Affect	V49. I laugh easily.		0.659		0.627
	V59. I really enjoy talking to people.		0.438		
	V79. I am a cheerful, high-spirited person.		0.660		

Construct	Item	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
	V84. I don't get much pleasure from chatting with people.		0.392		
Activity	V64. I like to be where the action is.			0.423	0.610
	V74. I often feel as if I'm bursting with energy.			0.576	
	V89. My life is fast-paced.			0.481	
	V94. I am a very active person.			0.544	

Three factors were thus identified and labelled as: 1. Sociability; 2. Positive affect; and 3. Activity. Using Cronbach's alpha-coefficient, the internal consistencies (reliabilities) for sociability, positive affect and activity were found to be 0.673, 0.627 and 0.610 respectively. As these values were all above the exploratory research threshold of 0.6, they were deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.2.4 Agreeableness

The results of the CFA and EFA of agreeableness are presented below.

6.3.2.4.1 CFA for agreeableness

The model fit results of the initial CFA indicated that the agreeableness dimension is not a single construct in the case of this study (Table 6.17). With a chi-square value of 1288.416, $df = 54$ resulting in a p-value of 0.00, and CFI, TLI and IFI values lower than the recommended threshold of 0.90, the model is on the low side. The 0.093 RMSEA value is larger than the 0.08 or less criterion. The factor structure is not confirmed.

Table 6.17: CFA fit indices of the agreeableness model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	1288.416	54	0.000	23.860	0.772	0.093	0.721	0.772

The factor structure is not confirmed.

6.3.2.4.2 EFA for agreeableness

The Kaiser-Meyer-Olkin measure of sampling adequacy for agreeableness was 0.820, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 11 items dealing with agreeableness, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the agreeableness constructs, as the analysis identified three factors based on the Eigen value criterion (Eigen value greater than 1) and the factors explain 48.882% of the variance. The factor loadings are shown in Table 6.18 below.

Table 6.18: Agreeableness factor loadings

Construct	Item	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
Tender-mindedness (Meekness)	V51. At times I bully or flatter people into doing what I want them to.	0.728			0.721
	V101. If necessary, I am willing to manipulate people to get what I want.	0.795			

Construct	Item	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
Non-antagonistic Orientation	V61. If someone starts a fight, I'm ready to fight back.		0.502		0.675
	V71. When I've been insulted, I just try to forgive and forget.		0.339		
	V86. I'm hard-headed and tough-minded in my attitudes.		0.566		
	V96. If I don't like people, I let them know it.		0.512		
Prosocial Orientation	V46. I try to be courteous to everyone I meet.			0.583	0.531
	V76. I tend to assume the best about people.			0.346	
	V91. I generally try to be thoughtful and considerate.			0.690	
Other	V56. Some people think I'm selfish and egotistical.				
	V66. I'm better than most people, and I know it.				

Three factors were thus identified and labelled as: 1. Tender-mindedness; 2. Non-antagonistic orientation; and 3. Prosocial orientation. Using Cronbach's alpha-coefficient, the internal consistencies (reliabilities) for tender-mindedness/meekness, non-antagonistic orientation and prosocial orientation were found to be 0.721, 0.675 and 0.531 respectively. Two of the constructs have values above the acceptable exploratory research threshold of 0.6, and the value of the third construct fell between 0.5 and 0.6 which is still deemed acceptable (Cortina 1993:98; Kline 1999;

Field 2005). Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.3.2.5 *Neuroticism*

The results of the CFA and EFA of neuroticism are presented below.

6.3.2.5.1 *CFA for neuroticism*

The model fit results of the initial CFA indicated that the neuroticism dimension is not a single construct in the case of this study (Table 6.19). With a chi-square value of 995.525, $df = 54$ and a p-value of 0.00, as well as CFI, TLI and IFI values lower than the recommended threshold of 0.90, the model is on the low side. The 0.079 RMSEA value is smaller than the 0.08 or less criterion.

Table 6.19: CFA fit indices of the neuroticism model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	995.525	54	0.000	17.349	0.878	0.079	0.851	0.879

The factor structure is not confirmed.

6.3.2.5.2 *EFA for neuroticism*

The Kaiser-Meyer-Olkin measure of sampling adequacy for neuroticism was 0.892, which is above the recommended threshold of 0.5 and the Bartlett's sphericity test was significant ($p < 0.001$) for the 11 items dealing with neuroticism, thus indicating that the factor analysis was appropriate.

The analysis did not confirm uni-dimensionality for the neuroticism constructs, as the analysis identified three factors based on the Eigen value criterion (Eigen value

greater than 1) and the factors explain 53.182% of the variance. The factor loadings are shown in Table 6.20 below.

Table 6.20: Neuroticism factor loadings

Construct	Items	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
Depression	V58. I rarely feel lonely or blue.	0.636			0.614
	V73. I rarely feel fearful or anxious.	0.683			
	V88. I am seldom sad or depressed.	0.759			
Self-reproach	V53. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.		0.338		0.730
	V68. Sometimes I feel completely worthless.		0.466		
	V83. Too often, when things go wrong, I get discouraged and feel like giving up.		0.619		
	93. I often feel helpless and want someone else to solve my problems.		0.747		
	V98. At times I have been so ashamed I just wanted to hide.		0.526		
Negative Affect	V48. At times I have felt bitter and resentful.			0.708	0.683

Construct	Items	Loadings			Cronbach's alpha
		Factor 1	Factor 2	Factor 3	
	V63. I often feel tense and jittery.			0.358	
	V78. I often get angry at the way people treat me.			0.771	

Three factors were thus identified and labelled as: 1. Depression; 2. Self-reproach; and 3. Negative affect. Using Cronbach's alpha-coefficient, the internal consistencies (reliabilities) for depression, self-reproach and negative affect were found to be 0.614, 0.730 and 0.683 respectively. As these values were all above the exploratory research threshold of 0.6, they were deemed satisfactory. Factor-based scores were subsequently calculated as the mean score of the variables included in each factor.

6.4 OPERATIONAL DEFINITIONS AND NEW HYPOTHESES OF THE SUBCOMPONENTS

6.4.1 Operational definitions of cognitive adaptability subcomponents

Current metacognitive knowledge has been operationalised as the extent to which the individuals rely on what is currently known about oneself, other people and strategy when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goal to manage a changing environment.

Prior metacognitive knowledge has been operationalised as the extent to which the individuals rely on what is previously known about oneself, other people and strategy when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goals to manage a changing environment.

Current metacognitive experience has been operationalised as the extent to which the individual relies on current idiosyncratic experiences, emotions and information

when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goals to manage a changing environment.

Prior metacognitive experience has been operationalised as the extent to which the individual relies on previous idiosyncratic experiences, emotions, information and intuition when engaging in the process of generating multiple decision frameworks focused on interpreting, planning and implementing goals to manage a changing environment.

6.4.2 Operational definitions of the Big Five personality trait subcomponents and new hypotheses

The subcomponents found in this study concur with Saucier (1998) as shown in Table 2.5. The following operational definitions have been formulated using the 10 highest adjective correlates from 525 person descriptors (Saucier 1997:1296).

6.4.2.1 *Openness to experience*

Unconventionality has been operationalised as the extent to which an individual is conservative, traditional and unusual.

Intellectual interest has been operationalised as the extent to which an individual is intellectual, philosophical, deep, intelligent and knowledgeable.

Aesthetic interest has been operationalised as the extent to which an individual is artistic, imaginative, tolerant and curious.

Goal orientation

H1(a): Unconventionality is positively related to *goal orientation*.

H1(b): Intellectual interest is positively related to *goal orientation*.

H1(c): Aesthetic interest is positively related to *goal orientation*.

Current metacognitive knowledge

- H2a(a): Unconventionality is positively related to *current metacognitive knowledge*.
- H2a(b): Intellectual interest is positively related to *current metacognitive knowledge*.
- H2a(c): Aesthetic interest is positively related to *current metacognitive knowledge*.

Prior metacognitive knowledge

- H2a(d): Unconventionality is positively related to *prior metacognitive knowledge*.
- H2a(e): Intellectual interest is positively related to *prior metacognitive knowledge*.
- H2a(f): Aesthetic interest is positively related to *prior metacognitive knowledge*.

Current metacognitive experience

- H3a(a): Unconventionality is positively related to *current metacognitive experience*.
- H3a(b): Intellectual interest is positively related to *current metacognitive experience*.
- H3a(c): Aesthetic interest is positively related to *current metacognitive experience*.

Prior metacognitive experience

- H3a(e): Unconventionality is positively related to *prior metacognitive experience*.
- H3a(f): Intellectual interest is positively related to *prior metacognitive experience*.
- H3a(g): Aesthetic interest is positively related to *prior metacognitive experience*.

Metacognitive choice

- H4a(a): Unconventionality is positively related to *metacognitive choice*.
H4a(b): Intellectual interest is positively related to *metacognitive choice*.
H4a(c): Aesthetic interest is positively related to *metacognitive choice*.

Monitoring

- H5a(a): Unconventionality is positively related to *monitoring*.
H5a(b): Intellectual interest is positively related to *monitoring*.
H5a(c): Aesthetic interest is positively related to *monitoring*.

6.4.2.2 *Conscientiousness*

Goal striving has been operationalised as the extent to which an individual is dedicated, ambitious, persistent and productive.

Orderliness has been operationalised as the extent to which an individual is organised, efficient, neat, systematic and thorough.

Goal orientation

- H6a(a): Orderliness is positively related to *goal orientation*.
H6a(b): Goal striving is positively related to *goal orientation*.

Current metacognitive knowledge

- H7a(a): Orderliness is positively related to *current metacognitive knowledge*.
H7a(b): Goal striving is positively related to *current metacognitive knowledge*.

Prior metacognitive knowledge

- H7a(c): Orderliness is positively related to *prior metacognitive knowledge*.
H7a(c): Goal striving is positively related to *prior metacognitive knowledge*.

Current metacognitive experience

- H8a(a): Orderliness is positively related to *current metacognitive experience*.
H8a(b): Goal striving is positively related to *current metacognitive experience*.

Prior metacognitive experience

- H8a(c): Orderliness is positively related to *prior metacognitive experience*.
H8a(d): Goal striving is positively related to *prior metacognitive experience*.

Metacognitive choice

- H9a(a): Orderliness is positively related to *metacognitive choice*.
H9a(b): Goal striving is positively related to *metacognitive choice*.

Monitoring

- H10a(a): Orderliness is positively related to *monitoring*.
H10a(b): Goal striving is positively related to *monitoring*.

6.4.2.3 Extraversion subcomponents

Activity has been operationalised as the extent to which an individual is energetic, active, exciting, lively, busy, powerful, awesome and influential.

Positive affect has been operationalised as the extent to which an individual is joyful, cheerful, laughing, positive, glad and lively.

Sociability has been operationalised as the extent to which an individual is active, gets along with others, and is talkative.

Goal orientation

- H11a(a): Activity is positively related to *goal orientation*.
H11a(b): Positive affect is positively related to *goal orientation*.
H11a(c): Sociability is positively related to *goal orientation*.

Current metacognitive knowledge

- H12a(a): Activity is positively related to *current metacognitive knowledge*.
- H12a(b): Positive affect is positively related to *current metacognitive knowledge*.
- H12a(c): Sociability is positively related to *current metacognitive knowledge*.

Prior metacognitive knowledge

- H12a(d): Activity is positively related to *prior metacognitive knowledge*.
- H12a(e): Positive affect is positively related to *prior metacognitive knowledge*.
- H12a(f): Sociability is positively related to *prior metacognitive knowledge*.

Current metacognitive experience

- H13a(a): Activity is positively related to *current metacognitive experience*.
- H13a(b): Positive affect is positively related to *current metacognitive experience*.
- H13a(c): Sociability is positively related to *current metacognitive experience*.

Prior metacognitive experience

- H13a(d): Activity is positively related to *prior metacognitive experience*.
- H13a(e): Positive affect is positively related to *prior metacognitive experience*.
- H13a(f): Sociability is positively related to *prior metacognitive experience*.

Metacognitive choice

- H14a(a): Activity is positively related to *metacognitive choice*.
- H14a(b): Positive affect is positively related to *metacognitive choice*.
- H14a(c): Sociability is positively related to *metacognitive choice*.

Monitoring

- H15a(a): Activity is positively related to *monitoring*.
- H15a(b): Positive affect is positively related to *monitoring*.
- H15a(c): Sociability is positively related to *monitoring*.

6.4.2.4 Agreeableness subcomponents

Meekness has been operationalised as the extent to which an individual is patient, long-suffering, forbearing and resigned.

Prosocial orientation has been operationalised as the extent to which an individual is friendly, kind-hearted, pleasant, considerate helpful and warm-hearted.

Non-antagonistic orientation has been operationalised as the extent to which an individual is not grouchy, arrogant, irritable, hot-tempered, hostile and argumentative.

Goal orientation

- H16a(a): Meekness is positively related to *goal orientation*.
- H16a(b): Prosocial orientation is positively related to *goal orientation*.
- H16a(c): Non-antagonistic orientation is positively related to *goal orientation*.

Current metacognitive knowledge

- H17a(a): Meekness is positively related to *current metacognitive knowledge*.
- H17a(b): Prosocial orientation is positively related to *current metacognitive knowledge*.
- H17a(c): Non-antagonistic orientation is positively related to *current metacognitive knowledge*.

Prior metacognitive knowledge

- H17a(d): Meekness is positively related to *prior metacognitive knowledge*.
- H17a(e): Prosocial orientation is positively related to *prior metacognitive knowledge*.
- H17a(f): Non-antagonistic orientation is positively related to *prior metacognitive knowledge*.

Current metacognitive experience

- H18a(a): Meekness is positively related to *current metacognitive experience*.
- H18a(b): Prosocial orientation is positively related to *current metacognitive experience*.
- H18a(c): Non-antagonistic orientation is positively related to *current metacognitive experience*.

Prior metacognitive experience

- H18a(d): Meekness is positively related to *prior metacognitive experience*.
- H18a(e): Prosocial orientation is positively related to *prior metacognitive experience*.
- H18a(f): Non-antagonistic orientation is positively related to *prior metacognitive experience*.

Metacognitive choice

- H19a(a): Meekness is positively related to *metacognitive choice*.
- H19a(b): Prosocial orientation is positively related to *metacognitive choice*.
- H19a(c): Non-antagonistic orientation is positively related to *metacognitive choice*.

Monitoring

- H20a(a): Meekness is positively related to *monitoring*.
- H20a(b): Prosocial orientation is positively related to *monitoring*.
- H20a(c): Non-antagonistic orientation is positively related to *monitoring*.

6.4.2.5 Neuroticism subcomponents

Depression has been operationalised as the extent to which an individual is lonely, fearful, anxious and depressed.

Self-reproach has been operationalised as the extent to which an individual is sad, afraid, insecure, depressed and troubled.

Negative affect has been operationalised as the extent to which an individual is depressed, sad, worried, afraid and insecure.

Goal orientation

- H21a(a): Depression is positively related to *goal orientation*.
H21a(b): Self-reproach is positively related to *goal orientation*.
H21a(c): Negative affect is positively related to *goal orientation*.

Current metacognitive knowledge

- H22a(a): Depression is positively related to *current metacognitive knowledge*.
H22a(b): Self-reproach is positively related to *current metacognitive knowledge*.
H22a(c): Negative affect is positively related to *current metacognitive knowledge*.

Prior metacognitive knowledge

- H22a(d): Depression is positively related to *prior metacognitive knowledge*.
H22a(e): Self-reproach is positively related to *prior metacognitive knowledge*.
H22a(f): Negative affect is positively related to *prior metacognitive knowledge*.

Current metacognitive experience

- H23a(a): Depression is positively related to *current metacognitive experience*.
- H23a(b): Self-reproach is positively related to *current metacognitive experience*.
- H23a(c): Negative affect is positively related to *current metacognitive experience*.

Prior metacognitive experience

- H23a(d): Depression is positively related to *prior metacognitive experience*.
- H23a(e): Self-reproach is positively related to *prior metacognitive experience*.
- H23a(f): Negative affect is positively related to *prior metacognitive experience*.

Metacognitive choice

- H24a(a): Depression is positively related to *metacognitive choice*.
- H24a(b): Self-reproach is positively related to *metacognitive choice*.
- H24a(c): Negative affect is positively related to *metacognitive choice*.

Monitoring

- H25a(a): Depression is positively related to *monitoring*.
- H25a(b): Self-reproach is positively related to *monitoring*.
- H25a(c): Negative affect is positively related to *monitoring*.

6.5 DESCRIPTIVE STATISTICS

The descriptive statistics on the summated scores are presented below.

6.5.1 Cognitive adaptability

Descriptive analysis was conducted, in which the mean scores for the metacognitive dimensions were all above mid-point (3) level (Table 6.41). The subcomponent of metacognitive knowledge, prior metacognitive knowledge was low. A relatively high average score emerged for all the other dimensions suggesting that individuals had medium to high levels of metacognition on goal orientation, current metacognitive knowledge, current metacognitive experience, prior metacognitive experience, and metacognitive choice and monitoring. A low level score on prior metacognitive experience suggests that individuals have low levels of prior metacognitive knowledge.

Correlation analysis was first conducted to ensure that the nature of relationships is understood. The correlation between the variables is reported with levels of significance denoted, as depicted in Table 6.21.

Table 6.21: Cognitive adaptability descriptive statistics and correlations

	Mean	Std.Dev	1	2	3	4	5	6	7
Monitoring	3.164	0.415	1						
Choice	3.131	0.455	0.670	1					
Current ME	3.353	0.396	0.621	0.486	1				
Prior ME	3.103	0.659	0.115	0.120	0.166	1			
Prior MK	1.738	0.513	-0.314	-0.257	-0.317	0.171	1		
Current MK	3.261	0.386	0.700	0.604	0.647	0.225	-0.255	1	
Goal orientation	3.2117	0.463	0.679	0.570	0.658	0.074	-0.254	0.636	1

6.5.2 The Big Five personality trait subcomponents

6.5.2.1 Openness to experience subdimensions

Similarly, descriptive analyses were performed on the subcomponents of openness to experience. The mean score for intellectual interest was slightly above the mid-point (3) level (Table 6.22). Both unconventionality and aesthetic interest scores were below the mid-point. This suggests that on openness to experience, established entrepreneurs in this study had higher levels of intellectual interest than unconventionality and aesthetic interest levels.

Table 6.22: Correlation results for openness to experience subfactors with each of the cognitive adaptability factors

		IV: Openness to experience subfactors	DV: Cognitive adaptability dimensions						
Mean	Std. Dev		GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
2.956	0.490	Unconventionality	.087**	.150**	.091**	.082**	.099**	.050*	.086**
3.193	0.4770	Intellectual Interest	.300**	.392**	.068**	.137**	.308**	.251**	.285**
2.696	0.664	Aesthetic Interest	.198**	.233**	0.021	.068**	.135**	.134**	.205**

6.5.2.2 Conscientiousness subcomponents

The mean scores of conscientiousness subcomponents are represented in Table 6.23 below. Both orderliness and goal striving have mean scores above the mid-point level suggesting that the respondents are conscientious. However, goal striving is higher than orderliness giving this dimension additional fidelity (Saucier 1998:275). Saucier (1998:275) argued that the subcomponents afford the researchers some degree of additional fidelity. The item clusters allow researchers and practitioners

potential to distinguish the strongly goal striving but not strongly orderly from the barely goal striving but strongly orderly.

Table 6.23: Correlation results for conscientiousness subfactors with each of the cognitive adaptability factors

		IV: Conscientiousness	DV: Cognitive adaptability factors						
Mean	Std. Dev		GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
3.211	0.463	Orderliness	.347**	.249**	-.099**	-0.021	.467**	.194**	.278**
3.364	0.403	Goal striving	.527**	.459**	-.234**	.139**	.588**	.341**	.437**

6.5.2.3 Extraversion subcomponents

Extraversion subcomponents are shown in Table 6.24 below. The mean score for positive affect is above the mid-point level, whereas both activity and sociability are below the mid-point. This suggests that respondents in this study have higher levels of positive affect than activity and sociability levels.

Table 6.24: Correlation results for the extraversion subfactors with each of the cognitive adaptability factors

		IV: Extraversion subfactors	DV: Cognitive adaptability factors						
Mean	Std. Dev.		GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
2.975	0.466	Activity	.294**	.283**	-.054**	.189**	.305**	.186**	.192**
3.137	0.491	Positive Affect	.167**	.211**	-.091**	.112**	.190**	.134**	.162**
2.589	0.526	Sociability	.081**	.062**	0.005	0.018	.061**	0.022	0.023

6.5.2.4 Agreeableness subcomponents

Agreeableness subcomponents are shown below in Table 6.25. A relatively higher score for prosocial orientation emerged, with mean score levels of meekness and non-antagonistic orientation lower than average. This suggests that respondents in this study exhibited higher levels of prosocial orientation than meekness and non-antagonistic orientation.

Table 6.25: Correlation results for the agreeableness subfactors with each of the cognitive adaptability factors

Mean	Std. Dev.	IV: agreeableness subfactors	DV: cognitive adaptability						
			GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
2.665	0.729	Meekness	0.025	0.026	0.007	-.143**	.045*	.040*	.077**
3.252	0.426	Prosocial orientation	.166**	.261**	-.181**	.092**	.198**	.189**	.246**
2.621	0.504	Non-antagonistic orientation	-0.019	-0.012	-0.012	-.153**	-0.031	-0.019	0.037

6.5.2.5 Neuroticism subcomponents

Relatively lower scores for self-reproach emerged with mean score levels of depression and negative affect higher than average.

Table 6.26: Correlation results for the neuroticism subfactors with each of the cognitive adaptability factors

Mean	Std. Dev.	IV: Neuroticism subfactors	DV: Cognitive adaptability						
			GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
2.1281	0.636	Depression	-.083**	-.132**	0.023	-.083**	-.161**	-.090**	-.080**
1.768	0.523	Self-Reproach	-.188**	-.191**	-0.006	-.061**	-.307**	-.078**	-.131**
2.277	0.549	Negative Affect	-.068**	-.090**	-.114**	.042*	-.192**	0.009	-0.035

6.6 STRUCTURAL EQUATION MODELLING (SEM) FOR THE FIVE PERSONALITY TRAIT DIMENSIONS

Model estimation and specification were conducted using CFA processes. The CFA processes were used to determine whether the hypothesised structure provided a good fit to the data, i.e. whether a relationship existed between the observed variables and the underlying latent or unobserved constructs. The findings are provided below.

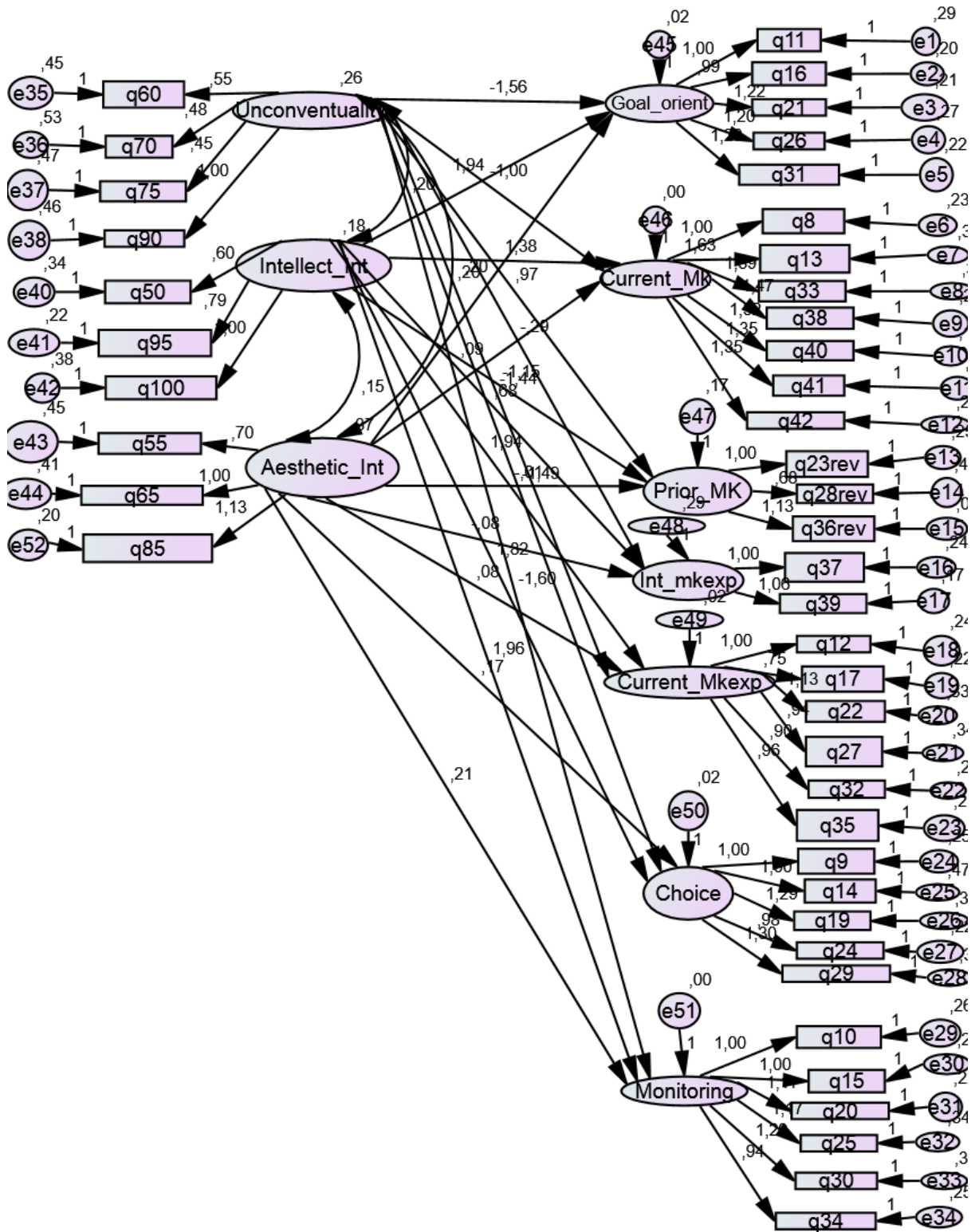
6.6.1 Evaluation of hypothesised model for openness to experience

The model evaluation and the notes for openness to experience model (default model) are provided in this section.

6.6.1.1 Structural model for openness to experience subconstructs and the seven cognitive adaptability dimensions

The structural model for the openness to experience subconstructs and cognitive adaptability dimensions is illustrated in Figure 6.7.

Fig. 6.7: Structural model for openness to experience personality trait subconstructs and cognitive adaptability dimensions



The results (standardised regression weight) yielded a number of standardised regression weights that were larger than 1 or -1 (refer to Table 1 in appendix B). As it is known that the presence of multi-collinearity can produce standardised regression weights larger than 1 (Joreskog 1999:1), inspection of the results revealed multi-collinearity of the subconstructs unconventionality and intellectual interest (correlation value of 0.925). In the light of these results and the results of the fit statistics (refer to Table 6.27 below), it was therefore decided to consider openness to experience as a single construct for testing the relationship.

Table 6.27: Fit indices of the original openness to experience model (subconstructs)

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	6859.976	879	0.000	7.804	0.824	0.051	0.811	0.824

6.6.1.2 Structural model for openness to experience as a single construct and the seven cognitive adaptability dimensions

The structural model for the openness to experience as a single construct and the seven identified cognitive adaptability dimensions is illustrated in Figure 6.8. Table 6.28 explains the fit indices for openness as a single construct.

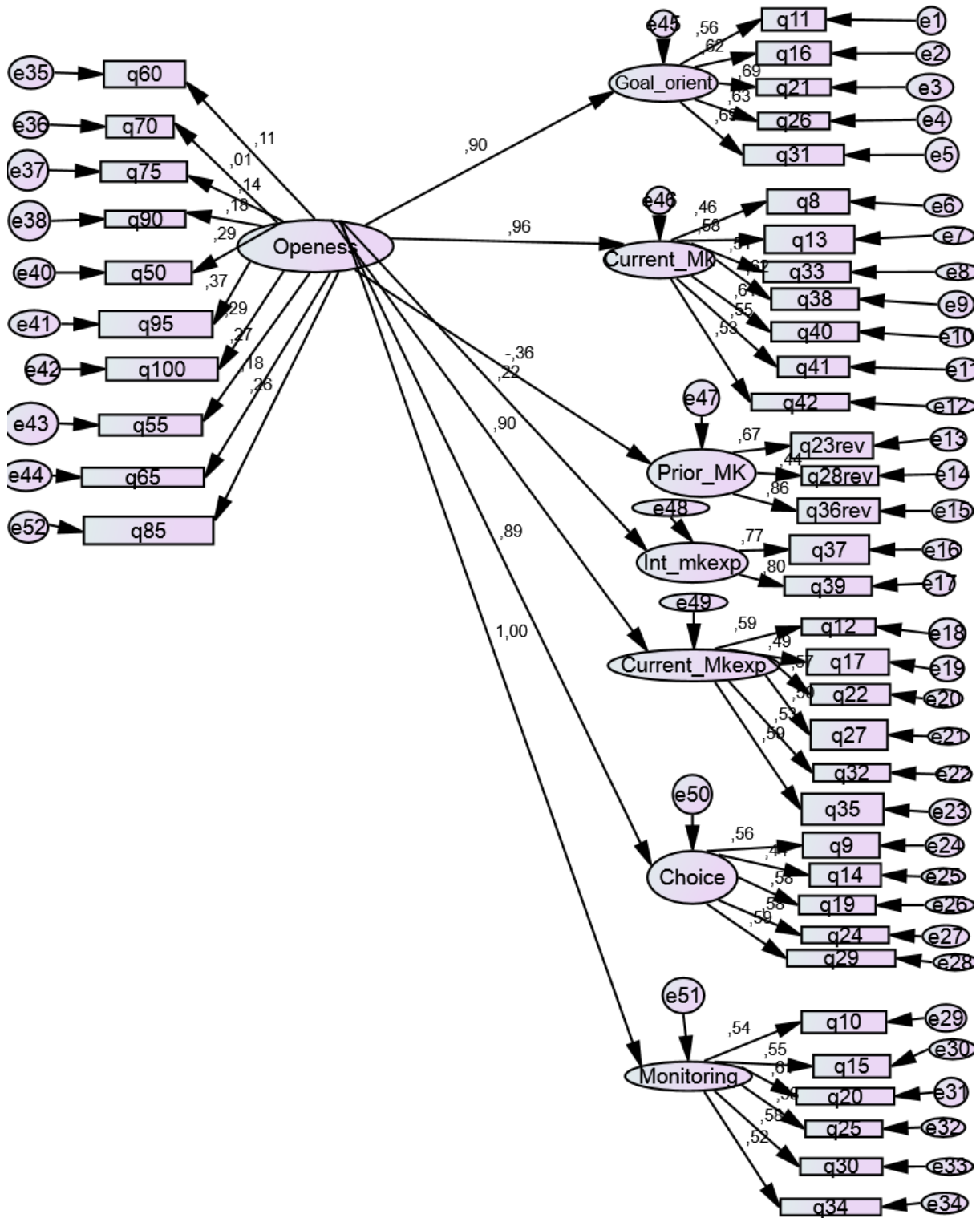
The results in Table 6.28 show acceptable fit according to the RMSEA, but the CFI, TLI and IFI values were below the recommended threshold of 0.90.

Table 6.28: Fit indices of the original openness to experience model (single construct)

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	10334.850	896	0.000	11.534	0.723	0.063	0.723	0.707

The data thus does not reveal acceptable fit to the structural model.

Fig. 6.8: Structural model for openness to experience as a single construct and cognitive adaptability dimensions



One of the greatest advantages of the RMSEA is its ability for a confidence interval to be calculated around its value (McCallum *et al.* 1996). This is possible due to the known distribution values of the statistic and subsequently allows for the null hypothesis (poor fit) to be tested more precisely (McQuitty 2004). It is generally reported in conjunction with the RMSEA and in a well-fitting model the lower limit is close to zero, while the upper limit should be less than 0.08. Due to the RMSEA value of 0.063 it was decided to continue with path analysis, as this value is the main contributor to the model fit indices which determine acceptable fit or not.

The standardised regression coefficients and the statistical significance of each of the paths are provided in Tables 6.29 and 6.30.

Table 6.29: Standardised regression weights for openness to experience to each of the cognitive adaptability factors

Openness to experience with cognitive adaptability factors	Estimate
Goal orientation	0.899
Current metacognitive knowledge	0.962
Prior metacognitive knowledge	-0.361
Prior metacognitive experience	0.222
Current metacognitive experience	0.901
Metacognitive choice	0.890
Monitoring	1.000

Table 6.30: Unstandardised regression weights for openness to experience to each of the cognitive adaptability factors

Openness to experience with cognitive adaptability factors	Estimate	S.E.	C.R.	P	Label
Goal orientation	1.480	0.110	13.459	***	
Current metacognitive knowledge	1,071	0.084	12.802	***	
Prior metacognitive knowledge	-0.746	0.071	-10.434	***	
Prior metacognitive experience	0.576	0.078	7.388	***	
Current metacognitive experience	1.442	0.106	13.593	***	
Metacognitive choice	1.352	0.101	13.360	***	
Monitoring	1.490	0.110	13.595	***	

All path coefficients were found to be statistically significant. The relationships between openness to experience and goal orientation, current metacognitive knowledge, prior metacognitive experience, current metacognitive experience, metacognitive choice and monitoring are positive. In the case of the relationship between openness to experience and prior metacognitive knowledge, the relationship is negative. A possible reason for this negative relationship might be that metacognition represents an important resource for entrepreneurs - above and beyond prior knowledge - given that they are often required to perform dynamic and novel tasks (Hill & Levenhagen 1995:1057). Entrepreneurs who rely on their prior metacognitive knowledge might not survive in a dynamic and unstable environment which may require flexibility. When environmental cues change decision-makers adapt their cognitive responses and develop strategies for responding to the environment (Earley *et al.* 1989b:589).

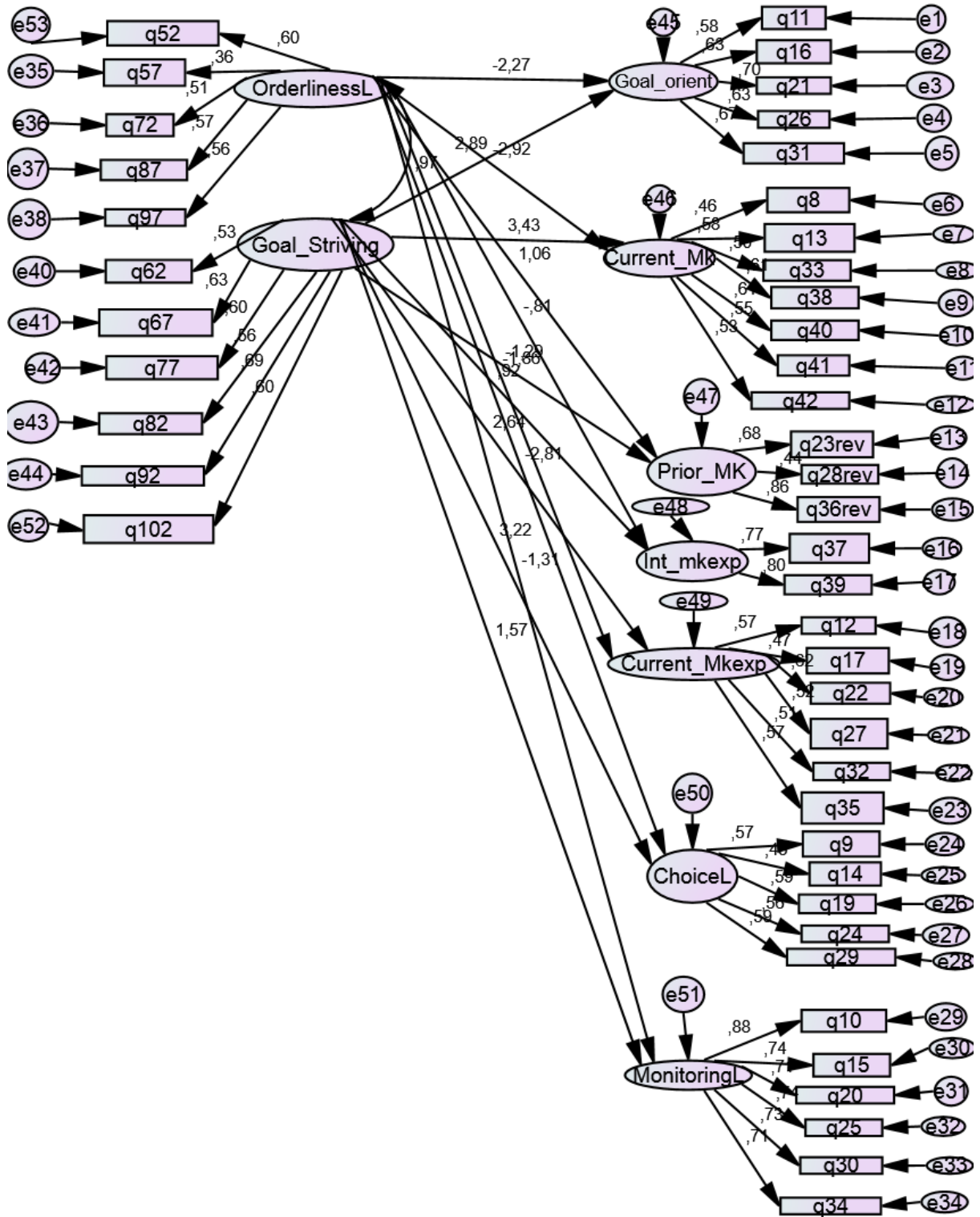
6.6.2 Evaluation of hypothesised model for conscientiousness

The model evaluation and the notes for the conscientiousness model (default model) are provided in this section.

6.6.2.1 Structural model for conscientiousness subconstructs and the seven cognitive adaptability dimensions

The structural model for the conscientiousness subconstructs and cognitive adaptability dimensions is illustrated in Figure 6.9.

Fig. 6.9: Structural model for conscientiousness personality trait subconstructs and cognitive adaptability dimensions



The results (standardised regression weight) again yielded a number of standardised regression weights that were larger than 1 or -1 (refer to Table 2 in appendix B). As it is known that the presence of multi-collinearity can produce standardised regression weights larger than 1 (Joreskog 1999:1), inspection of the results revealed multi-collinearity of the subdimensions orderliness and goal striving (correlation value of 0.966). In the light of these results, and analysing the results of the fit statistics (refer to Table 6.31 below), it was therefore decided to consider conscientiousness as a single construct for testing the relationship.

Table 6.31: Fit indices of the original conscientiousness model (subconstructs)

Model	Chi-square	Df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	11657.408	931	0.000	12.521	0.719	0.066	0.688	0.720

6.6.2.2 Structural model for conscientiousness as a single construct and the seven cognitive adaptability dimensions

The structural model for conscientiousness as a single construct and the seven identified cognitive adaptability dimensions is illustrated in Figure 6.10. Table 6.26 explains the fit indices for conscientiousness as a single construct.

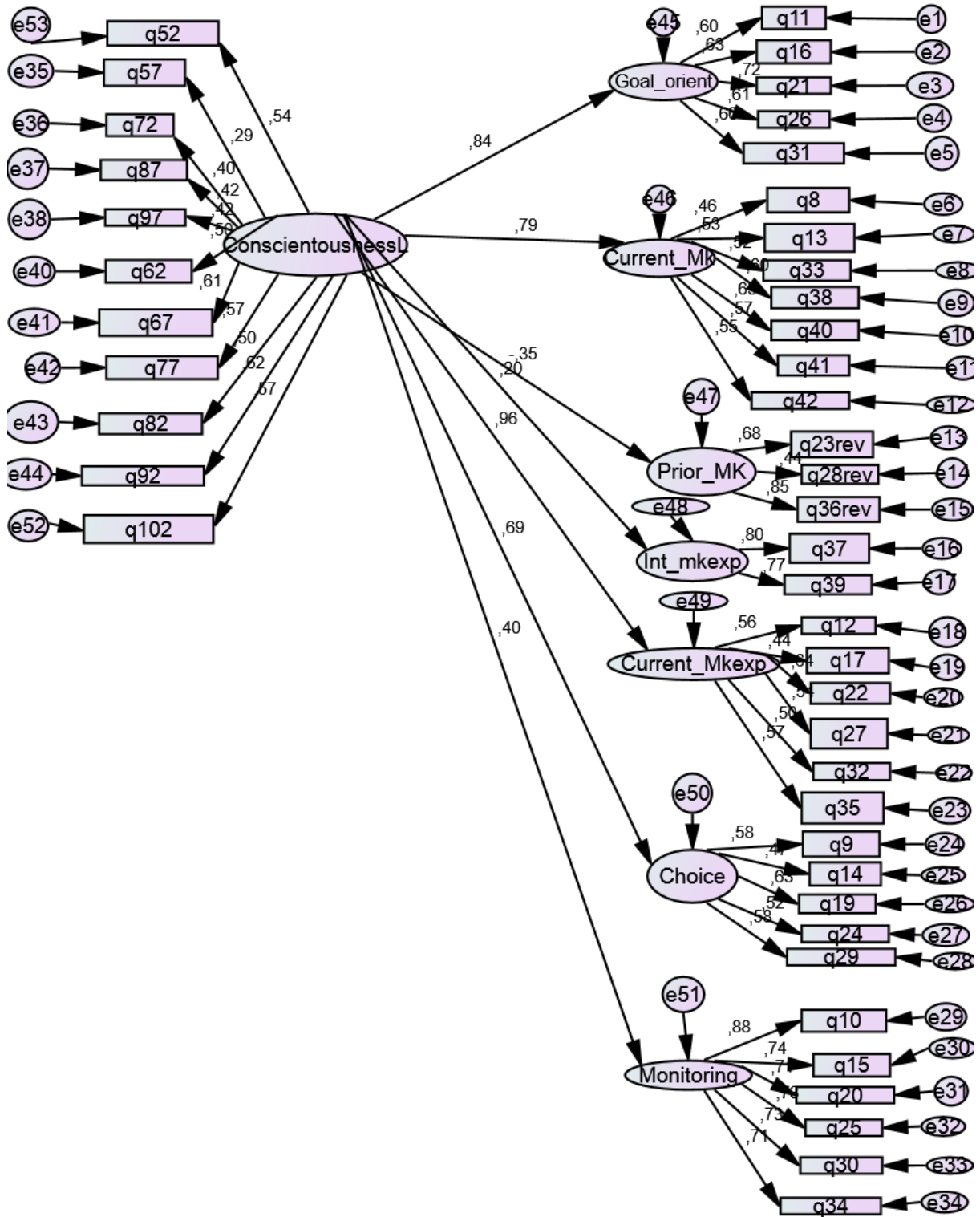
The results in Table 6.32 show acceptable fit according to the RMSEA, but the CFI, TLI and IFI values were below the recommended threshold of 0.90.

Table 6.32: Fit indices of the original conscientiousness model (single construct)

Model	Chi-square	Df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	13692.195	939	0.000	14.869	0.659	0.072	0.624	0.660

The data thus does not reveal acceptable fit to the structural model.

Fig. 6.10: Structural model for conscientiousness as a single construct and cognitive adaptability dimensions



Due to the RMSEA value of 0.072 it was decided to continue with path analysis as this value is the main contributor to the model fit indices which determine acceptable fit or not.

The standardised regression coefficients and the statistical significance of each of the paths are provided in Tables 6.33 and 6.34.

Table 6.33: Standardised regression weights for conscientiousness to each of the cognitive adaptability factors

Conscientiousness with cognitive adaptability factors	Estimate
Goal orientation	0.843
Current metacognitive knowledge	0.794
Prior metacognitive knowledge	-0.353
Prior metacognitive experience	0.199
Current metacognitive experience	0.961
Metacognitive choice	0.693
Monitoring	0.404

Table 6.34: Unstandardised regression weights for conscientiousness to each of the cognitive adaptability factors

Conscientiousness with cognitive adaptability factors	Estimate	S.E.	C.R.	P	Label
Goal orientation	1.048	0.046	22.857	***	
Current metacognitive knowledge	0.621	0.034	18.273	***	
Prior metacognitive knowledge	-0.517	0.040	-13.066	***	
Prior metacognitive experience	0.376	0.049	7.630	***	
Current metacognitive experience	1.024	0.045	22.912	***	
Metacognitive choice	0.762	0.039	19.604	***	
Monitoring	1.403	0.082	17.129	***	

All path coefficients were found to be statistically significant. The relationships between conscientiousness and goal orientation, current metacognitive knowledge, prior metacognitive experience, current metacognitive experience, metacognitive

choice and monitoring are positive. In the case of the relationship between conscientiousness and prior metacognitive knowledge the relationship is negative. A possible reason for this negative relationship could be that for some individuals, a lack of prior knowledge might be overcome (at least in part) by the use of cognitive mechanisms to facilitate expeditious and effective learning and adaptation (Haynie *et al.* 2010:237).

6.6.3 Evaluation of hypothesised model for extraversion

The model evaluation and the notes for the extraversion model (default model) are provided in this section.

6.6.3.1 *Structural model for the extraversion subconstructs and the seven cognitive adaptability dimensions*

The structural model for the extraversion subconstructs and cognitive adaptability dimensions could not be run due to unsuccessful minimisation.

6.6.3.2 *Structural model for extraversion as a single construct and the seven cognitive adaptability dimensions*

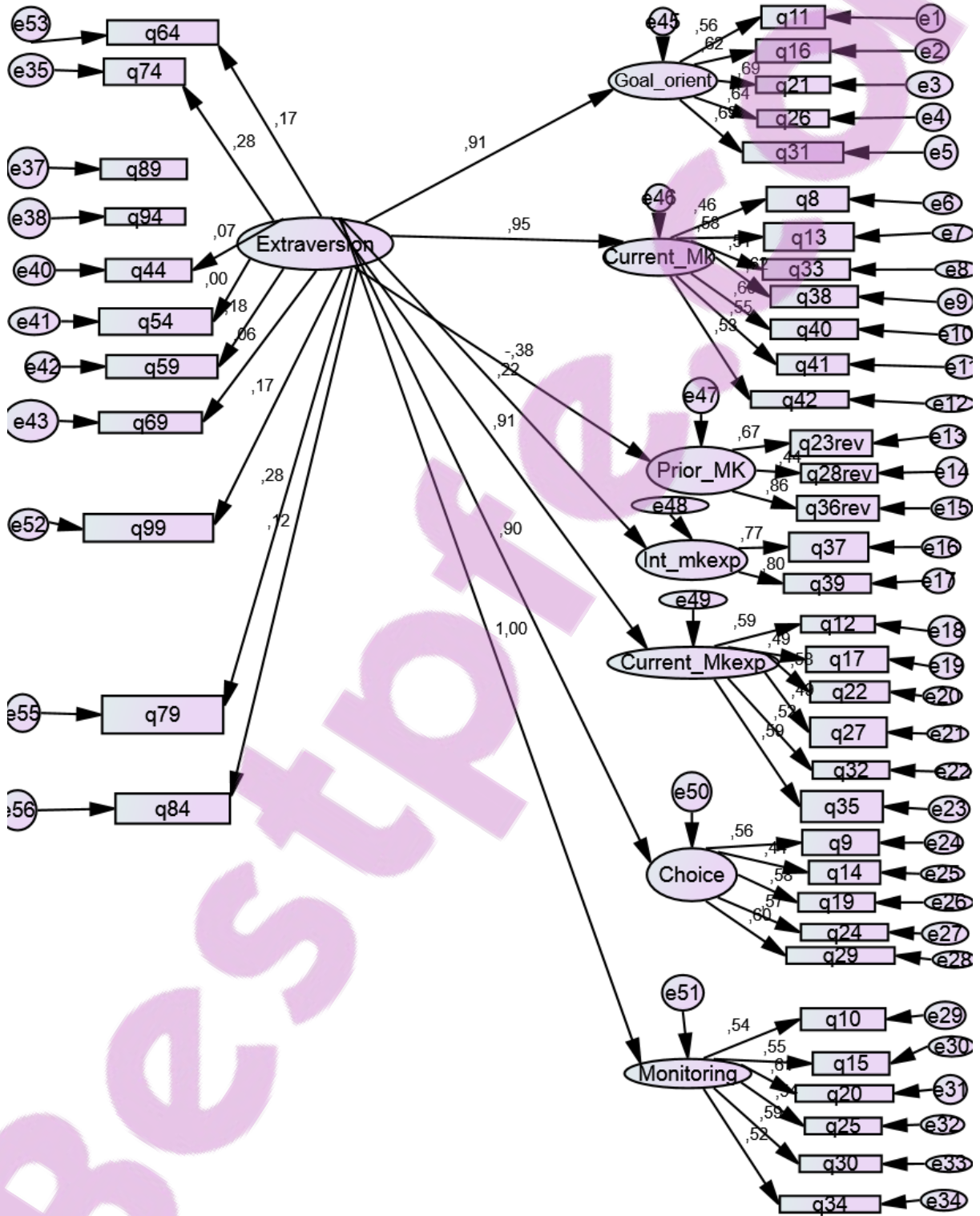
The structural model for extraversion as a single construct and the seven identified cognitive adaptability dimensions is illustrated in Figure 6.11. Table 6.35 explains the fit indices for extraversion as a single construct. The results in Table 6.29 show acceptable fit according to the RMSEA, but the CFI, IFI and TLI values were below the recommended threshold of 0.90.

Table 6.35: Fit indices of the original extraversion model (single construct)

Model	Chi-square	Df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	11788.49	940	0.000	12.541	0.689	0.066	0.762	0.689

The data thus does not reveal acceptable fit to the structural model.

Fig. 6.11: Structural model for extraversion as a single construct and cognitive adaptability dimensions



Due to the RMSEA value of 0.066 it was decided to continue with path analysis as this value is the main contributor to the model fit indices which determine acceptable fit or not.

The standardised regression coefficients and the statistical significance of each of the paths are provided in Tables 6.36 and 6.37.

Table 6.36: Standardised regression weights for extraversion to each of the cognitive adaptability factors

Extraversion and cognitive adaptability factors	Estimate
Goal orientation	0.910
Current metacognitive knowledge	0.950
Prior metacognitive knowledge	-0.377
Prior metacognitive experience	0.220
Current metacognitive experience	0.914
Metacognitive choice	0.896
Monitoring	0.995

Table 6.37: Unstandardised regression weights for extraversion to each of the cognitive adaptability factors

Extraversion and cognitive adaptability factors	Estimate	S.E.	C.R.	P	Label
Goal orientation	2.691	0.306	8.794	***	
Current metacognitive knowledge	1.907	0.222	8.592	***	
Prior metacognitive knowledge	-1.399	0.178	-7.843	***	
Prior metacognitive experience	1.032	0.166	6.221	***	
Current metacognitive experience	2.642	0.299	8.839	***	
Metacognitive choice	2.454	0.280	8.768	***	
Monitoring	2.675	0.303	8.820	***	

All path coefficients were found to be statistically significant. The relationships between extraversion and goal orientation, current metacognitive knowledge, prior

metacognitive experience, current metacognitive experience, metacognitive choice and monitoring are positive. In the case of the relationship between extraversion and prior metacognitive knowledge the relationship is negative. A possible contributor for the negative relationship between extraversion and prior metacognitive knowledge could be that when environmental cues change, decision-makers adapt their cognitive responses and develop strategies for responding to the environment (Earley *et al.* 1989b:589).

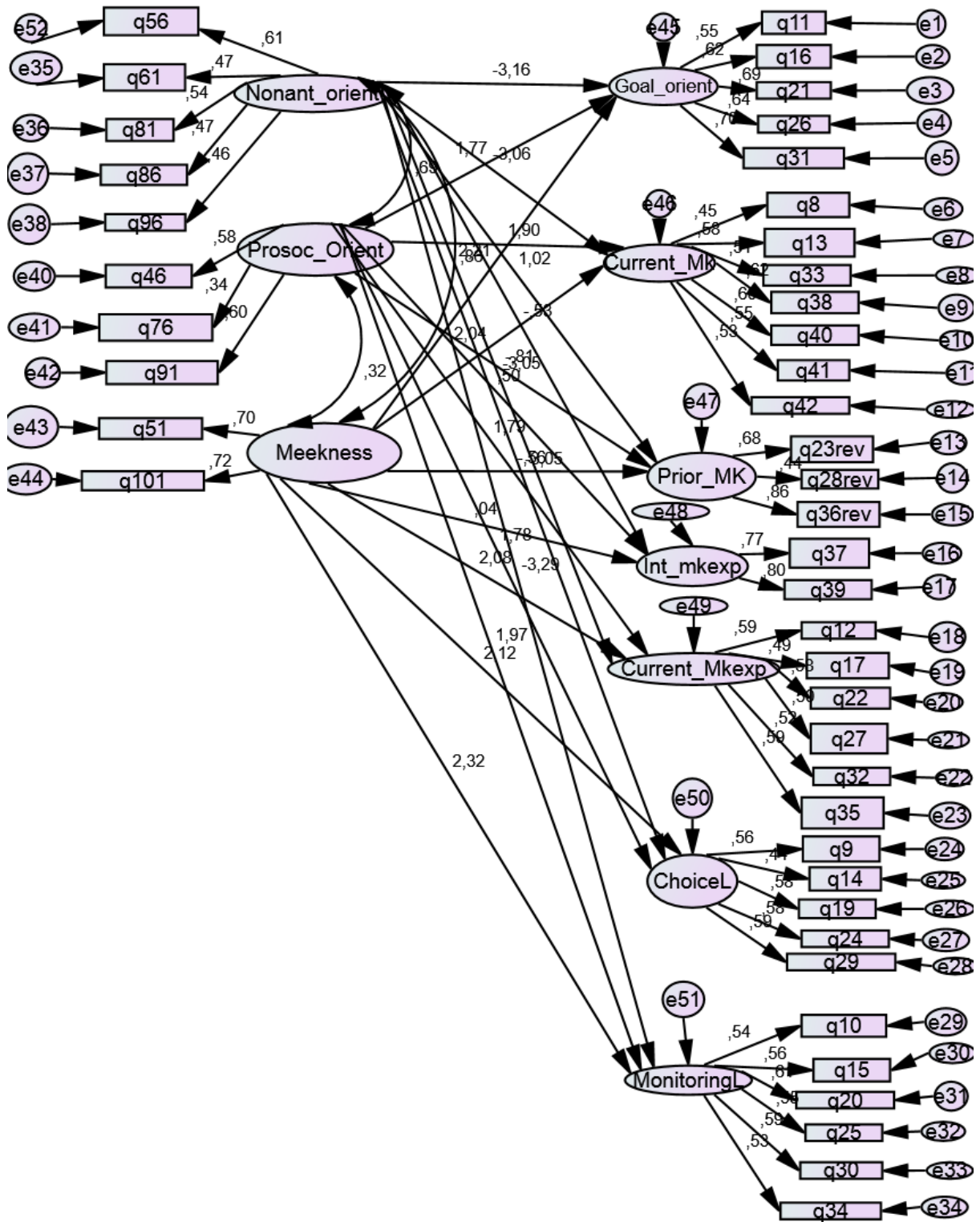
6.6.4 Evaluation of hypothesised model for agreeableness

The model evaluation and the notes for the agreeableness model (default model) are provided in this section.

6.6.4.1 Structural model for agreeableness subconstructs and the seven cognitive adaptability dimensions

The structural model for the agreeableness subconstructs and cognitive adaptability dimensions is illustrated in Figure 6.12.

Fig. 6.12: Structural model for agreeableness personality trait subconstructs and cognitive adaptability dimensions



The results (standardised regression weight) yielded a number of standardised regression weights that were larger than 1 or -1 (refer to Table 3 in appendix B). As it is known that the presence of multi-collinearity can produce standardised regression weights larger than 1 (Joreskog 1999:1), inspection of the results revealed multi-collinearity of the subconstructs of non-antagonistic orientation, prosocial orientation and meekness (correlation value of 0.688). In the light of these results and the results of the fit statistics (refer to Table 6.38 below), it was therefore decided to consider agreeableness as a single construct for testing the relationship.

Table 6.38 Fit indices of the original agreeableness model (subconstructs)

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	6780.803	879	0.000	7.714	0.827	0.050	0.813	0.827

6.6.4.2 Structural model for agreeableness as a single construct and the seven cognitive adaptability dimensions

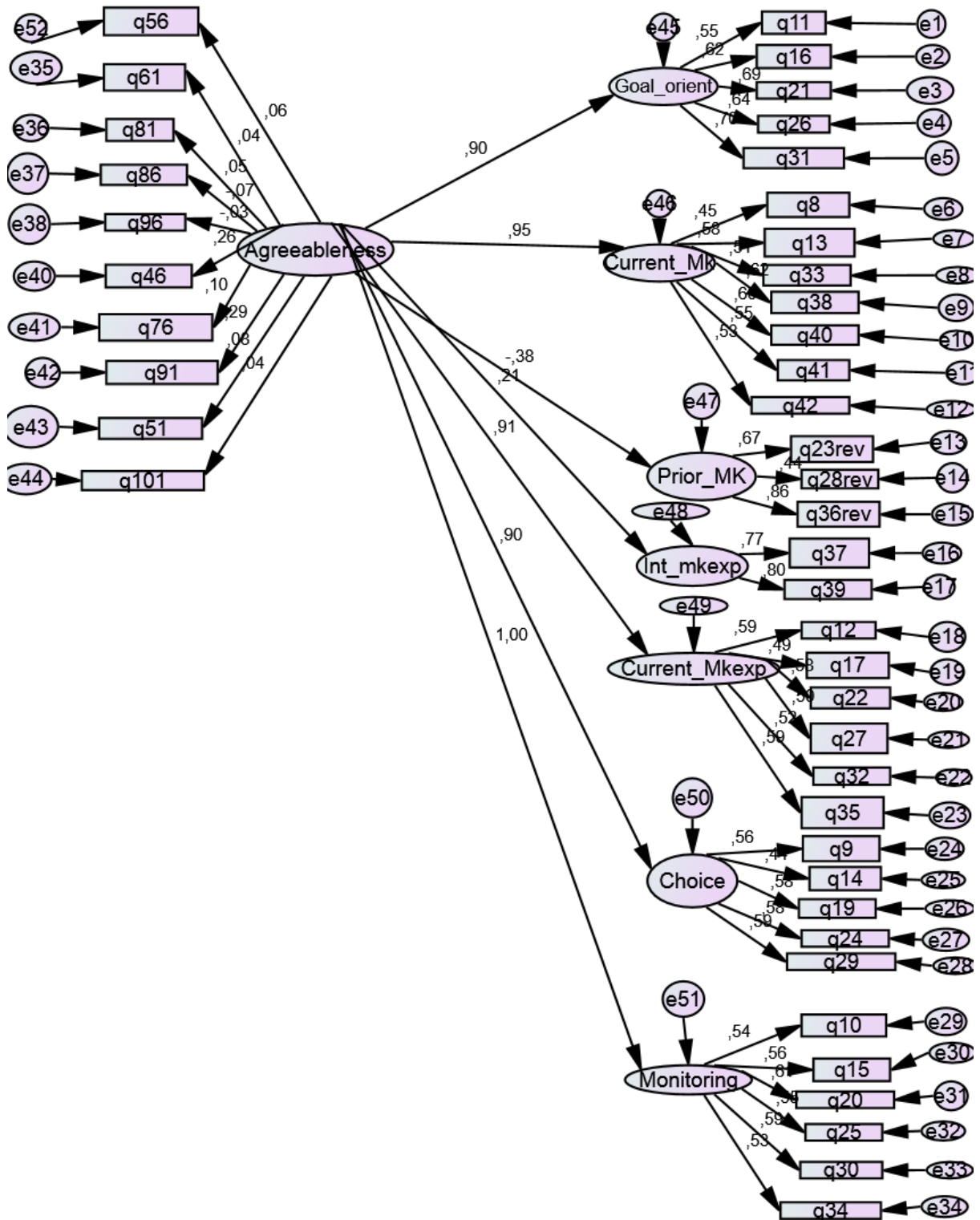
The structural model for agreeableness as a single construct and the seven identified cognitive adaptability dimensions is illustrated in Figure 6.13. Table 6.39 explains the fit indices for agreeableness as a single construct. The results in Table 6.35 show acceptable fit according to the RMSEA, but the CFI and TLI values were below the recommended threshold of 0.90.

Table 6.39: Fit indices of the original agreeableness model

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	11044.789	896	0.000	12.327	0.702	0.065	0.685	0702

The data thus does not reveal acceptable fit.

Fig. 6.13: Structural model for agreeableness as a single construct and cognitive adaptability dimensions



Due to the RMSEA value of 0.065 it was decided to continue with path analysis as this value is the main contributor to the model fit indices which determine acceptable fit or not.

The standardised regression coefficients and the statistical significance of each of the paths are provided in Tables 6.40 and 6.41.

Table 6.40: Standardised regression weights for agreeableness to each of the cognitive adaptability factors

Agreeableness and cognitive adaptability factors	Estimate
Goal orientation	0.901
Current metacognitive knowledge	0.950
Prior metacognitive knowledge	-0.385
Prior metacognitive experience	0.211
Current metacognitive experience	0.905
Metacognitive choice	0.904
Monitoring	1.000

Table 6.41: Unstandardised regression weights for agreeableness to each of the cognitive adaptability factors

Agreeableness and cognitive adaptability factors	Estimate	S.E.	C.R.	P	Label
Goal orientation	2.074	0.157	13.206	***	
Current metacognitive knowledge	1.490	0.119	12.568	***	
Prior metacognitive knowledge	-1.125	0.106	-10.635	***	
Prior metacognitive experience	0.776	0.110	7.072	***	
Current metacognitive experience	2048	0.153	13.378	***	
Metacognitive choice	1943	0.147	13.189	***	
Monitoring	2103	0.157	13.362	***	

All path coefficients were found to be statistically significant. The relationships between agreeableness and goal orientation, current metacognitive knowledge, prior metacognitive experience, current metacognitive experience, metacognitive choice

and monitoring are positive. In the case of the relationship between agreeableness and prior metacognitive knowledge the relationship is negative. A possible reason could be that entrepreneurship by nature requires that entrepreneurs be cognitively adaptive to any situation that might arise, expectedly or unexpectedly. This is a critical question for entrepreneurship scholars, given the importance of new entry and venture creation for economic growth (Wiklund & Shepherd 2003:1920).

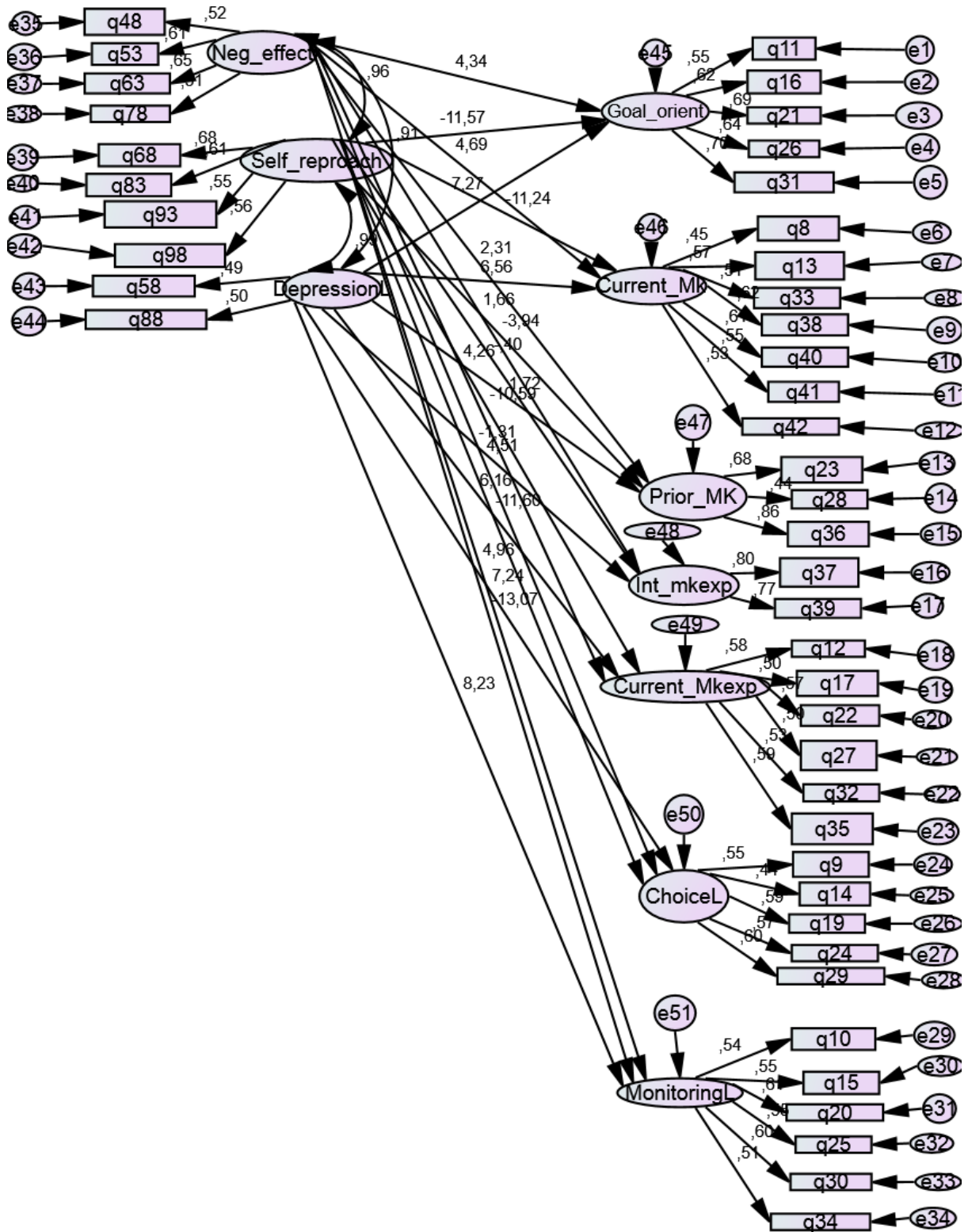
6.6.5 Evaluation of hypothesised model for neuroticism

The model evaluation and the notes for the neuroticism model (default model) are provided in this section.

6.6.5.1 Structural model for neuroticism subconstructs and the seven cognitive adaptability dimensions

The structural model for the neuroticism subconstructs and cognitive adaptability dimensions is illustrated in Figure 6.14 below.

Fig. 6.14: Structural model for neuroticism subconstructs and cognitive adaptability



The results (standardised regression weight) yielded a number of standardised regression weights that were larger than 1 or -1 (refer to Table 4 in appendix B). As it is known that the presence of multi-collinearity can produce standardised regression weights larger than 1 (Joreskog 1999:1), inspection of the results revealed multi-collinearity of the subconstructs negative affect, self-reproach and depression (correlation value of 0.959). In the light of these results, and the results of the fit statistics (refer to Table 6.42 below), it was therefore decided to consider neuroticism as a single construct for testing the relationship.

Table 6.42: Fit indices of the original neuroticism model (subconstructs)

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	6654.006	878	0.000	7.579	0.837	0.050	0.825	0.837

6.6.5.2 Structural model for neuroticism as a single construct and the seven cognitive adaptability dimensions

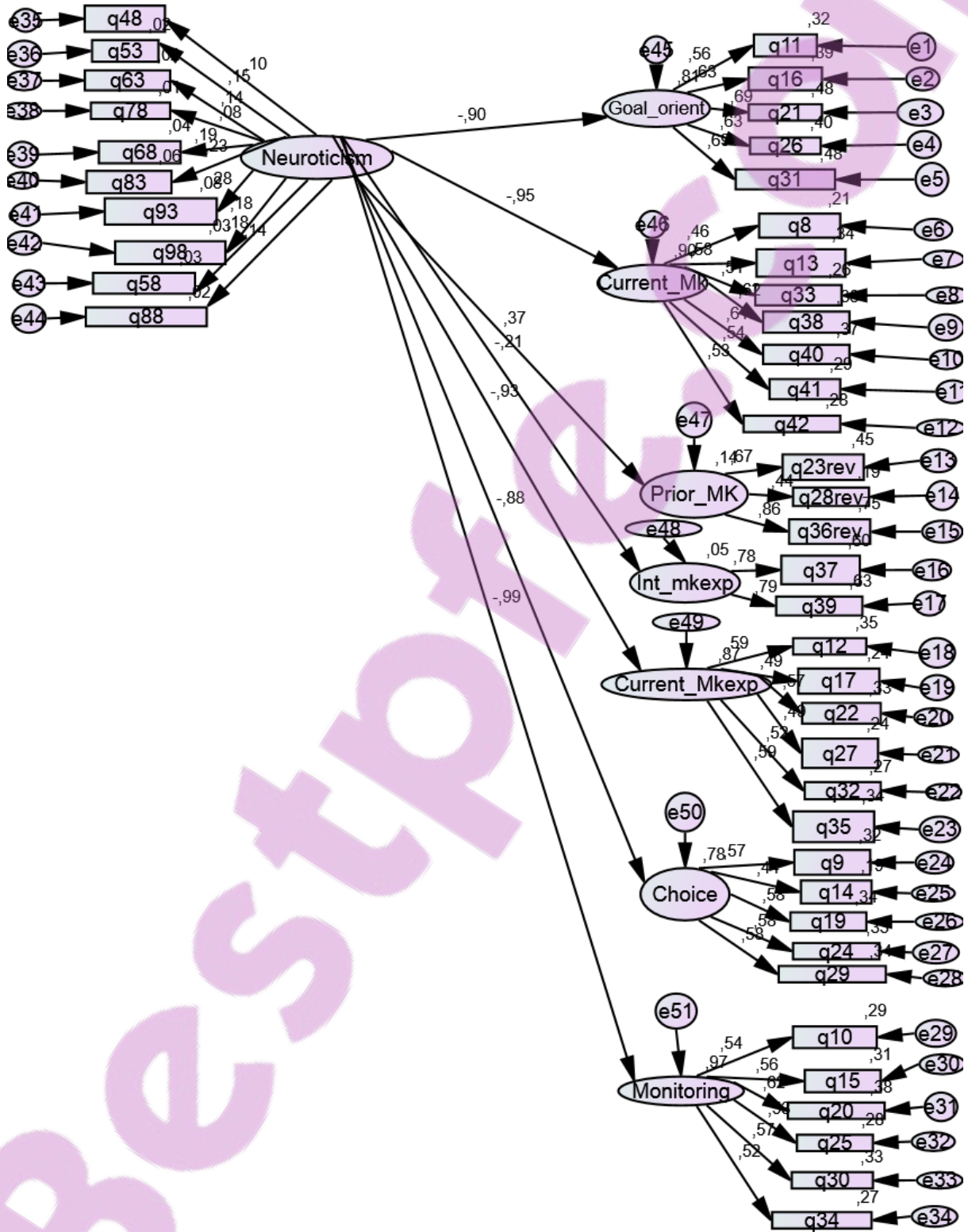
The structural model for neuroticism as a single construct and the seven identified cognitive adaptability dimensions is illustrated in Figure 6.15. The results in Table 6.43 show acceptable fit according to the RMSEA, but the CFI, IFI and TLI values were below the recommended threshold of 0.90.

Table 6.43: Fit indices of the original neuroticism model (single construct)

Model	Chi-square	df	P	CMIN/DF	CFI	RMSEA	TLI	IFI
Hypothesised Model	12.380.783	895	0.000	13.833	0.676	0.070	0.658	0.677

The data thus does not reveal acceptable fit.

Fig. 6.15: Structural model for neuroticism as a single construct and cognitive adaptability dimensions



Due to the RMSEA value of 0.070 it was decided to continue with path analysis as this value is the main contributor to the model fit indices which determine acceptable fit or not.

The standardised regression coefficients and the statistical significance of each of the paths are provided in Tables 6.44 and 6.45.

Table 6.44: Standardised regression weights for neuroticism to each of the cognitive adaptability factors

Neuroticism and cognitive adaptability factors	Estimate
Goal orientation	-0.903
Current metacognitive knowledge	-0.946
Prior metacognitive knowledge	0.368
Prior metacognitive experience	-0.213
Current metacognitive experience	-0.935
Metacognitive choice	-0.882
Monitoring	-0.987

Table 6.45: Unstandardised regression weights for neuroticism to each of the cognitive adaptability factors

Neuroticism and cognitive adaptability factors	Estimate	S.E.	C.R.	P	Label
Goal orientation	-2.571	0.307	-8.385	***	
Current metacognitive knowledge	-1.840	0.224	-8.220	***	
Prior metacognitive knowledge	1.304	0.174	7.502	***	
Prior metacognitive experience	-0.960	0.161	-5.975	***	
Current metacognitive experience	-2.579	0.306	-8.434	***	
Metacognitive choice	-2.340	0.280	-8.362	***	
Monitoring	-2.529	0.301	-8.398	***	

All path coefficients were found to be statistically significant. The relationships between neuroticism and goal orientation, current metacognitive knowledge, prior metacognitive experience, current metacognitive experience, metacognitive choice

and monitoring are negative. In the case of the relationship between neuroticism and prior metacognitive knowledge, the relationship is positive. A possible reason could be that of all the Big Five personality traits, neuroticism indicates the general tendency to experience negative affective states such as fear, sadness, embarrassment, anger, guilt and disgust. Cognitive adaptability indicates flexibility and an ability to be in control.

6.7 REGRESSION ANALYSIS

As none of the SEMs revealed an overall acceptable fit, it was decided to conduct multiple linear regressions to establish the statistical significance, strength and direction of each path coefficient. There are main areas that measures any statistical relationship – the level of the relationship between the variables, as well as the form and strength of the relationship. According to Fielding and Gilbert (2006:258) the relationship refers to the statistical level of significance which indicates the level of preparedness on how the study is conducted. In this study, we used the 1% and 5% levels, indicating that any result so unlikely that it would only occur 1% or 5% of the time will be enough to reject the null hypothesis. The form of the relationship indicates whether the relationship is positive or negative. The strength of the relationship is one method of assessing the importance of the findings. It indicates the relative magnitude of the differences between means, or the amount of the total variance in the dependent variable that is predicted from the knowledge of the levels of the independent variable (Tabachnick & Fidell 2013:54; Pallant 2013:219). The strength thresholds used in this study, in accordance with Pallant (2001), are: 0 – 0.2 = weak; 0.2 – 0.4 = mild/modest; 0.4 – 0.6 = moderate; 0.6 – 0.8 = moderately strong; and 0.8 – 1.0 = strong. The results of each dimension of the Big Five personality traits with the seven cognitive adaptability factors are discussed in the tables below.

Table 6.46 shows the regression relationships between the openness to experience subfactors (unconventionality, intellectual interest and aesthetic interest) and the seven cognitive adaptability factors (goal orientation, current metacognitive

knowledge [current MK], prior metacognitive knowledge [prior MK], current metacognitive experience [current ME], prior metacognitive experience [prior ME], metacognitive choice [choice] and monitoring).

Table 6.46: Regression results for openness to experience subfactors with each of the cognitive adaptability factors

IV: Openness to experience subfactors	DV: Cognitive adaptability dimensions						
	GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
Unconventionality	-0.053**	-0.016	0.127**	0.035	-0.020	-0.063**	-0.052**
Intellectual Interest	0.276**	0.359**	-0.123**	0.122**	0.308**	0.250**	0.255**
Aesthetic Interest	0.107**	0.095**	0.024	0.006	0.019	0.057**	0.122**
R ²	0.100	0.160	0.020	0.020	0.095	0.067	0.093
F (p value)	97.5 (.000)	168.5 (.000)	18.3 (.000)	18.0 (.000)	93.1 (.000)	63.6 (.000)	90.6 (.000)

Note: Standardised beta-coefficients are presented.

* $p < 0.05$, ** $p < 0.01$

The results show that:

(i) For goal orientation (GO) –

All openness to experience factors are statistically significant predictors. The relationship between unconventionality and goal orientation is very weak and negative. There is a mild and positive relationship between intellectual interest and goal orientation. The relationship between aesthetic interest and goal orientation is weak and positive. Intellectual interest is the strongest predictor of goal orientation. Unconventionality, intellectual interest and aesthetic interest explain 10% of the variance in goal orientation.

(ii) For current metacognitive knowledge (Current MK) –

Intellectual interest and aesthetic interest are statistically significant predictors. Unconventionality is not a statistically significant predictor. The relationship between unconventionality and current metacognitive knowledge is very weak and negative. There is a mild and positive relationship between intellectual interest and current metacognitive knowledge. The relationship between aesthetic interest and current metacognitive knowledge is very weak and positive. Intellectual interest is the strongest predictor of current metacognitive knowledge. Unconventionality, intellectual interest and aesthetic interest explain 16% of the variance in current metacognitive knowledge.

(iii) For prior metacognitive knowledge (Prior MK) –

Unconventionality and intellectual interest are statistically significant predictors. Aesthetic interest is not a statistically significant predictor. There is a weak and positive relationship between unconventionality and prior metacognitive knowledge and a weak and negative relationship between intellectual interest and prior metacognitive knowledge. The relationship between aesthetic interest and prior metacognitive knowledge is very weak and positive. Unconventionality is the strongest predictor of prior metacognitive knowledge. Unconventionality, intellectual interest and aesthetic interest explain 2% of the variance in current metacognitive knowledge.

(iv) For prior metacognitive experience (Prior ME) –

Intellectual interest is a statistically significant predictor. Unconventionality and aesthetic interest are not statistically significant predictors. There is a very weak and positive relationship between unconventionality and prior metacognitive experience. The relationship between intellectual interest and prior metacognitive experience is weak and positive. The relationship between aesthetic interest and prior metacognitive experience is very weak and

positive. Intellectual interest is the strongest predictor of prior metacognitive experience. Unconventionality, intellectual interest and aesthetic interest explain 16% of the variance in prior metacognitive experience.

(v) For current metacognitive experience (Current ME) –

Intellectual interest is a statistically significant predictor. Unconventionality and aesthetic interest are not statistically significant predictors. There is a very weak and negative relationship between unconventionality and current metacognitive experience as well as a mild and positive relationship between intellectual interest and current metacognitive experience. The relationship between aesthetic interest and current metacognitive experience is very weak and positive. Intellectual interest is the strongest predictor of current metacognitive experience. Unconventionality, intellectual interest and aesthetic interest explain 9% of the variance in current metacognitive experience.

(vi) For metacognitive choice (Choice) –

All three openness to experience constructs are statistically significant predictors. There is a very weak and negative relationship between unconventionality and metacognitive choice, as well as a mild and positive relationship between intellectual interest and metacognitive choice. The relationship between aesthetic interest and metacognitive choice is very weak and positive. Intellectual interest is the strongest predictor of metacognitive choice. Unconventionality, intellectual interest and aesthetic interest explain 7% of the variance in metacognitive choice.

(vii) For monitoring –

All three openness to experience constructs are statistically significant predictors. There is a very weak and negative relationship between

unconventionality and monitoring as well as a mild and positive relationship between intellectual interest and monitoring. The relationship between aesthetic interest and monitoring is weak and positive. Intellectual interest is the strongest predictor of monitoring. Unconventionality, intellectual interest and aesthetic interest explain 9% of the variance in monitoring.

In summary, **intellectual interest** seems to be the most important and consistent predictor of all seven dimensions of cognitive adaptability. It has the strongest relationship across all the dependent variables which is represented by the largest numbers throughout. Intellectual interest is negatively related to prior metacognitive knowledge. This could mean that the more reliant an entrepreneur is on his prior knowledge, the less open to new experiences he is likely to be. Unconventionality and aesthetic interest make a difference in some dimensions and not in others. Unconventionality is the strongest predictor of prior metacognitive knowledge but this is not helpful because it is explained by only 2% of the variance in openness to experience subfactors. This could mean that the more traditional and dependent one is on prior knowledge, the less cognitively adaptable one is likely to be. However, unconventionality is a statistically significant predictor of goal orientation, prior metacognitive knowledge, metacognitive choice and monitoring. Aesthetic interest is the most significant predictor of goal orientation, current metacognitive knowledge, metacognitive choice and monitoring.

It can be concluded that entrepreneurs who have high levels of intellectual interest are likely to adapt in challenging and novel entrepreneurial environments. Intellectual interest has been defined as being knowledgeable, intelligent and deep thinking (refer to Table 6.14 for intellectual interest factor loading items). Aesthetic interest is not a powerful predictor of openness to experience in that it has small positive effects. Unconventionality seems to have much weaker effects; sometimes they are significant but rarely very large. They are mostly negative. Unconventionality does not seem to make a significant difference to cognitive adaptability.

Table 6.47 shows the regression relationships between the conscientiousness subfactors and the seven cognitive adaptability factors.

Table 6.47: Regression results for conscientiousness subfactors with each of the cognitive adaptability factors

IV: Conscientiousness	DV: Cognitive adaptability factors						
	GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
Orderliness	0.052**	-0.029	0.055**	-0.146**	0.179**	-0.010	0.030
Goal striving	0.481**	0.471**	-0.259**	0.229**	0.473**	0.338**	0.413**
R ²	0.262	0.207	0.054	0.036	0.350	0.111	0.185
F (p value)	418.7 (0.000)	308.49 (0.000)	67.75 (0.000)	44.7 (0.000)	636.5 (0.000)	147.1 (0.000)	268.9 (0.000)

Note: Standardised beta-coefficients are presented.

* $p < 0.05$, ** $p < 0.01$

The results show that:

(i) For goal orientation (GO) –

Orderliness and goal striving are statistically significant predictors. There is a very weak and positive relationship between orderliness and goal orientation and a moderate and positive relationship between goal striving and goal orientation. Goal striving is the strongest predictor of goal orientation. Orderliness and goal striving explain 26% of the variance in goal orientation.

(ii) For current metacognitive knowledge (Current MK) –

Goal striving is a statistically significant predictor, whereas orderliness is not. There is a very weak and negative relationship between orderliness and current metacognitive knowledge; and a moderate and positive relationship between goal striving and current metacognitive knowledge. Goal striving is the strongest predictor of current metacognitive knowledge. Orderliness and goal striving explain 21% of the variance in current metacognitive knowledge.

(iii) For prior metacognitive knowledge (Prior MK) –

Orderliness and goal striving are statistically significant predictors. There is a very weak and positive relationship between orderliness and prior metacognitive knowledge and a mild and negative relationship between goal striving and prior metacognitive knowledge. Orderliness is the strongest predictor of prior metacognitive knowledge. Orderliness and goal striving explain 5% of the variance in prior metacognitive knowledge.

(iv) For prior metacognitive experience (Prior ME) –

Orderliness and goal striving are statistically significant predictors. There is a weak and negative relationship between orderliness and prior metacognitive knowledge and a mild and positive relationship between goal striving and prior metacognitive experience. Goal striving is the strongest predictor of prior metacognitive knowledge. Orderliness and goal striving explain 4% of the variance in current metacognitive experience.

(v) For current metacognitive experience (Current ME) –

Orderliness and goal striving are statistically significant predictors. There is a weak but positive relationship between orderliness and current metacognitive knowledge, and a moderate and positive relationship between goal striving and current metacognitive experience. Goal striving is the strongest predictor of current metacognitive knowledge. Orderliness and goal striving explain 35% of the variance in current metacognitive experience.

(vi) For metacognitive choice (Choice) –

Goal striving is a statistically significant predictor, whereas orderliness is not. There is a very weak and negative relationship between orderliness and metacognitive choice; and a mild and positive relationship between goal striving and metacognitive choice. Goal striving is the strongest predictor of metacognitive choice. Orderliness and goal striving explain 11% of the variance in metacognitive choice.

(vii) For monitoring –

Goal striving is a statistically significant predictor, whereas orderliness is not. There is a very weak and positive relationship between orderliness and monitoring, and a moderate and positive relationship between goal striving and monitoring. Goal striving is the strongest predictor of monitoring. Orderliness and goal striving explain 18% of the variance in monitoring.

In summary, **goal striving** seems to be the most consistent and important driver of all the seven dimensions of cognitive adaptability. It has the largest and positive effects across the seven cognitive adaptability factors. It is however negatively related to prior metacognitive knowledge. It can be concluded that the more reliant one is on prior metacognitive knowledge, the less likely one is to be productive and to excel in an entrepreneurial environment. Goal striving is defined as being productive, hard-working and having an ability to excel and accomplish goals (refer to Table 6.16 for goal striving factor loading items, which can be seen as examples of statements which could be linked to goal striving behaviour). Orderliness is the most significant predictor of goal orientation, prior metacognitive knowledge, prior metacognitive experience and current metacognitive experience. It is strongly and positively related to current metacognitive experience.

Table 6.48 shows the regression relationships between the extraversion subconstructs and the seven cognitive adaptability factors.

Table 6.48: Regression results for the extraversion subfactors with each of the cognitive adaptability factors

IV: Extraversion subfactors	DV: Cognitive adaptability factors						
	GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
Activity	0.278**	0.254**	-0.036	0.185**	0.287**	0.173**	0.170**
Positive Affect	0.094**	0.173**	-0.116**	0.088**	0.137**	0.118**	0.156**
Sociability	-0.056**	-0.108**	0.075**	-0.086**	-0.101**	-0.093**	-0.110**
R ²	0.093	0.102	0.013	0.043	0.108	0.046	0.055
F (p value)	90.28 (0.000)	99.9 (0.000)	11.6 (0.000)	39.9 (0.000)	106.3 (0.000)	42.5 (0.000)	51.6 (0.000)

Note: Standardised beta-coefficients are presented.

*p < 0.05, **p < 0.01

The results show that:

(i) For goal orientation (GO) –

Activity, positive affect and sociability are statistically significant predictors. There is a mild and positive relationship between activity and goal orientation. There is a very weak and positive relationship between positive affect and goal orientation. There is a very weak and negative relationship between sociability and goal orientation. Activity is the strongest predictor of goal orientation. Activity, positive affect and sociability explain 9% of the variance in goal orientation.

(ii) For current metacognitive knowledge (Current MK) –

Activity, positive affect and sociability are statistically significant predictors. There is a mild and positive relationship between activity and current metacognitive knowledge. There is a weak and positive relationship between positive affect and current metacognitive knowledge. There is a weak and negative relationship between sociability and current metacognitive knowledge. Activity is the strongest predictor of current metacognitive knowledge. Activity, positive affect and sociability explain 10% of the variance in current metacognitive knowledge.

(iii) For prior metacognitive knowledge (Prior MK) –

Positive affect and sociability are statistically significant predictors. Activity is not a statistically significant predictor. There is a very weak and negative relationship between activity and prior metacognitive knowledge. There is a weak and negative relationship between positive affect and prior metacognitive knowledge. The relationship between sociability and prior metacognitive knowledge is very weak and positive. Positive affect is the strongest predictor of prior metacognitive knowledge. Activity, positive affect and sociability explain 1% of the variance in prior metacognitive knowledge.

(iv) For prior metacognitive experience (Prior ME) -

Activity, positive affect and sociability are statistically significant predictors. There is a weak and positive relationship between activity and prior metacognitive experience. There is a very weak and positive relationship between positive affect and prior metacognitive experience. The relationship between sociability and prior metacognitive experience is very weak and negative. Positive affect is the strongest predictor of prior metacognitive experience. Activity, positive affect and sociability explain 4% of the variance in prior metacognitive experience.

(v) For current metacognitive experience (Current ME) -

Activity, positive affect and sociability are statistically significant predictors. There is a mild and positive relationship between activity and current metacognitive experience, and a weak and positive relationship between positive affect and current metacognitive experience. The relationship between sociability and current metacognitive experience is weak and negative. Positive affect is the strongest predictor of current metacognitive experience. Activity, positive affect and sociability explain 10% of the variance in current metacognitive experience.

(vi) For metacognitive choice (Choice) -

Activity, positive affect and sociability are statistically significant predictors. There is a weak and positive relationship between activity and metacognitive choice. There is a weak and positive relationship between positive affect and metacognitive choice. The relationship between sociability and metacognitive choice is very weak and negative. Activity is the strongest predictor of metacognitive choice. Activity, positive affect and sociability explain 4% of the variance in prior metacognitive knowledge.

(vii) For monitoring -

Activity, positive affect and sociability are statistically significant predictors. There is a weak and positive relationship between activity and monitoring. There is a weak and positive relationship between positive affect and monitoring. The relationship between sociability and monitoring is weak and negative. Activity is the strongest predictor of monitoring. Activity, positive affect and sociability explain 5% of the variance in monitoring.

In conclusion, **activity** seems to be the most significant and important predictor of six of the cognitive adaptability dimensions, but is not a significant predictor of prior metacognitive knowledge. This could mean that the more active and cognitively adaptable one is, the less likely you are to depend on prior metacognitive knowledge. Prior metacognitive knowledge is explained by 1% variance in activity, positive affect and sociability, indicating that it is not helpful for cognitive adaptability. Overall, entrepreneurs who are active (as defined below) are more likely to be cognitively adaptable. An active person has been defined as someone who likes to be where the action is, often feeling as if they are bursting with energy, leading a fast-paced life and being very active (see Table 6.18 for the activity factor loading items).

Alternatively positive affect and sociability seem to be the most consistently significant drivers of all cognitive adaptability dimensions, but they have much smaller effects than activity. Positive affect is negatively related to prior metacognitive knowledge. Sociability seems to be negatively related to prior metacognitive experience, current metacognitive experience, metacognitive choice and monitoring. Positive affect seems to be an even better predictor than sociability in this instance. Table 6.49 shows the regression relationships between the agreeableness subconstructs and the seven cognitive adaptability factors.

Table 6.49: Regression results for the agreeableness subfactors with each of the cognitive adaptability factors

IV: Agreeableness subfactors	DV: Cognitive adaptability						
	GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
Meekness	0.036	0.027	0.027	-0.097**	0.068**	0.054**	0.065**
Prosocial orientation	0.193**	0.297**	-0.200**	0.165**	0.232**	0.218**	0.260**
Non-antagonistic orientation	-0.101**	-0.124**	0.042	-0.161**	-0.142**	-0.118**	-0.082**
R ²	0.035	0.080	0.036	0.054	0.053	0.046	0.066
F (p value)	31.8 (0.000)	76.3 (0.000)	32.8 (0.000)	50.2 (0.000)	49.6 (0.000)	42.05 (0.000)	62.19 (0.000)

Note: Standardised beta-coefficients are presented.

*p < 0.05, **p < 0.01

The results show that:

(i) For goal orientation (GO) -

Prosocial orientation and non-antagonistic orientation are statistically significant predictors, whereas meekness is not a statistically significant predictor. There is a very weak and positive relationship between meekness and goal orientation. There is a weak and positive relationship between prosocial orientation and goal orientation. The relationship between non-antagonistic orientation and goal orientation is weak and negative. Prosocial orientation is the strongest predictor of goal orientation. Meekness, prosocial orientation and non-antagonistic orientation explain 3% of the variance in goal orientation.

(ii) For current metacognitive knowledge (Current MK) -

Prosocial orientation and non-antagonistic orientation are statistically significant predictors, whereas meekness is not a statistically significant predictor. There is a very weak and positive relationship between meekness and current metacognitive knowledge. There is a mild and positive relationship between prosocial orientation and current metacognitive knowledge. The relationship between non-antagonistic orientation and current metacognitive knowledge is weak and negative. Prosocial orientation is the strongest predictor of goal orientation. Meekness, prosocial orientation and non-antagonistic orientation explain 3% of the variance in goal orientation.

(iii) For prior metacognitive knowledge (Prior MK) -

Prosocial orientation is a statistically significant predictor. Meekness and non-antagonistic orientation are not statistically significant predictors. There is a very weak and positive relationship between meekness and prior metacognitive knowledge. There is a mild and negative relationship between

prosocial orientation and past metacognitive knowledge. The relationship between non-antagonistic orientation and prior metacognitive knowledge is very weak and positive. Prosocial orientation is the strongest predictor of current metacognitive knowledge. Meekness, prosocial orientation and non-antagonistic orientation explain 8% of the variance in current metacognitive knowledge.

(iv) For prior metacognitive experience (Prior ME) -

Meekness, prosocial orientation and non-antagonistic orientation are statistically significant predictors. There is a very weak and negative relationship between meekness and prior metacognitive experience. There is a weak and positive relationship between prosocial orientation and prior metacognitive experience. The relationship between prosocial orientation and prior metacognitive experience is weak and negative. Prosocial orientation is the strongest predictor of prior metacognitive experience. Meekness, prosocial orientation and non-antagonistic orientation explain 5% of the variance in prior metacognitive experience.

(v) For current metacognitive experience (Current ME) -

Meekness, prosocial orientation and non-antagonistic orientation are statistically significant predictors. There is a very weak and positive relationship between meekness and current metacognitive experience. There is a mild and positive relationship between prosocial orientation and current metacognitive experience. The relationship between non-antagonistic orientation and current metacognitive experience is weak and negative. Prosocial orientation is the strongest predictor of current metacognitive experience. Meekness, prosocial orientation and non-antagonistic orientation explain 5% of the variance in current metacognitive experience.

(vi) For metacognitive choice (Choice) -

Meekness, prosocial orientation and non-antagonistic orientation are statistically significant predictors. There is a very weak and positive relationship between meekness and metacognitive choice. There is a mild and positive relationship between prosocial orientation and metacognitive choice. The relationship between non-antagonistic orientation and metacognitive choice is weak and negative. Prosocial orientation is the strongest predictor of metacognitive choice. Meekness, prosocial orientation and non-antagonistic orientation explain 5% of the variance in metacognitive choice.

(vii) For monitoring -

Meekness, prosocial orientation and non-antagonistic orientation are statistically significant predictors. There is a very weak and positive relationship between meekness and monitoring. There is a mild and positive relationship between prosocial orientation and monitoring. The relationship between non-antagonistic orientation and monitoring is very weak and negative. Prosocial orientation is the strongest predictor of monitoring. Meekness, prosocial orientation and non-antagonistic orientation explain 6% of the variance in monitoring.

In summary, **prosocial orientation** seems to be the most important predictor or driver of all of the factors of cognitive adaptability. It shows stronger effects and larger numbers, thereby revealing the strongest relationships. Although prosocial orientation is negatively related to prior metacognitive knowledge, the three subfactors of openness to experience explain only 4% of the variance in prior metacognitive knowledge. This could mean that it is not important for cognitive adaptability and could also imply that the more reliant one is on prior metacognitive knowledge, the less likely one is to be courteous, considerate of other people and unassuming of other people. Therefore, the more prosocially oriented one is, the more likely one is to be cognitively adaptable. Prosocial orientation is defined as

being courteous to everyone, assuming the best about people, as well as being thoughtful and considerate (see Table 6.20 on prosocial orientation factor loading items).

Non-antagonistic orientation is a statistically significant predictor in all factors except for one – prior metacognitive knowledge. It has smaller effects which, interestingly, are mostly negative. Meekness is a statistically significant predictor of prior metacognitive experience, current metacognitive experience, metacognitive choice and monitoring. It is not a statistically significant predictor of goal orientation, current metacognitive knowledge and prior metacognitive knowledge.

Table 6.50 shows the regression relationships between the neuroticism subfactors and the seven cognitive adaptability factors.

Table 6.50: Regression results for the neuroticism subfactors with each of the cognitive adaptability factors

IV: Neuroticism subfactors	DV: Cognitive adaptability						
	GO	Current MK	Prior MK	Prior ME	Current ME	Choice	Monitoring
Depression	-0.025	-0.078**	0.075**	-0.105**	-0.040	-0.097**	-0.049**
Self-Reproach	-0.219**	-0.191**	0.074**	-0.105**	-0.286**	-0.102**	-0.115**
Negative Affect	0.071**	0.055**	-0.191**	0.149**	-0.009	0.110**	0.076**
R ²	0.039	0.042	0.023	0.021	0.096	0.018	0.021
F (p value)	35.4 (0.000)	38.4 (0.000)	20.8 (0.000)	19.2 (0.000)	93.7 (0.000)	15.8 (0.000)	19.3 (0.000)

Note: Standardised beta-coefficients are presented.

*p < 0.05, **p < 0.01

The results show that:

(i) For goal orientation (GO) -

Self-reproach and negative affect are statistically significant predictors, whereas depression is not. There is a very weak and negative relationship between depression and goal orientation. There is a mild and negative relationship between self-reproach and goal orientation. The relationship between negative affect and goal orientation is very weak and positive. Self-reproach is the strongest predictor of goal orientation. Depression, self-reproach and negative affect explain 4% of the variance in goal orientation.

(ii) For current metacognitive knowledge (Current MK) -

Depression, self-reproach and negative affect are statistically significant predictors. There is a very weak and negative relationship between depression and current metacognitive knowledge. There is a weak and negative relationship between self-reproach and current metacognitive knowledge. The relationship between negative affect and current metacognitive knowledge is very weak and positive. Self-reproach is the strongest predictor of current metacognitive knowledge. Depression, self-reproach and negative affect explain 4% of the variance in current metacognitive knowledge.

(iii) For prior metacognitive knowledge (Prior MK) -

Depression, self-reproach and negative affect are statistically significant predictors. There is a very weak and positive relationship between depression and prior metacognitive knowledge. There is very weak and positive relationship between self-reproach and prior metacognitive knowledge. The relationship between negative affect and prior metacognitive knowledge is weak and negative. Negative affect is the strongest predictor of prior

metacognitive knowledge. Depression, self-reproach and negative affect explain 2% of the variance in prior metacognitive knowledge.

(iv) For prior metacognitive experience (Prior ME) -

Depression, self-reproach and negative affect are statistically significant predictors. There is a weak and negative relationship between depression and prior metacognitive experience. There is a weak and negative relationship between self-reproach and prior metacognitive experience. The relationship between negative affect and prior metacognitive experience is weak and positive. Negative affect is the strongest predictor of prior metacognitive experience. Depression, self-reproach and negative affect explain 2% of the variance in prior metacognitive experience.

(v) For current metacognitive experience (Current ME) -

Self-reproach is a statistically significant predictor. Depression and negative affect are not statistically significant predictors. There is a very weak and negative relationship between depression and current metacognitive knowledge. There is a mild and negative relationship between self-reproach and current metacognitive knowledge. There is a very weak and negative relationship between negative affect and current metacognitive experience. Self-reproach is the strongest predictor of current metacognitive experience. Depression, self-reproach and negative affect explain 9% of the variance in prior metacognitive experience.

(vi) For metacognitive choice (Choice) -

Depression, self-reproach and negative affect are statistically significant predictors. There is a very weak and negative relationship between depression and metacognitive choice. There is a weak and negative relationship between self-reproach and metacognitive choice. The relationship between negative

affect and metacognitive choice is weak and positive. Negative affect is the strongest predictor of metacognitive choice. Depression, self-reproach and negative affect explain 2% of the variance in metacognitive choice.

(vii) For monitoring -

Depression, self-reproach and negative affect are statistically significant predictors. There is a very weak and negative relationship between depression and monitoring. There is a weak and negative relationship between self-reproach and monitoring. The relationship between negative affect and monitoring is very weak and positive. Self-reproach is the strongest predictor of monitoring. Depression, self-reproach and negative affect explain 2% of the variance in monitoring.

In summary, **self-reproach** is consistently the most significant predictor or driver of all the cognitive adaptability factors. It has the largest effect, which is denoted by the large numbers for goal orientation, current metacognitive knowledge, current metacognitive experience and monitoring. Apart from prior metacognitive knowledge, all the relationships are negative. Prior metacognitive knowledge is the only one which is positively related to self-reproach. This relationship is explained by 2% of the variation in depression, self-reproach and negative affect. This means that entrepreneurs who sometimes feel completely worthless, get easily discouraged and prefer others to solve their problems, and are less likely to be cognitively adaptable. However, in the case of prior metacognitive knowledge, the positive relationship indicates that people who depend on prior metacognitive knowledge are more likely to find it difficult to survive in a dynamic and challenging entrepreneurial environment. Self-reproach is described as a feeling of worthlessness, discouragement, shame and helplessness (see Table 6.22 for the self-reproach factor loading items).

Depression is a significant predictor of current metacognitive knowledge, prior metacognitive knowledge, prior metacognitive experience, metacognitive choice and monitoring. It is not a statistically significant predictor of goal orientation and current

metacognitive experience. It is significant to note that prior metacognitive knowledge is the only one which is positively related to depression. This relationship is explained by 2% of the variance. Depressed people often feel lonely, blue, fearful and anxious, and are often sad and depressed (see Table 6.22 for the depression factor loading items). Negative affect is a statistically significant predictor of all the cognitive adaptability factors except for current metacognitive experience. Overall, these results show that neuroticism does not exert a powerful influence on cognitive adaptability.

Tables 6.51-6.55 show the comparison between SEM and regression results for the different relationships between the Big Five personality traits and the cognitive adaptability factors.

Table 6.51: Summary of SEM and regression results for openness to experience

OPENNESS TO EXPERIENCE								
	Structured Equation Modelling results							
	Cognitive adaptability factors							
		GO	CMK	PMK	CME	PME	MC	M
Openness to experience as a single construct		Positive	Positive	Negative	Positive	Positive	Positive	Positive
Regression results								
Unconventionality		Very weak and negative	Very weak and negative	Weak and positive	Very weak and negative	Very weak and positive	Very weak and negative	Very weak and negative
Intellectual Interest		Mild and positive	Modest and positive	Weak and negative	Mild and positive	Weak and positive	Mild and positive	Mild and positive
Aesthetic interest		Weak and positive	Very weak and positive	Very weak and positive	Very weak and positive	Weak and positive	Very weak and positive	Weak and positive

The results in Table 6.51 generally reveal that openness to experience has a positive relationship with the seven cognitive adaptability factors.

Table 6.52: Summary of SEM and regression results for conscientiousness

CONSCIENTIOUSNESS							
	Structured Equation Modelling results						
	Cognitive adaptability factors						
	GO	CMK	PMK	CME	PME	MC	M
Conscientiousness as a single construct	Positive	Positive	Negative	Positive	Positive	Positive	Positive
Regression results							
Orderliness	Very weak and positive	Very weak and negative	Very weak and positive	Weak and positive	Very weak and negative	Very weak and negative	Very weak and positive
Goal striving	Moderate and positive	Moderate and positive	Mild and negative	Moderate and positive	Mild and positive	Mild and positive	Moderate and positive

Table 6.52 highlights that conscientiousness has a general positive relationship with the seven cognitive adaptability factors.

Table 6.53: Summary of SEM and regression results for extraversion

EXTRAVERSION								
	Structured Equation Modelling results							
	Cognitive adaptability factors							
		GO	CMK	PMK	CME	PME	MC	M
Extraversion as a single construct		Positive	Positive	Negative	Positive	Positive	Positive	Positive
	Regression results							
Activity		Mild and positive	Mild and positive	Very weak and negative	Mild and positive	Weak and positive	Weak and positive	Weak and positive
Positive affect		Very weak and positive	Weak and positive	Weak and negative	Weak and positive	Very weak and positive	Weak and positive	Weak and positive
Sociability		Very weak and positive	Weak and positive	Very weak and positive	Weak and negative	Very weak and negative	Very weak and negative	Weak and negative

The results in Table 6.53 generally indicate that extraversion has a positive relationship with the seven cognitive adaptability factors.

Table 6.54: Summary of SEM and regression results for agreeableness

AGREEABLENESS								
	Structured Equation Modelling results							
	Cognitive adaptability factors							
		GO	CMK	PMK	CME	PME	MC	M
Agreeableness as a single construct		Positive	Positive	Negative	Positive	Positive	Positive	Positive
Regression results								
Meekness		Very weak and positive	Very weak and positive	Very weak and positive	Very weak and positive	Very weak and negative	Very weak and positive	Very weak and positive
Prosocial orientation		Weak and positive	Mild and positive	Mild and negative	Weak and positive	Weak and positive	Weak and positive	Mild and positive
Non-antagonistic orientation		Weak and positive	Weak and positive	Very weak and positive	Weak and negative	Weak and negative	Very weak and negative	Very weak and negative

Table 6.54 highlights that agreeableness has a generally positive relationship with the seven cognitive adaptability factors. In Tables 6.45-6.48 it is significant that prior metacognitive knowledge is the only negative relationship between all of these constructs.

Table 6.55: Summary of SEM and regression results for neuroticism

NEUROTICISM								
	Structured Equation Modelling results							
	Cognitive adaptability factors							
		GO	CMK	PMK	CME	PME	MC	M
Neuroticism as a single construct		Negative	Negative	Positive	Negative	Negative	Negative	Negative
Regression results								
Depression		Very weak and negative	Very weak and negative	Very weak and positive	Very weak and negative	Weak and negative	Very weak and negative	Very weak and negative
Self-Reproach		Mild and negative	Weak and negative	Very weak and positive	Mild and negative	Weak and negative	Weak and negative	Weak and negative
Negative affect		Very weak and positive	Very weak and positive	Weak and negative	Very weak and negative	Weak and positive	Weak and positive	Very weak and positive

Table 6.55 highlights that neuroticism has a generally negative relationship with the seven cognitive adaptability factors. Again, prior metacognitive knowledge seems to be the common thread that runs through the two models. Table 6.49 reveals the only factor where the relationship with neuroticism is found to be positive.

6.8 CONCLUSION

The empirical findings of the study were presented in this chapter. The findings were presented in the form of figures and tables. They were organised according to personal and business venture demographics of the total established business sample. These tables were followed by the descriptive statistics relating to the respondents' rating of their personality trait dimensions and their cognitive adaptability dimensions. The validity and reliability of the measuring instrument were confirmed through factor analysis of the personality trait dimensions and the cognitive

adaptability dimensions. The statistical techniques used in this study comprised structural equation modelling (SEM) as well as Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Regression analyses were also conducted when the SEM technique did not yield model fit.

Personality trait factor analysis confirmed several factors related to each of the personality trait dimensions. Openness to experience confirmed three factors, namely **aesthetic interest, intellectual interest and unconventionality**. Conscientiousness confirmed two factors, namely **orderliness and goal striving**. Extraversion confirmed three factors, namely **positive affect, sociability and activity**. Agreeableness confirmed three factors, namely **non-antagonistic orientation, prosocial orientation and meekness (tender-mindedness)**. Neuroticism confirmed three factors, namely **negative affect, self-reproach and depression**.

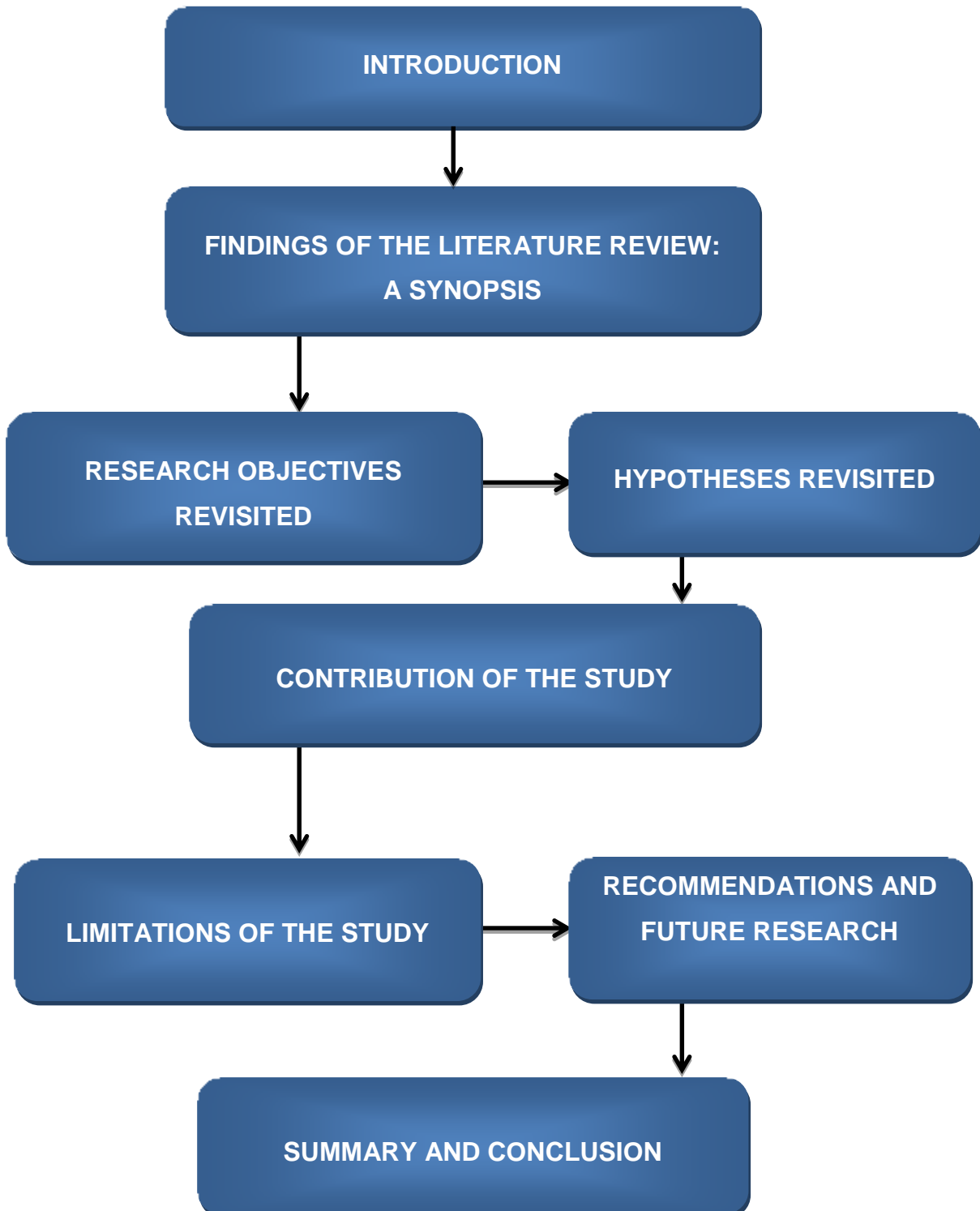
The cognitive adaptability factor analysis confirmed seven factors. Goal orientation, metacognitive choice and monitoring were each confirmed as one factor. Metacognitive knowledge confirmed two factors, namely **prior metacognitive knowledge and current metacognitive knowledge**. Metacognitive experience confirmed two factors, namely **prior metacognitive experience and current metacognitive experience**. The factor analysis indicated relatively high construct validity of the measuring instrument as evidenced by the high Cronbach alpha-coefficients.

The factors that were derived from the factor analyses were used in inferential statistical analysis, including Structural Equation Modelling (SEM), Confirmatory Factor Analysis (CFA), Exploratory Factor Analysis (EFA) and Regression Analysis to present statistical relationships. Important statistical findings were presented, highlighting significant relationships, and other critical statistical values such as chi-square values, degrees of freedom, Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA). The statistical analysis proved both the existence and direction of the relationships.

The results revealed that intellectual interest, goal striving, activity and prosocial orientation are positively related to the goal orientation, current metacognitive knowledge, current metacognitive experience, prior metacognitive experience, metacognitive choice and monitoring dimensions of cognitive adaptability. They are negatively related to prior metacognitive knowledge. Self-reproach is negatively related to the goal orientation, current metacognitive knowledge, current metacognitive experience, prior metacognitive experience, and metacognitive choice and monitoring dimensions of cognitive adaptability. Self reproach is positively related to prior metacognitive knowledge.

The most critical findings are discussed in Chapter 7. These inform the conclusions and recommendations of the study, and lead the way in making suggestions for further research. The limitations of the study are also discussed in detail and the research objectives as well as the study's 25 hypotheses are revisited.

CHAPTER SEVEN: DIAGRAMMATIC SYNOPSIS: CONCLUSIONS AND RECOMMENDATIONS



7.1 INTRODUCTION

Interest in the role of personality in entrepreneurship has recently seen a re-emergence after a hiatus of almost 20 years (e.g. Baum *et al.* 2001; Ciavarella *et al.* 2004). By the late 1980s, narrative reviews of the literature had concluded that there was no consistent relationship between personality and entrepreneurship, and that future research using the trait paradigm should therefore be abandoned (e.g. Brockhaus & Horwitz 1986; Gartner 1988). More recently, however, other scholars (Rauch & Frese 2007a; Shane, Locke & Collins 2003) have suggested that the contradictory findings in the earlier literature on personality and entrepreneurship may be due to the dearth of theoretically derived hypotheses and various research artifacts. This study endeavoured to address some of these artifacts, such as sampling error and poor reliability, which could not be accounted for in the narrative reviews. The relationship between the Big Five personality traits and the cognitive adaptability of established entrepreneurs was analysed and evaluated.

The research findings of the study were presented and discussed in Chapter 6. The present chapter opens with an overview of the literature study, followed by an exercise in revisiting and interpreting the research objectives and hypotheses. The main focus of the chapter falls on the accepting or rejecting of the stated hypotheses based on the statistical techniques executed in Chapter 6. Furthermore, the contribution of the study, limitations, recommendations and opportunities for future research are outlined, and the summary and conclusion constitute the final elements of the study.

7.2 FINDINGS OF THE LITERATURE REVIEW: A SYNOPSIS

The literature review was covered in Chapters 2, 3 and 4. Research objectives were formulated from the literature review and the measuring instrument was developed. The study sought to determine the relationship between two constructs: the personality traits and cognitive adaptability of established entrepreneurs.

Chapter 1 serves as the foundation of the study. It starts with a discussion of the importance of entrepreneurship in the economy, i.e. the entrepreneurial activity carried out by individual entrepreneurs operating businesses at the various levels of the entrepreneurial process. The focus of the present study fell on established entrepreneurs (as opposed to those finding themselves in the start-up stages of entrepreneurial activity), as significant role players in the economy. These entrepreneurs create and manage established businesses and in the process assist in solving various problems such as unemployment and poverty. Business failure is high in South Africa, meaning that the more established and successful businesses need to be supported and empirically studied for possible emerging lessons that can be applied to other business types. The research problem and the purpose of the study were introduced. The research problem is described as being an investigation into whether a relationship exists between the individual dimensions of the five major personality traits and the individual dimensions of the cognitive adaptability of established entrepreneurs. The purpose of this study was to determine whether the personality traits and cognitive adaptability of established entrepreneurs play a role in why they are surviving. Key terms were defined, including definitions of the constructs of personality traits and cognitive adaptability. The proposed combined model of personality traits and cognitive adaptability was introduced in Chapter 1.

The notion of personality traits is discussed in **Chapter 2**, and, for purposes of this study, the Big Five personality trait model was adopted. The five dimensions of this model are: openness to experience; conscientiousness; extraversion; agreeableness; and neuroticism. These five dimensions have associated narrow personality traits also known as facets (please see Table 2.4). The historical developments of the trait theory are discussed, i.e. trait approaches to personality by the three notable trait theorists – Gordon Allport, Raymond Cattell and Hans Eysenck. The Big Five personality trait model was influenced by the work of these pioneers. Trait facets associated with the five personality domains are presented in Table 2.4, as outlined by Costa and McCrae's five-factor model of personality. The chapter continues with the discussion of each dimension and its relevance or importance to the field of

entrepreneurship. The chapter concludes with a combined conceptual model of the Big Five personality trait profile of an entrepreneur.

Cognitive adaptability is discussed in **Chapter 3**. Cognitive adaptability is made up of five dimensions, namely goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice and monitoring. Social cognition theory as the theoretical foundation of human cognition provides the groundwork for the construct of cognitive adaptability. The construct of metacognition is conceptualised, together with its facets and their manifestations as a function of monitoring and control. These facets are metacognitive knowledge, metacognitive experience and metacognitive skills. Metacognitive theory, metacognitive awareness and cognitive adaptability are discussed to demonstrate the association between these constructs. Metacognitive awareness allows individuals to plan, sequence and monitor their learning in a way that directly improves performance (Schraw & Dennison 1994:460). Cognitive adaptability is conceptualised as the aggregate of metacognition's five theoretical dimensions in an entrepreneurial context. The dimensions of cognitive adaptability and its importance in entrepreneurial tasks are also discussed. The chapter ends with a combined conceptual profile of the cognitive adaptability of an entrepreneur.

The relationship between the personality traits and cognitive adaptability is discussed in **Chapter 4**. This chapter brings the two constructs together to determine the existence of any theoretical relationships. The importance of the role of established entrepreneurs in the economy is examined in this context. Entrepreneurs' behaviour patterns across life cycle stages, including start-up and growth phases, cast light on the different behaviour patterns. The relationships between each of the personality traits and the five dimensions of cognitive adaptability are investigated and hypotheses are formed. The chapter ends with a combined conceptual model of the personality traits and cognitive adaptability of established entrepreneurs. This model is used in **Chapters 5 and 6** to measure the hypotheses and related sub-hypotheses.

7.3 Research objectives revisited

The primary and secondary research objectives of the study are revisited and presented below.

7.3.1 Primary objectives

The primary objective of the study was to determine the relationship between the personality traits and cognitive adaptability of established entrepreneurs in South Africa.

7.3.2 Secondary objectives

From the primary objective, the researcher formulated the secondary objectives of the study, namely to determine whether there is a relationship between:

- openness to experience and the five dimensions of cognitive adaptability.
- conscientiousness and the five dimensions of cognitive adaptability.
- extraversion and the five dimensions of cognitive adaptability.
- agreeableness and the five dimensions of cognitive adaptability.
- neuroticism and the five dimensions of cognitive adaptability.

The primary objective was met by measuring the various relationships in all the study's hypotheses, H1-H25. The first secondary objective was met by measuring openness to experience and the cognitive adaptability dimensions in hypotheses H1–H5. The second of the secondary objectives was met by measuring conscientiousness and the cognitive adaptability dimensions (H6-H10). The third secondary objective was met by measuring extraversion and the cognitive adaptability dimensions (H11-H15). The fourth secondary objective was met by measuring agreeableness and the cognitive adaptability dimensions (H16-H20). The

fifth secondary objective was met by measuring neuroticism and the cognitive adaptability dimensions (H21-H25).

7.3.3 Measurement models and research hypotheses

The assessment of the measurement models' reliability and validity was conducted by means of CFA. The findings suggested that the measurement models used in the study had acceptable construct validity and reliability. All the measurement scales showed evidence of convergent validity in that each item had a statistically significant loading on its specified factor (Van Dyne & LePine 1998).

7.3.4 Study hypotheses tested

The research hypotheses that were tested were grounded on sound personality and metacognitive theory, as elaborated on earlier. Hypothesis testing was performed in order to accept or reject the null or alternative hypothesis. All 25 hypotheses developed in Chapter 1 (including the hypotheses relating to the subfactors) needed to be statistically tested and then either accepted or rejected based on the findings and the levels of significance. If the probability of the occurrence of the observed data was smaller than the level of significance, then the data would suggest that the null hypothesis should be rejected. The hypotheses below were tested utilising descriptive and inferential statistics.

7.3.4.1 Hypotheses surrounding openness to experience and cognitive adaptability

Due to the splitting of the factor openness to experience, which was found to have three separate dimensions (unconventionality, intellectual interest and aesthetic interest), this hypothesis was accordingly divided into these three dimensions. All subfactors were tested and Table 7.1 provides a summary of the tested hypotheses regarding their rejection or acceptance.

Table 7.1: Summary of openness to experience and cognitive adaptability dimension results related to tested hypotheses

Hypotheses Tested		Accepted/Rejected
Openness to experience is positively related to goal orientation		
H1a(a)	Unconventionality is positively related to goal orientation	Rejected
H1a(b)	Intellectual interest is positively related to goal orientation	Accepted
H1a(c)	Aesthetic interest is positively related to goal orientation	Accepted
Openness to experience is positively related to current metacognitive knowledge		
H2a(a)	Unconventionality is positively related to current metacognitive knowledge	Rejected
H2a(b)	Intellectual interest is positively related to current metacognitive knowledge	Accepted
H2a(c)	Aesthetic interest is positively related to current metacognitive knowledge	Accepted
Openness to experience is positively related to prior metacognitive knowledge		
H2a(d)	Unconventionality is positively related to prior metacognitive knowledge	Accepted
H2a(e)	Intellectual interest is positively related to prior metacognitive knowledge	Rejected
H2a(f)	Aesthetic interest is positively related to prior metacognitive knowledge	Accepted
Openness to experience is positively related to current metacognitive experience		
H3a(a)	Unconventionality is positively related to current metacognitive experience	Rejected
H3a(b)	Intellectual interest is positively related to current metacognitive experience	Accepted
H3a(c)	Aesthetic interest is positively related to current metacognitive experience	Accepted
Openness to experience is positively related to prior metacognitive experience		
H3a(d)	Unconventionality is positively related to prior metacognitive experience	Accepted
H3a(e)	Intellectual interest is positively related to prior metacognitive experience	Accepted
H3a(f)	Aesthetic interest is positively related to prior metacognitive experience	Accepted
Openness to experience is positively related to metacognitive choice		
H4a(a)	Unconventionality is positively related to	Rejected

Hypotheses Tested		Accepted/Rejected
	metacognitive choice	
H4a(b)	Intellectual interest is positively related to metacognitive choice	Accepted
H4a(c)	Aesthetic interest is positively related to metacognitive choice	Accepted
Openness to experience is positively related to monitoring		
H5a(a)	Unconventionality is positively related to monitoring	Rejected
H5a(b)	Intellectual interest is positively related to monitoring	Accepted
H5a(c)	Aesthetic interest is positively related to monitoring	Accepted

Out of the 21 hypotheses to be tested, 15 were accepted while six were rejected. The following were the six rejected hypotheses:

- H1a(a): Unconventionality is positively related to goal orientation.
- H2a(a): Unconventionality is positively related to current metacognitive knowledge.
- H2a(e): Intellectual interest is positively related to prior metacognitive knowledge.
- H3a(a): Unconventionality is positively related to current metacognitive experience.
- H4a(a): Unconventionality is positively related to metacognitive choice.
- H5a(a): Unconventionality is positively related to monitoring.

H1: Openness to experience is positively related to goal orientation

All relationships were found to be statistically significant. The empirical findings in Table 6.45 revealed that the hypothesis surrounding unconventionality and its positive relationship with goal orientation was rejected. The two hypotheses surrounding intellectual interest and aesthetic interest with goal orientation were accepted. In accordance with the postulated relationships, unconventionality was found to negatively predict goal orientation. The literature review, however, indicated

that a positive relationship was expected between openness to experience and goal orientation. McCrae (1987:1258) describes openness to experience as unconventional. Therefore, people who have a low level of openness to experience are found to be more conservative and are more likely to prefer familiar and conventional ideas (Costa & McCrae 1992a:1). *Unconventionality* has been operationalised as the extent to which an individual is open-minded, liberal, unusual and religious (Saucier 1998:274).

Intellectual interest was found to be a mild and positive predictor of goal orientation, which is supported in the literature. Klein and Lee (2006:43) revealed that people who have a high level of openness to experience are characterised as being imaginative, artistic, cultured, curious, original, broad-minded, and intelligent. Intellectual interest has been operationalised as philosophical, intelligent and knowledgeable (Saucier 1998:274).

Aesthetic interest was found to be a weak and positive predictor of goal orientation. Like intellectual interest, this finding is supported in the literature, as aesthetic interest is at the core of openness to experience and denotes creativity. Learning goal orientation was found to be positively related to creativity, and avoiding goal orientation was negatively related to creativity (Borlongan 2008:34). *Aesthetic interest* has been operationalised as the extent to which an individual is artistic, imaginative, tolerant and curious (Saucier 1988:274).

H2: Openness to experience is positively related to current metacognitive knowledge

Unconventionality was found not to be statistically significant, whereas intellectual interest and aesthetic interest were indeed found to be statistically significant. The empirical findings summarised in Table 6.45 revealed that the hypothesis surrounding unconventionality and its positive relationship with metacognitive knowledge was rejected. The two hypotheses surrounding intellectual interest and aesthetic interest with metacognitive knowledge, were accepted. Unconventionality

was found to be a very weak and negative predictor of current metacognitive knowledge. Based on the literature review, a positive relationship was expected. Unconventionality was described in the factor analysis in Chapter 6 as the ability to be able to allow controversial speakers to address students, which could be described as the dissemination of knowledge. Literature on current metacognitive knowledge (Chapter 4) focuses on knowledge management, outflow, inflow and dissemination of knowledge, i.e. knowledge sharing. Lofti *et al.* (2016:241) found that openness to experience appeared to be the most significant factor influencing knowledge sharing. Openness to experience was the strongest predictor of knowledge sharing (Cabrera *et al.* 2006:245; Matzler & Müller 2011:317; Matzler *et al.* 2011:296; Wang & Yang 2007:1427). Intellectual interest was found to be a moderate and positive predictor of current metacognitive knowledge. This is supported in the literature in the definition of intellectual interest, which describes intellectual interest as intellectual knowledge and the exploration of new and novel ideas (Weber 1947:8; Saucier 1998:263). Aesthetic interest was found to be a very weak and positive predictor of current metacognitive knowledge. This is supported in the literature by Gupta and Govindarajan (2000:473), who stated that current metacognitive knowledge is related to the creative process of how information is identified and shared.

H2: Openness to experience is positively related to prior metacognitive knowledge

Unconventionality and intellectual interest were found to be statistically significant and aesthetic interest was not. The empirical findings summarised in Table 6.45 revealed that the hypotheses surrounding unconventionality and aesthetic interest were accepted, but that the hypothesis surrounding intellectual interest was rejected. Unconventionality was found to be a weak and positive predictor of prior metacognitive knowledge. This is supported in the literature in that unconventionality is described by Costa and McCrae (1992a:653) as non-conforming behaviour which could be positively associated with the ability to sense and adapt to uncertainty by leveraging prior entrepreneurial knowledge. This is a critical ability in cognitive

adaptability (Haynie *et al.* 2010:237). Intellectual interest was found to be a negative and weak predictor of prior metacognitive knowledge. Hill and Levenhagen (1995:1057) support this relationship in the literature by postulating that metacognition may represent an important resource for entrepreneurs – above and beyond prior metacognition – given that entrepreneurs are often required to perform dynamic and novel tasks. Intellectual interest relates to the ability to be able to be innovative and perform novel tasks. Aesthetic interest was found to be a weak and positive predictor of prior metacognitive knowledge. Similar to unconventionality, aesthetic interest is defined as the ability to be creative and adaptable to uncertainty by leveraging prior metacognitive knowledge if needed (Haynie *et al.* 2010:237).

H3: Openness to experience is positively related to current metacognitive experience

Unconventionality and aesthetic interest were found not to be statistically significant, whereas intellectual interest was found to be statistically significant. The empirical findings summarised in Table 6.45 revealed that the hypothesis surrounding unconventionality was rejected but the hypotheses surrounding intellectual interest and aesthetic interest were accepted. Unconventionality was found to be a very weak and negative predictor of current metacognitive experience. This finding is supported by Saucier (1998:263) in his labelling of the attributes related to unconventionality. Unconventionality is described as being open-minded, which is linked to current metacognitive knowledge factor items (Table 6.9, e.g. 'I think of several ways to solve a problem and choose the best one.') (Costa & McCrae 1992a). Intellectual interest was found to be a mild and positive predictor of current metacognitive experience. Aesthetic interest was found to be a very weak and positive predictor of current metacognitive experience. Both intellectual interest and aesthetic interest are supported in the literature by Rasmussen and Berntsen (2010:774). These authors state that people who score high on openness tend to make greater use of their memories (an attribute of current metacognitive experience) for problem-solving and behaviour guidance, as well as for self- and identity-defining purposes, consistent with their enhanced intellectual, creative, and narrative abilities.

H3: Openness to experience is positively related to prior metacognitive experience

Intellectual interest was found to be statistically significant, whereas unconventionality and aesthetic interest were found not to be statistically significant. The empirical findings summarised in Table 6.45 revealed that the hypotheses surrounding all three the subfactors were accepted. Unconventionality was found to be a very weak and positive predictor of prior metacognitive experience. This finding is supported in the literature review by Saucier (1998:263), who stated that unconventionality is an ability to notice the moods and feelings that different environments produce. This is also found in prior metacognitive experience. Prior metacognitive experience is also defined as a 'gut' feeling which is used to determine whether a given strategy will be effective (NEO PI-R; Costa & McCrae 1992a and Table 6.10). Intellectual interest was found to be a very weak and positive predictor of prior metacognitive experience. This is supported in the literature as it revealed that the significance attached to a given experience, no matter how novel, is influenced by one's stock of previous experiences (Reuber & Fischer 1999:365). Aesthetic interest was found to be a weak and positive predictor of prior metacognitive experience. This was also supported in the literature by Katz and Shepherd (2003:253), who postulated that the extent to which entrepreneurs can translate previous ownership experience into higher subsequent entrepreneurial performance is likely to depend on a number of intangible considerations such as cognition and learning.

H4: Openness to experience is positively related to metacognitive choice

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.45 revealed that the hypothesis surrounding unconventionality was rejected but the hypotheses surrounding intellectual interest and aesthetic interest were accepted. Unconventionality was found to be a very weak and negative predictor of metacognitive choice. Intellectual interest was found to be a

mild and positive predictor of metacognitive choice. Aesthetic interest was found to be a weak and positive predictor of metacognitive choice. Both intellectual interest and aesthetic interest are supported by Ghaemi and Sabokrouh (2015:11), as well as by Ayhan and Turkylmaz (2015:56), but unconventionality is not supported because the authors found that openness to experience was positively correlated to metacognitive strategies (a function of metacognitive choice). The results showed that students who were curious about their own worlds and welcoming of unconventional values and novel ideas showed more frequent use of these strategies than the students who were more conventional and conservative in behaviour, and who maintained a narrow outlook and scope of interests.

H5: Openness to experience is positively related to monitoring

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.45 revealed that the hypothesis surrounding unconventionality was rejected but the hypotheses surrounding intellectual interest and aesthetic interest were accepted. Intellectual interest was found to be a mild and positive predictor of monitoring. Aesthetic interest was found to be a weak and positive predictor of monitoring. These findings are supported in the literature by Barrick *et al.* (2005:745), who indicated that high levels of self-monitoring appear to compensate for low openness to experience. Low levels of self-monitoring should positively relate to openness to experience because there is no need to disguise the true behaviour. Unconventionality was found to be a very weak and negative predictor of monitoring.

On the basis of the sample data, these findings indicate that of the subfactors of openness to experience, intellectual interest has the most positive relationship with the subfactors of cognitive adaptability. It can therefore be concluded that entrepreneurs who demonstrate intellectual interest, i.e. find learning and developing new hobbies interesting, have a lot of intellectual curiosity and often enjoy playing with theories or abstract ideas, may be able to effectively and appropriately change

decision policies, given feedback from the environmental context in which cognitive processing is embedded.

This overarching finding is consistent with previous studies on openness to experience. These studies indicated that intellect is an alternative label for openness to experience (John 1999:21). Peabody and Goldberg (1989) found that openness to experience included both controlled aspects of intelligence (perceptive, reflective, intelligent) and expressive aspects (imaginative, curious, broad-minded). Furthermore there are relatively few adjectives that describe openness to experience and most of them, e.g. 'curious, creative, inquisitive, and intellectual', refer only to more cognitive forms of openness, leading many lexical researchers to call this factor 'intellect' (Costa & McCrae 1992a:656; McCrae 1990).

7.3.4.2 Hypotheses surrounding conscientiousness and cognitive adaptability

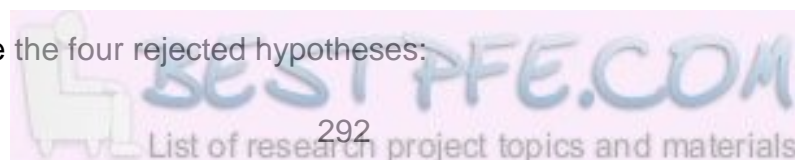
Due to the splitting of the conscientiousness factor, which was found to have two separate dimensions (goal striving and orderliness), this hypothesis was accordingly divided into these two dimensions. All subfactors were tested. Table 7.2 provides a summary of the tested hypotheses regarding their rejection or acceptance.

Table 7.2: Summary of conscientiousness and cognitive adaptability dimension results related to tested hypotheses

Hypotheses Tested		Accepted/Rejected
Conscientiousness is positively related to goal orientation		
H6a(a)	Orderliness is positively related to goal orientation	Accepted
H6a(b)	Goal striving is positively related to goal orientation	Accepted
Conscientiousness is positively related to current metacognitive knowledge		
H7a(a)	Orderliness is positively related to current metacognitive knowledge	Rejected
H7a(b)	Goal striving is positively related to current metacognitive knowledge	Accepted
Conscientiousness is positively related to prior metacognitive knowledge		
H7a(c)	Orderliness is positively related to prior metacognitive knowledge	Accepted
H7a(d)	Goal striving is positively related to prior metacognitive knowledge	Rejected
Conscientiousness is positively related to current metacognitive experience		
H8a(a)	Orderliness is positively related to current metacognitive experience	Accepted
H8a(b)	Goal striving is positively related to current metacognitive experience	Accepted
Conscientiousness is positively related to prior metacognitive experience		
H8a(c)	Orderliness is positively related to prior metacognitive experience	Rejected
H8a(d)	Goal striving is positively related to prior metacognitive experience	Accepted
Conscientiousness is positively related to metacognitive choice		
H9a(a)	Orderliness is positively related to metacognitive choice	Rejected
H9a(b)	Goal striving is positively related to metacognitive choice	Accepted
Conscientiousness is positively related to monitoring		
H10a(a)	Orderliness is positively related to monitoring	Accepted
H10a(b)	Goal striving is positively related to monitoring	Accepted

There were 14 hypotheses, 11 were accepted and four were rejected.

The following were the four rejected hypotheses:



- H7a(a): Orderliness is positively related to current metacognitive knowledge.
H7a(d): Goal striving is positively related to prior metacognitive knowledge.
H8a(c): Orderliness is positively related to prior metacognitive experience.
H9a(a): Orderliness is positively related to metacognitive choice.

H6: Conscientiousness is positively related to goal orientation

Both relationships were found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that the hypotheses surrounding both orderliness and goal striving were accepted. Orderliness was found to be a very weak and positive predictor of goal orientation. Goal striving was found to be a moderate and positive predictor of goal orientation. Orderliness and goal striving are supported in the literature by Barrick *et al.* (1993:715), who postulated that conscientious individuals perform better because they are planful, organised, and this purposeful approach leads them to set goals (which are often difficult). Work goal orientation, hard work, and perseverance in the face of daunting obstacles to achieve one's goals are closely associated with entrepreneurship in the popular imagination (Locke 2000).

H7: Conscientiousness is positively related to current metacognitive knowledge

Orderliness was found not to be statistically significant, whereas goal striving was found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that the hypothesis surrounding orderliness was rejected but the hypothesis surrounding goal striving was accepted. Orderliness was found to be a very weak and negative predictor of current metacognitive knowledge. The findings in the literature review disagree with this negative relationship. Current metacognitive knowledge entails planning and being orderly; for instance, creating examples to make information more meaningful denotes the positive nature of the relationship (Haynie & Shepherd 2009:695) (see Table 6.9 on current metacognitive items). Goal

striving was found to be a moderate and positive predictor of current metacognitive knowledge. This finding is supported in the literature by Haynie and Shepherd (2009:695), as well as Haynie *et al.* (2010:217). They suggested the significance of both entrepreneurs' metacognitive awareness and resources in adopting cognitive strategies that lead to desirable outcomes related to specific entrepreneurial goals.

H7: Conscientiousness is positively related to prior metacognitive knowledge

Both relationships were found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that the hypothesis surrounding orderliness was accepted but the hypothesis surrounding goal striving was rejected. It is interesting that for prior metacognitive knowledge, the hypotheses that were accepted and rejected were the opposite from those found in current metacognitive knowledge. This might mean that goal-striving entrepreneurs may need to adapt to changing environments by using current metacognitive knowledge instead of prior metacognitive knowledge in pursuit of their goals.

Orderliness was found to be a very weak and positive predictor of prior metacognitive knowledge. This finding is supported in the literature, where metacognitive knowledge is described as being able to perform best when already possessing knowledge of the tasks (Haynie & Shepherd 2009:695) (see Table 6.9 on prior metacognitive knowledge). Goal striving was found to be a weak and negative predictor of prior metacognitive knowledge. This finding is supported in the literature by Earley *et al.* (1989:589), who postulated that when environmental cues change, decision-makers adapt their cognitive responses and develop strategies for responding to the environment. Goal-striving entrepreneurs may not rely on their prior metacognitive knowledge in response to a dynamic entrepreneurial environment. Metacognition may represent an important resource for entrepreneurs, above and beyond prior metacognitive knowledge, given that they are often required to perform dynamic and novel tasks (Hill & Levenhagen 1995:1057).

H8: Conscientiousness is positively related to current metacognitive experience

Both the hypotheses of goal striving and orderliness were accepted and were found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that orderliness was found to be a very weak and positive predictor of current metacognitive experience. Goal striving was found to be a moderate and positive predictor of current metacognitive experience. Both orderliness and goal striving are supported in the literature review. People who are conscientious tend to organise their lives, work hard to achieve goals, meet the expectations of others, avoid giving in to temptations, and uphold the norms and rules of life more than others. Conversely, people low in conscientiousness lead more spontaneous, disorganised lives in which they will more often fail to meet interpersonal responsibilities and control temptations (Roberts *et al.* 2009:369). Current metacognitive experience includes being good at organising information and time to best accomplish goals (Haynie & Shepherd 2009:625) (see Table 6.10 on current metacognitive experience).

H8: Conscientiousness is positively related to prior metacognitive experience

Both relationships were found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that the hypothesis surrounding orderliness was rejected but the hypothesis surrounding goal striving was accepted. Orderliness was found to be a very weak and negative predictor of prior metacognitive experience. This finding is supported by Haynie and Shepherd (2009:625), as well as by Saucier (1998:263), who found that people who are orderly prefer getting into situations where they are prepared, which may mean that they may not be able to use their intuition to help formulate strategies. Goal striving was found to be a mild and positive predictor of prior metacognitive knowledge. Goal striving is supported in the literature by Roberts *et al.* (2009:369), who stated that the unpleasant situations that follow from not being conscientious, such as damaged interpersonal relationships

and failure to achieve goals, should cause individuals to experience more negative affect.

H9: Conscientiousness is positively related to metacognitive choice

Orderliness was not found to be statistically significant while goal striving was found to be statistically significant. The empirical findings summarised in Table 6.46 revealed that the hypothesis surrounding orderliness was rejected while the hypothesis surrounding goal striving was accepted. Orderliness was found to be a very weak and negative predictor of metacognitive choice. This finding disagrees with what Saucier (1998:268) found, who postulated that orderliness entails being thorough and systematic, which is similar to the attributes used to describe metacognitive choice. Metacognitive choice entails being orderly (see Table 6.11 on metacognitive choice, e.g. 'I ask myself if I have considered all the options when solving a problem.'). Goal striving was found to be a mild and positive predictor of metacognitive choice. This finding is supported by Ghaemi and Sabokrouh (2015:11), where conscientiousness was found to be strongly correlated to metacognitive strategies. This result implies that being purposeful, strong-willed, and determined to achieve goals more frequently leads to using strategies that assist in the accomplishment of goals.

H10: Conscientiousness is positively related to monitoring

Orderliness was not found to be statistically significant, whereas goal striving was found to be statistically significant. The empirical findings in Table 6.46 indicate that the hypotheses surrounding both orderliness and goal striving were accepted. Table 6.46 revealed that orderliness was found to be a weak and negative predictor of monitoring. Goal striving was found to be moderate and positive predictor of monitoring. This finding is supported by Day and Schleicher (2006:685), and Brown and Treviño (2006:954), who found that high self-monitors are ethically pragmatic as well as socially pragmatic. The opportunistic tendencies (i.e. win-at-all-costs) of self-monitoring are activated in non-interpersonal and task-based situations, amplifying

the natural/trait-relevant expression of low conscientiousness (e.g. lack of discipline, disregard for rules, lack of integrity). In private settings, high self-monitors low in conscientiousness are more likely to prefer expediency to principle and do whatever it takes to get what they want (e.g. more money, more break time).

Overall, of the sub factors of conscientiousness, goal striving has the most positive relationship with the sub factors of cognitive adaptability. On the basis of the sample data of established entrepreneurs, it can be concluded that entrepreneurs who demonstrate goal-striving abilities may be able to effectively and appropriately change decision policies, given feedback from the environmental context in which cognitive processing is embedded. Goal-striving abilities include trying to perform all the tasks assigned to them conscientiously, having a clear set of goals, and working towards them in an orderly fashion, working hard to accomplish their goals, being dependable in following through when having made a commitment, and being productive.

This finding is supported in the literature review in that conscientiousness is reported by Zhao and Seibert (2006:259) as one of the Big Five dimensions in which entrepreneurs are superior to managers. Looking at two facets of conscientiousness (i.e. achievement motivation and dependability), only achievement motivation differentiated entrepreneurs from managers.

7.3.4.3 Hypotheses surrounding extraversion and cognitive adaptability

Due to the splitting of the extraversion factor, which was found to have three separate dimensions (activity, positive affect and sociability), this hypothesis was accordingly divided into these three dimensions. All subfactors were tested. Table 7.3 provides a summary of the tested hypotheses regarding their rejection or acceptance.

Table 7.3: Summary of extraversion and cognitive adaptability dimension results related to tested hypotheses

Hypotheses Tested		Accepted/Rejected
Extraversion is positively related to goal orientation		
H11a(a)	Activity is positively related to goal orientation	Accepted
H11a(b)	Positive affect is positively related to goal orientation	Accepted
H11a(c)	Sociability is positively related to goal orientation	Accepted
Extraversion is positively related to current metacognitive knowledge		
H12a(a)	Activity is positively related to current metacognitive knowledge	Accepted
H12a(b)	Positive affect is positively related to current metacognitive knowledge	Accepted
H12a(c)	Sociability is positively related to current metacognitive knowledge	Accepted
Extraversion is positively related to prior metacognitive knowledge		
H12a(d)	Activity is positively related to prior metacognitive knowledge	Rejected
H12a(e)	Positive affect is positively related to prior metacognitive knowledge	Rejected
H12a(f)	Sociability is positively related to prior metacognitive knowledge	Accepted
Extraversion is positively related to current metacognitive experience		
H13a(a)	Activity is positively related to current metacognitive experience	Accepted
H13a(b)	Positive affect is positively related to current metacognitive experience	Accepted
H13a(c)	Sociability is positively related to current metacognitive experience	Rejected
Extraversion is positively related to prior metacognitive experience		
H13a(d)	Activity is positively related to prior metacognitive experience	Accepted
H13a(e)	Positive affect is positively related to prior metacognitive experience	Accepted
H13a(f)	Sociability is positively related to prior metacognitive experience	Rejected
Extraversion is positively related to metacognitive choice		
H14a(a)	Activity is positively related to metacognitive choice	Accepted
H14a(b)	Positive affect is positively related to metacognitive choice	Accepted

Hypotheses Tested		Accepted/Rejected
H14a(c)	Sociability is positively related to metacognitive choice	Rejected
Extraversion is positively related to monitoring		
H15a(a)	Activity is positively related to monitoring	Accepted
H15a(b)	Positive affect is positively related to monitoring	Accepted
H15a(c)	Sociability is positively related to monitoring	Rejected

Out of the 21 hypotheses to be tested, 20 were accepted while six were rejected.

The following constitute the six rejected hypotheses:

- H12a(d): Activity is positively related to prior metacognitive knowledge.
- H12a(e): Positive affect is positively related to prior metacognitive knowledge.
- H13a(c): Sociability is positively related to current metacognitive experience.
- H13a(f): Sociability is positively related to prior metacognitive experience.
- H14a(c): Sociability is positively related to metacognitive choice.
- H15a(c): Sociability is positively related to monitoring.

H11: Extraversion is positively related to goal orientation

All relationships were found to be statistically significant and all hypotheses regarding extraversion were accepted. The empirical findings summarised in Table 6.47 revealed that all three relationships were accepted. Activity was found to be a mild and positive predictor of goal orientation. Elliot and Thrash (2002) support this finding in the literature, in that extraverts tend to set high performance goals and attain them and are likely to set active skill/knowledge acquisition goals. They found that extraversion loaded onto a latent construct, general approach temperament, which predicted learning goal orientation. Positive affect was found to be a weak and positive predictor of goal orientation. Sociability was found to be a very weak and positive predictor of goal orientation. This finding is supported by Kristof-Brown *et al.* (2002:27), who found that extraverts are more likely to use self-promotion tactics in

job-related communications to serve impression management purposes and adopt proving goal orientation.

H12: Extraversion is positively related to current metacognitive knowledge

All relationships were found to be statistically significant. The empirical finding summarised in Table 6.46 revealed that the hypotheses surrounding all three relationships were accepted. Activity was found to be a mild and positive predictor of current metacognitive knowledge. Positive affect was found to be a weak and positive predictor of current metacognitive knowledge. Sociability was found to be a weak and positive predictor of current metacognitive knowledge. These findings are supported by Gupta (2008) and Agyemang *et al.* (2011:115), who found that the extraverts' social skills and the wish to work with others implies that they could be more involved in knowledge sharing, as there was a significant positive influence on knowledge-sharing attitude and behaviour among teachers who exhibited the extraversion traits. Extraverted individuals tend to share knowledge whether or not they will be held accountable or will be rewarded for it (Wang *et al.* 2011:115). A possible explanation for this finding may be that there is a relationship between extraversion and the need to gain status (Barrick *et al.* 2005), which has been identified as a motivating factor for knowledge sharing (e.g. Ardichvili 2008).

H12: Extraversion is positively related to prior metacognitive knowledge

Activity was found not to be statistically significant, whereas both positive affect and sociability were found to be statistically significant. The empirical findings in Table 6.47 revealed that the hypotheses surrounding activity and positive affect were rejected while the hypothesis surrounding sociability was accepted. Activity was found to be a very weak and negative predictor of prior metacognitive knowledge. Positive affect was found to be a weak and statistically negative predictor of current metacognitive knowledge. These findings are supported by Saucier (1998:268), who described activity and positive affect as fast-paced and action orientated. Sociability was found to be a very weak and positive predictor of prior metacognitive knowledge.

This finding disagrees with Saucier (1998:268), since sociability is closely linked to both activity and positive affect, making all three applicable to current and not prior metacognitive knowledge.

H13: Extraversion is positively related to current metacognitive experience

All three relationships were found to be statistically significant. The empirical finding in Table 6.47 revealed that the hypotheses surrounding activity and positive affect were accepted. The hypothesis surrounding sociability was rejected. Activity was found to be a mild and positive predictor of current metacognitive experience. This finding is supported by Bono and Vey (2007:180), who postulated that when extraverts are faced with emotional regulation demands that call for enthusiasm, they should be able to draw on past experiences and elicit the required positive emotion, allowing them to both experience and express genuine enthusiasm. Positive affect was found to be a weak and positive predictor of current metacognitive experience. This finding is supported by Clark and Watson (1991:56), stating that extraversion is characterised by positive feelings and experiences and is therefore seen as a positive affect. When extraverts are faced with emotional regulation demands that call for enthusiasm, they should be able to draw on past experiences and elicit the required positive emotion, allowing them to both experience and express genuine enthusiasm (Bono & Vey 2007:180). Sociability was found to be a weak and negative predictor of current metacognitive experience. A review by Wilson (1981:210) reports that extraverts are more open to social influences, suggesting they may also be more willing to engage in the emotions prescribed by their job roles.

H13: Extraversion is positively related to prior metacognitive experience

All three relationships were found to be statistically significant. The empirical findings in Table 6.47 revealed that the hypotheses surrounding activity and positive affect were accepted. The hypothesis surrounding sociability was rejected. Activity was found to be a weak and positive predictor of prior metacognitive experience. Positive affect was found to be a very weak and positive predictor of prior metacognitive

experience. Sociability was found to be a very weak and negative predictor of prior metacognitive experience. This finding disagrees with what was found in the literature by Bono and Vey (2007:180), because, as indicated in activity and positive affect, extraverts should draw on past experiences to elicit the required emotion.

H14: Extraversion is positively related to metacognitive choice

All relationships were found to be statistically significant. Table 6.47 found that activity and positive affect were accepted but sociability was rejected. Activity was found to be a weak and positive predictor of metacognitive choice. Positive affect was found to be a weak and positive predictor of metacognitive choice. These findings are supported in the literature review. Extraversion was found to be positively correlated to metacognitive strategies (Ghaemi & Sabokrouh 2015:11). Sociability was found to be a very weak and negative predictor of metacognitive choice.

H15: Extraversion is positively related to monitoring

All relationships were found to be statistically significant. The empirical findings in Table 6.47 revealed that the hypotheses surrounding activity and positive affect were accepted. The hypothesis surrounding sociability was rejected. Activity was found to be a weak and positive predictor of monitoring. Positive affect was found to be a weak and positive predictor of monitoring. The results are supported in the literature by Barrick *et al.* (2005:745), who showed that individuals who scored high on self-monitoring had relatively strong interpersonal performance when the person had relatively low levels of, for example, extraversion. It should also be noted, of course, that the reverse would also be true, i.e. that extraversion would moderate the relationship between self-monitoring and performance. Sociability was found to be a weak and negative predictor of monitoring.

Overall, of the subfactors of extraversion, activity has the most positive relationship with the subfactors of cognitive adaptability. On the basis of the sample data of

established entrepreneurs, it can therefore be concluded that entrepreneurs who are active, i.e. like to be where the action is, often feel as if they are bursting with energy, lead a fast-paced life and are active, may be able to effectively and appropriately change decision policies, given feedback from the environmental context in which cognitive processing is embedded.

This finding is further supported in the literature by Shane (2003:56), who found that activity is a valuable trait for entrepreneurs because they need to spend a lot of time interacting with investors, employees and customers and have to sell all of them on the value of the business.

7.3.4.4 Hypotheses surrounding agreeableness and cognitive adaptability

Due to the splitting of the agreeableness factor, which was found to have three separate dimensions (meekness, prosocial orientation and non-antagonistic orientation), this hypothesis was accordingly divided into these three dimensions. All subfactors were tested. Table 7.4 provides a summary of the tested hypotheses regarding their rejection or acceptance.

Table 7.4: Summary of agreeableness and cognitive adaptability dimension results related to tested hypotheses

Hypotheses Tested		Accepted/Rejected
Agreeableness is positively related to goal orientation		
H16a(a)	Meekness is positively related to goal orientation	Accepted
H16a(b)	Prosocial orientation is positively related to goal orientation	Accepted
H16a(c)	Non-antagonistic orientation is positively related to goal orientation	Accepted
Agreeableness is positively related to current metacognitive knowledge		
H17a(a)	Meekness is positively related to current metacognitive knowledge	Accepted
H17(b)	Prosocial orientation is positively related to current metacognitive knowledge	Accepted

Hypotheses Tested		Accepted/Rejected
H17a(c)	Non-antagonistic orientation is positively related to current metacognitive knowledge	Accepted
Agreeableness is positively related to prior metacognitive knowledge		
H17a(d)	Meekness is positively related to prior metacognitive knowledge	Accepted
H17a(e)	Prosocial orientation is positively related to prior metacognitive knowledge	Rejected
H17a(f)	Non-antagonistic orientation is positively related to prior metacognitive knowledge	Accepted
Agreeableness is positively related to current metacognitive experience		
H18a(a)	Meekness is positively related to current metacognitive experience	Accepted
H18a(b)	Prosocial orientation is positively related to current metacognitive experience	Accepted
H18a(c)	Non-antagonistic orientation is positively related to current metacognitive experience	Rejected
Agreeableness is positively related to prior metacognitive experience		
H18a(d)	Meekness is positively related to prior metacognitive experience	Rejected
H18a(e)	Prosocial orientation is positively related to prior metacognitive experience	Accepted
H18a(f)	Non-antagonistic orientation is positively related to prior metacognitive experience	Rejected
Agreeableness is positively related to metacognitive choice		
H19a(a)	Meekness is positively related to metacognitive choice	Accepted
H19a(b)	Prosocial orientation is positively related to metacognitive choice	Accepted
H19a(c)	Non-antagonistic orientation is positively related to metacognitive choice	Rejected
Agreeableness is positively related to monitoring		
H20a(a)	Meekness is positively related to monitoring	Accepted
H20a(b)	Prosocial orientation is positively related to monitoring	Accepted
H20a(c)	Non-antagonistic orientation is positively related to monitoring	Rejected

Out of the 21 hypotheses to be tested, 17 were accepted while six were rejected.

The following were the six rejected hypothesis:

- H17a(e): Prosocial orientation is positively related to prior metacognitive knowledge.
- H18a(c): Non-antagonistic orientation is positively related to current metacognitive experience.
- H18a(d): Meekness is positively related to prior metacognitive experience.
- H18a(f): Non-antagonistic orientation is positively related to prior metacognitive experience.
- H19a(c): Non-antagonistic orientation is positively related to metacognitive choice.
- H20a(c): Non-antagonistic orientation is positively related to monitoring.

H16: Agreeableness is positively related to goal orientation

Meekness was found not to be statistically significant, whereas prosocial orientation and non-antagonistic orientation were found to be statistically significant. The empirical findings in Table 6.47 revealed that the hypotheses surrounding all three subfactors were accepted. Meekness was found to be a very weak and positive predictor of goal orientation. Prosocial orientation was found to be a weak and positive predictor of goal orientation. Non-antagonistic orientation was found to be a weak and positive predictor of goal orientation. All three relationships are supported by McCabe *et al.* (2013:698), who found that agreeableness is positively related to mastery-approach goals and negatively related to performance-approach goals. Mastery-approach goals emphasise self-improvement in competence, and they are associated with positive constructs, including intrinsic motivation and task interest (Harackiewicz *et al.* 2008; Van Yperen 2006), cooperative behaviour while working with others (Janssen & Van Yperen 2004; Poortvliet *et al.* 2009), and less cheating behaviour (Van Yperen *et al.* 2011:5).

H17: Agreeableness is positively related to current metacognitive knowledge

Meekness was found not to be statistically significant, whereas prosocial orientation and non-antagonistic orientation were found to be statistically significant. The empirical findings in Table 6.48 revealed that the hypotheses surrounding all three subfactors were accepted. Meekness was found to be a very weak and positive predictor of current metacognitive knowledge. Prosocial orientation was found to be a mild and positive predictor of current metacognitive knowledge. Non-antagonistic orientation was found to be a weak and positive predictor of current metacognitive knowledge. All three are supported in the literature by Ferguson *et al.* (2010), who found that agreeableness is likely to positively influence knowledge sharing. People who score high on the agreeableness scale are friendly, generous, and willing to help (Matzler *et al.* 2008:296). According to De Vries *et al.* (2006:115), teams with members who scored high on the agreeableness scale were more likely to share knowledge than those whose members had lower scores.

H17: Agreeableness is positively related to prior metacognitive knowledge

Meekness and non-antagonistic orientation were found not to be statistically significant, whereas prosocial orientation was found to be statistically significant. The empirical findings in Table 6.48 revealed that the hypotheses surrounding meekness and non-antagonistic orientation were accepted. The hypothesis surrounding prosocial orientation was rejected. Meekness was found to be a very weak and positive predictor of current metacognitive knowledge. Non-antagonistic orientation was found to be a very weak and positive predictor of prior metacognitive knowledge. These two findings are supported in the literature by Saucier (1998:269), who found that in the agreeableness domain, the content of the non-antagonistic orientation cluster pertains to one's degree of cynicism, scepticism and distrust of others, along with tough-mindedness and argumentativeness. This means that a positive score would suggest the lack of such attitudes and tendencies. People who show meekness and prosocial orientation attributes are likely to depend on their intuition and prior knowledge in entrepreneurial assignments. Prosocial orientation was found

to be a mild and negative predictor of prior metacognitive knowledge. This is supported in the literature by Haynie and Shepherd (2009:625), who found that being courteous and considerate could mean being more aware of current strategies that should be applied in an entrepreneurial setting.

H18: Agreeableness is positively related to current metacognitive experience

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.48 revealed that hypotheses surrounding meekness and prosocial orientation were accepted. The hypothesis surrounding non-antagonistic orientation was rejected. Meekness was found to be a very weak and positive predictor of current metacognitive experience. Prosocial orientation was found to be a weak and positive predictor of current metacognitive experience. Both meekness and current prosocial orientation are supported by Graziano *et al.* (2007:583), Nettle and Liddle (2008:323), as well as DeYoung *et al.* (2010:820), who found that agreeableness is linked to psychological mechanisms that allow the understanding of others' emotions, intentions, and mental states, including empathy, theory of mind, and other forms of social information processing. Non-antagonistic orientation was found to be a weak and negative predictor of current metacognitive experience. This finding is supported in the literature by Ode and Robinson (2009:436), who suggested that agreeableness may be a contributing factor in regulating negative emotions.

H18: Agreeableness is positively related to prior metacognitive experience

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.48 revealed that the hypotheses surrounding meekness and non-antagonistic orientation were accepted. The hypothesis surrounding prosocial orientation was rejected. Meekness was found to be a weak and negative predictor of prior metacognitive experience. Non-antagonistic orientation was found to be a weak and negative predictor of prior metacognitive experience. These findings are supported in the literature by Meier and Robinson (2004:856), who found that

accessible hostile thoughts predicted anger and aggression only at low levels of agreeableness. Conversely, at high levels of agreeableness, accessible hostile thoughts did not predict anger or aggression. Additionally, Meier *et al.* (2006:136) found that individuals high in agreeableness were able to mitigate the primed influence of hostile thoughts in an implicit cognitive paradigm and in regards to a behavioural measure of laboratory aggression. Prosocial orientation was found to be a weak and positive predictor of prior metacognitive experience. This finding has been supported in the literature by Tobin *et al.* (2000:656), who found that researchers have identified a term called 'effortful control' that appears to be substantial in moderating the negative emotions. That is, the ability of individuals high in agreeableness to regulate negative emotions has been significantly associated with increased effort.

H19: Agreeableness is positively related to metacognitive choice

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.48 revealed that hypotheses surrounding meekness and prosocial orientation were accepted. The hypothesis surrounding non-antagonistic orientation was rejected. Meekness was found to be a weak and positive predictor of metacognitive choice. Prosocial orientation was found to be a weak and positive predictor of metacognitive choice. Meekness and prosocial orientation are supported in the literature by Komarraju *et al.* (2011:472), who found that the agreeableness domain has a relationship with the use of metacognitive strategies. Usually cooperation with others and making use of social contexts seem like activators of target language use and therefore agreeableness might be a prerequisite through other requirements. They reported a significantly positive relationship between agreeableness and academic achievement and learning styles. Non-antagonistic orientation was found to be a weak and negative predictor of metacognitive choice. This finding is not supported by Komarraju *et al.* (2011:472), due to the strong relationship between metacognitive strategies and agreeableness.

H20: Agreeableness is positively related to monitoring

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.48 revealed that the hypotheses surrounding meekness and prosocial orientation were accepted. The hypothesis surrounding non-antagonistic orientation was rejected. Meekness was found to be a very weak and positive predictor of monitoring. Prosocial orientation was found to be a mild and positive predictor of monitoring. Meekness and prosocial orientation are supported in the literature by Barrick *et al.* (2005:745), who found that self-monitoring moderated the relationships between several relevant interpersonal personality traits (e.g. low agreeableness) and performance in interpersonal settings, in that relevant personality traits had stronger correlations with interpersonal performance among low self-monitors than among high self-monitors. Non-antagonistic orientation was found to be a very weak and negative predictor of monitoring.

Overall, of the subfactors of agreeableness, prosocial orientation has the most positive relationship with the subfactors of cognitive adaptability. On the basis of the sample data of established entrepreneurs, it can therefore be concluded that entrepreneurs who are prosocially oriented may be able to effectively and appropriately change decision policies, given feedback from the environmental context in which cognitive processing is embedded. Prosocial orientation includes statements such as trying to be courteous to everyone they meet, tending to assume the best about people, and generally trying to be thoughtful and considerate.

This finding is further supported in the literature by Costa and McCrae (1992a:653), who posited that agreeableness is a trait dimension associated with the tendency to behave prosocially; highly agreeable people tend to be highly cooperative and altruistic. Agreeableness affects one's interpersonal orientation (Digman 1990:417).

7.3.4.5 Hypotheses surrounding neuroticism and cognitive adaptability

Due to the splitting of the neuroticism factor, which was found to have three separate dimensions (depression, self-reproach and negative affect), this hypothesis was accordingly divided into these three dimensions. All subfactors were tested. Table 7.5 provides a summary of the tested hypotheses regarding their rejection or acceptance.

Table 7.5: Summary of neuroticism and cognitive adaptability dimension results related to tested hypotheses

Hypotheses Tested		Accepted/Rejected
Neuroticism is negatively related to goal orientation		
H21a(a)	Depression is negatively related to goal orientation	Accepted
H21a(b)	Self-reproach is negatively related to goal orientation	Accepted
H21a(c)	Negative affect is negatively related to goal orientation	Rejected
Neuroticism is negatively related to current metacognitive knowledge		
H22a(a)	Depression is negatively related to current metacognitive knowledge	Accepted
H22a(b)	Self-reproach is negatively related to current metacognitive knowledge	Accepted
H22a(c)	Negative affect is negatively related to current metacognitive knowledge	Rejected
Neuroticism is negatively related to prior metacognitive knowledge		
H22a(d)	Depression is negatively related to prior metacognitive knowledge	Rejected
H22a(e)	Self-reproach is negatively related to prior metacognitive knowledge	Rejected
H22a(f)	Negative affect is negatively related to prior metacognitive knowledge	Accepted
Neuroticism is negatively related to current metacognitive experience		
H23a(a)	Depression is negatively related to current metacognitive experience	Accepted
H23a(b)	Self-reproach is negatively related to current metacognitive experience	Accepted

Hypotheses Tested		Accepted/Rejected
H23a(c)	Negative affect is negatively related to current metacognitive experience	Accepted
Neuroticism is negatively related to prior metacognitive experience		
H23a(d)	Depression is negatively related to prior metacognitive experience	Accepted
H23a(e)	Self-reproach is negatively related to prior metacognitive experience	Accepted
H23a(f)	Negative affect is negatively related to prior metacognitive experience	Rejected
Neuroticism is negatively related to metacognitive choice		
H24a(a)	Depression is negatively related to metacognitive choice	Accepted
H24a(b)	Self-reproach is negatively related to metacognitive choice	Accepted
H24a(c)	Negative affect is negatively related to metacognitive choice	Rejected
Neuroticism is negatively is positively related to monitoring		
H25a(a)	Depression is negatively related to monitoring	Accepted
H25a(b)	Self-reproach is negatively related to monitoring	Accepted
H25a(c)	Negative affect is negatively related to monitoring	Rejected

Out of the 21 hypotheses to be tested, 18 were accepted while seven were rejected.

The following were the seven rejected hypotheses:

- H21a(c): Negative affect is negatively related to goal orientation.
- H22a(c): Negative affect is negatively related to current metacognitive knowledge.
- H22a(d): Depression is negatively related to prior metacognitive knowledge.
- H22a(e): Self-reproach is negatively related to prior metacognitive knowledge.
- H23a(f): Negative affect is negatively related to prior metacognitive experience.
- H24a(c): Negative affect is negatively related to metacognitive choice.
- H25a(c): Negative affect is negatively related to monitoring.

H21: Neuroticism is negatively related to goal orientation

Depression was found not to be statistically significant, whereas self-reproach and negative affect were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were accepted. The hypothesis surrounding negative affect was rejected. Depression was found to be a very weak and negative predictor of goal orientation. Self-reproach was found to be a mild and negative predictor of goal orientation. Both findings are supported in the literature review by Elliot and Thrash (2002), who found that negative affect is negatively related to goal-setting motivation, expectancy motivation, and self-efficacy motivation (Judge & Ilies 2002), and positively related to avoidance motivation (Elliot & Thrash 2002). People who score high on depression and self-reproach are anxious and tend to question their own ideas and behaviours (Digman 1990). They are more likely to actively seek to avoid failure than directly move toward achieving a goal. Negative affect was found to be a very weak and positive predictor of goal orientation. This finding is supported in the literature by Wallace and Newman (1997:135 and 1998:253), who found that neurotic individuals tend to allocate mental effort to task-irrelevant mental processes related to often intrusive negative affect at the expense of effective task performance.

H22: Neuroticism is negatively related to current metacognitive knowledge

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were accepted. The hypothesis surrounding negative affect was rejected. Depression was found to be a very weak and negative predictor of current metacognitive knowledge. Self-reproach was found to be a weak and negative predictor of current metacognitive knowledge. Both depression and self-reproach are supported in the literature by Lofti *et al.* (2016:241), who found that no significant relationship was found between neuroticism and the intention to share knowledge (Wang & Yang 2007; Amayah 2013). Negative affect was found to be very weak and positively related to current metacognitive knowledge. This is supported in the

literature by Davidson *et al.* (2001:191), who found that individuals with negative affect readily worry and feel easily threatened and uncomfortable with themselves, which makes them have negative interpretations of events.

H22: Neuroticism is negatively related to prior metacognitive knowledge

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were rejected. The hypothesis surrounding negative affect was accepted. Depression was found to be a very weak and positive predictor of prior metacognitive knowledge. Self-reproach is a very weak and positive predictor of prior metacognitive knowledge. Depression and self-reproach findings are supported in the literature by Saucier (1998:263), who found that people presenting with depression and self-reproach are described as being anxious and ill-adjusted. It could be expected that such entrepreneurs would most likely depend on prior metacognitive knowledge than current metacognitive knowledge. Negative affect was found to be a weak and negative predictor of prior metacognitive knowledge. Neuroticism is the opposite of emotional stability. Neurotic individuals are depressed, anxious and unstable, so this dimension may be irrelevant to the intention of sharing knowledge (Wang & Yang 2007:1429).

H23: Neuroticism is negatively related to current metacognitive experience

Depression and negative affect were found not to be statistically significant, whereas self-reproach was found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding all three subfactors were accepted. Depression was found to be a very weak and negative predictor of current metacognitive experience. Self-reproach was found to be a negative and mild predictor of current metacognitive experience. Negative affect was found to be a negative and very weak predictor of current metacognitive knowledge. These findings are all consistent with the literature review on current metacognition. Consistent with previous findings (Rubin *et al.* 2008:591), higher ratings on

neuroticism were found to be related to having emotionally more negative memories. Consistent with previous work, neuroticism correlated negatively with emotional valence (Rasmussen & Berntsen 2010:780). Neuroticism is linked to the tendency to experience negative emotions (Clark & Watson 2008:265; Costa & McCrae 1992a), and includes such traits as anxiety, self-consciousness, and irritability (DeYoung *et al.* 2010:820).

H23: Neuroticism is negatively related to prior metacognitive experience

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were accepted but the hypothesis surrounding negative affect was rejected. Depression was found to be a weak and negative predictor of prior metacognitive experience. Self-reproach was found to be a weak and negative predictor of prior metacognitive experience. These findings are supported in the literature by Feldman-Barrett (1997:1100), who found that those who scored high on a measure of the personality trait of anxiety reported more negative affect than those who scored low, and at the end of the study they recalled having felt even worse than the average of their reports. They also found that participants who scored high on neuroticism overestimated the average intensity of their previously recorded negative emotional states. Negative affect was found to be a weak and positive predictor of prior metacognitive experience. This finding is supported in the literature by Rubin *et al.* (2008:591) and Sutin (2008:1060), who found that neuroticism shows a consistent relationship with a basic memory property, namely with negative affect, which is consistent with the idea of a special role for openness.

H24: Neuroticism is negatively related to metacognitive choice

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were accepted, but the hypothesis surrounding negative affect was rejected. Depression was found to be a very weak and negative predictor of

metacognitive choice. Self-reproach was found to be a weak and negative predictor of metacognitive choice. These findings are supported in the literature by Ackerman and Heggstad (1997), Bandura (1986), Costa and McCrae (1992a), De Barbenza and Montoya (1974), Entwistle (1988), Lathey (1991), Miculincer (1997), Nahl (2001), Schouwenburg (1995), as well as by Ghaemi and Sabokrouh (2015:11), all having found neuroticism to be significantly negatively correlated only to metacognitive strategies, with a negative influence on educational outcomes and language learning. Negative affect is a weak and positive predictor of metacognitive choice. This finding is supported by McCrae and Costa (1992:653), who defined the first domain of the five-factor model, neuroticism, as a tendency to experience negative emotional affects.

H25: Neuroticism is negatively related to monitoring

All relationships were found to be statistically significant. The empirical findings summarised in Table 6.49 revealed that the hypotheses surrounding depression and self-reproach were accepted. The hypothesis surrounding negative affect was rejected. Depression was found to be a very weak and negative predictor of monitoring. Self-reproach was found to be a weak and negative predictor of monitoring. The findings are supported in the literature by Barrick *et al.* (2005), who found that self-monitoring moderated the relationships between several relevant interpersonal personality traits (e.g. neuroticism) and performance in interpersonal settings, in that relevant personality traits had stronger correlations with interpersonal performance among high self-monitors than among low self-monitors. Negative affect was found to be a very weak and positive predictor of monitoring. This finding is supported in the literature by Wallace and Newman (1998:253), who found that neurotic individuals have a tendency to automatically orient toward task-irrelevant cues, which also makes them more vulnerable to distraction.

Overall, of all the neuroticism subfactors, self-reproach has the most negative relationship with the subfactors of cognitive adaptability. On the basis of the sample data of established entrepreneurs, it can therefore be concluded that entrepreneurs

who demonstrate self-reproach may not be able to effectively and appropriately change decision policies, given feedback from the environmental context in which cognitive processing is embedded. People who engage in self-reproach are described as those who, when under stress, sometimes feel that they are going to pieces and feel completely worthless. Too often, when things go wrong they get discouraged and feel like giving up. They also tend to want someone to solve their problems and at times become so ashamed that they feel they want to hide.

The literature review further supports this finding, whereby the adjective correlates of the Neuroticism-Extraversion-Openness Five Factor Inventory (NEO-FFI) item clusters of self-reproach include feeling sad, afraid, insecure, depressed, ashamed, scared and troubled (Saucier 1998:268). These are not attributes that are associated with entrepreneurs. Entrepreneurs are expected to be self-assured and self-confident. These attributes should help them adapt to changing and novel entrepreneurial environments.

7.3.4.6 The Five Factors emerging from this study

The Big Five personality trait model helps to specify the range of traits that a comprehensive personality instrument should measure, and the factors that emerge from an analysis of these traits are considered the basic dimensions of personality (Costa & McCrae 1992a:653). The five factors which emerged from this study – **intellectual interest, goal striving, activity, prosocial orientation and self-reproach** - are consistent with previous studies which found that the highest loading is always on the intended factor. This proves the universality of the factors (Costa & McCrae 1992a:653). Table 7.6 is an illustration of the Big Five personality traits which emerged from this study.

Table 7.6: Big Five personality traits and the five factors emerging from this study

Big Five personality traits (Costa & McCrae 1992a)	Themes of clusters and generally dominant factors (Saucier 1998:263)	Themes of clusters and dominant factors in this study
Openness to experience	Unconventionality Intellectual interest Aesthetic interest	Unconventionality Intellectual interest Aesthetic interest
Conscientiousness	Orderliness Goal striving Dependability	Orderliness Goal striving
Extraversion	Activity Positive affect Sociability	Activity Positive affect Sociability
Agreeableness	Prosocial orientation Non-antagonistic orientation	Meekness Prosocial orientation Non-antagonistic orientation
Neuroticism	Self-reproach Negative affect	Depression Self-reproach Negative affect

Source: Own compilation

Table 7.6 illustrates that the results of this study are similar to Saucier's clustering of themes as subfactors. This study found that the dominant factors were intellectual interest, goal striving, activity, prosocial orientation and self-reproach. This study used Saucier's clusters in the factor analysis, when the Big Five personality dimensions were split into subfactors. This study's findings are consistent with previous studies on personality traits, confirming the reality, pervasiveness and the universality of the Big Five personality model (Costa & McCrae 1992a:653).

7.4 CONTRIBUTION OF THE STUDY

The following theoretical and practical contributions emerged from the study.

7.4.1 Theoretical contribution

This study makes a contribution to the fields of psychology and entrepreneurship. It opens up the debate between the significance of trait and cognitive theory in their impact on entrepreneurship. By bringing together literatures from personality psychology and cognitive psychology in one model of personality traits and cognitive adaptability, this study offers a robust, testable framework that serves to address two notable shortcomings of the extant entrepreneurial cognition literature, specifically 1) the inadequate treatment of the influences of personality on cognitive processing, and 2) the inadequate treatment of the cognitive mechanisms that promote adaptable (rather than inhibit) thinking and cognitive processes in general, given a dynamic environment. The issue of why entrepreneurs 'think' differently about a given entrepreneurial task (and subsequently behave differently) becomes even more important.

By empirically investigating a series of relationships proposed by the theoretical model - specifically how monitoring of one's own cognitions relates to one's personality trait, this study demonstrated the utility of the model as a framework to be applied to the study of entrepreneurial cognitions. More significantly, the findings suggest that personality traits and normative differences in performance on entrepreneurial tasks may be explained by the role that metacognition plays in promoting cognitive adaptability.

In terms of methodology, this study makes a significant contribution in entrepreneurship research through its focus on established entrepreneurs. Metacognition is naturally suited to studying individuals engaged in a series of entrepreneurial processes and examining cognitive processes across entrepreneurial endeavors (Haynie 2009:21). Entrepreneurship is commonly defined based on new products, new markets, and new ventures (e.g., Lumpkin & Dess 1996). As a result, entrepreneurship scholars are most interested in questions focused on opportunity recognition, exploitation, new venture creation, learning, knowledge, and entrepreneurial 'intent.' Understanding how established entrepreneurs utilise their

cognitive adaptability and personality traits in analysing entrepreneurial tasks should benefit start-up and potential entrepreneurs in dealing with challenging entrepreneurial environments.

The present study has enhanced the prevailing understanding of the broad and narrower sub-dimensions of metacognitive resources (metacognitive knowledge and metacognitive experience). In terms of constructs and variables, seven sub-dimensions emerged as opposed to the five dimensions of cognitive adaptability found by Haynie and Shepherd (2009:703). This study found that metacognitive knowledge and metacognitive experience split. Metacognitive knowledge split into current metacognitive knowledge and prior metacognitive knowledge, whereas metacognitive experience split into current metacognitive experience and prior metacognitive experience. Established entrepreneurs in a South African or developing entrepreneurial environment draw on current metacognitive knowledge (and not on prior metacognitive knowledge) in handling entrepreneurial tasks.

This study facilitates a better understanding of the differences between the broad and narrower sub-dimensions of overarching personality traits. The popular revised NEO Personality Inventory (NEO PI-R) has a short form, i.e. the NEO Five-Factor Inventory (NEO-FFI), which taps the five broad factors with fidelity and reliability. However, conventional scoring of this short form does not provide scores on more specific aspects of the broad-bandwidth factors. Fourteen factor-analytically derived scales in the NEO-FFI emerged in this study. Thirteen factor-analytically derived scales were found in Saucier's study (1998:263). This study contributes to the literature demonstrating that information gained from the NEO-FFI need not be limited to a single score from each of the five broad factor domains. On the practical level, researchers are afforded some degree of additional fidelity.

7.4.2 Practical contribution

Entrepreneurs at the various levels of the entrepreneurial process should be made aware of the crucial role that metacognition plays in entrepreneurship – the art of thinking about thinking. Similarly, policy makers may find the process of uncovering the personality dimensions which are positively or negatively related to cognitive adaptability informative. Entrepreneurs at the different phases of the entrepreneurial life cycle should be able to find this study beneficial. For start-up entrepreneurs it will create awareness of what it takes to adapt in dynamic and unstable entrepreneurial environments. When faced with challenges these entrepreneurs need to think beyond the biases that might be embedded in their thinking and in so doing adapt their own thinking. This will create awareness of what personality traits are related to cognitive adaptability in an established entrepreneurial environment. The ability to compare one's attributes with those of established entrepreneurs could assist aspiring entrepreneurs to make an important career decision even if they have no previous experience of working in an entrepreneurial environment.

Entrepreneurship education should incorporate the field of metacognition in its curriculum. The practical implications of this study can be brought into the classroom setting, where consideration of cognitive adaptability in the design of curriculum and teaching methodologies could enhance learning and promote adaptable thinking. The articulation of the seven new aggregated metacognitive dimensions provides a meaningful categorisation, where there is ample opportunity for curriculum designers to develop skill-building exercises and activities that target the various metacognitive dimensions (Urban 2012:28). If a certain type of personality is closely associated with entrepreneurship, the effort of developing entrepreneurs in South Africa could include the development of personality. Metacognition is not represented as a dispositional trait but rather as a dynamic, learned response that can be enhanced through experience and training (Haynie *et al.* 2010:217).

Venture capitalists and other funding agencies are frequently faced with the decision to fund or not to fund a start-up company. With large amounts of money at risk, this

research would allow them to make sound decisions about the people involved, in addition to market analysis and evaluating the merits of the product/service. The NEO-FFI scale with its 14 theory-tested items offers additional fidelity to distinguish between two equally qualifying entrepreneurs when deciding on funding.

This study has made a sound contribution towards the larger field of entrepreneurship studies by conducting research into the *modus operandi* of established entrepreneurs in *various* industry sectors. The study was conducted across all sectors of the South African economy instead of focusing on one sector only. At least 555 of the respondents (20%) indicated that they operated in sectors of the industry classified as 'Other', i.e. categories which were not classified in the present study. The nine official sectors as listed on the DTI's website were included in the research instrument for respondents to choose from. This means that there are several other sectors that they might be overlooking and could also be added to the existing list. This makes a significant contribution to understanding business sector demographics for different stakeholders in the entrepreneurial support and funding space.

7.5 LIMITATIONS OF THE STUDY

The study was conducted as professionally and efficiently as possible, but no study is without its limitations. The following limitations should be mentioned:

The novel nature of this study is both a limitation and a contribution in that literature in this field is limited.

This study sought to use Structured Equation Modelling (i.e. CFA and EFA) in the analysis of the data. An unacceptable model fit was found for all the dimensions, which is not ideal. One of the reasons for poor model fit could be due to some items measuring multiple factors. It might also be that some items within a factor were more related to each other than others (covariance). Deleting indiscriminant items would likely improve fit, and would have the advantage that it would be unlikely to have any

major theoretical repercussions. Given the complexity of SEM, it is not uncommon to find that the fit of a proposed model is poor. Allowing modification indices to drive the process is a dangerous game, although some modification indices can be made locally and could substantially improve results. It is good practice to assess the fit of each construct and its items individually to determine whether there are any items that are particularly weak (e.g. items with values less than 0.20 indicate a high level of error).

Web-based surveys are good for large sample sizes but often no sampling frame exists as was the case in this study. It was not possible to predict how many respondents were going to take part in the survey. Web-based surveys exclude individuals who do not have access to emails. For those who have email addresses, respondents are asked to follow a web link to a site that allows for completion of the survey. Some respondents may find this cumbersome and opt out.

7.6 RECOMMENDATIONS FOR FUTURE RESEARCH

Future researchers are encouraged to expand on this study by building additional conceptual bridges between cognitive adaptability and entrepreneurship. Future research could identify variables that may influence and moderate the relationship between personality traits and cognitive adaptability.

Structural equation modelling did not show model fit. Future researchers are encouraged to use path analysis to describe an entire set of linkages explaining the causal links between the study variables.

The Big Five personality subcomponents emerged from this study. The degree of generalisation of the more precise constructs – the within-domain subcomponents – to other samples and populations needs further investigation. Future research should focus on testing the replicability of the 14 new dimensions in similar environments or in other entrepreneurial environments.



South Africa is an emerging economy. Future research should focus on similar economies for comparative studies and benchmarking. The focus should be on factors which can assist established entrepreneurs to survive and grow.

New cognitive adaptability sub-dimensions emerged. Future research should focus on testing the replicability of the two new dimensions in similar environments (emerging economies) or in other entrepreneurial environments (developed economies).

This study focused on established entrepreneurs only. A decision was made to focus only on established entrepreneurs due to the size and strength of the sample (90% established entrepreneurs). Future research should focus on a comparative analysis of the two samples (i.e. start-up and established entrepreneurs), to build on the work that has already been done. This would add to the body of knowledge and could paint an interesting picture of the differences in the needs and personality / cognitive adaptability profiles of start-up and established entrepreneurs in driving economic development in developing nations.

7.7 SUMMARY AND CONCLUSION

The literature review in this study introduced two constructs that play significant roles in entrepreneurship research but had previously never been associated in an entrepreneurial context. Chapter 2 focused on the personality traits of entrepreneurs and on employing the five-factor model to determine the dominant factors specific to entrepreneurs. Chapter 3 focused exclusively on cognitive adaptability and its importance for an entrepreneurial mind-set in surviving novel and dynamic entrepreneurial environments. Chapter 4 introduced the importance of established entrepreneurs and discussed the relationship between the personality traits (Chapter 2) and the cognitive adaptability (Chapter 3) of established entrepreneurs. The combined theoretical model of personality traits was formulated and proposed. The model revealed that there was a positive relationship between four of the personality traits and the cognitive adaptability dimensions (openness to experience,

conscientiousness, extraversion and agreeableness revealed a positive relationship with the cognitive adaptability dimensions). The fifth personality trait, neuroticism, demonstrated a negative relationship with the cognitive adaptability dimensions. Chapter 5 provided a discussion of the research methodology used in this study and explained the statistical techniques that were used to analyse the data. SEM and regression analysis were proposed as the most suitable techniques for data analysis.

Chapter 6 presented a discussion of the study's findings. Factor analysis of personality traits revealed that the model loaded onto more than one factor for all five personality traits. Openness to experience split into three factors – unconventionality, intellectual interest and aesthetic interest. Conscientiousness loaded onto orderliness and goal striving. Extraversion loaded onto activity, positive affect and sociability. Agreeableness split into meekness, prosocial orientation and non-antagonistic orientation. Neuroticism split into depression, self-reproach and negative affect. Structured equation modelling showed an unacceptable fit, and regression analysis was subsequently used in the data analysis. Intellectual interest (openness to experience sub factor) was found to positively predict cognitive adaptability. Goal striving (conscientiousness sub factor) was found to positively predict cognitive adaptability. Activity (extraversion sub factor) was found to positively predict cognitive adaptability. Prosocial orientation (agreeableness) was found to positively predict cognitive adaptability. Self-reproach (neuroticism sub factor) was found to negatively predict cognitive adaptability.

The research objectives were restated in this final chapter, and demonstrated that the objectives of the study have been met. Furthermore, the hypotheses were revisited and explained, whereby each of the hypotheses were stated and accepted or rejected based on the literature review findings (Chapters 2, 3 and 4) as well as the empirical findings (Chapter 6).

Established entrepreneurs were found to rate themselves relatively strongly on all four of the personality trait dimensions and relatively low on neuroticism. Furthermore, they rated themselves relatively high on all five of the cognitive

adaptability dimensions. In terms of the Big Five personality traits, established entrepreneurs in this study are open to experiences, conscientious, extraverted and agreeable, but not neurotic. They are cognitively adaptable to novel and challenging entrepreneurial environments. However, factor analysis identified more than one factor for all Big Five personality dimensions and more than one factor for two of the cognitive adaptability dimensions (i.e. metacognitive knowledge and metacognitive experience). This is a significant contribution, as it proves that the personality trait and cognitive adaptability measurement instrument developed in other entrepreneurial environments should be empirically tested in different entrepreneurial environments.

Finally, this study established the potential relationships between established entrepreneurs' personalities and their ability to effectively and appropriately change decision policies (i.e. to learn) given feedback (inputs) from the environmental context in which cognitive processing is embedded.

This study's findings revealed that:

- Intellectual interest (a facet/sub factor of openness to experience) is positively related to six dimensions of cognitive adaptability. It is negatively related to **prior metacognitive knowledge**. This means entrepreneurs in this study are intellectual, philosophical, intelligent and knowledgeable. They do not rely on prior metacognitive knowledge of oneself, other people and strategy.
- Goal striving (a facet/sub factor of conscientiousness) is positively related to cognitive adaptability. It is negatively related to **prior metacognitive knowledge**. This means that entrepreneurs in this study are dedicated, ambitious, persistent and productive. Goal striving is negatively related to **prior metacognitive knowledge**. They do not rely on prior metacognitive knowledge of oneself, other people and strategy.
- Activity (a facet/sub factor of extraversion) is positively related to six dimensions of cognitive adaptability. It is negatively related to **prior metacognitive knowledge**. This means that entrepreneurs in this study are

energetic, active, exciting, lively, busy, powerful and influential. Activity is negatively related to prior metacognitive knowledge. They do not rely on prior metacognitive knowledge of oneself, other people and strategy.

- Prosocial orientation (a facet/sub factor of agreeableness) is positively related to cognitive adaptability. It is negatively related to **prior metacognitive knowledge**. This means that entrepreneurs in this study are friendly, kind-hearted, pleasant, considerate, helpful and warm-hearted. They do not rely on prior metacognitive knowledge of oneself, other people and strategy.
- Self-reproach (a facet/sub factor of neuroticism) is negatively related to cognitive adaptability. It is positively related to **prior metacognitive knowledge**. This means that entrepreneurs in this study were found not to be sad, afraid, insecure, depressed and troubled. They do not rely on prior metacognitive knowledge of oneself, other people and strategy.

From the background of the study, it is evident that the established business rate, although low, has been positively increasing since 2001. There could be many reasons for this positive increase. This study has revealed a unique model of personality traits and cognitive adaptability of established entrepreneurs. As entrepreneurs are required to make decisions with incomplete information, they sometimes make correct and other times incorrect decisions and they may think about these issues on a meta-cognitive level and decide how they would approach the decision-making task differently the next time they are faced with a similar situation. In a world of ever-increasing uncertainty and unpredictability, having an entrepreneurial mindset (thinking innovatively and proactively, as well as taking risks through making decisions despite incomplete information) is seen as more important. This study can assist the entrepreneurial community, government policy makers and enterprise support agencies who assist start-up entrepreneurs on how to think about thinking when faced with dynamic entrepreneurial tasks.

Entrepreneurs at various phases of the entrepreneurial process might find it valuable to know whether they are positioned for cognitive adaptability in entrepreneurial environments by assessing their personality traits. It might be useful for

entrepreneurs to determine their personality trait profiles and cognitive adaptability before they embark on their entrepreneurial career. A potential personality and cognitive adaptability assessment instrument has also been revealed through this investigation. All efforts towards encouraging established and successful entrepreneurship should be supported by policy makers, entrepreneurship support agencies, funders and all other stakeholders. Established businesses are responsible for employment creation and this has a directly positive impact on various outcomes such as poverty alleviation, crime prevention and wealth creation.

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APPENDIXES

APPENDIX A: QUESTIONNAIRE

Chair in Entrepreneurship
Department of Business Management

RESEARCH QUESTIONNAIRE

PLEASE NOTE: THIS QUESTIONNAIRE SHOULD BE COMPLETED BY START-UP AND ESTABLISHED ENTREPRENEURS ONLY!

This academic research study is part of the doctoral thesis towards a PhD in entrepreneurship whose objective is to determine if there is a relationship between **personality type** (*actions, attitudes and behaviours that people possess*) and **cognitive adaptability** (*ability to adapt one's thinking and strategies in the face of dynamic and complex entrepreneurial environments*). This survey should take about 15-20 minutes or less to complete.

All information will be treated as STRICTLY CONFIDENTIAL and will only be used for academic purposes. Please feel free to contact the researcher if you need any information concerning the questionnaire.

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Instructions for completion:

Please answer the all the questions as objectively as possible by selecting an option which reflects your opinion, thoughts and behaviour most accurately.

All questions are mandatory, as this will provide more information to the researcher so that an accurate analysis and interpretation of data can be made.

Please note that you won't be able to save progress. To avoid to losing progress made, you are requested to please complete the survey at once.

PART A: DEMOGRAPHIC DETAILS

Instruction for completion: Please use X to make a selection.

1. Gender

Male	
Female	

2. What is your age?

.....years

3. Race

Black	
Coloured	
Indian	
White (Caucasian)	
Asian	
Other (please specify)	

4. What is the highest level of education you are in possession of?

Primary school	
Secondary school (High school – Grade 8 to 11)	
Matric (Grade 12)	
Tertiary (College/Technikon/University)	
Post Graduate (Honours Degree/B Tech)	
Post Graduate (Master or Doctoral Degree)	

5. For how long have you run your business?

For less than 3 and a half years	
For more than 3 and a half years	

6. In which sector does the main focus of your business lie?

Instruction for completion: You may select more than one option

(E.g. *Service, Retail, Manufacturing, Food, Education, Medical, Beauty*)

Agriculture, forestry and fishing.	
Accommodation and food service activities	
Administration and support service activities	
Arts, entertainment and recreation	
Construction	
Education	
Electricity, gas, steam and air conditioning supply.	
Financial and insurance activities	
Human health and social work activities	
Information and communication	
Manufacturing	
Mining and quarrying	
Professional, scientific and technical activities	
Public administration and defense; compulsory social security	
Real estate activities	
Transportation and storage	
Water supply, sewerage, waste management and remediation activities	
Wholesale and retail trade, repair of motor vehicles and motorcycles	
Activities of households as employers; undifferentiated goods- and services producing activities of households for own use	
Other service activities	

7. Province

Eastern Cape	
Free State	
Gauteng	
KwaZulu-Natal	
Limpopo	
Mpumalanga	
Northern Cape	
North West	
Western Cape	

PART B: COGNITIVE ADAPTABILITY

Cognitive adaptability is the ability to adapt one’s thinking and strategies in the face of dynamic and complex entrepreneurial environments. Please indicate whether you agree or disagree with the following:

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
8. I think of several ways to solve a problem and choose the best one				
9. I ask myself if I have considered all the options when solving a problem				
10. I periodically review to help me understand important relationships.				
11. I often define goals for myself				
12. I think about what I really need to accomplish before I begin a task				
13. I challenge my own assumptions about a task before I begin				
14. I ask myself if there was an easier way to do things after I finish a task				
15. I stop and go back over information that is not clear				
16. I understand how accomplishment of a task relates to my goals				
17. I use different strategies depending on the situation				
18. I think about how others may react to my actions				
19. I ask myself if I have considered all the options after I solve a problem				
20. I am aware of what strategies I use when engaged in a given task				
21. I set specific goals before I begin a task				
22. I organise my time to best accomplish my goals				
23. I find myself automatically employing strategies that have worked in the past				
24. I re-evaluate my assumptions when I get confused				
25. I find myself pausing regularly to check my comprehension of the problem or situation at hand				

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
26. I ask myself how well I've accomplished my goals once I've finished				
27. I am good at organising information				
28. I perform best when I already have knowledge of the task				
29. I ask myself if I have learned as much as I could have when I finished the task				
30. I ask myself questions about how well I am doing while I am performing a novel task				
31. When performing a task, I frequently assess my progress against my objectives				
32. I know what kind of information is most important to consider when faced with a problem				
33. I create my own examples to make information more meaningful				
34. I stop and reread when I get confused				
35. I consciously focus my attention on important information				
36. I try to use strategies that have worked in the past				
37. My 'gut' tells me when a given strategy I use will be most effective				
38. I ask myself questions about the task before I begin				
39. I depend on my intuition to help me formulate strategies				
40. I focus on the meaning and significance of new information				
41. I try to translate new information into my own words				
42. I try to break problems down into smaller components				

PART C: PERSONALITY

Personality traits are actions, attitudes and behaviours that people possess. Please indicate whether you agree or disagree with the following:

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
43. I am not a worrior				
44. I like to have a lot of people around me				
45. I enjoy concentrating on a fantasy or daydream and exploring all its possibilities, letting it grow and develop.				
46. I try to be courteous to everyone I meet.				
47. I keep my belongings neat and clean.				
48. At times I have felt bitter and resentful.				
49. I laugh easily.				
50. I think it's interesting to learn and develop new hobbies.				
51. At times I bully or flatter people into doing what I want them to.				
52. I'm pretty good about pacing myself so as to get things done on time.				
53. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.				
54. I prefer jobs that let me work alone without being bothered by other people.				
55. I am intrigued by patterns I find in art and nature.				
56. Some people think I'm selfish and egotistical.				
57. I often come into situations without being fully prepared.				
58. I rarely feel lonely or blue.				
59. I really enjoy talking to people.				
60. I believe letting students hear controversial speakers can only confuse and mislead them.				
61. If someone starts a fight, I'm ready to fight back.				

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
62. I try to perform all the tasks assigned to me conscientiously.				
63. I often feel tense and jittery				
64. I like to be where the action is.				
65. Poetry has little or no effect on me.				
66. I'm better than most people, and I know it.				
67. I have a clear set of goals and work toward them in an orderly fashion.				
68. Sometimes I feel completely worthless.				
69. I shy away from crowds of people.				
70. I would have difficulty just letting my mind wonder without control or guidance.				
71. When I've been insulted, I just try to forgive and forget.				
72. I waste a lot of time before settling down to work.				
73. I rarely feel fearful or anxious.				
74. I often feel as if I'm bursting with energy.				
75. I seldom notice the moods or feelings that different environments produce.				
76. I tend to assume the best about people.				
77. I work hard to accomplish my goals.				
78. I often get angry at the way people treat me.				
79. I am a cheerful, high-spirited person.				
80. I experience a wide range of emotions or feelings.				
81. Some people think of me as cold and calculating.				
82. When I make a commitment, I can always be counted on to follow through.				
83. Too often, when things go wrong, I get discouraged and feel like giving up.				
84. I don't get much pleasure from chatting with people.				

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
85. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.				
86. I'm hard-headed and tough-minded in my attitudes.				
87. Sometimes I'm not as dependable or reliable as I should be.				
88. I am seldom sad or depressed.				
89. My life is fast-paced.				
90. I have little interest in speculating on the nature of the universe or the human condition.				
91. I generally try to be thoughtful and considerate.				
92. I am a productive person who always gets the job done.				
93. I often feel helpless and want someone else to solve my problems.				
94. I am a very active person.				
95. I have a lot of intellectual curiosity.				
96. If I don't like people, I let them know it.				
97. I never seem to be able to get organised.				
98. At times I have been so ashamed I just wanted to hide.				
99. I would rather go my own way than be a leader of others.				
100. I often enjoy playing with theories or abstract ideas.				
101. If necessary, I am willing to manipulate people to get what I want.				
102. I strive for excellence in everything I do.				

Thank you for taking your time to participate in this study.

APPENDIX B: STANDARDISED REGRESSION WEIGHTS FOR PERSONALITY TRAIT DIMENSIONS

Table 1: Standardised regression weights for openness to experience to each of the cognitive adaptability subfactors

Cognitive adaptability subfactors	Estimate
Goal orientation and unconventionality	-2.203
Current metacognitive knowledge and unconventionality	-2.045
Prior metacognitive knowledge and unconventionality	1.075
Prior metacognitive experience and unconventionality	-0.260
Current metacognitive experience and unconventionality	-2.070
Metacognitive choice and unconventionality	-2.265
Monitoring and unconventionality	-2.471
Goal orientation and intellectual interest	2.306
Current metacognitive knowledge and intellectual interest	2.393
Prior metacognitive knowledge and intellectual interest	-1.078
Prior metacognitive experience and intellectual interest	0.523
Current metacognitive experience and intellectual interest	2.350
Metacognitive choice and intellectual interest	2.334
Monitoring and intellectual interest	2.540
Goal orientation and aesthetic interest	0.336
Current metacognitive knowledge and aesthetic interest	0.215
Prior metacognitive knowledge and aesthetic interest	-0.017
Prior metacognitive experience and aesthetic interest	-0.083
Current metacognitive experience and aesthetic interest	0.139
Metacognitive choice and aesthetic interest	0.309
Monitoring and aesthetic interest	0.388

Table 2: Standardised regression weights for conscientiousness to each of the cognitive adaptability subfactors

Cognitive adaptability dimensions	Estimate
Goal orientation and orderliness	-2.274
Current metacognitive orderliness	-2.921
Prior metacognitive knowledge and orderliness	1.063
Prior metacognitive experience and orderliness	-0.813
Current metacognitive experience and orderliness	-1.863
Metacognitive choice and orderliness	-2.806
Monitoring and orderliness	-1.308
Goal orientation and goal striving	2.886
Current metacognitive knowledge and goal striving	3.429
Prior metacognitive knowledge and goal striving	-1.291
Prior metacognitive experience and goal striving	0.920
Current metacognitive experience and goal striving	2.640
Metacognitive choice goal striving	3.216
Monitoring and goal striving	1.574

Table 3: Standardised regression weights for extraversion to each of the cognitive adaptability subfactors

Cognitive adaptability dimensions	Estimate
Goal orientation and activity	-2.700
Current metacognitive knowledge and activity	-54.502
Prior metacognitive knowledge and activity	0.138
Current metacognitive experience and activity	-0.015
Metacognitive choice and activity	-1.872
Monitoring and activity	-311.936
Goal orientation and sociability	-6.241
Current metacognitive knowledge and sociability	210.142
Prior metacognitive and sociability	-0.487
Current metacognitive experience and sociability	-6.624
Metacognitive choice and sociability	-11.693
Monitoring and sociability	100.258
Goal orientation and positive affect	9.061
Current metacognitive knowledge and positive affect	-155.402
Prior metacognitive knowledge and positive affect	0.341
Current metacognitive experience and positive affect	6.883

Cognitive adaptability dimensions	Estimate
Metacognitive choice and positive affect	13.653
Monitoring and positive affect	211.780

Table 4: Standardised regression weights for agreeableness to each of the cognitive adaptability subfactors

Cognitive adaptability dimensions	Estimate
Goal orientation and non-antagonistic orientation	-3.162
Current metacognitive knowledge and non-antagonistic orientation	-3.061
Prior metacognitive knowledge and non-antagonistic orientation	1.019
Prior metacognitive experience and non-antagonistic orientation	-0.531
Current metacognitive experience and non-antagonistic orientation	-3.045
Metacognitive choice and non-antagonistic orientation	-3.048
Monitoring and non-antagonistic orientation	-3.295
Goal orientation and prosocial orientation	1.775
Current metacognitive knowledge and prosocial orientation	1.901
Prior metacognitive knowledge and prosocial orientation	-0.809
Prior metacognitive experience and prosocial orientation	0.495
Current metacognitive experience prosocial orientation	1.793
Metacognitive choice and prosocial orientation	1.779
Monitoring and prosocial orientation	1.970
Goal orientation and meekness	2.212
Current metacognitive knowledge and meekness	2.039
Prior metacognitive knowledge and meekness	-0.558
Prior metacognitive experience and meekness	0.040
Current metacognitive experience and meekness	2.084
Metacognitive choice and meekness	2.122
Monitoring and meekness	2.319

Table 5: Standardised regression weights for neuroticism to each of the cognitive adaptability subfactors

Cognitive adaptability dimensions	Estimate
Goal orientation and negative affect	4.336
Current metacognitive knowledge and negative affect	4.685
Prior metacognitive knowledge and negative affect	2.314
Prior metacognitive knowledge and negative affect	1.656
Current metacognitive experience and negative affect	4.255
Metacognitive choice and negative affect	4.507
Monitoring and metacognitive affect	4.963
Goal and self-reproach	-11.571
Current metacognitive knowledge and self-reproach	-11.244
Prior metacognitive knowledge and self-reproach	-3.936
Prior metacognitive experience and self-reproach	-0.398
Current metacognitive experience and self-reproach	-10.587
Metacognitive choice and self-reproach	-11.600
Monitoring and self-reproach	-13.074
Goal orientation and depression	7.273
Current metacognitive knowledge and depression	6.558
Prior metacognitive knowledge and depression	1.724
Prior metacognitive experience and depression	-1.306
Current metacognitive experience and depression	6.160
Metacognitive choice and depression	7.237
Monitoring and depression	8.229