The Influence of Managers' Personality Traits on Taking Project Risky Decisions

تأثير السمات الشخصية للمدراء على إتخاذ القرارات الخطرة المتعلقة بالمشروع

by

AHMAD MAHMOUD MOHAMMAD RASHID

A dissertation submitted in fulfilment
of the requirements for the degree of
DOCTOR OF PHILOSPHY IN PROJECT MANAGEMENT
at
The British University in Dubai

Supervisor's Name: Professor Halim Boussabaine

June 2017

The Influence of Managers' Personality Traits on Taking Project Risky Decisions

تأثير السمات الشخصية للمدراء على إتخاذ القرارات الخطرة المتعلقة بالمشروع

by

AHMAD MAHMOUD MOHAMMAD RASHID

A thesis submitted to the Faculty of Engineering and IT
in fulfilment of the requirements for the degree of
DOCTOR OF PHILOSOPHY IN PROJECT MANAGEMENT
at
The British University in Dubai
June 2017

Thesis Supervisor
Professor Halim Boussabaine

Approved for award:

Professor Ronald McCaffer External Examiner	Professor Ashly H. Pinnington Internal Examiner
Dr John McKenny Chair of Examiners	Professor Abdullah Al Shamsi Chair of Research Degree Committee

Date: 24 May 2017

Abstract

Several studies had explored the topic of individuals' risk propensity related to general life domains such as: health, career, financial, safety and social. Yet, there is little research that was conducted specifically on project managers' risk propensity related to project domains. The existing literature emphasizes the need for researchers to analyze individuals' traits differences and its effects on shaping their risk propensity towards project success criteria. It is well understood that project managers' will take their risky decisions based on available information and on their tendency to take risks, i.e. risk propensity. Therefore, this research investigated the influence of certain project managers' personality traits on their risk propensity and risky decisions in relation to specific project success criteria. Accordingly, this research is expanding the existing literature on personality traits related to risk propensity, risk propensity in project management literature, individual characteristics related to project managers and project management success criteria. This research employed a mix of qualitative and quantitative methods to investigate the influence of 65 personality traits on project managers' risky decisions in relation to project success criteria. Finally, the research examines the stability of project managers' risk propensity across different project domains and in comparison to their general risk propensity.

الملخص

هناك العديد من الدراسات التي بحثت في ميول الأفراد لإتخاذ القرارات الخطرة و لكن معظمها كان في مجالات الحياة العامة مثل: الصحة ، الوظيفة، الأمور المالية ، الأمان و المجالات الإجتماعية. و لكن القليل من الأبحاث تطرق لموضوع ميول مدراء المشاريع لإتخاذ القرارات الخطرة المتعلقة بنواحي المشروع. و قد أكدت معظم الأبحاث المتعلقة بهذا الموضوع على أهمية البحث في تحليل أثر السمات الشخصية للأفراد على تكوين ميولهم في إتخاذ القرارات الخطرة و المؤثرة على معايير نجاح المشروع. من المعلوم أن مدراء المشاريع سيتخذون القرارات الخطرة بناء على المعلومات المتوفرة و بناء على ميولهم الفردية لإتخاذ القرارات الخطرة. و من هنا تأتي أهمية هذا البحث في تقصي تأثير سمات شخصية محددة على تكوين الميول الفردية لإتخاذ القرارات الخطرة و المؤثرة على معايير نجاح المشروع. و بالتالي، فإن هذا البحث يعتبر إمتداد للأبحاث الموجودة و المتعلقة بالسمات الشخصية وعلاقتها بالميول الفردية لإتخاذ القرارات الخطرة المؤثؤة على نجاح المشروع. بالإضافة لذلك، استخدمت العديد من وسائل التحليل الكمي والنوعي لتحليل نتائج البحث و بالتحديد أثر خمسة و ستون من السمات الشخصية على الميول الفردية لإتخاذ القرارات الخطرة. و أخيرا، فإن هذا البحث يفحص في ثبات الميول الفردية لمدراء المشاريع لإتخاذ القرارات الخطرة في النواحي المختلفة لنجاح المشروع و بالمقارنة مع الميول الفردية العامة لإتخاذ القرارت الخطرة.

Declaration

I warrant that the content of this research is the direct result of my own work and that any use made in it of published or unpublished copyright material falls within the limits permitted by international copyright conventions.

I understand that a copy of my research will be deposited in the University Library for permanent retention.

I hereby agree that the material mentioned above for which I am author and copyright holder may be copied and distributed by The British University in Dubai for the purposes of research, private study or education and that The British University in Dubai may recover from purchasers the costs incurred in such copying and distribution, where appropriate.

I understand that The British University in Dubai may make a digital copy available in the institutional repository.

I understand that I may apply to the University to retain the right to withhold or to restrict access to my thesis for a period which shall not normally exceed four calendar years from the congregation at which the degree is conferred, the length of the period to be specified in the application, together with the precise reasons for making that application.

Signature of the student

Copyright and Information to Users

Acknowledgements

In the name of Allah, Most Gracious, Most Merciful.

Praise be to Allah, the Cherisher and Sustainer of the worlds for giving me the strength and ability to complete my PhD thesis in a timely manner while being a full-time employee and a full-time student.

My sincerest gratitude goes to my director of studies Prof. Haleem Boussabaine; for his generous supervision, invaluable guidance, advice, tremendous support and encouragement during my PhD journey. His emotional support and efforts to raise my confidence during hard times were truly appreciated. I thank him for giving me the opportunity to become more competent as a researcher and teaching me how to always look at things through new thinking paradigms. Also, I thank all my professors at the British University in Dubai (BUiD) for their assistance during taught courses and the doctoral training center (DTC) for their valuable workshops.

I would like to extend my appreciation to the executive management of my company; Meirc Training & Consulting for providing moral support, financial assistance, and self-development time during my studies. I am also profoundly grateful for my colleague and friend; Samer Taher for his continuous support during my studies; and whose belief in my abilities made me strive harder to meet his expectations. I also would like to express my special appreciation for my colleagues and friends who took the time and put effort to complete the mapping matrices; specifically (in alphabetical order): Charles Touq, Fouad Awad, George Khayat, and Samer Taher. Also, I would like to thank my colleague and friend Raid Marie; for assisting me with Excel during the ranking analysis.

At the end, special thanks goes to my family whose prayers and support enabled me to complete this research: parents, wife and kids. They are the most important people in my life and words cannot express how grateful I am to them. I thank my mother for teaching me how to never quit and be persistent in pursuing my goals; my father for teaching me how to receive life problems and blows with open arms and a smile. Last, but not the least; I thank my beloved wife Ghada and my three precious kids: Sara, Abdulrahman and Omar. This thesis would never have been completed without your love, patience, and the understanding you showed during this endeavor.

Table of Contents

1 Chapter One: Introduction 1

1.1 Introduction 1

1.2 Background to the research problem 1

1.3 Research significance 3

1.4 Research aim 4

1.5 Research objectives 5

1.6 Research questions 5

1.7 Research Hypotheses 6

1.8 Research Scope 10

1.9 Methodology Overview 10

1.10 Thesis Outline 12

2 Chapter Two: Uncertainty, Risk and Risk Propensity 15

2.1 Introduction 15

2.2 Uncertainty and Risk 15

2.3 Risk Propensity Definitions 22

2.4 Theory of planned behaviour 28

2.5 Risk as feelings 33

2.6 The Psychology of risk 39

2.7 Risk and rationality 41

2.8 Risk behaviour 48

2.9 Environmental and situational factors 52

2.10 Group and individual risk propensity 54

2.11 Individual characteristics and risk propensity 55

2.12 Heuristic and biases 59

2.13 Cognitive biases 62

2.14 Morality and Risk 66

2.15 Summary 70

3 Chapter Three: Influence of risk propensity on project success criteria 71

3.1 Introduction 71

3.2 Project success factors and criteria 71

3.3 Project success criteria and triple constraints 75

3.4 The multidimensionality of project success 82

3.5 Selecting project success criteria 99

3.6 Propensity constructs and project success criteria 102

3.7 Summary 106

4 Chapter Four: Theoretical Research Framework 107

4.1 Introduction 107

4.2 The research conceptual framework 107

4.3 Risk propensity in project management literature 110

4.4 Personality traits influencing project managers' risk propensity 117

4.5 Developing the research hypotheses 130

4.6 Individual characteristics influencing project managers' risk propensity 152

4.7 Project success criteria influenced by project managers' risk propensity 157

4.8 Proposed research theoretical framework 159

4.9 Summary 161

5 Chapter Five: Research Methodology 162

5.1 Introduction 162

5.2 Research philosophy 162

5.3 Research paradigm and approach 169

5.4 Research methods 174

5.5 Research process 176

5.6 Measurement of personality traits in relation to risk propensity 177

5.7 Questionnaire design and structure 186

5.8 Type of questions 188

5.9 Measurements 193

5.10 Questionnaire data coding 198

5.11 Questionnaire validation 199

5.12 Questionnaire reliability and validity 204

5.13 Statistical analysis 207

5.14 Dependency structure Matrices analysis 214

5.15 Sample composition and size 218

5.16 Pilot study 219

5.17 Ethical considerations 219

5.18 Limitations 220

5.19 Summary 220

6 Chapter Six: Descriptive Statistics and Ranking Analysis 221

6.1 Introduction 221

6.2 Research questionnaire 221

6.3 Descriptive statistics 223

6.4 Ranking analysis 234

6.5 Assessing data normality 254

6.6 Reliability tests 263

6.7 Summary 265

7 Chapter Seven: Correlation Tests 266
7.1 Introduction 266
7.2 Assumptions and relevance to research questions 266
7.3 Correlation Analyses 270
7.4 Summary 279
8 Chapter Eight: Hypotheses Testing 280
8.1 Introduction 280
8.2 One way analysis of variance (ANOVA) analysis 280
8.3 ANOVA testing results 282
8.4 Summary 301
9 Chapter Nine: Multiple and Logistic Regression Tests 302
9.1 Introduction 302
9.2 Multiple regression tests 302
9.3 Logistic regression tests 322
9.4 Summary 327
10 Chapter Ten: Risk Propensity and Success Criteria Dependencies 328
10.1 Introduction 328
10.2 Dependency structural analysis 328
10.3 Risk propensity ego networks analyses 339
10.4 Summary 444
11 Chapter Eleven: Discussions 445
11.1 Introduction 445
11.2 Traits classification and reliability: 445
11.3 Ranking analysis and hypotheses testing 448
11.4 Correlation and regression analyses 471
11.5 Logistic regression 491

11.6 Interdependency between research constructs ... 494
11.7 Summary ... 510
12 Chapter Twelve: Conclusions and Further Recommendations ... 511
12.1 Introduction ... 511
12.2 Robustness of the research methodology ... 511
12.3 Accomplishing the research objectives ... 513
12.4 Research limitations ... 519
12.5 Knowledge contribution ... 520
12.6 Recommendations for future research ... 523
13 References ... 524
14 Appendix ... 567
14.1 Appendix I: Questionnaire validation. ... 567
14.2 Appendix II: Research invitation letter. ... 568
14.3 Appendix III: Research questionnaire. ... 569
14.4 Appendix VI: Mapping matrices. ... 584

List of Figures

Figure 1.1: Research Outline 12

Figure 2.1: Risk and uncertainty as defined in different disciplines. 19

Figure 2.2: Determinants of risk behaviour. 23

Figure 2.3: Theory of planned behaviour model 30

Figure 2.4: Linking risk behaviour determinants and the theory of planned behaviour model. 33

Figure 2.5: Theory of risk-as-feelings (RAF) model 35

Figure 2.6: Theories of (TPB) and (RAF) components 36

Figure 2.7: Combining risk and responsibility perspectives 69

Figure 3.1: Criteria and factors as applied to project success 73

Figure 3.2: Macro viewpoint of success related to projects. 74

Figure 3.3: Micro viewpoint of success related to projects. 75

Figure 3.4: Summary of risk factors in projects phases. 76

Figure 3.5: Attempts in measuring project success criteria and factors 78

Figure 3.6: Expanded dimensions of project success criteria 81

Figure 3.7: A framework for subjective project t success criteria. 83

Figure 3.8: A framework for project t success criteria 84

Figure 3.9: Suggested project success factors and criteria 85

Figure 3.10: Measure of project success 86

Figure 3.11: Project success measures 87

Figure 3.12: Project managers' risk propensity influence on their needs satisfaction. 88

Figure 3.13: Project success criteria based on stakeholders' types 89

Figure 3.14: Assessment for project success of design projects 91

Figure 3.15: Project success criteria over the last decade 1990 -2000. 92

Figure 3.16: Risk profiles and tolerances 95

Figure 3.17: Concave utility curve for risk-averse individual. 96

Figure 3.18: Convex utility curve for risk-taking individual. 96

Figure 3.19: Types of scope measurement. 100

Figure 3.20: Types of time measurement 101

Figure 3.21: Types of cost measurement. 102

Figure 4.1: Research conceptual framework. 109

Figure 4.2: List of Risk Appetite Definitions among different Standards 113

Figure 4.3: Honesty/humility traits hypotheses. 132

Figure 4.4: Emotionality traits hypotheses. 134

Figure 4.5: Extraversion traits hypotheses. 136

Figure 4.6: Agreeableness traits hypotheses. 138

Figure 4.7: Conscientiousness traits hypotheses. 140

Figure 4.8: Openness to experience traits hypotheses. 143

Figure 4.9: Generic descriptions and relationships of personality traits related to risk propensity. 146

Figure 4.10: Traits descriptions within project management and risky decisions context. 152

Figure 4.11: Research theoretical framework. 160

Figure 5.1: Thinking bases used for generating research topics 163

Figure 5.2: The research onion 169

Figure 5.3: Research philosophies and paradigms comparisons 170

Figure 5.4: Four research paradigms for social theory analysis. 171

Figure 5.5: Inductive and deductive research approaches. 173

Figure 5.6: Research process. 176

Figure 5.7: Risk taking index assessment 178

Figure 5.8: Kogan and Wallach's CDQ. 179
Figure 5.9: Manipulation questions using experimental scenarios. 181
Figure 5.10: Risk propensity using Sitkin-Weingart scale. 182
Figure 5.11: Starting path model for all domains 183
Figure 5.12: Different questionnaire types. 187
Figure 5.13: Data requirements table 189
Figure 5.14: Response categories for different rating questions. 192
Figure 5.15: Data Types. 195
Figure 5.16: Reliability analysis process. 205
Figure 5.17: Questionnaire validation process. 207
Figure 5.18: Statistical analysis steps. 208
Figure 5.19: Descriptive statistics by data type 210
Figure 5.20: Analysis of variance (ANOVA) steps. 212
Figure 5.21: Correlation values. 213
Figure 5.22: Correlation analysis process. 213
Figure 5.23: Dependency structure matrix. 215
Figure 5.24: Multi-domain network visualization. 216
Figure 5.25: Dependency matrices development. 218
Figure 6.1: Research sample age breakdown. 223
Figure 6.2: Research sample gender breakdown. 224
Figure 6.3: Research sample education level breakdown. 225
Figure 6.4: Research sample number of dependents breakdown. 226
Figure 6.5: Research sample race breakdown. 227
Figure 6.6: Research sample professional certifications breakdown. 228

Figure 6.7: Research sample years of project experience breakdown. 229

Figure 6.8: Research sample current position breakdown. 230

Figure 6.9: Research sample nature of industry breakdown. 231

Figure 6.10: Research sample organization type breakdown. 232

Figure 6.11: Research sample organization size breakdown. 233

Figure 6.12: personality traits clusters. 235

Figure 6.13: Research sample re-grouped position breakdown. 238

Figure 6.14: Research sample re-grouped experience breakdown. 239

Figure 6.15: Cronbach's alpha ranges 264

Figure 7.1: Correlation coefficients interpretations. 270

Figure 10.1: Dependency matrices development process. 329

Figure 10.2: Social network sample. 331

Figure 10.3: Directed and undirected graph samples. 332

Figure 10.4 weighted network sample. 333

Figure 10.5: Ego-centric network sample. 333

Figure 10.6: Risk propensity dependency network. 340

Figure 10.7: Clustering coefficients versus degree of risk propensity dependency network. 343

Figure 10.8: Scope ego network. 348

Figure 10.9: Clustering coefficients versus degree of scope ego network. 350

Figure 10.10: Degree versus closeness in the scope ego network. 352

Figure 10.11: Degree versus betweeness in the scope ego network. 353

Figure 10.12: Degree versus eigenvector in the scope ego network. 354

Figure 10.13: Closeness versus betweeness in the scope ego network. 355

Figure 10.14: Closeness versus eigenvector in the scope ego network. 356

Figure 10.15: Betweeness versus eigenvector in the scope ego network. 357

Figure 10.16: Time ego network.. 359

Figure 10.17: Clustering coefficients versus degree of time network. 361

Figure 10.18: Degree versus closeness in the time ego network. 363

Figure 10.19: Degree versus betweeness in the time ego network. 365

Figure 10.20: Degree versus eigenvector in the time ego network... 366

Figure 10.21: Closeness versus betweeness in the time ego network... 367

Figure 10.22: Closeness versus Eigenvector in the time ego network.. 368

Figure 10.23: Betweeness versus eigenvector in the time ego network. 369

Figure 10.24: Cost ego network... 370

Figure 10.25: Clustering coefficients versus degree of cost network. 372

Figure 10.26: Degree versus closeness in the cost ego network. 374

Figure 10.27: Degree versus betweeness in the cost ego network.. 375

Figure 10.28: Degree versus eigenvector in the cost ego network. 376

Figure 10.29: Closeness versus betweeness in the cost ego network. 377

Figure 10.30: Closeness versus eigenvector in the cost ego network... 378

Figure 10.31: Betweeness versus eigenvector in the cost ego network. 379

Figure 10.32: Quality ego network. 380

Figure 10.33: Clustering coefficients versus degree of quality ego network... 382

Figure 10.34: Degree versus closeness in the quality ego network. 384

Figure 10.35: Degree versus betweeness in the quality ego network. 385

Figure 10.36: Degree versus eigenvector in the quality ego network... 386

Figure 10.37: Closeness versus betweeness in the quality ego network.. 387

Figure 10.38: Closeness versus eigenvector in the quality ego network. 388

Figure 10.39: Betweeness versus eigenvector in the quality ego network. 389

Figure 10.40: Risk ego network.. 390

Figure 10.41: Clustering coefficients versus degree of risk ego network... 392

Figure 10.42: Degree versus closeness in the risk ego network. 394

Figure 10.43: Degree versus betweeness in the risk ego network. 395

Figure 10.44: Degree versus eigenvector in the risk ego network... 396

Figure 10.45: Closeness versus betweeness in the risk ego network.. 397

Figure 10.46: Closeness versus eigenvector in the risk ego network. 398

Figure 10.47: Betweeness versus eigenvector in the risk ego network. 399

Figure 10.48: Resources ego network.. 401

Figure 10.49: Clustering coefficients versus degree of resources ego network....................................... 403

Figure 10.50: Degree versus closeness in the resources ego network. 405

Figure 10.51: Degree versus betweeness in the resources ego network. 406

Figure 10.52: Degree versus eigenvector in the resources ego network.. 407

Figure 10.53: Closeness versus betweeness in the resources ego network.. 408

Figure 10.54: Closeness versus eigenvector in the resources network. 409

Figure 10.55: Betweeness versus eigenvector in the resources ego network. 410

Figure 10.56: Stakeholder satisfaction ego network... 412

Figure 10.57: Clustering coefficients versus degree of stakeholder satisfaction ego network. 414

Figure 10.58: Degree versus closeness in the stakeholder satisfaction ego network............................... 416

Figure 10.59: Degree versus betweeness in the stakeholder satisfaction ego network............................ 417

Figure 10.60: Degree versus eigenvector in the stakeholder satisfaction ego network. 418

Figure 10.61: Closeness versus betweeness in the stakeholder satisfaction ego network. 419

Figure 10.62: Closeness versus Eigenvector in the stakeholder satisfaction ego network. 420

Figure 10.63: Betweeness versus eigenvector in the stakeholder satisfaction ego network. 421

Figure 10.64: General Risk propensity ego network. 423

Figure 10.65: Clustering coefficients versus degree of general risk propensity ego network. 425

Figure 10.66: Degree versus closeness in the general risk propensity ego network. 427

Figure 10.67: Degree versus betweeness in the general risk propensity ego network. 428

Figure 10.68: Degree versus eigenvector in the general risk propensity ego network. 429

Figure 10.69: Closeness versus betweeness in the general risk propensity ego network. 430

Figure 10.70: Closeness versus eigenvector in the general risk propensity ego network. 431

Figure 10.71: Betweeness versus eigenvector in the general risk propensity ego network. 432

Figure 10.72: Risk propensity description ego network. 434

Figure 10.73: Clustering coefficients versus degree of risk propensity description ego network. 436

Figure 10.74: Degree versus closeness in the risk propensity description ego network. 438

Figure 10.75: Degree versus betweeness in the risk propensity description ego network. 439

Figure 10.76: Degree versus eigenvector in the risk propensity description ego network. 440

Figure 10.77: Closeness versus betweeness in the risk propensity description network. 441

Figure 10.78: Closeness versus Eigenvector in the risk propensity description ego network. 442

Figure 10.79: Betweeness versus eigenvector in the risk propensity description ego network. 443

List of Tables

Table 5.1: Research questions types. 190

Table 6.1: Research sample responses collectors. 222

Table 6.2: Importance ranking of honesty/humility traits within overall traits. 241

Table 6.3: Importance ranking of honesty/humility traits within the same cluster. 241

Table 6.4 Importance ranking of emotionality traits within overall traits. 242

Table 6.5: Importance ranking of emotionality traits within same cluster. 243

Table 6.6 Importance ranking of extraversion traits within overall traits. 244

Table 6.7: Importance ranking of extraversion traits within same cluster. 245

Table 6.8: Importance ranking of agreeableness traits within overall traits. 246

Table 6.9: Importance ranking of agreeableness traits within same cluster. 246

Table 6.10: Importance ranking of conscientiousness traits within overall traits. 248

Table 6.11 Importance ranking of conscientiousness traits within same cluster. 249

Table 6.12: Importance ranking of openness to experience traits within overall traits. 250

Table 6.13 Importance ranking of openness to experience traits within same cluster. 251

Table 6.14: Importance ranking of risk propensity domains. 252

Table 6.15: Kendall's coefficients of concordance for personality traits clusters. 253

Table 6.16: Methods used for data statistical analysis. 255

Table 6.17: z-values of personality traits variables. 260

Table 6.18: The original mean and 5% trimmed mean for honesty/humility items. 262

Table 6.19: Reliability statistics for personality traits scale. 264

Table 6.20: Reliability statistics for risk propensity scale. 265

Table 7.1: Significant correlations between honesty/humility traits and risk propensity variables. 271

Table 7.2: Significant correlations between emotionality traits and risk propensity variables. 272

Table 7.3: Significant correlations between extraversion traits and risk propensity variables. 273

Table 7.4: Significant correlations between conscientiousness traits and risk propensity variables. 275

Table 7.5: Significant correlations between openness to experience and risk propensity variables......... 276

Table 7.6: Significant correlations between moderator variables and risk propensity variables. 277

Table 7.7: Summary of significant correlation tests results.. 278

Table 8.1: ANOVA test of risk propensity items with position variable.. 283

Table 8.2: ANOVA test of risk propensity items with experience variable. 283

Table 8.3: ANOVA test of honesty/humility items with position variable. 285

Table 8.4: ANOVA test of honesty/humility items with experience variable. 286

Table 8.5: ANOVA test of emotionality items with position variable. 287

Table 8.6: ANOVA test of emotionality items with experience variable. 289

Table 8.7: ANOVA test of extraversion items with position variable.. 290

Table 8.8: ANOVA test of extraversion items with experience variable. 292

Table 8.9: ANOVA test of agreeableness items with position variable. 293

Table 8.10: ANOVA test of agreeableness items with experience variable. 294

Table 8.11: ANOVA test of conscientiousness items with position variable. 296

Table 8.12: ANOVA test of conscientiousness items with experience variable. 298

Table 8.13: ANOVA test of openness to experience items with position variable................................. 300

Table 8.14: ANOVA test of openness to experience traits with experience variable. 301

Table 9.1: Results of honesty/humility regressions related to cost domain. 307

Table 9.2: Results of honesty/humility regressions related to general domain. 308

Table 9.3: Results of emotionality regressions related to time domain. 309

Table 9.4: Results of emotionality regressions related to cost domain.. 310

Table 9.5: Results of emotionality regressions related to general domain. 311

Table 9.6: Results of extraversion regressions related to scope domain. 313

Table 9.7: Results of extraversion regressions related to general domain. 314

Table 9.8: Results of conscientiousness regressions related to scope domain. 316

Table 9.9: Results of conscientiousness regressions related to time domain. 317

Table 9.10: Results of conscientiousness regressions related to general domain. 318

Table 9.11: Results of openness to experience regressions related to scope domain. 320

Table 9.12: Results of openness to experience regressions related to time domain. 321

Table 9.13: Results of openness to experience regressions related to general domain. 322

Table 9.14: Baseline of SPSS prediction of risk propensity description. 324

Table 9.15: Summary of logistic regression results for all personality traits clusters. 324

Table 9.16: Summary of logistic regression results for significant personality traits. 326

Table 10.1: Social network analysis components. 330

Table 10.2: Graph measures descriptions. 331

Table 10.3: Node measures. 335

Table 10.4: Personality traits networks and node measures. 337

Table 10.5: Combined centrality measures plots. 338

Table 10.6: General characteristics of the risk propensity dependency network. 341

Table 10.7: Centrality measures of risk propensity dependency network. 347

Table 10.8: General characteristics of the scope ego network. 349

Table 10.9: Centrality measures of the scope ego network. 351

Table 10.10: General characteristics of the time ego network. 360

Table10.11: Centrality measures of the time ego network. 362

Table 10.12: General characteristics of the cost ego network. 371

Table10.13: Centrality measures of the cost network. 373

Table 10.14: General characteristics of the quality graph network. 381

Table 10.15: Centrality measures of the quality ego network. 383

Table 10.16: General characteristics of the risk ego network.. 391

Table 10.17: Centrality measures of the risk ego network. 393

Table 10.18: General characteristics of the resources ego network... 402

Table 10.19: Centrality measures of the resources ego network. 404

Table 10.20: General characteristics of the stakeholder satisfaction ego network. 413

Table 10.21: Centrality measures of the stakeholder satisfaction network... 415

Table 10.22: General characteristics of the general risk propensity ego network. 424

Table 10.23: Centrality measures of the general risk propensity ego network.. 426

Table 10.24: General characteristics of the risk description ego network. 435

Table 10.25: Centrality measures of the risk propensity description ego network. 437

Table 11.1: ANOVA for honesty/humility traits based on position and experience. 452

Table 11.2: ANOVA for emotionality traits based on position and experience. 455

Table 11.3: ANOVA for extraversion traits based on position and experience. 459

Table 11.4: ANOVA for agreeableness traits based on position and experience. 462

Table 11.5: ANOVA for conscientiousness traits based on position and experience.............................. 466

Table 11.6: ANOVA for openness to experience traits based on position and experience. 470

Table 11.7: Regression for honesty/humility traits.. 473

Table 11.8: Regression for emotionality traits... 476

Table 11.9: Regression summary for extraversion traits. 480

Table 11.10: Regression summary for conscientiousness traits. 486

Table 11.11: Regression summary for openness to experience traits.. 489

Table 11.12: Summary of significantly associated traits with risk propensity. 490

Table 11.13: Summary of traits associated with risk propensity description. 493

Table 11.14: Most important personality traits in each project success criteria ego network. 495

Table 11.15: Trend of degree and closeness equations.. 505

Table 11.16: Trend of degree and betweeness equations. 507

Table 11.17: Trend of closeness and betweeness equations. 509

List of Abbreviations

ANOVA	One-Way Analysis of Variance
APM	Association for Project Management
ATT	Attitude
CDQ	Choice Dilemma Questionnaire
DOSPERT	Domain Specific Risk Taking
DSM	Dependency Structure Matrix
EDA	exploratory data analysis
ESRC	Economic and Social Research Council
HEXACO	Honesty/humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, Openness to experience
IPIP	International Personality Item Pool
OCEAN	Openness to experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism
OGC	Office of Government Office
PBC	Perceived Behavioural Control
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PRINCE2	Projects in Controlled Environment
RAF	Risk-as-Feelings
SN	Subjective Norm
SPS	Sensory-Processing Sensitivity
SPSS	Statistical Package for Social Sciences
TBP	Theory of Planned Behaviour

1 Chapter One: Introduction

1.1 Introduction

This chapter discusses the research problem statements, research rationale and significance. Additionally, the chapter lists the research aim, objectives and questions. Furthermore, it elaborates on the research hypotheses, scope and methodology. Finally, an outline for the thesis chapters was presented detailing each chapter information.

1.2 Background to the research problem

Many researchers highlighted the existing interrelationships between individuals' personal traits and situational factors and its impact on shaping different risk propensity. However, there was a gap in the knowledge where a plethora of researchers emphasized the need for further research on risk propensity determinants as well as investigating general and domain-specific risk propensities (Eudriulaitiene & Martisius 2010; Nicholson et al. 2005; Rawling & Rohrman 2003). Moreover, Legoherel et al. (2004) pointed out the influence of personality traits on risk propensity; nevertheless there was no investigation of on the specific traits that can directly influence individuals' risk propensity. Furthermore, Nicholson et al. (2005) stated that there is enough evidence in the literature supporting the possibility of having general and domain-specific risk propensities. However, there was no research done on linking risk propensities to project success criteria domains. Also, some scholars viewed risk propensity as a dispositional characteristic that is unchanging over all risky situations where claiming that risk propensity as an inborn trait that is stable over time and not affected by the situation (Kogan & Wallach 1964). Whereas, other scholars viewed risk propensity as a trait that can be modified in different situations (Wolman 1989). According to Gibbons et al. (2004), only few attempts were done by researchers to understand individuals' tendency to take risky decisions and its links to personality characteristics and situational risk behaviours. Also, Cooper (2010) pointed out that the majority of previous studies on risk propensity topic examined only few factors in isolation of each other. Moreover, to fill this gap in understanding the influence of personality traits and situational factors on risk propensity; more attempts should be directed towards combining the situational and individual approaches to risk propensity by considering individual responses to different risk domains (Nicholson et al. 2005). Furthermore, Huff & Prbutok (2008) pointed out that project managers' are the most important individual involved in the managing the project risks and hence project managers' risk propensity might dramatically influence their risky decisions in relation to project success criteria. In conclusion, there was a gap in the knowledge about the influence of personality traits on project managers' tendency to take risky decisions (risk propensity) and the stability of their risk propensity in different project success criteria domains. Hence, this research was an attempt to bridge this gap in the knowledge through identifying project managers' personality traits that can influence their risk propensity and whether their tendency to take risky decisions will be consistent across different project domains. Additionally, the research investigates the impact of different project managers' individual characteristics - acting as moderator variables- on project managers' risk propensity. Also, the importance of this research is in trying to statistically predict project managers' risky behaviour and responses based on understanding their risk propensity while considering individual characteristics and surrounding project environment factors. Therefore, the research investigates the interaction between various personal and situational factors as predictors of project managers’ risk propensity across different project success criteria domains. Consequently, describing project managers’ risk propensity and predicting their tendency in taking or avoiding risky decisions will lead to effective selection of project managers so that project teams can have balanced group risk propensities and not be biased towards low risk propensity or high risk propensity.

1.3 Research significance

There have been many studies exploring the topic of the individuals’ tendency to take risky decisions (risk propensity) related to general domains such as: health, career, financial, safety and social. Nevertheless, there is no research that was conducted specifically on project managers’ tendency to take risky decisions (risk propensity) related to specific project domains. Moreover, almost all the conducted previous research was considering the individuals’ risk propensity from one aspect; either the situation or the individual traits. According to Nicholson et al. (2005), there is no consensual agreement on risk tendency determinants and measurements. Additionally, Li & Tang (2010) emphasized the need for researchers to analyze the individual’s traits differences and its effects on shaping their risk propensity. Similarly, Stanovich & West (1998) pointed out that usually situational factors are considered when analyzing how individuals’ take risky decisions while individuals’ trait differences are ignored. Therefore, the research major question is as below:

RQ: how do project managers’ personality traits influence their tendency to take risky decisions (risk propensity) in relation to project success criteria domains?

Additionally, the hypotheses of this research were derived based on extensive literature review done on: personality traits related to risk propensity, risk propensity in project management literature, individual characteristics related to project managers and project management success criteria. Moreover, this research addresses the issue of project managers' risk propensity stability across different project domains and whether project managers' demonstrate consistent risk propensities when taking risky decisions related to different project success criteria domains. Therefore, the research investigates the interaction between various personality traits and individual factors as predictors of project managers' risk propensity. Thus, the significance of this research can be summarized in the following points:

- To analyze influence of project managers' personality traits on their tendency to take risky decisions (risk propensity) in relation to project success criteria domains.
- To investigate the consistency of project managers' risk propensity in different project domains and whether risk propensity can change or be altered depending on other individual and situational inputs related to project success criteria domain.
- To use new analysis such as dependency structural analysis in investigating the interdependencies between project managers' personality traits and their risk propensity in relation to project success criteria domains.

1.4 Research aim

The aim of the research is to investigate the existence of association between personality traits of project managers' and their tendency of taking risky decisions (risk propensity) in relation to project success criteria. The outcome of this research will assist project practitioners to associate many personality traits to different risk propensity levels. Furthermore, the research might lead to designing a new risk propensity assessment tool which can assist in assigning project managers to relevant projects based on their predicted risk propensity.

1.5 Research objectives

The following objectives were suggested for achieving the above research aim:

- Review existing literature on identified personality traits related to risk propensity.
- Review existing literature on risk propensity in relation to project management context.
- Review existing literature on individual characteristics related to project managers which can influence their risk propensity.
- To investigate project management success criteria that can be influenced by project managers' risk propensity and risky decisions.
- To investigate the influence of project managers' personality traits on their risk propensity and risky decisions in relation to project success criteria.
- To investigate the influence of project managers' demographic and individual characteristics on their risk propensity and risky decisions in relation to project success criteria.

1.6 Research questions

The following questions are suggested to address the research problem statement which relate to investigating the project managers' personality traits influence on their tendency to take risky decisions (risk propensity) in relation to project success criteria:

- Which project managers' personality traits can be associated with risk propensity?
- What are the groupings that can be used to cluster these personality traits?
- What are the possible classifications of project managers' risk propensity?

- What are the individual characteristics that can moderate the influence of personality traits on project managers' risk propensity?
- What are the most important project success criteria that can be influenced by project managers' risk propensity?

1.7 Research Hypotheses

The following hypotheses were developed prior to conducting the research:

1.7.1 Honesty/humility cluster hypotheses

H1A: there is no difference on rating honesty/humility traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2A: demographic factors will influence respondents' mean rating of honesty/humility traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3A: honesty/humility traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4A: demographic factors will have an influence on the relationship between honesty/humility traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.7.2 Emotionality cluster hypotheses

H1B: there is no difference on rating emotionality traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2B: demographic factors will influence respondents' mean rating of emotionality traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3B: emotionality traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4B: demographic factors will have an influence on the relationship between emotionality traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.7.3 Extraversion cluster hypotheses

H1C: there is no difference on rating extraversion traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2C: demographic factors will influence respondents' mean rating of extraversion traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3C: extraversion traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4C: demographic factors will have an influence on the relationship between extraversion traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.7.4 Agreeableness cluster hypotheses

H1D: there is no difference on rating agreeableness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2D: demographic factors will influence respondents' mean rating of agreeableness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3D: agreeableness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4D: demographic factors will have an influence on the relationship between agreeableness traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.7.5 Conscientiousness cluster hypotheses

H1E: there is no difference on rating conscientiousness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2E: demographic factors will influence respondents' mean rating of conscientiousness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3E: conscientiousness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4E: demographic factors will have an influence on the relationship between conscientiousness traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.7.6 Openness to experience cluster hypotheses

H1F: there is no difference on rating openness to experience traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2F: demographic factors will influence respondents' mean rating of openness to experience traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3F: openness to experience traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4F: demographic factors will have an influence on the relationship between openness to experience traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

1.8 Research Scope

There are numerous personality traits that had been investigated in the psychology and psychometric areas and many scholars studied the influence of certain personality traits on project managers' performance. Moreover, researchers distinguished between project success factors and criteria and hence extensive literature review was done in this research to identify the most important project success criteria than can be influenced by project managers' personality traits. Therefore, the scope of this research is centered on the following aspects:

- Identifying the most critical personality traits that can influence project managers' tendency in taking risky decisions; i.e. risk propensity.
- Investigating the association direction and strength between these personality traits and risk propensity.
- Identifying the most critical project success criteria domains that can be impacted by project managers' risk propensity.
- Investigating the association strength between the selected project managers' personality traits, their risk propensity and impact on project success criteria domains.

1.9 Methodology Overview

The detailed methodology is described in chapter five which includes detailed elaboration on the adopted research philosophy, paradigm, research approach and methods; and suggested statistical analysis methods. However, this section include a brief overview of the applied research methodology. Additionally, the research is considering the project manager as a unit of measurement when analyzing risk propensity. Hence, only personality traits that could relate to risk propensity are considered. Also, only project success criteria that are within the control of the project manager should be considered; such as: scope, time and cost. Furthermore, a thorough analysis of existing literature review on propensity measurement was conducted to identify the most appropriate research philosophy, approach and methods for measuring project managers’ risk propensity. Consequently, a positivism philosophical research approach was adopted due to the research nature in being an investigation on a social science area and the need for a highly structure methodology that will be used in collecting and analyzing the data. Also, deductive research approach was adopted due to the research nature in attempting to explain a causal relationship between several variables and testing different hypotheses where data will be quantitatively analyzed. As a result, the primary used tool for the study was a questionnaire that includes: general part (to measure demographic variables), and a specific section to measure personality traits related to project managers’ risk propensity and its influence on the selected project success criteria. Also, dependency structural network analyses were performed to investigate the interdependencies between project managers’ personality traits and different project success criteria domains. Finally, the collected research data were analyzed using different analysis soft wares such as: Microsoft Excel, Statistical Package for Social Sciences (SPSS) and visualization network software (Gephi).

1.10 Thesis Outline

Figure 1.1 illustrate the research outline where each chapter is displayed in order.

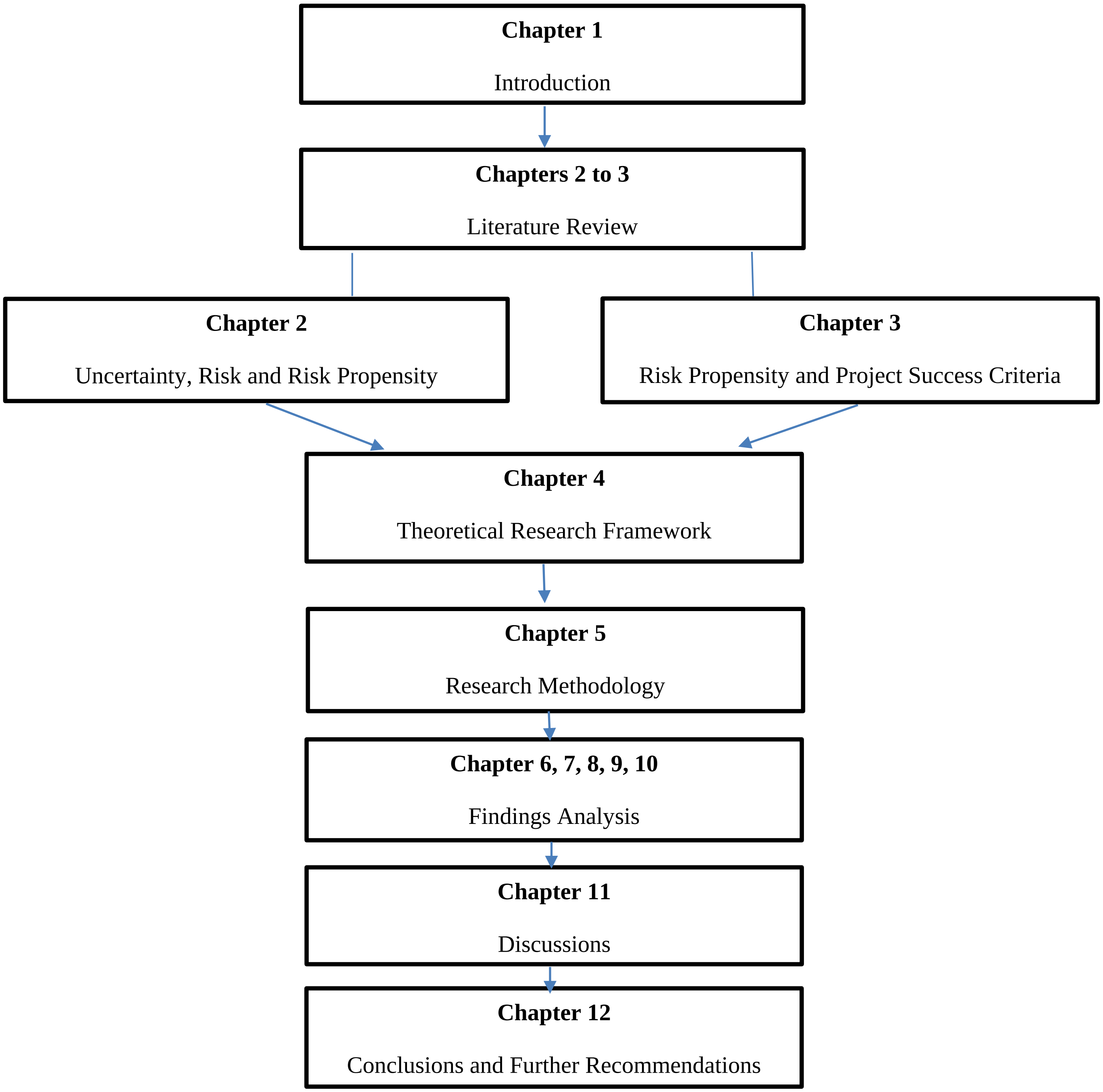


Figure 1.1: Research Outline

Chapter 1: A summary of the research problem statements, rationale and significance, research objectives and aims, research questions and hypotheses, research methodology and thesis outline.

Chapter 2: Extensive literature review on uncertainty, risk and risk propensity. Also, includes comparison between uncertainty and risk, risk propensity and risk attitude definitions, different models related to risk propensity, psychology of risk, risk behaviour, risk rationality and heuristics and biases.

Chapter 3: Thorough review of literature on project success factors and criteria. Additionally, includes elaboration on triple constraints as project success criteria and relationship between risk propensity constructs and project success criteria domains.

Chapter 4: Includes suggested project managers' personality traits and individual characteristics that can influence their risk propensity in relation to project success criteria domains. Also, includes suggested research conceptual and theoretical frameworks and suggested hypotheses.

Chapter 5: Includes comparisons between different research philosophies, paradigms and approaches. Also, justifies the adopted: research philosophy, research approach, research methods and suggested data analysis.

Chapter 6: Presentation of collected data and descriptive statistics. Also, includes ranking of the most important project managers' personality traits in terms of ratings means. It also includes assessment of data normality using different techniques. Also, includes results of research questionnaire reliability tests for both dependent and independent variables.

Chapter 7: Discussion of correlation tests assumptions and results. Also, detailed correlation results is discussed between each of the six personality cluster traits and risk propensity related to each project success criteria domain.

Chapter 8: Results of one way analysis of variance (ANOVA) and comparison of mean ratings of more than two groups within demographic variables. Also, includes the between-groups analysis of variance.

Chapter 9: Discussions of multiple and logistic regressions analyses. Also, it includes the results of adding project managers' demographic variables into the regression equations.

Chapter 10: Discussions of dependency matrices results and network analysis. It also includes detailed investigation of the relationship between personality traits and project managers' risk propensity using network analysis and centrality measures.

Chapter 11: Presentations of key research findings and relating it to research questions. Includes results of all statistical tests, dependency structure analysis and research hypotheses testing.

The subsequent sections present discussion on the findings from the survey and dependency structure matrix exercises. Also, implications of findings are discussed with respect to theory and practice.

Chapter 12: Presentation of conclusions drawn out from the research analysis and findings discussions. Includes presentation on the robustness of the adopted research methodology, linking study objectives to findings. Also, includes the study contribution to knowledge as well as suggested ideas for future research in the field.

2 Chapter Two: Uncertainty, Risk and Risk Propensity

2.1 Introduction

This chapter includes extensive literature review on uncertainty, risk and risk propensity. Specifically, the chapter presents different literature review definitions of these terminologies and the link between them. Also, the chapter presents different theories related to risk propensity such as: theory of planned behaviour, risk as feelings and the psychology of risk. Furthermore, the chapter addresses the issues of risk rationality and behaviour as well as situation and individual factors affecting risk propensity. Additionally, the chapter reports the influence of heuristic and cognitive biases on individuals' risk propensity. Finally, the chapter ends with defining risk and risk propensity within the project management context.

2.2 Uncertainty and Risk

There have been hundreds of attempts by researchers that aimed to distinguish between "risk" and "uncertainty". Are they synonymous words? Are they two different words referring to the same meaning? Or are they two different meanings referring to the same word? This section is an additional attempt to compare between "risk" and "uncertainty" for understanding their meanings, relationships and degree of impact they have on shaping project managers' risk propensity and on the project outcomes. Many project managers limit project risk management to dealing with negative events and threats. While it is true that project risk management has to deal with negative risks and threats; it also has to deal with positive risks and opportunities. Furthermore, project managers' should avoid adopting a project risk management model that limits project uncertainty to dealing with negative risks only. Additionally, Ward & Chapman

(2003) argued for converting project risk management processes into uncertainty management in order to extend the benefits of the current processes of project risk management to include both project threats and opportunities. In line with the above, Green (2001) stated that the existing risk management techniques do not include uncertainties related to different project stakeholders interactions. Moreover, some researchers argued for using the strategic choice approach as a tool for aiding project managers in decision making by including risks as well as opportunities. Furthermore, the strategic choice approach divides uncertainty into three categories related to: working environment, guiding values and related decisions (Friend & Hickling 1997).

Additionally, Kaplan & Garrick (1981) pointed out that risk includes both uncertainty and some kind of damage or adverse effect on project where risk could be presented as the following formula: risk = uncertainty + damage. Although this risk formula might be true, uncertainty should not be considered as part of risk; it should be the other way round, where risk should be treated as a form of uncertainty. Furthermore, another distinction should be made between “risk” and “hazard” where many project managers confuse between these two terms. Whilst, hazard can be defined as a source of danger; risk is more about the likelihood degree of loss. Hence, the relationship between risk and hazard can be summarized by considering risk as the probability of converting hazard into actual delivery of loss or damage to the project. As a result, the relationship between risk and hazard can be expressed as: risk = hazard/safeguards in which safeguards includes the simple awareness of risk (Kaplan & Garrick 1981). Obviously, risk awareness can reduce risk by increasing safeguards; however, risk can never reach zero level. After all, there is no such project as risk-free project.

It has always been and will continue to be problematic to define risk. As a matter of fact, the Society for Risk Analysis formed a committee to define the term “risk”; and this committee recommended after four years of meetings that it is better not to define risk and to let each researcher define risk in their own way. Thus, many researchers might be using the word “risk” referring to different meanings or use different wording of “risk” referring to the same meaning! According to Fischhoff (1985), defining risk is one of the major problems related to project risk management. Moreover, the lack of consensus among researchers in defining risk could be due to more than one reason. First, the risk construct is composed from more than one element such as probability and impact. Second, risk is situational-based where it can display different features in different situations. Third, risk is subjective because it differs among individuals based on their risk perceptions and propensities. Nevertheless, many theorists offered similar risk definitions by focusing on common risk elements such as probability and impact. Notably, the Concise Oxford Dictionary defined risk as: “hazard, chance of bad consequences, loss, exposure to chance of injury or loss”; thus limiting the term risk to negative consequences only. Furthermore, this limitation of associating risk only with negative events that affect project performance adversely; lead to the failure of recognizing and managing project opportunities. Additionally, Dowie (1999) argued to abandon the term “risk” altogether claiming that it acts as an obstacle for effective decision making where it infects negatively all discussions of probability because of the unspoken value that is built in humans mind linking “risk” term only to negative events only. Although threats and opportunities can be treated separately; they have much interdependency where reducing threats might lead to opportunities and exploiting opportunities might be associated with risks. Also, Ward & Chapman (2003) claimed that in any given project situation; both threats and opportunities should be addressed and managed. Consequently, almost all international project management standards adopted a broad view of project risk. For example; the Project Management Institute (PMI) based in the US stated risk as: "an uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective" (PMBOK 2013, p.127). Similarly, the Association for Project Management (APM) based in the UK defined risk as: "an uncertain event or set of circumstances that, should it occur, will have an effect on the achievement of the project's objectives" (PRINCE2 2009, p.16). Whilst the above definitions addressed both aspects of risk; threats and opportunities; it limited the occurring of risk to uncertainties related to "events" and "circumstances" where risk should be addressed as uncertainty that matters in all aspects. According to Hillson (2005), risk is defined as uncertainty that matters where project managers should only address uncertainties that are relevant to the project objectives and ignore uncertainties that are irrelevant of project objectives. Furthermore, project risks should be stated by the use of risk metalanguage that includes three elements: cause, risk and effect. The link between risk and uncertainty can be easily detected in all project management international standards through examining their definition of project risks. For example, the PMBOK guide (2013) describes risk through the notion of uncertainty by stating that risk is an "uncertain" event or condition that if it occurs; it impact project objectives. Similarly, the PRINCE2 guide (2009) also described risk in view of uncertainty by stating that risk is "uncertain" event or set of circumstances that affect project objectives. Even though there is a strong and dynamic link between risk and uncertainty; they should be approached by project managers in different manners. Additionally, risk and uncertainty are not synonymous and there should be clear distinction between them in order to study their impact on project performance.

There has been a significant amount of research that tried to theorize and measure uncertainty. Furthermore, some researchers regarded uncertainty as having adverse impact on the project where project managers tend to ignore or eliminate uncertainty (Lorenzi 1981). Whilst, other researchers regarded uncertainty as a way to create opportunities such as Weick (1977) who researched how organizations can create opportunities through uncertainties by being proactive rather than reactive towards their environment. Additionally, Perminova et al. (2008) stated that risk and uncertainty are two different phenomena and could be described as cause and consequences. Hence, risks should be considered as one of the consequences of uncertainty and not assuming it same as uncertainty. To put in another way, traditional project "risk management" should be converted into project "uncertainty management". Figure 2.1 summarizes a general comparison between risk and uncertainty in different areas.

Risk and uncertainty as defined in different disciplines

	Risk	Uncertainty
Economics	Risk refers to events subject to known or knowable probability distribution [23]	Uncertainty is a situation for which it is not possible to specify numerical probabilities [23] Uncertainty is a state in which individual actors find it impossible to attribute a reasonably definite probability to the expected outcome of their choice (Keynes, 1937)
Psychology	Risk is the fact that the decision is made under conditions of known probabilities [39]	Uncertainty is a state of mind characterized by a conscious lack of knowledge about the outcomes of an event [19]
Philosophy		Doubt presupposes certainty [44]
Org. theory		Uncertainty emanates from a set of objective but largely unmeasured environmental characteristics [22]
Dictionary	The possibility of something bad happening at some time in the future; the situation that could be dangerous or have a bad result (Oxford Dictionary of Current English, 2005)	Uncertainty is the state of being uncertain; something you can not be sure about (Oxford Dictionary of Current English, 2005)
Project management	Risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective, such as time, cost, scope or quality [36]	

Figure 2.1: Risk and uncertainty as defined in different disciplines (Perminova et al. 2008, p.76).

Moreover, the term “uncertainty management” is being widely adopted by project managers as a balanced approach between “risk management” and “opportunity management”. According to Ward & Chapman (2003) uncertainty management is about addressing and managing all sources of uncertainty and not limiting them only to threats and opportunities. Moreover, this definition of “uncertainty management” indicates discovering all project uncertainty origins and managing them without having any prior notions about what is desirable and undesirable. Although uncertainty exits in all project stages from “initiation” stage to “closing” stage; it tends to be at its highest levels during planning and execution stages. Furthermore, Ward & Chapman (2003) stated that uncertainty is more evident during initiation, plan and execution stages in a project context. Additionally, the above mentioned stages contribute to uncertainty through five areas: variability in estimating project parameters (such as time, cost and quality), the basis of these estimations, the scoping of project processes and deliverables, the project goals and priorities and the relationship between project stakeholders. (Ward & Chapman 2003). As a conclusion, uncertainty management in projects needs to be addressed in different terms; where some of the above mentioned uncertainties are related to ambiguity of some project parameters while others relate to variability in project parameters. Comparatively, Knight (1964) referred to uncertainty as events that are difficult to assign them numerical likelihoods; whereas risks are events that can have known probability. Equally, Head (1967) defined uncertainty as a condition of the environment where it is extremely difficult for project managers to assign probabilities of possible consequences of the event. Likewise, Nowotny et al. (2001) distinguished risk from uncertainty by stating that uncertainty exist in a situation where individuals cannot attribute a certain probability to the outcomes of a decision. Thereupon, risk can be seen as less threatening than uncertainty because risk is more controllable and it exists when there is enough information to predict the probability and outcome of a certain event; while uncertainty exists when it is difficult to calculate risk and thus it is less controllable than risk. At the same time, the term “risk” is being increasingly used in modern science to indicate incalculability and uncontrollability (Nowotny et al. 2001). According to Perminova et al. (2008); uncertainty can occur due to internal and external sources of the project where it includes risks that might adversely affect project performance or opportunities that might positively affect project performance. As can be seen from the above, there are many challenges that face project managers’ in today’s world; such as: increasing project complexities, globalization, growing concepts of continuous improvements and customer centricity. Moreover, these challenges do not indicate the increase of project risks or uncertainties as much as it indicates the need for better understanding and management of project uncertainty and risks. After all, uncertainty can be looked at as an evolutionary project management characteristic where lack of uncertainty might lead to lack of project management evolution. Generally speaking, there are almost hundreds definitions of risk that can be found in the risk literature. Moreover the lack of consensus in defining risk arouse from the fact that risk is composed from many elements and it displays different characteristics under different situations. Furthermore, risk is fundamentally subjective due to the fact that risk perceptions consistently differ among individuals (Yates & Stone 1992). Hence, it is important to address the relationship between risk and the individuals who are observing it. Additionally, Kaplan & Garrick (1981) stated that risk perception changes depending on the individual observing it where the same risk can be perceived in different ways depending on who is looking at it. Correspondingly, uncertainty has a psychological aspect into it; where it is defined in psychology as an individual's mental state that is characterized by not having enough information about the consequences of certain events (Perminova et al. 2008). Certainly the previous definition emphasized the fact that uncertainty can come from the individual mental reaction to an event and not assuming that external environment is the only source of uncertainty. According to Head (1967, p. 206) "uncertainty exists in the mind of the person who doubts." Consequently, uncertainty is perceived differently among project team members resulting in the formation of different attitudes towards uncertainty. To emphasize, Weick (1977) pointed out that although project managers' propensity do not create or eliminate uncertainties; their risk propensity still can impact their actions towards uncertainties and thus project success. Hence, the following section of the literature review will address risk propensity and its impact on project outcomes.

2.3 Risk Propensity Definitions

Similar to the problem in defining risk; risk propensity has been subject for much research and investigation resulting in the lack of consensus on risk propensity theorization and measurement. According to Huff & Prybutok (2008), the two important factors that affect the project manager reaction to risk as well as the risk impact on decision making are: risk perception and risk propensity. Furthermore, Pablo & Sitkins (1992, p.15) stated risk propensity as "the general likelihood of a person's behaving in more or less risky ways" in which risk propensity is theorized as a convergence of dispositional traits and past experiences. Moreover, the risk propensity of individuals has direct impact on their risk behaviour; while risk preference has influence on risk propensity. Additionally, risk propensity has a positive relationship with risk preferences where managers who enjoy challenges in risky situations are more likely to accept and take risks than those who do not (Pablo & Sitkins 1992). As could be seen from figure 2.2; Sitkin & Pablo (1992) model proposed risk propensity as a predecessor for risk behaviour. Additionally, the model proposed the predecessors for risk propensity as: risk preferences, inertia and the outcome history.

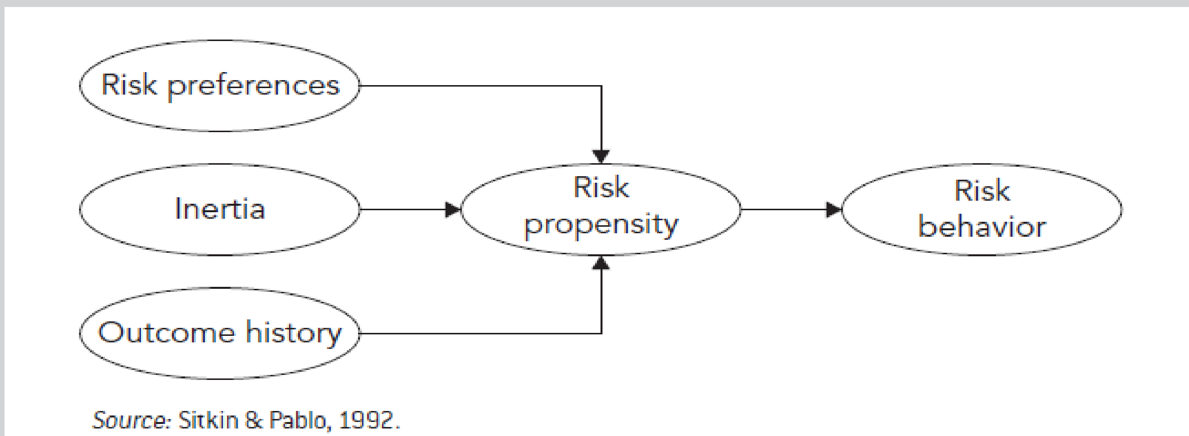


Figure 2: Determinants of risk behavior.

Figure 2.2: Determinants of risk behaviour (Sitkin & Pablo. 1992, p.).

Consequently, risk perception is the person's probabilistic estimation of perceived level of risk and degree of controllability they possess over this risk (Baird & Thomas 1985). Additionally, uncertainty of the situation and individuals cognitive biases can impact the perceived level of control the individual's possess over the risk. On the other hand, risk propensity is the individual's current tendency for avoiding or taking risks (Sitkin & Weingart 1995). Surely, risk perception and risk propensity are not the same; where many scholars considered risk propensity as a characteristic of a person and not situational-based. Furthermore, DeVinne (1985) stated that risk propensity is an innate characteristic that might be stable in all situations. In fact, Brockhaus (1980) pointed out that the differences in how individuals perceive risk lead to differences of individuals' propensity towards risks. While some scholars indicated that risk propensity is a matter of predisposition (Taylor & Dunnette 1974); others suggested that risk propensity may not be a generic trait and that the individuals' risk propensity is determined by the situation (Slovic 1972, Kogan & Wallach 1964). Additionally, most of the risk propensity literature is based on two themes: the prospect theory and the individual difference factors theory. According to Kanhneman & Tversky (1979); the prospect theory suggests that the individual level of risk taking (risk propensity) varies across different situations where sometimes a person will be risk averse and in other situations the same person will tend to be more risk seeker. Furthermore, people tend to be more risk averse when they see themselves in the gain domain and tend to be more risk seekers when they perceive themselves in the loss domain. The second theme is to consider risk propensity as a characteristic of the individual linking it to trans-situational factors such as personality (Zukerman et al. 1964). Similarly, Weber & Milliman (1997) showed that underlying risk preferences and attitudes of individuals tend to remain constant across different situations and emphasized stability of cross-domain risk preferences. Thus, the question that needs to be asked: is it possible for a project manager to be risk averse (having low risk propensity) in some areas of the project and risk seeker (having higher risk propensity) in other domains? There is enough evidence in the literature that both general and domain-specific risk attitudes are possible (Nicholson et al. 2005). Moreover, Nicholson et al. (2005) defined risk propensity as the frequency to which individuals will or will not take different types of risks. Indeed, this perspective of risk propensity support the idea that risk propensity can have a domain-general feature based on consistent personality natures as well as domain-specific feature based on situational variables. Obviously, there are two schools of thoughts when it comes to the nature of risk propensity. The first view about risk propensity states it as a dispositional characteristic that is unchanging over all risky situations (Kogan & Wallach 1964). Furthermore, scholars that support this view look at risk propensity as an inborn trait that is stable over time and not affected by the situation (Wolman 1989). In essence, this view considers traits as intrinsic characteristic which represents an exclusive combination of genetic features that determine how a person will react and behave to an environmental stimulus such as risks. The second view about risk propensity states it as a trait that can be modified due to the individual's practical learning which leads to different types of behaviour in different situations. Again, this second view about risk propensity aligns with the first view in considering risk propensity as an individual's trait that is relatively stable; however, it differs with it in claiming that risk propensity changes as a result of the individual's increase in learning and experience levels (Corsini & Osaki 1984). Likewise, Satikin & Pablo (1992) defined risk propensity as being the current tendency of an individual in reacting to a perceived risk. Moreover, they stated that the individual's past actions and experiences determine the risk propensity of that individual at any given time in which risk propensity changes according to the changes of the person's level of experience. To clarify, if a person past action resulted in negative outcomes; then the person will have lower risk propensity level in order to avoid facing the same negative outcome. Of course, vice versa; the level of risk propensity will be higher if the individual experienced positive outcome based on a past action. In line with the above, Sitkin & Weingart (1995) also emphasized a significant relation between individuals' past experience and their risk propensity as well as between risk propensity and the risk behaviour. Equally, Richards et al. (1996) pointed out the same result of risk propensity changing according to level of learning in which they showed that as the individual's level of knowledge in doing a certain task increases; so does the level of risk propensity related with this task. According to Gibbons et al. (2004), only few attempts were done by researchers to understand the decision making process and its links to personality characteristics and situational risk behaviours. Also, Cooper (2010) pointed out that the majority of previous studies on risk propensity topic examined only few factors in isolation of each other. Moreover, to fill this gap in understanding the influence of personality traits and situational factors on risk propensity; more attempts should be directed towards combining the situational and individual approaches to risk propensity by considering individual responses to different risk domains (Nicholson et al. 2005). One of these attempts was the work of Eudriulaitiene & Martisius (2010); where they researched the relationship between several personality traits and situational factors in shaping the individual's risk propensity. Noticeably, their research adopted a new approach towards understanding risk propensity since it was based on studying the impact of certain personality traits and situational factors on risk propensity from two perspectives: dispositional and behavioural. To explain, some scholars have found that the stated verbal personal dispositions of an individual towards risk taking might differ from the real behaviour taken in reality (Finucane et al. 2000). Many researchers emphasized the link between personal traits and situational factors and described their impact on shaping different risk propensity; they also suggested further research on risk propensity related to general and domain-specific (Eudriulaitiene & Martisius 2010; Nicholson et al. 2005; Rawling & Rohrman 2003). Moreover, Legoherel et al. (2004) emphasized risk propensity, risk perception and ambiguity tolerance as personal traits that together can influence the decisions related to risks. Additionally, risk perception is defined as the personal evaluation of probability and impact related to a specific uncertain event (Sjoberg et al. 2004). Moreover, Keil et al. (2000) claimed that risk propensity refers to the notion that individuals' have stable and consistent tendencies to either avoid or take risky actions. As for ambiguity tolerance; it could be defined as the perceived inadequacy of knowledge and information regarding a specific decision that needs to be taken (McLain 1993). Additionally, Petrakis (2005) stated that individuals with lower risk propensity will have the tendency to overestimate the risks involved in certain situation. In particular, a risk-averse person has more tendencies to over-estimate the negative outcomes of a decision leading to higher levels of risk perception and lower risk propensity levels. Whereas, a risk-seeker person has more tendency to over-estimate the positive outcomes of a decision leading to lower levels of risk perception and higher risk propensity levels.

As a conclusion and building on the above literature review on risk and risk propensity definitions; in this thesis define **project risk is defined as:** "**the project manager perception about an uncertain event that have calculable probability and will lead to positive or negative impact on one of project objectives related to domains such as: scope, time and cost**". **As for risk propensity; it is defined as: "the project manager tendency to avoid or take risky decisions based on their innate characteristics as well as the situation variables".** Additionally, project managers' risk propensity in relation to project success criteria domains can be interpreted as below:

Low risk propensity: project managers' being uncomfortable with uncertainty, and such have low tendency to take risky decisions in order to avoid uncertain outcomes; i.e. low risk propensity. Hence, they will not take risky decisions although it might have positive impact on project success criteria. Thus, this research attempts to investigate personality traits that might be associated with project managers' tendency to avoid risky decisions; i.e. low risk propensity.

High risk propensity: project managers' being comfortable with uncertainty, and such have high tendency to take risky decisions and live with uncertain outcomes; i.e. high risk propensity. Hence, they will take risky decisions that they perceive it have positive impact on project success criteria. Thus, this research attempts to investigate personality traits that might be associated with project managers' tendency to take risky decisions; i.e. high risk propensity.

Next, is a detailed discussion of important theories that relate individuals' innate characteristics to risk propensity; in an attempt to conclude with risk propensity constructs.

2.4 Theory of planned behaviour

The origin of Theory of Planned Behaviour (TPB) was based on the theory of reasoned action developed by Fishbein & Ajzen (1975) where they stated that the individual's behavioural intention is a combination of subjective norms and attitude. Later, Ajzen (1991) developed the Theory of Planned Behaviour (TPB) by emphasizing a third factor which is the individual's perceived behavioural control. Moreover, Theory of Planned Behaviour (TPB) emphasized the strong link between humans' behavioural intention and their actions. Many scholars studied and investigated the Theory of Planned Behaviour (TBP) such as: Armitage & Conner (2001); Sutton (1998); and Godwin & Kok (1996). According to Jacelon (2007), the Theory of Planned Behaviour (TBP) is a model of decision-making where the individual's subjective norms, attitude and perceived control combine together to make an intention to act a certain behaviour which leads to the actual performance of that behaviour. Furthermore, Yoon (2011) pointed out that under Theory of Planned Behaviour (TPB); an individual's actual behaviour is impacted by their behavioural intention which is based on the individual attitude, subjective norms and perceived behavioural controls towards acting that behaviour. Additionally, Theory of Planned Behaviour (TPB) undertakes the notion that most human behaviour is influenced by the individual's social network and that the individual's behaviour is aimed at achieving a certain goal where humans are reasonable and rational in making their decisions (Sandberg & Conner 2008). Hence, Theory of Planned Behaviour (TPB) can be considered as a model of intentional processing where individuals make behavioural decisions according to cautious analysis of available information (Conner & Sparks 2005). Also Ajzen & Madden (1986) stated that Theory of Planned Behaviour (TPB) took into consideration the importance of estimating the level of control that individuals' possess over the behaviour in question. Additionally, Ajzen (1991) emphasized Theory of Planned Behaviour (TPB) as an expectancy value model where the individual's "behaviour" (B) can be considered as a result of the individual's "behavioural intention" (BI). Moreover, Hassan & Shiu (2007) pointed out that human "behavioural intention" (BI) can be driven by three factors: the individual attitude (ATT), subjective norm (SN) and perceived behavioural control (PBC). Figure 2.3 is a graphical representation of the theory of planned behaviour (TBP) elements.

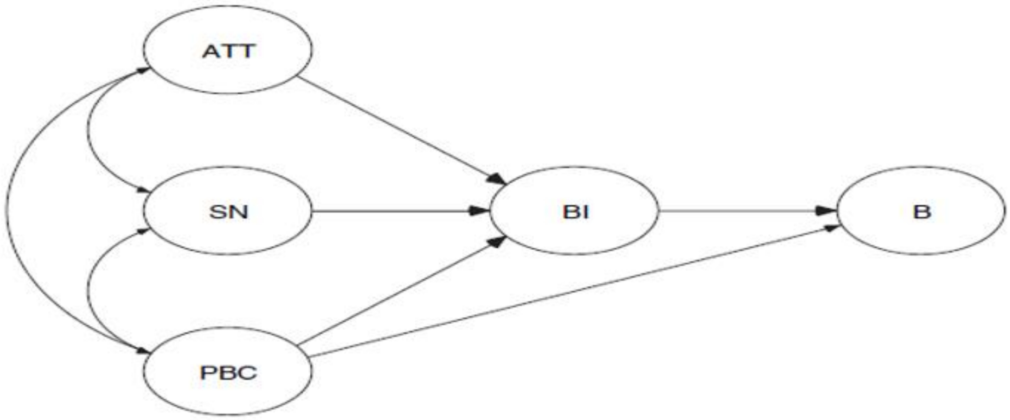


Figure 2.3: Theory of planned behaviour model (Hassan & Shiu. 2007, p.319).

Additionally, Hassan & Shiu (2007) described behavioural intention (BI) as the cerebral representation of the individual's motivation to ratify the behaviour that is being considered where they summarized the determinants of behavioural intention (BI) as below:

Attitude (ATT): refers to the individual's attitude towards performing the behaviour and to the negative or positive assessment of enacting the behaviour.

Subjective Norm (SN): refers to the individual's perception of the pressure from the surrounding social circle in case of acting or not acting the behaviour.

Perceived Behavioural Control (PBC): refers to the individual's perceived level of difficulty or easiness in executing the behaviour.

Furthermore, each one of the above mentioned determinants is constructed of two components. First, the attitudes (ATT) components can be summarized as "attitude towards the behaviour" and "behavioural beliefs". Moreover, "attitude towards the behaviour" can be referred to as the amount to which the act of the behaviour is valued while "behavioural belief" can be referred to as individual's perception that the behaviour will lead to a certain outcome (Ajzen 2002).

Second, the subjective norms (SN) components can be summarized as the “perceived social pressure” on the individual to perform or refrain from a certain behaviour; and the “normative beliefs” which can be summarized as the individual’s perception of his/her social network expectations (Ajzen 2002). Third, the perceived behavioural control components can be summarized as the “individual’s perception level” of their competence to act a certain behaviour; and the “control beliefs” which is the individual’s perception of the existence of certain factors that may ease or hinder the act of behaviour in question (Jacelon 2007). Additionally, Arimtage & Conner (2001) emphasized that Theory of Planned Behaviour (TBP) can predict and explain the human behaviour where they reported in their research that the model can classically explain 27% of the behaviour variance and 39% of the intention variance. Nevertheless, the above mentioned percentages indicate the need for further analysis to improve the ability of Theory of Planned Behaviour (TBP) to predict the individual’s behaviour. Thus, the behaviour intention (BI) which is considered as the direct predecessor of the individual’s behaviour; is composed of all the above determinants which shapes the cerebral representation of the individual’s willingness to act a certain behaviour. Consequently, behaviour according to Theory of Planned Behaviour (TBP) is the apparent response in a situation where the accuracy of perceived behavioural control can function as substitution of the actual control and be used for forecasting the individual’s behaviour (Ajzen 2002). Finally, Lin et al. (1999) stated that Theory of Planned Behaviour (TPB) is an area of research that has been covered well by researchers and proved to be successful in forecasting and explaining the individual’s behaviour across many domains. Additionally, Theory of Planned Behaviour (TPB) has been applied in a variety of social behavioural domains such as entrepreneurial intention and accounting ethics (Godin et al. 1992;

Buchan 2005; Carpenter & Reimers 2005; Devonish et al. 2010). Therefore, Theory of Planned Behaviour (TPB) can be adopted to explain and predict project managers' behaviours and tendency towards taking risky decisions (risk propensity) related to different project domains. In essence, the perceived behavioural control (PBC) which is a construct of Theory of Planned Behaviour (TPB) could be linked to risk propensity through the psychological variable of "controllability". Additionally, "controllability" refers to the individual's overconfidence in controlling and managing the risk events and effects (Boussabaine 2014). Furthermore, Cho et al. (2010) pointed out the existence of positive relationship between individuals' perception of controlling risks and optimistic bias where optimistic bias increases with higher levels of perceived control over an event outcome. The determinants of risk behaviour as suggested by Sitkin & Pablo (1992) and the Theory of Planned Behaviour (TPB) as suggested by Hassan & Shiu (2007) can both be linked through the individual's risk propensity component in both models. Figure 2.4 displays the link between both models.

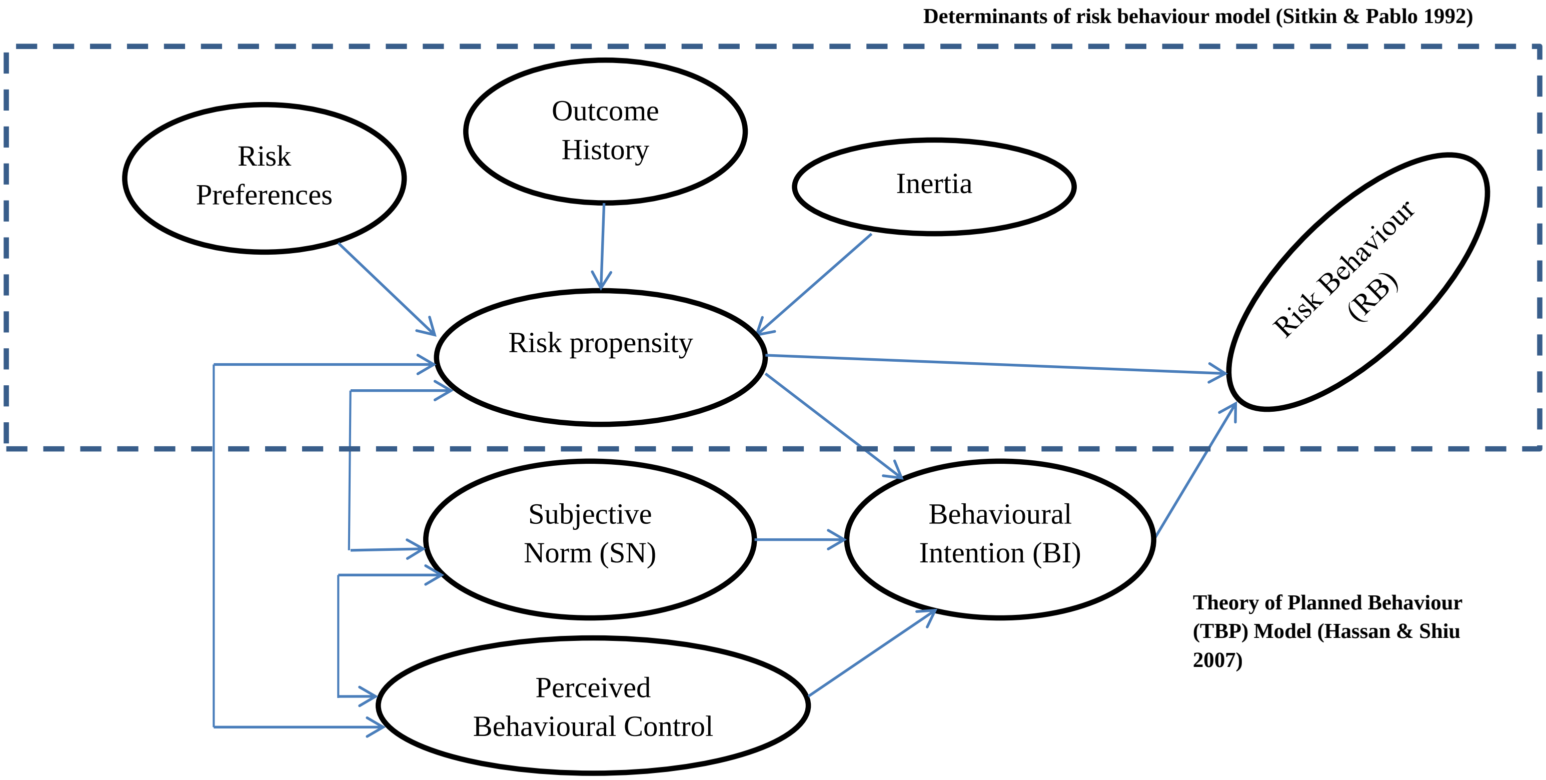


Figure 2.4: Linking risk behaviour determinants and the theory of planned behaviour model.

2.5 Risk as feelings

Whilst Theory of Planned Behaviour (TPB) is based on a utility framework, the Risk-as-Feelings (RAF) theory is more of a feelings-based behavioural model. Furthermore, individuals' sometimes behave in order to achieve a certain outcome, and other times they behave in certain ways to enjoy the activity itself. According to Kobbeltvedt & Wolff (2009), the Theory of Planned Behaviour (TPB) emphasizes the importance of outcome-expectations in the formations of intentions, while the Risk-as-Feelings (RAF) emphasizes the significance of emotional constructs in propensities and attitudes. Many scholars researched the contrast between behaviour as goal in itself and behaviour as means towards achieving a goal. Moreover, Higgins & Bryant (1982) referred to this dichotomy as extrinsic versus intrinsic motivation while De

Grada et al. (1999) referred to it as incentives versus motivation; and finally Dhar (2000) referred to it as utilitarian versus hedonically driven behaviour. Also, several scholars researched the difference between behaviours as goals or as means to achieving the goals from the human motivation perspective (Baard et al. 2004; Ryan et al. 2008). For example, the self-determination theory stated that individual’s behaviour is driven by certain basic motivational forces; such as the need for: competence, authority, social belonging. According to Weber & Johnson (2008), the Risk-as-Feelings (RAF) theory was used for predicting the behaviour that might be selected in psychological risk-return models. Additionally, the Risk-as-Feelings (RAF) model suggests that behaviour is driven by anticipatory feelings; i.e. feelings experienced when making decisions and it also integrates many outcome-related variables such as expected outcomes and emotions (Kobbeltvedt *&* Wolff 2009). Thus, the Risk-as-Feeling (RAF) model supports the idea that the individual’s intuitive structure may override the rational assessments when there is a conflict between the two. Moreover, the Risk-as-Feeling (RAF) theory was originally developed by Loewenstein et al. (2001) to describe a range of behaviours which establish difference between cerebral evaluations and feelings; such as: failure to behave in consistent with personal values, or conforming to intentions, or behaving in an irrational way. Additionally, Loewenstein et al. (2001) argued that the Risk-as-Feeling (RAF) model is emotions-based theory which is different form almost all other theories that aim at explaining and anticipating the individual’s behaviour from a consequential perspective. Figure 2.5 displays the theory of Risk-as-Feelings (RAF) model.

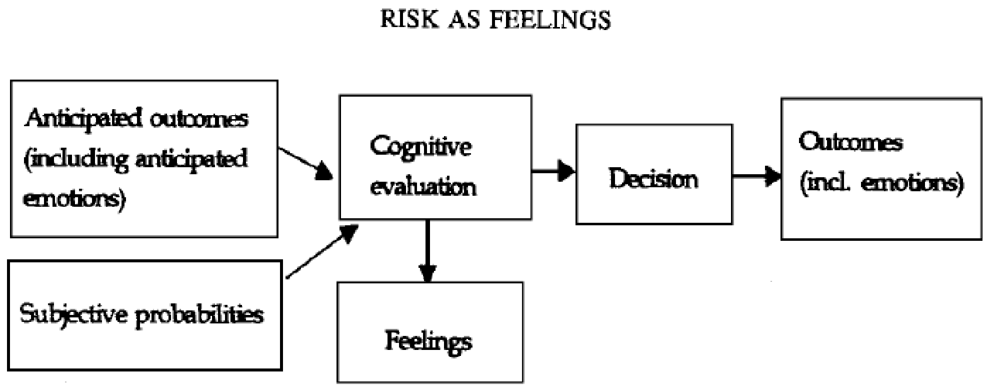


Figure 2.5: Theory of risk-as-feelings (RAF) model (Loewenstein et al. 2001, p.269).

Furthermore, Dhar (2000) stated that the central difference between intentional and feelings (incidental) behaviours arise from the pressure an individual will experience when trying to behave in order to achieve a certain outcome opposite of behaving for the sake of enjoyment. In general, both Theory of Planned Behaviour (TPB) and Risk-as-Feelings (RAF) model are aimed at explaining and predicting the predecessors of human behaviours where according to Theory of Planned Behaviour (TPB) the direct predecessor of behaviour is the individual's intention that is composed of: attitudes, social norms and perceived behavioural control. Whilst, according to the Risk-as-Feeling (RAF) model the driving predecessors for the individual's behaviour are composed of both: consequential factors (such as expected outcomes and subjective probabilities) and feeling-based factors (such as consequences and the individual's mood state). However, the Risk-as-Feeling (RAF) model focus more on how the individual's rational assessments and emotional feelings may deviate from each other leading the way for emotions and feelings to drive behaviour (Kobbeltvedt & Wolff 2009). Figure 2.6 shows a comparison between the theories of Theory of Planned Behaviour (TPB) and Risk-as-Feeling (RAF).

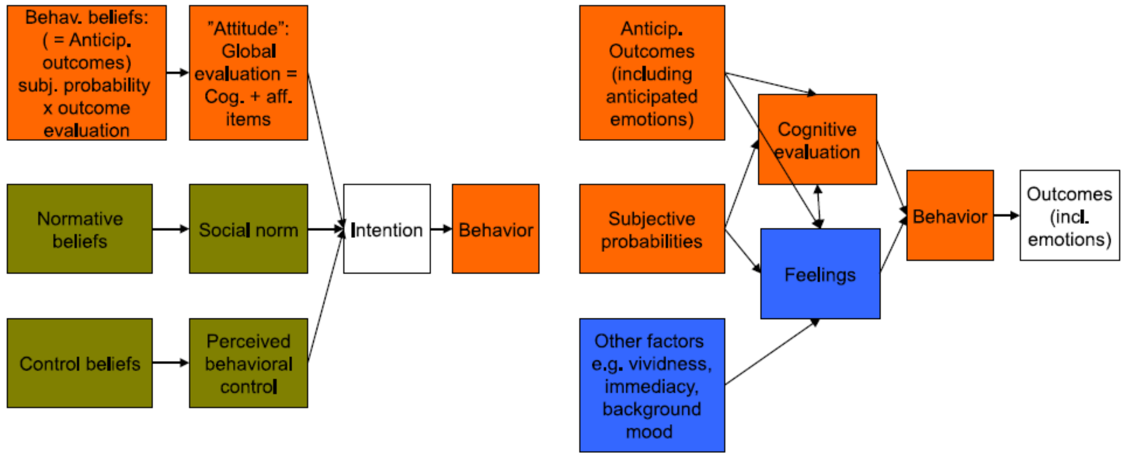


Figure 1: TpB and RaF variables. Colour codes: Orange = shared variables, Green = Unique TpB variables, Blue = Unique RaF variables.

Figure 2.6: Theories of (TPB) and (RAF) components (Kobbeltvedt & Wolff. 2009, p.570).

As indicated in the above figure, both theories discuss the determinants of human behaviour; nevertheless, there are some common elements between the two theories as well as some differences. Specifically, the common elements between the two theories are: behavioural beliefs, attitude, subjective probability and cognitive evaluation while the unique variables of the Risk-as-Feeling (RAF) model are: feelings and other factors. Additionally, the “feelings” variable in Risk-as-Feeling (RAF) model refers to feelings the individuals’ experience at the moment of decision making while the “other factors” variable refers to vividness, immediacy and background mood. According to Loewenstein et al. (2001), “vividness” component is about how intense an individual will perceive the expected consequences of a certain act while “immediacy” component refers to the proximity and closeness of the behavioural consequences. Obviously, it is imperative to include emotions and feelings effect in any attempt to understand how individuals’ develop their risk propensity. Additionally, Mishra (2014) stated that normative theories of decision-taking under-risk ignored the influence of emotions and feelings on decision-making; however emotions can impact and distort the rational decision-taking processes where it have organized and systematic impacts on individuals' behaviours. According to Boussabaine (2014), emotions have great impact on decision-making under risk. Furthermore, Lalumière & Williams (2010) pointed out that risk-taking behaviours increase with negative emotions and risk-aversion behaviours increase with positive emotions. Specifically, individuals' in positive moods tend to avoid risks to increase the probability of maintaining their positive mood; while on the other hand, individuals' with negative moods tend to seek risks to increase the probability of obtaining gains that will change their negative mood (Arkes et al. 1988). Nevertheless, Loewestein et al. (2001) suggested that the influence of emotions on decision-taking cannot be limited to positive and negative moods only; but rather it is a matter of how emotions can impact the individual's cognitive assessment of different options. Moreover, Fessler et al. (2004) claimed that emotions influence decision-taking based on biological fitness where examining emotions that motivate decision-taking and individuals' behaviour to solve problems is more useful than the separation of positive and negative emotions impact on decisions. To clarify, Oehman & Mineka (2001) mentioned that while fear and anger are both negative emotions; their effect on decision-taking under risk is completely different. Specifically, fear might lead to higher level of risk-aversion where individuals' will be motivated to escape in search for safety as a response to a threat. Whilst, anger might lead to increased level of risk-seeking in which individuals' will be motivated to show more aggressiveness as a response to social misbehaviours. Moreover, both fear and anger are considered as "immediate emotions" opposite of "expected emotions". Furthermore, it is imperative to distinguish between "immediate" and "expected" emotions; both of which are considered important constructs of risk propensity. Additionally, Han et al. (2009) related “immediate emotions” to the individual’s mental state at time of making a decision defining it as real emotions expressed by the individual at time of decision-making. Moreover, “immediate emotions” results from anticipating the outcomes of certain events in terms of emotions such as anger and stress. Additionally, the individuals’ perceptions of reward and penalization linked to risky decisions could lead to the adoption of low or high risk propensity (Boussabaine 2014). Also, Han et al. (2009) reported that individuals’ tend to be more optimistic under good moods rather than when under bad moods which eventually will influence risk propensity. As for “expected emotions”, Han et al. (2009) defined it as the engagement of individuals’ in cerebral efforts to forecast how certain risky decisions outcomes will make them feel. Thus, “expected emotions” could be referred to the expected future emotions at the time of risky decision-taking. Additionally, Boussabaine (2014) pointed out that “expected emotions” has to do with the individual’s intuition feelings about decision outcomes which influence the way individuals’ perceive situations resulting in shaping a certain risk propensity. Also, Boussabaine (2014) mentioned that individuals’ can be biased to be more optimistic or pessimistic depending on expected feelings that are associated with the risky decision outcomes. Furthermore, Lewis et al. (2008) reported that individuals’ choose economic decisions based on their emotions and how they might feel about possible decision outcomes. On the other hand, Hans et al. (2009) emphasized the ineffectiveness of taking risky decisions based on expected emotions due to the ignorance of other key objective criteria as well as inability to forecast emotions about future consequences. Moreover, Boussabaine (2014) adopted a middle ground between the above mentioned views stating that both immediate and expected emotions influence individuals’ behaviours and decisions under risk. Furthermore, Boussabaine (2014) mentioned two specific emotions that can bias risky decisions: dread and optimism. Moreover, Stern (2012) emphasized the influence of "dread" on risky decisions and risk behaviours. Similarly, Harris (2012) stated that the individuals' objective of reducing "dread" emotions influences their choice of behaviour where the feeling of "dread" also dramatically increases with the closeness of a risk event. Thus, the recalling of past experiences related to "dread" emotion will influence individuals' risk perceptions (Boussabaine 2014). As for "optimism" emotion, it can be referred to as a mental attitude that infers events as being best in the hope for future positive outcomes (Wikipedia 2015). Additionally, Anderson & Galinsky (2006) claimed that individuals' with high authority in decision-making are more optimistic in their risk perceptions. Also, Boussabaine (2014) mentioned that "optimism" is a mental state where individuals' overconfidence of their abilities leads to their assumption of the correctness of their risky decisions. Thus, high levels of "optimism" can be linked to high risk propensity behaviours.

2.6 The Psychology of risk

According to Mishra (2014), the study and analysis of decision-making in risk situations is considerably important to all behavioural sciences due to the fact that all humans and other creatures' decisions are usually made under some sort of risk. Additionally, decision-taking under risk can be studied in different behavioural sciences such as: psychology, economics and biology. Also, Mishra (2014) pointed out that there have been many decision-taking theories that were developed to address the decision-taking process under risk in different behavioural sciences such as: expected utility theory (relates more to economics), prospect theory (relates more to psychology and economics), risk-sensitivity theory (relates more to biology) and heuristic approaches (relates more to psychology). Furthermore, the majority of researchers in psychology, biology and economics areas agreed to define risk in relation to the outcome variance; such as: Bernoulli (1738), Friedman & Savage (1948), Rubin & Paul (1979), Real & Caraco (1986), Winterhalder et al. (1999), Daly & Wilson (2001). The above mentioned "decision-taking under risk" theories can be categorized under either normative and/or descriptive approaches. Additionally, normative theories of decision-taking under risk (such as: expected utility theory and risk-sensitivity theory) include the following characteristics:

- It is a top-down approach for recognizing the most rational decision in a certain situation where rationality is defined by the decisions that maximize a currency of interest (Mishra 2014).
- It describes what humans ought to do in a situation that includes risk and requires a risky decision (Mishra 2014).
- It explains risky decisions related to utility where utility can be referred to as the level of satisfaction that comes along with a certain behaviour (Friedman & Savage 1952).
- It focuses on the differential generative success of humans who hold certain genetic characteristics (Williams 1996).

On the other hand, descriptive theories of decision-taking under risk (such as: prospect theory, heuristic approaches) include the following characteristics:

- It is bottom-up approaches that identify the decision-making proximate mechanisms in which it usually begins with the experimental observation of the individual's actual behaviour.

- It describe how humans actually behave and how they take risky decisions rather than why they made their risky decisions.
- Although it is empirically driven theories, it still require the normative definition of a currency of decision making (Mishra 2014).

In summary, both normative and descriptive theories of "decision-taking under risk" complement each other and should not be treated as competing theories. Moreover, normative theories can provide the rationale for decision-taking through defining a decision-taking currency while descriptive theories can provide the mechanisms of decision-taking under risk through the empirical observation of the individual's actual behaviour. Therefore, there is a need for an approach that integrates both normative and descriptive theories in order to understand "decision-taking under risk".

2.7 Risk and rationality

Normative theories can provide the rationality of risky decisions; specifically "expected-utility" theory and the "risk-sensitivity" theory.

2.7.1 Expected utility theory

The theory was initiated based on the work of Bernoulli (1738) where he suggested a solution for the St. Petersburg paradox which is related to the risky decision made by individual on the maximum amount he or she is ready to pay as an entry fee. Additionally, Bernoulli (1738) proposed that money has a lessening marginal utility in which a single dollar perception value will differ based on the person who owns it. To clarify, a single dollar is worth more for a poor person than a wealthy one where the utility (or subjective value) of a decision outcome is as equally important as the absolute value of the decision outcome (e.g.: money being earned). In fact, the theory is based on the computation of the expected utility of a risky decision outcome multiplied by its likelihood; where utility predicts that decision makers seek to maximize their level of satisfaction or happiness through their risky decisions or behaviours (Friedman & Savage, 1952). Furthermore, Von Neumann & Morgenstern (1944) postulated three utility functions types that describe the relationship between the perceived utility of a risky decision and its expected value. Specifically, the three utility functions curves are: risk-seeking/preference, risk neutral/indifference and risk-aversion where Mishra (2014) stated that each of these utility curves quantifies marginal utility in different manner in which marginal utility is referred to as the variation in utility based on every unit variation in reward. First, the risk-seeking function is a concaved up curve indicating a situation where each unit of reward is valued more than the last one. Second, the risk-neutral curve defines between decision currency (e.g. wealth, happiness satisfaction) and marginal utility in a linear manner. Third, the risk-averse is a concaved down curve that represents the rule of diminishing returns where each additional unit of reward is valued less than the last one. In addition, Von Neumann & Morgenstern (1944) argued that the three utility function curves define consistent behaviour patterns among humans. In other words, although any change in the individual's surrounding environment when taking risky decisions might impact the steepness of the utility curve; the general curve shape will stay constant for individuals. However, this idea of risk propensity stability is challenging because usually decision-making behaviours are inconsistent where the same individual that take risky decisions might have the tendency to avoid taking risky decisions based on different situational factors (Mishra 2014). Also, there is the challenge of defining utility within the expected utility theory.

To clarify, utility is a currency that is problematic for putting to use since it takes many positive forms such as opportunity, pleasure and fortune. Consequently, under the expected utility theory; all risky decisions made by individuals' can be justified as utility maximizing where this idea has been referred to as discovered preference (Cubitt et al. 2001). Hence, expected utility theory proposes little prognostic value as a normative theory of decision-making. Additional criticism for expected utility theory is related to its inability to clarify actual forms of decision-taking under risk. Moreover, Von Neumann & Morgenstern (1944) proposed that decision-taking under risk follows five preference assumptions: independence (preferences will stay independent even when paired choices are mixed with other set of paired choices), continuity (individuals' might possibly be indifferent between best and worst outcomes when taking decisions under risk), transitivity (individuals' preferred options are always ranked in the same order), monotonicity (individual's prefer outcomes with higher probability when choosing between outcomes of equal expected utility values), and completeness (individuals' can always rank outcomes according to their risk preferences). Furthermore, and based on the previous preferences assumptions; Von Neumann & Morgenstern (1944) suggested the possibility of developing an individual's utility curve that is consistent and adapts to the forecasts of the expected utility theory. Nevertheless, the problem with such an approach is that it does not consider the individual's actual preference behaviour in the reality. Moreover, a plethora of researchers pointed out that there is distinctive evidence about the constant violation of the expected utility theory assumptions in many various ways (Allais, 1953; Ellsburg, 1961; Kahneman & Tversky, 1979; Barrett & Fiddick, 1999; Rode & Wang, 2000; Starmer, 2000; Aktipis & Kurzban, 2004). It is important to realize, that although the expected utility theory can hypothetically predict an individual's decision in perfect consistent environments where all variables are known (referred to as “small worlds”); it lacks the ability to predict the individual’s “decision-taking under risk” in a more realistic situations (Gigerenzer & Gaissmaier 2011). Additionally, risk rationality and expected utility theory could be linked to risk propensity through many variables; such as: “anchoring”, “confirmation”, “high benefits” and “scenario bias” concepts. Furthermore, Tverskey & Kahneman (1973) defined “anchoring” psychological variable as the tendency of individuals’ to estimate risks starting from a reference point that could be accustomed for reaching a final estimate. In the same line, Boussabaine (2014) concluded that individuals’ under the “anchoring” concept would estimate risks from an initial anchor and keep altering until reaching an estimate that is satisfactory for them. Thus, different risk estimates would be reached due to having different initial anchor points which would also lead to the individual’s bias towards the these initial points. As for “confirmation” variable, it refers to the individuals’ pursuing supportive evidence for confirming their rationale and beliefs; and ignoring all evidence that contradicts their rationale (Boussabaine 2014). Moreover, Yudkowsky (2006) pointed out that “confirmation” is due to the tendency of pessimistic and skilled individuals’ to apply their skills in a selective manner that allow them to select evidence that fit their risk appetite. Also, the concept of “high benefits” can be considered as a construct of personal risk propensity where individuals’ self-interest can influence risk perception and management. Additionally, Lloyds (2010) stated that rational and objective risk assessment can be biased when risk is connected to high personal benefits. To clarify, personal benefits might act as a source of conflict where if risk assessment does not align with the individuals’ personal expectations; then they change their risky decisions in order to achieve their expected benefits (Boussabaine 2014). Additionally, the individual’s ability to describe different future scenarios and anticipate their outcomes can also influence risk propensity. Moreover, Boussabaine (2014) introduced “scenario bias” as a construct influencing risk propensity defining it as the use of hypothetical scenarios in describing a situation prior to risk occurrence and anticipating its outcomes. Furthermore, the risk assessments outcomes could be impacted by the assumptions used in designing the risk scenarios.

2.7.2 Risk-sensitivity theory

According to Mirsha (2014), risk-sensitivity theory is considered a normative theory that was developed to explain risky decisions taken by creatures in the “hunting” situations. Moreover, the origin of the risk-sensitivity theory was developed by behavioural ecologists to analyze how animals acquire food in scavenging context. Opposite of expected utility theory; which focuses on maximizing utility; the risk-sensitivity theory try to explain the behavioural responses of risky decisions made for seeking returns in survival contexts leading to the enhancement of success (Hurly 2003). Thus, risk-sensitivity theory emphasize the idea that individuals’ risk propensity changes from low to high in situations where they need to acquire something where this “need” explains the difference between the individual’s present and desired goals (Mishra & Fiddick 2012). Similarly, Stephens & Krebs (1986) stated that individuals’ under risk-sensitivity theory are more interested in avoiding certain outcomes that make them fail to reach their goals rather than seeking to maximize desirable consequences. Additionally, risk-sensitivity theory was majorly criticized for its origins of being applied initially on hunting animals’ behaviour rather than humans’ decision-making behaviour. However, there is a plethora of researchers who emphasized the successful attempts of applying risk-sensitivity theory on human decision-making related to risky situations (Deditius-Island et al. 2007; Ermer et al. 2008; Mishra &

Lalumière 2010; Mishra & Fiddick 2012; Mishra et al. 2012). Also, risk-sensitivity theory received experimental support from different studies that relates to humans and non-humans (Mishra & Fiddick 2012). Although, risk-sensitivity theory is based on psychological aspects; where it assumes that individuals' needs leads their behaviour; it was not largely considered in psychology. Additionally, Mishra & Fiddick (2012) defined the individual's need as the difference between the current and desired states where the larger is the difference between these two states; the higher the individual's tendency to take risky decisions that will reduce this difference. Moreover, the individual will first seek to bridge the gap between the current and desired states through choosing a low-risk option before considering high-risk options. As a result, individuals under risk-sensitivity theory make decisions that will satisfy their needs rather than making decisions that are considered optimal (Mishra & Lalumière, 2010). Consequently, individuals' weigh their needs differently according to different domains. Additionally, Stearns et al. (2008) proposed the use of "life history" theory for understanding how individuals prioritize and sequence their motivational factors across development in different domains. Furthermore, "life history" theory explains the individuals' allocation of limited resources; such as energy and time; to different biological domains that includes survival, development and investments (Kaplan & Gangestad 2005). Also, "life-history" is based on the concept of trade-off; where individuals' will need to distribute their limited amount of resources (effort and energy) to activities that might restrain each other (Stearns 1992). Furthermore, Kaplan & Gangestad (2005) indicated that "life-history" theory is based on the individual's natural selection in distributing resources while considering the characteristics of the surrounding environment. Moreover, Kenrick et al. (2010) suggested prioritizing the individual's needs according to the “life-history” theory as follows: basic physiological needs, self-protection, social relationships, self-confidence, companion acquisition, companion preservation and parenting. In effect, this evolutionary ordering of human needs lead to better understanding of its effect on decision-making under risk and how it drives the human behaviour and their relevant risk propensity. However, it is important to keep in mind those higher needs such as “parenting” might replace lower ones such as “physiological needs” depending on the cost-benefit analysis done by the individual’s on the surrounding environment. Moreover, risk-sensitivity theory postulates that individuals will take risky decisions while considering survival and reproductive needs (Hurly 2003). Additionally, individuals’ will show more risk-seeking behaviours when they are close to reproducing results that they desire; where they take risks to ensure that reproduction will lead to better results than when showing risk-averse behaviours (Bednekoff 1996).

In conclusion, Individuals’ tend to do careful calculations when taking risky decisions while considering their needs as well as the decision’s benefits and costs in a given environment. Thus, the risk-sensitivity theory underlying principle is that individuals’ will tend to engage in risk-taking behaviour if low-risk behaviour will not make them satisfy their needs and meet their goals (Mishra & Lalumiere 2008). According to Dall et al. (2012), individuals’ differences interrelate with ecological and situational factors to shape the human behaviour; where situational factors are the immediate causes of behaviour while individuals’ differences are primarily based on growth and genetic. However, traditional theories of “decision-taking under risk” did not sufficiently address the influence of the individuals’ differences on their risk propensity. Furthermore, Mirsha (2014) stated that most traditional theories do not provide normative justification for the high variance in risk propensity across different situations. Next is a section that addresses environmental and situational factors that influence risk propensity.

2.8 Risk behaviour

The prospect theory can be used for understanding individuals' risk behaviour and risk propensity where it is considered a descriptive theory. Additionally, prospect theory was developed in the 1970s to address the weakness of the expected utility theory in predicting the actual individual's decision-making under risk. Additionally, the prospect theory addressed the following violations of the expected utility theory that were observed during experimental studies on humans: framing effect, certainty effect and isolation effect. According to Tversky & Kahneman (1981), the above three effects can be described as follows:

Framing effect: refers to the individual's tendency to be risk-averse when encountering a decision that is framed as gain and risk-seeker when encountering a decision framed as loss even if both decisions have the same expected values.

Certainty effect: refers to the individual's tendency to overweight outcomes that are certain in comparison to outcomes which involve probabilities regardless of the expected value.

Isolation effect: refers to the individual's tendency to simplify their risky decisions by disregarding the common components of specific decision choices (Kahneman & Tversky 1979).

Additionally, Tversky & Kahneman (1979) suggested two phases that define individuals' decision-taking under risk: editing and evaluation phases. Furthermore, the editing phase purpose is to organize all possible risky decisions and it includes the following processes: coding, combination, segregation, and cancellation. Furthermore, Mishra (2014) suggested that the coding process is the most significant addition of prospect theory where coding refers to the coding of gains and losses done by decision makers around a reference point. Additionally decision outcomes that are above the reference point are treated as gains while outcomes that are below the reference point are treated as losses where reference points are determined according to the person's present state and can be changed based on decision makers' biases or expectations (Tversky & Kahneman 1981). As for the other editing processes; they can be defined as follows according to Tversky & Kahneman (1981): methods used in combining separate risky decisions with equal outcomes and likelihoods into single risky decision (combination); clarification of outcomes based on risk level (segregation); and canceling similar decision components to simplify multistep decisions (cancellation). Also, Mirsha (2014) defined the evaluation phase as the assessment of all edited options by the individual for reaching a decision. Also, the evaluation phase consists of two functions: value and weighting where "value function" refers to the assignment of specific values to certain decision outcomes; and "weighting function" refers to the underweighting of high likelihood events and the overweighting of low likelihood events. Consequently, the value and weight of each risky decision outcome is multiplied in order to reach a quantified utility of risky decision alternatives. Although both expected utility theory and prospect theory share the same result of quantifying the individual's utility of risk; under the prospect theory the individual utility is quantified in a more subjective manner since the individual will engage in two phases namely editing and evaluation for processing the decisions and their outcomes before finalizing a decision. In summary, prospect theory is considered as an amendment to expected utility theory in which it dealt with some of the expected utility theory violations such as the framing effect. Nevertheless, both theories share almost the same problems where they use utility as the currency for "decision-taking under risk" and poorly define it (Marsha 2014). Hence, the need for a theory that defines an accurate currency for "decision-taking under risk" is needed to avoid the problems attached with expected utility theory and prospect theory. According to Mirsha (2014), any model for understanding human decision-taking have to be considered along with evolutionary descriptions of behaviour since humans are products of evolution by natural choice. Hence, there is a need to understand the behavioural evolutionary theory which has to do with the understanding of how humans adjusted themselves to fit in their adapted environments. Additionally, Tinbergen (1963) suggested that evolutionary behaviour causes can be organized under either proximate level or ultimate level ***(why);*** where proximate level mechanically describes the causes that led to a certain behaviour whilst ultimate level explains the behaviour occurrence in an evolutionary way ***(how).*** Moreover, Mirsha (2014) pointed out that proximate level explanation of human behaviour includes developmental influences (e.g., childhood environment and parental nutrition) as well as immediate casual mechanisms (e.g., situational factors and emotions); while ultimate level explanation of human behaviour includes function (e.g., traits role in decision-taking) as well as phylogeny (e.g., understanding the evolvement of different or similar traits in different creatures). Also, evolutionary explanation of behaviour is not limited only to genetic or biological factors where it should include the environment fit factor. Thus, Mirsha (2014) emphasized the importance of understanding the interaction of human genes as well as the surrounding environment to better understanding of human behaviour. Furthermore, Dickins & West (2011) stated that proximate and ultimate levels of evolutionary behaviour explanation complement each other where they syndicate to provide a better description of human behaviour and its causes. Nevertheless, many behavioural approaches that were developed for understanding human behaviour under risk focused only on the proximate level and disregarded the ultimate level of behaviour explanation (Buss 1995). As a matter of fact, the distinction between proximate and ultimate behaviour explanation is similar to the distinction between descriptive and normative behavioural theories that are used to explain the human decision-making under risk. To clarify, descriptive theories support the proximate level of behaviour explanation and decision-making causes; while normative theories supports the ultimate level explanation of human behaviour. Therefore, only an approach that combines proximate and ultimate levels of explanation can lead to the better understanding of human behaviour in decision-taking under risk. Additionally, one of the most challenging issues in decision-taking under risk is finding a clear and accurate currency of decision-taking where all of each of the above discussed theories defined a different currency for decision-taking. Moreover, Wilson & Daly (1997) pointed out the difficulty of understanding the individual's perception of benefits and costs of any decision without having a common currency. As mentioned earlier, the economic and psychological theories of taking risky decisions; such as: the expected utility theory and the prospect theory; focus more on achieving the highest levels of utilization. Whilst, the biological theory of taking risky decision; such as: risk-sensitivity theory; focus more on the individual's survival and improving the chancing of success in different contexts which can be referred to as "fitness". Moreover, Mirsha (2014) argued that using "utility" as a currency for decision-taking lead to inaccurate results due to unclear definition of "utility" where it can take various forms; such as: monetary outcomes, pleasure, etc. On the other hand, using "fitness" as a currency of "decision-taking under risk" leads to more accurate results where "fitness" has a clear definition and can be referred to as the influence of the individual's genetic makeup to gene pool of the future generations (Williams 1996). However, "utility" and "fitness" as currencies of decision-making should not be thought of as unrelated currencies but rather as interdependent currencies of decision-taking. Furthermore, Neuberg et al. (2004) emphasized that individuals take risky decisions while being aware of the benefits and costs of their risky decisions and in consideration of the "fitness" consequences. Additionally, some researchers used the term "deep rationality" to reflect the adaptive match between the individual decision-taking preferences and the surrounding environments (Todd & Gigerenzer 2012) where "deep rationality" can be referred to as the influence of evolutionary related motivations on the individual's decision-taking process (Kenrick et al. 2009). Furthermore, the evolutionary motivators include resources such as: material, respect and social status (Daly & Wilson 2001). In conclusion, there is an obvious relationship between risk propensity and risk behaviour. Moreover, the "cognitive dissonance" variable of risk propensity can influence risk behaviour. According to Festinger (1957), "cognitive dissonance" could be defined as the individuals' beliefs and attitudes which may impact their behaviours and actions leading to inconsistencies. Furthermore, Boussabaine (2014) stated that inconsistencies between beliefs and actions will cause conflict and dissonance resulting in the individual attempt to adjust their behaviour (beliefs and attitudes) to resolve this internal conflict. Therefore, it is imperative to understand the influence of internal conflicts beliefs on human decisions under risk for enhancing risk rationality and behaviour.

2.9 Environmental and situational factors

It is evident that environmental and situational factors have substantial impact on individuals' risk-taking behaviour resulting in different levels of risk propensity. Thus, the understanding of how individuals' change their risk-taking behaviours in response to environmental changes can lead to better adaptation that fits between the individual's behaviour and the surrounding environment. Furthermore, Mishra & Lalumiere (2010) suggested that individual differences in personality can be used for predicting risk-taking behaviour in situations where individuals' have low needs. However, in situations where individuals' seek to achieve high needs; individual differences in personality cannot be used considerably for predicting risk-taking behaviours where taking the wrong risky decision might be very costly for the individual. Consequently, the influence of individual differences in personality can be clearly seen in situations with low cost consequences; while in high costs situations most humans' will behave depending on the environmental and situational factors regardless of their personality traits (Mishra & Lalumiere 2010). Additionally, Mishra et al. (2011) pointed out that the individual's developmental environment can forecasts the emergence of individual differences in adults' risk-taking behaviours. Also, the individual's evolution by natural selection emphasizes the role of environment in shaping different risk propensities where it enables adaptive fit between individuals' and their surrounding environment. Furthermore, although individuals' that are competitively disadvantaged might engage in risk-taking behaviour when they are far from achieving their goals; they might also make "rational" decisions that are based on environmental factors and could be adjusted with changes in the surrounding environment (Buss & Greiling 1999; Mishra et al. 2012). A plethora of researchers emphasized that environmental factors' such as macroeconomic disparity between individuals' result in increased levels of risk-taking behaviours in different domains; i.e. different levels of risk propensity (Morenoff et al. 2001; Daly et al. 2001; Gold et al. 2002; Room 2005; Wilkinson & Pickett 2009; Mishra et al. 2014).

Such a conclusion is consistent with the risk-sensitivity theory where the feeling of inequality produces a perception of need that results in risky behaviour from the individuals' side to satisfy their needs. Additionally, one of the most important risk propensity psychological constructs that relate to situational and environmental factors is the "chain processes" construct where Boussabaine (2014) defined it as the individuals' perception of different factors that interact for causing risks. Furthermore, the interactions between different risk variables and their influence on risk propensity are evident when considering different risk situations and domains where Loiyd's (2010) pointed out the importance of considering situational factors when taking risky decisions.

2.10 Group and individual risk propensity

The collective group risk propensity can influence the individual's risk propensity. A psychological cognitive construct related to this matter is "group biases" which refers to how the structure of a group participating in risk assessment can influence the individual's risk propensity and behaviours (Boussabaine 2014). Also, the "group biases" construct deals with how group members perceive each other in relation to oneself; therefore it has to do with the influence of the social status of group members' on risk propensity rather than personality influence. According to Lloyds (2010), taking risky decisions within a group tend to narrow ideas spoken by group members due to their feeling of being committed to group position and thus attempting to protect group homogeneity.

2.11 Individual characteristics and risk propensity

A plethora of researchers emphasized the difference of personality traits as one of the main individuals' factors that impact risk propensity where traits such as: low self-confidence, impulsivity and needs for achievement have been linked to risky behaviours (Blaszczynski et al. 1997; Langewisch & Frisch 1998; Skitch & Hodgins 2004; Zuckerman 2007; Mishra et al. 2011). Moreover, Roberts & DelVecchio (2000) postulated that individual personality traits possess some degree of consistency over time in which they also lead to a degree of consistent individual's behaviour in risk situations. Similarly, many researchers pointed out notable evidence about the stability of different individual traits in risk-taking behaviours (Gosling & John 1999; Sih et al. 2004). Additionally, Buss (2009) reported that heterogeneity of the environments surrounding the individuals' results in adopting different risk behaviours. Of course, if individual differences in personality traits are assumed to be reasonably stable over time; then these individual differences in the personality traits might produce different random behaviours in stochastic environment (McDermott et al. 2008). Furthermore, the stable individual differences in risk-taking behaviours might also be the result of the individual's early developmental environments; where research showed that poor developmental environments (e.g. head injuries at early ages and poor nutrition of mothers') have been linked with increasing and consistent risk-taking behaviours (Harris et al. 2001; Mishra & Lalumière 2008). Moreover, the changeability and volatility of the individual's early environments; specifically in the first five years of life; has been proven to envisage risk-taking behaviour at later stages (Simpson et al. 2012). Also, it is imperative to recognize that developmental factors will interact with other social factors to encourage even higher levels of risk-taking behaviours; i.e. higher levels of risk propensity (Griskevicius et al. 2011). Additionally, the social factors can that influence the risk-taking behaviour can take various forms; such as: low parents income, parental cruelty, single-parent upbringing, parents' divorce, lack of family support, inequality, etc. (Mishra & Lalumière 2009). According to Mishra & Lalumiere (2008), individuals' long-lasting environmental effects such as neurodevelopmental agitations and maternal malnutrition might result in adopting and seeking risky behaviours. Additionally, the difference in risk-taking behaviour might be due to differences' of individual's embodied capital in which embodied capital is referred to as the inherent characteristics (e.g.: health and charm) that allow the individual to successfully compete with others' for different kinds of resources and things (Mirsha 2014). In other words, individuals' who have low embodies capital may constantly encounter situations of high need where they feel competitively disadvantaged in comparison to others; and thus will engage in constant risk-taking behaviours to effectively compete with others' (Mishra et al. 2014). Consequently, embodied capital as well as other individual differences will interact with environmental and situational factors to produce risk-taking behaviours. For example, gender could be an important individual difference when considering risk propensity. Additionally, Byrnes et al. (1999) pointed out that males are significantly inclined to take risks than females where they reported that men engage in more risk-taking behaviours than women in 14 out of 16 studied domains. Moreover, studies showed that individuals' (especially men) are more tempted to engage in risk-taking behaviours between the ages of 16 to 24 years where risk-taking behaviour is mainly normative in the teenage and early adulthood stages in male's life (Moffitt 1993). Furthermore, Wilson & Daly (1985) proposed the "young male syndrome" referring to the high preference of young males to involve in risk-taking behaviour due to competing for resources, societal status and friends. It is also worth mentioning that young males might have the tendency to compete with older males who are more experienced, knowledgeable and skilled where young males will feel competitively disadvantaged and will engage in risk-taking behaviours due to encountering high discrepancy between them and those older males who they perceive as being more privileged. In support of the above, Wohl et al. (2014) reported that humans' are more tempted to engage in risk-taking and even aggressive behaviours if they feel competitively unsuccessful in different situations; such as: being unemployed and feeling less charming than others. The involvement of individual's in risk-taking behaviours tend to decrease in early adulthood ages due to being more conscious about the benefits and costs of risk-taking behaviours. To clarify, when individuals' achieve their life goals in getting married, securing a job and a high social status; their tendency to engage in risk-taking behaviour is reduced; i.e. decreased levels of risk propensity (Mishra & Lalumière 2008). On the other hand, individuals' who experience loss of stability in their life; such as: losing their jobs or getting divorced will be more inclined to engage in high levels of risk-taking behaviours; i.e. increased levels of risk propensity. Thus, severe changes in the individual's perception of his or her competitive (dis)advantage lead to matching changes in risk-taking behaviour where risk propensity will be influenced by the individual's perception of the surrounding environments and situations of need (Mishra et al. 2014). Additionally, "life-history" theory can be used as a basis for describing the gender differences and its relation to risk-taking behaviour where males have massive higher potential "reproduction" levels than females in which they can produce children from unlimited number of females whereas females will be more involved in maternal issues and are constrained by physiology and other limitations (Trivers 1972). As a result, males will have to compete for females who are investing more energy and time into reproduction and thus they become a valued resource for males. Furthermore, risk-sensitivity theory has the potential to describe age and gender differences and their impact on risk-taking behaviours. According to Daly & Wilson (1997), young males are often involved in high levels of risk-taking behaviours due to high competition in their surrounding environments and due to the perception of disparity between their current and desired states in relation social status and different areas. However, females might have higher tendencies than males to engage in risk-taking behaviour in certain situations such as social situations where there is limited number of resources and high competition from other females (Campbell 1995). In brief, risk-sensitivity theory suggests that risk-taking behaviours can be predicted according to situation of needs regardless of different behaviours of gender type.

In conclusion, the above discussed individual differences among humans which influence their risk-taking behaviour can be explained by the risk-sensitivity theory. Furthermore, Mishra et al. (2011) emphasized that those individuals' who seek to satisfy their needs tend to have higher risk propensity where they tend to engage in higher levels of risk-taking behaviours because they feel competitively disadvantaged and seek to remove the disparity between their current and desired states by taking more risky decisions. Also, there are many other individual characteristics that can be associated with risk propensity and behaviours; such as: "venturesomeness" and "self-efficacy". Moreover, "venturesomeness" is considered an important personality trait that can be linked with risk-taking behaviour. Furthermore, Boussabaine (2014) referred to "venturesomeness" as the degree of being adventurous and the individual's willingness to take risky decisions and accept their outcomes. Additionally, individuals' with high degrees of "venturesomeness" tend to be sensation-seekers resulting in developing higher risk propensity through low assessment of risk probability and impact. Similarly, Lloyd's (2010) suggested that individuals' with high degrees of "venturesomeness" tend underestimate risk consequences due to their perception that they are in full control of the risk event probability and impact. Therefore, "venturesomeness" can result in "optimism" bias where individuals' are optimistic about certain risk events and perceive their control of the consequences. The other individual characteristic that can influence risk propensity is "self-efficacy" where it is an aspect of personality referring to the individual's capability of managing risks and events outcomes (Boussabaine 2014). According to Bandura (1986), "self-efficacy" construct is shaped from the interaction of different personal and environmental factors where "self-efficacy" influence decision-taking process related to risks and challenges. Furthermore, Barbosa (2007) pointed out the positive relationship between "self-efficacy" and risk-taking behaviours where individuals' with high "self-efficacy" tend to adopt higher risk propensity by overestimating opportunities and underestimating threats. On the other hand, individuals' with low levels of "self-efficacy" tend to adopt lower risk propensity by overestimating threats and underestimating opportunities. Likewise, Boussabaine (2014) suggested that individual' cognitive styles and "self-efficacy" influence risk propensity and behaviours.

2.12 Heuristic and biases

Heuristics can be referred to as "rules of thumb" that allow individuals to quickly take decisions based on inductive rationalizing of real patterns of decision behaviour. Thus, heuristics represent a descriptive approach for analyzing humans' decision-taking (Todd & Gigerenzer 2012). Furthermore, the theory of heuristics became more important after Tversky & Kahneman (1974) explained heuristics as encouraged irrational cognitive biases through the misapplication of rational processes. Additionally, Krueger & Funder (2004) pointed out that these cognitive biases are considered violations of the rational decision-taking that are is the basis of expected utility theory. However, Todd & Gigerenzer (2012) opposed the idea of heuristics by stating that heuristics are more results of adaptive evolutionary methods which tend to solve problems that were repeated in the individual's history. In contrast of expected utility theory and prospect theory, the heuristics approach does not assume the individual's boundless capacity of information processing in a rationale fashion where most real-world decisions need to be made quickly in uncertain situations that lacks complete information (Todd & Gigerenzer 2012). Moreover, heuristics approaches emphasize the importance of the individual's satisfaction of the risky decision outcome over the optimization of the outcomes. To clarify, almost all traditional utility theories tend to focus on optimizing the risky decision outcomes where individuals' reach the best risky decision through weighing the benefits and costs of each risky decision option and stop searching for additional options once a risky decision option benefits exceed its relevant costs (Todd & Gigerenzer 2012). In reality, it is extremely difficult to reach an optimal risky decision due to the vast number of risky decision options and environment uncertainty. Hence, heuristics approaches have the value of focusing on the individual's satisfaction that can be reached by looking for risky decision outcomes that are "good enough" as opposed of searching for optimal decision outcomes. Furthermore, satisficing heuristics -which is referred to as the acceptance of less than the ideal outcomes- can work effectively when applied quickly in uncertain situations characterized by incomplete information (Mirsha 2014). Moreover, effective heuristics approaches are those that lead to efficient decision-taking with regards to information and time such as taking risky decision in a timely manner based on one reason or a single piece of information (Todd & Gigerenzer 2012). As such, the difficulty of combining many different decision currencies can be avoided when using heuristics approaches based on single information or reason. Additionally, taking risky decisions using heuristics approaches is constrained by the surrounding environments of the individual's at the time of taking the risky decisions and thus it is imperative to consider the way information structured in these regular encountered surrounding environments (Wilke et al. 2009). Furthermore, taking quick but careful risky decisions using heuristics approaches indicates natural rationality that describes strong appropriateness between the recurrent structures of regularly encountered environments and decision-taking mechanisms (Todd & Gigerenzer 2012). Also, heuristics approaches have been found vigorous for effective decision-taking in multiple dissimilar environments due to their flexibility to work with limited information. Also, Hertwig et al. (2004) reported that heuristics approaches proved to be noticeably effective in explaining the change of actual decision-taking behaviour in different environments.

In conclusion, heuristics approaches involve explaining simple rules for understanding "decision-making under risk" through describing the way decision-taking is being done while considering the speed, efficiency and information structure in the surrounding environment (Berg & Gigerenzer 2010).Thus, heuristics approaches explain how individuals' take risky decisions by describing their perception of the surrounding environment, collection of information and the choice between different risky decision options. Next section addresses cognitive biases because as mentioned above; heuristics encourage irrational cognitive biases where these cognitive biases could be considered as violations of rational decision-taking and possible risk propensity constructs.

2.13 Cognitive biases

According to Tversky & Kahneman (1974), cognitive biases refer to violations to rational decision-taking which are considered as mistakes from the perspective of expected utility theory. Additionally, they argued that misapplied heuristics are the root causes of systematic cognitive biases. However Mishra (2014) stated that cognitive biases should be considered as a result of an evolutionary process and as adaptive environmental responses to frequent biological difficulties. Additionally, cognitive biases that can be used as risk propensity constructs are: framing, scale, hindsight, availability, representativeness, halo effect and accountability (Lloyd's 2010). Below are descriptions of each of these constructs and how they relate to risk propensity.

2.13.1 Framing and loss-aversion

According to Mishra (2014), framing effect is considered as a cognitive bias where it can be referred to as the change in the individuals' risk preference for mathematically identical alternatives based on framing the alternatives either negatively or positively. Additionally, an individual's positive frame might lead to lower risk propensity (risk-aversion) while negative frame might lead to higher risk propensity (risk-seeking). Moreover, there is significant evidence that human framing effects have some consistency in which individuals' show increase in risk-preference level in loss situations and high risk-aversion level in gain situations (Levin et al. 1998). In fact, decision-takers are more sensitive to losses than to gains where humans perceive marginal losses as being worse than marginal gains which in turn affect their risk behaviour.

Also, individuals' tend to concentrate more on negative outcomes rather than positive ones when taking decisions (Hertwig 2004). Additionally, Boussabaine (2014) referred "framing" to the wording and presentation of risk statement. Similarly, Wikipedia (2015) stated "framing" as influencing the individual's perception of meanings to certain risk words and phrases. In line with the above, Boussabaine (2014) mentioned that risk variables and constructs are influence by the wording of risk hypothesis. Also, the "framing" of risk in negative or positive way can have strong impact on risk responses and behaviours (Lloyd's 2010). After all, the results of qualitative and quantitative risk analysis could be understood differently by group members' based on the initial framing of risk (Boussabaine 2014).

2.13.2 Scale

Along with framing risk events as negative or positive, the size of risk associated to particular events can also affect individuals' risk propensity. Moreover, the scale cognitive bias refers to individuals' judgement of risk events size where individuals' perceive large-scale events to have greater risks within them (Boussabaine 2014). Furthermore, the scale cognitive bias can be linked with risk-acceptance attitude where Boussabaine (2014) stated that large-scale events might lead the phenomenon of "fait accompli"; in which individuals' perceive that there is nothing to do to minimize the risk since it is going to happen anyway.

2.13.3 Hindsight

Hindsight is a psychological cognitive bias in which individuals' perceive that they knew the outcome of certain risk decisions before its actual occurrence. According to Psychology (2012), hindsight can be defined as the inclination of humans to claim the knowledge of events outcomes prior to their occurrence. Additionally, Goodwin (2010) referred the causes of hindsight cognitive bias to certainty in predicting the risk events/impacts and to memory distortion. Furthermore, the effect of hindsight bias can lead to higher levels of risk propensity since individuals' will have the perception that they are knowledgeable about risk events and outcomes (Goodwin 2010).

2.13.4 Availability and familiarity

Availability and representativeness are both heuristics that lead to cognitive biases. According to Tversky & Kahneman (1973), "availability" could be defined as assessing the likelihood of an event occurrence based on available examples in mind that can be thought of easily because they are similar to the current event. Additionally, Tversky & Kahneman (1974) listed three human biases related to availability variable: retrievability of instances, effectiveness of search set and imaginability. Also, Boussabaine (2014) referred to availability as forecasting future events based on the individual's personal previous experiences emphasizing that the individual's past experiences influence risk perceptions. Hence, higher levels of availability might result in higher risk propensity due to individuals' basing their risky decisions on available examples in their minds. Also, related to the variable of availability is the concept of familiarity where it could be defined as the closeness of a certain risk event to the individual's past knowledge which in turn impacts their risky decisions and perceptions (Lloyd's 2010). Additionally, Boussabaine (2014) pointed out that as familiarity level of risk situation increases; the bias level will increase due to the ignorance of evolving issues that the individual might be unfamiliar with. Thus, higher levels of familiarity might result in higher levels of risk propensity since individuals' perceive themselves as being familiar with the risky situation.

2.13.5 Representativeness

According to Tversky & Kahneman (1973), representativeness could be defined as the tendency of assessing likelihood of an event occurrence based on comparing it as a representative example to the general population. Moreover, Lloyd's (2010) referred to representativeness as rule of thumb related to the degree of correspondence between a sample and a population. Moreover, representativeness heuristic is claimed to be the source of "gambler's misconception" phenomenon in which a person will perceive that certain probabilistic outcomes are "due" after a series of repeating a certain outcome (Mishra 2014). Also, representativeness heuristic is claimed to be the source of "hot hands" phenomenon where Mishra (2014) defined it as the individual's perception of being successful in certain period of times due to "momentum". Furthermore, representativeness heuristics can be due to insensitivity to sample size and concluding strong implications from insufficient number of past experiences (Boussabaine 2014).

Hence, higher levels of representativeness can result in higher levels of risk propensity where individuals tend to perceive that they can achieved desired outcomes after taking several risky decisions.

2.13.6 Halo Effect

Halo effect is considered as a psychological cognitive bias that can act as a construct for risk propensity. According to Wikipedia (2015), halo effect can be referred to as the transference of an individual's good trait onto other traits. Also, Boussabaine (2014) related halo effect to risk perception by referring it to risk augmentation which could be explained by uncertainty included in decision-making under risk which leads to the amplification of associated risk impacts. It is important to note that halo effect can lead to underestimation or overestimation of risk events and outcomes which in turn can influence individuals risk propensity.

2.13.7 Accountability

According to Lloyd's (2010), the construct of accountability can be used to justify individuals' behaviours and risky decisions. Moreover, individuals' might tend to alter their risk propensity when they know they are accountable of their risky decisions. Furthermore, Lerner & Tiedens (2002) pointed out that the accountability variable acts as social link between the individual and surrounding social systems in regards to decision-taking. Additionally, the accountability construct might result in different negative or positive emotions which would lead to developing certain tendency of taking risky decisions; i.e. risk propensity (Boussabaine 2014).

2.14 Morality and Risk

According to Athanassoulis & Ross (2010), risk-taking is morally problematic due to the fact that individuals' take risky decisions intentionally while they are aware that they are not in control of the consequences of their risky decisions outcomes. Additionally, higher levels of uncertainty that comes with risk can make individuals less responsible when taking risky decisions. Also, it is imperative to distinguish between risk-taking that involves choices and risk-taking that individuals face without having any choices (Rescher 1983). While it is true that the occurrence of certain risks that we face cannot be controlled; there is still a level of control on how these risks can be managed. For example, force majeure risks such as natural disasters are out of the individual's control where their occurrence cannot be controlled; nevertheless, there could be some preparation for such risks when they occur. On the other hand, risk-taking involves a decision from the individual side on whether to be exposed to risk or not. Thus, risks that individuals take -and not only face- comes with more responsibility and morality issues due to the level of control an individual have on how to manage these risks (Rescher 1983). Furthermore, Rescher (1983) emphasized that morality is more important to be considered at the time of taking risky decision rather than when evaluating what was the outcome of a risky decision. To clarify, the moral attention should be on the reasonableness the individual used in taking risky decisions and not the results of risky decisions which might be out of the individual’s control. Additionally, analyzing the reasonableness of taking risky decision will need to consider the individual’s risk propensity as well as the risk context for judging the individual moral character (Rescher 1983). Furthermore, the term “virtue ethics” could be used to describe the role of an individual’s character in moral actions where there is no right or wrong morals opposite of actions that can be judged as right or wrong. Therefore, it would be extremely difficult if not impossible to design a formula for assigning moral responsibility for the results of risk-taking behaviours. However, Rescher (1983) pointed out that risk-taking behaviour can be at best categorized as good or ruthless where good risks are those that represent responsiveness to morally significant characteristics of the context of risk-taking and the practical wisdom used in taking risky decisions. In summary, reasonable risky decisions can be considered as those risky decisions where a virtuous individual will take; and the morality of risk-taking can be determined by referring to what a virtuous individual would have chosen and why in a given situation. Congruently, Athanassoulis & Ross (2010) suggested extending the focus of morality assessment beyond the risk likelihood and impact where they defined risk in two stages. Stage one, is the existence of specific circumstances where individuals consider performing a certain behaviour that they might not be in control of its outcomes; nevertheless, they should be able to estimate probability of the considered behaviour which will have a range of potential outcomes. Stage two, is the actual decision taking by individuals' within the circumstances of risk; which will eventually make one of the outcomes more probable to occur. The issue of morality and taking risky decisions stems out of the fact that any risky decision might involve more than one person. Specifically, there are three roles that should be considered for moral evaluation when taking risky decisions: the risky decision-taker who evaluates the options and make a certain risky decision, the person(s) who might be harmed by the taken risky decision, and the person(s) that might benefit from the taken risky decision (Athanassoulis & Ross 2010). Moreover, these roles might be assumed by the same individual; in which case the issue of morality becomes less challenging since the harm and benefit of taking the risky decision will be limited to the same person who took the risky decision. Also, morality evaluation should focus on the reasonableness of the individual's risky decision rather than on the risky decision consequences. According to Athanassoulis & Ross (2010), virtue theory emphasizes the importance of considering the reasonableness of the individuals' risky when doing moral assessments of risk-taking. Additionally, they pointed out three factors of moral responsibility: level of other's being aware that they might be impacted by someone else's risky decisions, extent of taking risky decisions for the good reasons, the equal distribution of risk harm and benefit between the risky decision-taker and others who are exposed by the risky decision outcomes. Furthermore, Brinkmann (2013) pointed out that responsibility awareness comes with risk awareness where risk and responsibility are interdependent and risk-taking triggers morality and responsibility issues. Additionally, many researchers analyzed risk from different perspectives other than the probability and impact dimensions; such as: measurability of risk (Knight 1921), manageability of risk (Evers & Nowotny 1987), insurability of risk (Beck 1993), attributability of risk (Luhmann 1993), voluntariness of risk, and moral responsibility of risk. Furthermore, moral responsibility related to risk refers to the justification of risk taking by involving all exposed stakeholders in the risky decision and having a consensual agreement on the required risky decision (Brinkmann 2013). Figure 2.7 summarizes the ethical and moral perspectives in different risk management stages where "moral intensity" that is mentioned during the risk definition stage refers to the facet of defining risk as a possible moral issue (Jones 1991).

Exhibit #1 Risk management as management of risk-related tasks

Risk-related task[a]	Task description	Increasing an awareness of ethical responsibility (and inviting people to take it)[b]
Risk definition	Identification of risk sources, threats, possible events	*Moral intensity of risk definitions*, i.e. sources, threats, events; moral and reputational vulnerability; specific stakeholders as source of potential moral criticism.
Risk evaluation	Evaluating risk as severity of loss times likelihood of occurrence, for proper prioritising	Make sure to include ethical acceptability as an evaluation criterion, as well as specific *moral and reputational risks* by likelihood and seriousness, both as interesting in themselves and as a reflex of other risks
Risk control and financing	Select and perhaps mix alternatives such as tolerate-treat-terminate-transfer (or accept-control-avoid-transfer; or avoidance-reduction-retention-transfer)	Moral and reputational risk control as an end in itself and as insurance for other kinds of crises. Prevention of and preparation for routine and for worst case scenarios by *ethical climate development*, ethical codes, training and other tools.
Risk- related decision-making	Formulation, implementation and evaluation of a risk management plan, decision monitoring and control	*Explicit inclusion* of moral risk aspects, moral and reputational risk, both as a primary and as a secondary risk. Consider developing relevant tools.

Figure 2.7: Combining risk and responsibility perspectives (Brinkmann 2013, p.571).

2.15 Summary

There were many findings in this chapter. First, using extensive literature review to define project risk and risk propensity and relating them through the influence of risk propensity on project success criteria domains. Second, comparison of different theories on risk propensity and whether it is based on innate characteristics that might be stable in all situations - dispositional theory (Zukerman et al. 1964; Taylor & Dunnette 1974; Weber & Milliman 1997; Brockhaus 1980; DeVinne 1985; Wolman 1989) or determined by the situation – prospect theory (Kogan & Wallach 1964; Slovic 1972; Kanhneman & Tversky 1979). Hence, research conceptual and theoretical frameworks were designed based on the two above mentioned theories. Third, extracting the cognitive biases that can be used as risk propensity constructs.

3 Chapter Three: Influence of risk propensity on project success criteria

3.1 Introduction

This chapter discusses the relationship between project managers' tendency to take risky decisions (risk propensity) and project success criteria domains that can be influenced by their risky decisions. Furthermore, the chapter provides comparison between project success factors and criteria and the difference project management success and project success. Also, the chapter elaborates on the multi dimensionality of project success and its inter-relating factors. Finally, the chapter concludes by selecting the most important project success domains that can be influenced by project managers' risky decisions; i.e. by their risk propensity level.

3.2 Project success factors and criteria

Project stakeholders have different expectations from a project; and consequently project success criteria may differ according to these expectations. Additionally, these differences of project stakeholders' expectations explain why the same project could be considered as successful by one stakeholder and failure by another stakeholder. Furthermore, the challenge that project managers' face continuously; is in finding the ways to accommodate all project stakeholders' expectations where conflicting stakeholders' expectations about project success complicate decision-taking process (Hussain & Klakegg 2014). Furthermore, success criteria differs from one project to another because of the difference in project stakeholders expectations (Paarfitt & Sanvido 1993). Consequently, the way project success is defined and the parties involved in evaluating project success will impact the final decision of whether to consider the project a success or a failure one (Smithson & Hirschheim 1998). Also, project success is dependent on the stakeholders' perspective and perception (Pinto & Slevin 1988). As such, there is no "absolute" project success but only what stakeholders perceive as project success. Furthermore, Lim & Mohamed (1999) stated that stakeholders' expectations and perceptions change over time which might continuously affect project success criteria. Furthermore, Fincham (2002) pointed out that project success and failure do not oppose each other where they are not an issue of "black and white". Moreover, project success cannot be measured as a unidimensional variable but rather as a multidimensional variable whose definition is limited to a specific environment (Lavagon 2009).

Consequently, in order to examine how project managers' risk propensity influence their risky decisions related to project success; there is a need to examine the project success areas or domains that are impacted mostly by project managers' tendency to take risky decisions; i.e. their risk propensity. Moreover, Young (2006) pointed out that there is a risk factor when considering all project success criteria to be of equal importance where stakeholders' do not have the same interest level to criteria elements. Additionally, Lim & Mohamed (1999) distinguished between project success criteria and project success factors. Furthermore, project success criteria can be summarized as the standards used in judging project success, whereas project success factors underpin project success criteria and are related to the situation and facts that impact the project end result. Moreover, Hayword & Sparkes (1990) in their Concise English Dictionary defined criterion as: "a principle or standard by which anything is or can be judged"; whereas they defined factor as: "any circumstance, fact, or influence which contribute to a result". Also, the Canadian Oxford Dictionary (1998) defined success as: "the accomplishment of an aim, favorable outcome”. Figure 3.1 shows a graphical display of success criteria and factors as related to project success.

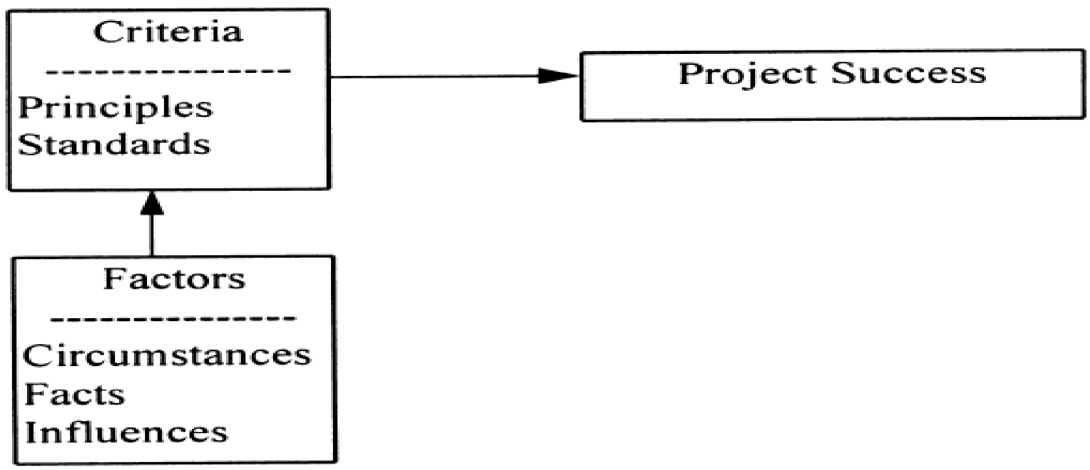


Figure 3.1: Criteria and factors as applied to project success (Lim & Mohamed 1999, p.244).

According to Lim & Mohamed (1999), project success criteria and project success factors can influence project success at the macro and micro levels. Hence, project success can be defined at both the macro and micro levels. Furthermore, stakeholders such as project sponsors and owners are more interested at achieving project success at the macro level which basically relates to the benefits realization and achieving the project concept or idea. On the other hand, project stakeholders such as users, project team members and project manager might be more interested at achieving project success at the micro level which focuses at smaller project achievements related to predetermined project objectives that usually include scope, time and cost. In line with the above, many researchers emphasized the importance of distinguishing between project management success and project success such as: Hussain & Klakegg (2014) and Barccarini (1999). Additionally, project success can be viewed at the macro level where stakeholders are more interested in the value and benefit of the project. Whilst, project management success can be viewed at the micro level where stakeholders are more interested in meeting scope, time and cost targets (Atkinson 1999). Furthermore, Hussain & Klakegg (2014) emphasized the need to consider both macro and micro levels when planning for project success criteria. It is imperative to understand the relationship between project success criteria and tendency to take risky decisions where project success at the macro level can be influenced by project sponsors and owners risk propensity; whilst project success at the micro level can be influenced by project manager and project team risk propensities levels. To clarify, Lim & Mohamed (1999) stated that completion and satisfaction criterions are used by project owners and users to judge the project success at macro level. Moreover, the project owners risk propensity can influence many factors that underpin the completion and satisfaction criteria. Figure 3.2 displays the criteria and factors related to project success at the macro level.

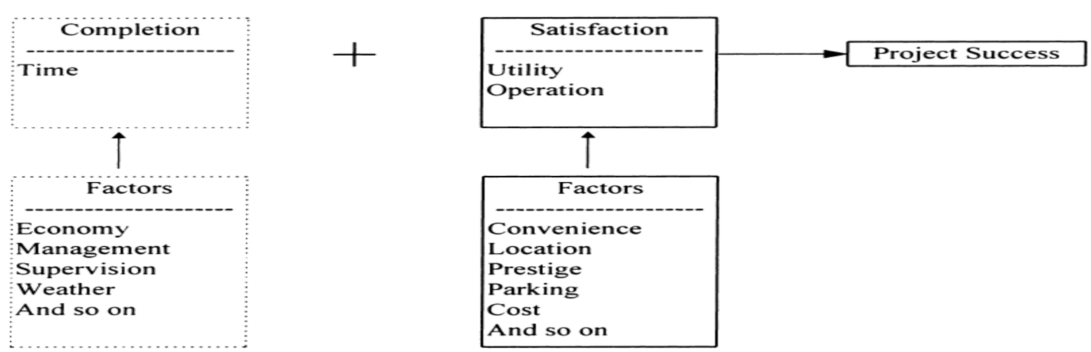


Figure 3.2: Macro viewpoint of success related to projects (Lim & Mohamed 1999, p.246).

On the other hand, the success of project at the micro level is primarily influenced by completion criteria where project manager and project team members are more concerned with achieving the project performance goals in related to scope, time and cost. Additionally, Lim & Mohamed (1999) stated the following factors that influence completion criteria: technical, human, risk and environmental. Therefore, project managers' risk propensity can be considered a major factor affecting their risky decisions related to project success criteria where their risk propensity could be part of human factors as well as environmental factors. Figure 3.3 displays a micro viewpoint of project success (Lim & Mohamed 1999).

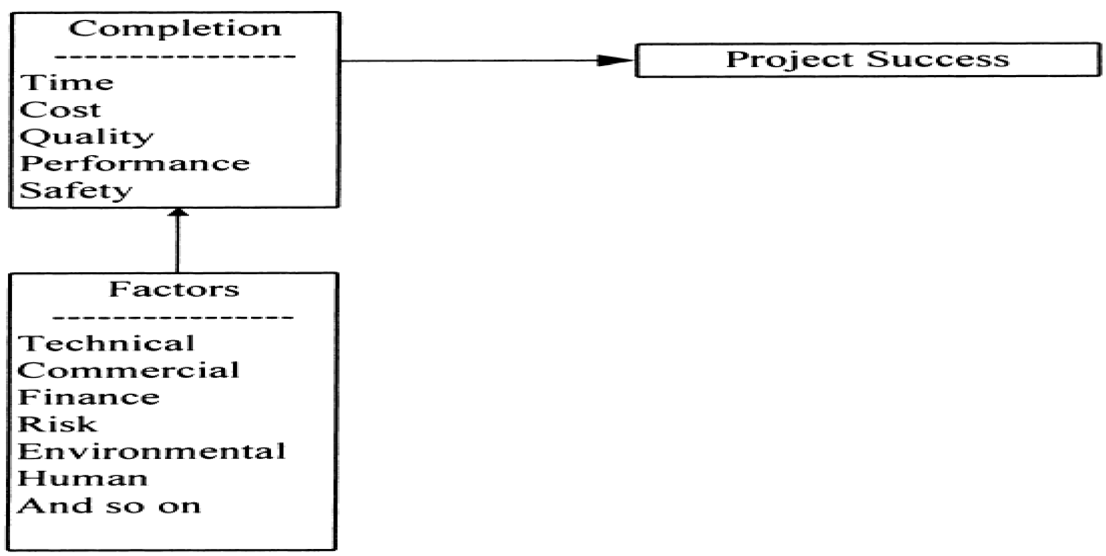


Figure 3.3: Micro viewpoint of success related to projects (Lim & Mohamed 1999, p.246).

3.3 Project success criteria and triple constraints

A plethora of researchers emphasized the importance of "triple constraints" criteria when considering project success at the macro level. For example, Rosenau (1984) pointed out that spirit of project success lays within achieving the goals related to triple constraints of scope, time and cost. Similarly, Pinto & Slevin (1987) introduced ten project success factors that included scope, time and cost. Also, Atkinson (1999) pointed out the “scope/time/cost” triangle can be sufficient to define project success and referred to it as the “iron triangle” and “golden triangle”. However, other researchers stated that project success or failure in not necessarily related to the achieving success within the project triple constraints (Baker et al. 1983). Similarly, De Wit (1988) distinguished between project success and project management success which relates to success in meeting requirements of project triple constraints. In line with the above, Munns & Bjermi (1996) stated that project objectives are not same as project management objectives and that project success should not be limited to adherence to the triple constraints objectives. As a matter of fact, many projects that met the triple constraints requirements were considered failures in the long term; and many projects that exceeded time and cost tolerances were considered as successful projects in the long-term (Lavagon 2009). Additionally, Kerzner (1987) suggested six project success factors in which two of them relates to the project managers’ traits and personal characteristics; which in turn might influence their risky decisions related to project success criteria. Additionally, Hussain & Klakegg (2014) concluded six risk factors in initiation project phase that might materialize in executing phase. Figure 3.4 summarizes these risk factors.

Risk factor	Meaning
Unrealistic	Use of optimistic or pessimistic targets in the formulation of success criteria.
Ambiguous	Use of ambiguous/soft criteria that might be interpreted differently
Narrow	Success criteria contain a limited set of criteria that focuses only on project management effort.
Diverse	Having conflicting or competing criteria in order to accommodate the multiplicity and diversity of stakeholders.
Alike	Lack of order or rating of each success criteria. That is all criteria are considered equally important
Incomplete	Failing to identify all success criteria due to lack of knowledge about stakeholders

Figure 3.4: Summary of risk factors in projects phases (Hussain & Klakegg 2014, p. 713).

Moreover, the first factor in the above figure which is “unrealistic” factor; refers to being pessimistic or optimistic when preparing targets of project success criteria. Furthermore, there is a direct link between project managers’ risk propensity level and the optimism or pessimism in estimating targets related to scope, time and cost (Champan et al. 2006). Additionally, project managers’ with low risk propensity tend to be more pessimistic in in their estimation of targets while project managers’ with high risk propensity tend to be more optimistic in their target estimations. According to Dvir et al. (2003), the adoption of “triple constraint” as criteria for measuring project success is due to its simplicity, clarity and ease of use by project managers’. Moreover, Baker et. al. (1974) expanded “triple constraint” formula by adding stakeholder satisfaction to scope, time and cost. Later, Baccarini (1999) suggested adding more criteria to “triple constraints” making it more of a hexagonal formula that includes: time, cost, quality, stakeholder satisfaction, benefits realization, and end users satisfaction. Additionally, Selvin & Pinto (1986) introduced ten success factors for project success that includes: project objective, senior executive support, schedules, stakeholder consultation, project team, technical activities, stakeholder acceptance, monitoring and controlling, communication and identifying and eliminating problems. Furthermore, the former ten success factors are controllable by the project team and can be managed to ensure project success. Also, Pinto & Slevin (1988b) added more factors that relates to external project environment and difficult to be managed by project team. Specifically, they added: project manager traits and characteristics, influence and power, situational events and urgency. Moreover, many researchers examined the relationship between specific factors and project success; such as Henderson (2004) who analyzed the link between project managers’ communication skills and project success. Thus, the researcher of this study is extending this area of research by investigating the relationship between a specific factor related to project managers' traits; i.e.: tendency to take risky decisions (risk propensity) and its influence on project success. It might be extremely difficult to create a comprehensive list that includes all project success criteria since these success criterions differ between projects due to factors such as: project complexity, scope, stakeholders' interests and technology (Wateridge 1998). Nevertheless, many scholars made efforts to develop a universal project success criteria and factors that can be applicable to all types of projects (Lim & Mohameed 1999; Westerveld 2003). Figure 3.5 displays attempts in measuring project success over the years from 1960s until the 21st century.

Research Focus	Period 1 1960s–1980s	Period 2 1980s–2000s	Period 3 21st Century
Success criteria	"Iron triangle" (time, cost, quality)	Iron triangle Client satisfaction Benefits to organization (org) End-user's satisfaction Benefits to stakeholders Benefits to project personnel	Iron triangle Strategic objective of client organizations and business success End-user's satisfaction Benefits to stakeholders Benefits to project personnel and symbolic and rhetoric evaluations of success and failure
Success factors	Anecdotic lists	CSF lists and frameworks	More inclusive CSF frameworks and symbolic and rhetoric success factors
Emphasis	Project management success	Project/product success	Project/product, portfolio, and program success and narratives of success and failure

Table 2: Measuring success across time.

Figure 3.5: Attempts in measuring project success criteria and factors (Lavagon 2009, p. 11).

It can be clearly seen from the above figure that project success criteria over the years from 1960s until the 21st century were focused on "triple constraint" or iron triangle (time, cost and quality). Additionally, over years the focus on project success moved from micro level of project management success to macro level of project/product success by concentrating more on benefits realization and stakeholder satisfaction. Moreover, Lavagon (2009) suggested that the trend in 21st century will continue to focus on project/product success in respective to project program and project portfolio success. Furthermore, most research done on project success was quantitative in nature due to ease of quantifying time and cost and analyzing the results using statistical software. According to Baccarini (1999), time and cost are considered as hard and tangible dimensions of the project that are easy to measure. On the other hand, other project success criteria; such as stakeholders' satisfaction; are more soft and intangible dimensions that are more difficult to measure than time and cost. As a conclusion, project management success is not the same as project success. Furthermore, project management success relates to project success at the micro level in terms of achieving the project success criteria in meeting the "triple constraint" requirements. However, project success relates to macro level of realizing the project benefits and satisfying the project stakeholder. Additionally, project managers' risk propensity might influence project management success where project managers' are usually in control of project "triple constraint" criteria and can influence project management success through their taken risky decisions. Also satisfying project stakeholders' needs can also include meeting their expectations related to scope, time and cost. There are many human factors that relate to project managers' which could influence their risky decisions related to "triple constraint" criteria. For example, if the project manager has low risk propensity level; then he/she might take decision to adopt innovative ideas at a later stage of the project which might affect project scope, time and cost. Nevertheless, project managers' control over the project success at the macro level is almost minimal since their main interest is in meeting project objectives and not ensuring benefits realization. Additionally, from the project managers' perspective; there is no need to consider the downstream impact of the project since their role ends with delivering the project product at the end of the project (Wateridge 1998). Moreover, Mcleod et al. (2012) suggested more elements that relate to project success; such as: multidimensionality, scope, project temporality, perspective and context. However, the benefits of adopting the triple constraints as measurement criteria for project success can be summarized as follows: its popularity in different project fields (such as: engineering, IT and construction), its short-tern mature where they end with project and product delivery, and their use in assessing the project managers' performance (Ika 2009). However, the triple constraints have been criticized for its narrow focus on project management processes and not including other stakeholders' perspectives (Bannerman 2008). Also, some researchers suggested project management efficiency and effectiveness as two dimensions that need to be added to the triple constraints dimensions (Toor & Ogunlana 2010). Furthermore, Bannerman (2008) suggested considering domain-specific processes within a project; where these processes might affect project management success; such as: risk management, scope management and change management. Nevertheless, using project success criteria that focus beyond the micro level will include behavioural and strategic dimensions that are intangible, subjective and difficult to measure (Ika 2009). Figure 3.6 summarizes project success criteria from process, product and organizational perspectives.

Expanding dimensions →

Process Success	Product Success	Organizational Success
Focus on project management	*Focus on project objectives*	*Focus on organizational objectives*
• On time	• Product use	• Business benefits
• Within budget	• Client satisfaction	• Strategic benefits
• To scope/specifications	• Client benefits	

Table 1: Project success criteria.

Figure 3.6: Expanded dimensions of project success criteria (Mcleod et al. 2012, p.70).

Although project success is considered as a multidimensional variable; not all criteria mentioned in the figure above will be relevant for all projects. According to Bannerman (2008), different project success criteria may apply on different types of projects. Additionally, Mcleod et al. (2012) emphasized the issue of temporality and its effect on the selection of project success criteria. Furthermore, temporality can affect project success in two ways. First, different project success criteria can be applied in different times. For example, project management success criteria (such as: adherence to triple constraints requirements) are more important during project execution while project success (such as: benefit realization and user satisfaction) are considered to be more important towards end of the project (Mcleod et al. 2012). Second, project managers' assessments of a project are dynamic and not static; i.e. project managers' assessment and perceptions keep changing over project duration and due to situational changes (Lanzara 1999). This is a very important aspect related to this study; where project managers' risk propensity level at the time of project evaluation and assessment can influence their risky decisions related to project success criteria. Moreover, it is recommended that multiple project assessments should be undertaken at different project times and for different purposes (Karlsen et al. 2005). As a conclusion, project success includes more than one aspect such as process success, project management success, product success and organizational success. Although project managers' risky decisions might primarily influence the process and project management success which relates to triple constraints criteria; eventually their risky decisions might also influence all other areas and project success as a whole. Hence, triple constraints is an important element of project success criteria that might be influenced with project managers' tendency to take risky decisions; i.e. their risk propensity.

3.4 The multidimensionality of project success

A plethora of researchers considered project success as a multidimensional construct that interrelate with many factors; such as: behavioural, technical and situational (Thomas & Fernandez 2008; Bannerman 2008; Ika 2009; Cao & Hoffman 2011). However, Mcleod et al. (2012) argued that the multidimensionality of project success is not consistently apparent in all projects. Furthermore, Ika (2009) pointed out that most project success studies were empirical and adopted quantitative approach that includes questionnaires in which project success is measured using simple equation that is clear and easy to apply. Moreover, these studies were based on a very objective manner that assumes the existence of objective project success criteria that can be measured using quantitative methods (Ika 2009). Nevertheless, Alderman & Ivory (2011) introduced a subjective approach in measuring project success criteria considering it as a social construct depending on individuals and project groups. Similarly, Mcleod et al. (2012) introduced subjective criteria in measuring project success that allow for multiple project assessments over project duration. Figure 3.7 displays a framework for subjective project success criteria (Mcleod et al. 2012).

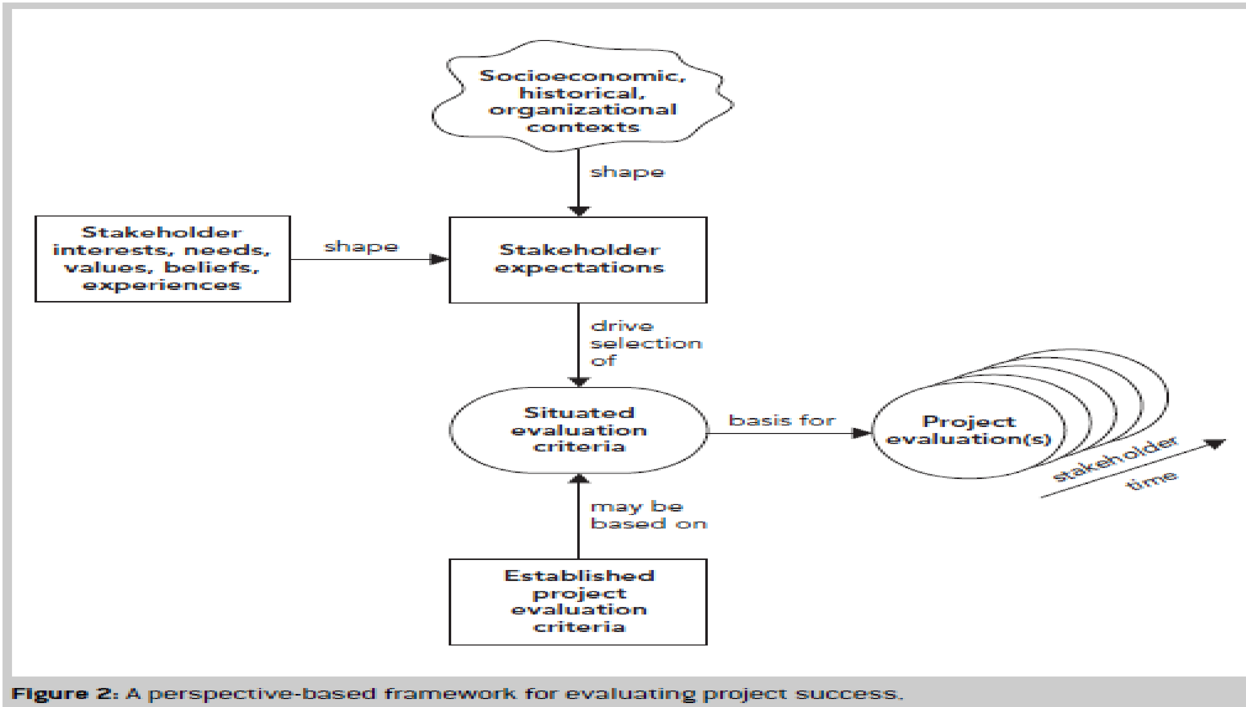


Figure 3.7: A framework for subjective project t success criteria (Mcleod et al. 2012, p.82).

Furthermore, Westhuizen & Fitzgerald (2005) referred to project success as a formula of two components where:

Project success (PS) = project management success (PMS) + project's product success (PPS).

It is clear that project management success refers to micro-level of success while project product success refers to macro level of success. Additionally, Westhuizen & Fitzgerald (2005) added two more criteria to "triple constraint" criteria; that are: project management process quality and stakeholders' satisfaction. To elaborate, "project management process quality" element refers to general project quality related to processes and not product. While "stakeholders' satisfaction" refers to satisfying stakeholders' needs and requirements. Figure 3.8 displays a suggested project success criteria by Westhuizen & Fitzgerald (2005).

Figure 3.8: A framework for project t success criteria (Westhuizen & Fitzgerald 2005, p.831).

The benefit of the above model suggested by Westhuizen & Fitzgerald (2005) is that it addresses both project management success and project product by distinguishing between them clearly and linking them to overall project success. Moreover, the “triple constraint” (time, cost and quality) can be used to measure project management success (PMS) while the quality of project management and satisfaction of stakeholders needs can be used to measure project product success (PPS). Notably, both project success criteria mentioned above can be affected by project managers’ risky decisions where project managers’ risk propensity could directly influence the decisions related to the “triple constraint” and decisions related to “quality of project management processes” which might impact the last element in the above model; “satisfaction of stakeholders’ needs”. Additionally, Mishra et al. (2011) stated that project success criteria can be based on factors related to the organization, situation, project team and the project manager. Again, one of the factors that can be related to the project manager is his/her risk propensity towards the project which affects their risk responses and risky decisions and eventually affects stakeholders’ satisfaction. Also, Neverauskas et al. (2013) introduced project success factors and criteria grouping them under the project life-cycle process groups of initiation, planning, implementation and closing. Figure 3.9 displays project success factors and criteria based on project life-cycle domains.

	Project life cycle stages			
	Initiation	**Planning**	**Implementation**	**Closing**
Project success factors and criteria	• Plain describes goals and tasks; • Project manager should be responsible, able to manage according to circumstances; • Project team should not afraid to be responsible; • Attention should be focused on clients' knowledge, experience, size/ type and legal environment; • Project should be formed to take an opportunity; • Feasibility study should be done by external organization; • Strategic decisions should be used; • Tools and techniques: • Analogues estimate, • Checklist, • Communication plan.	• Clearly defined scope; • Reality reflected schedule; Definition of tasks; Development of schedule; Organizational planning; Recruitment; • Communication plan; • Strategic decisions should be used; • Project plan development. • Tools and techniques: Analogues estimate, Contingency plan, • Cost baseline, • Critical path method, Hierarchical schedule.	• Project manager should effectively manage resources; • Team members should cooperate with each other; Tactic decisions should be used. • Tools and techniques: Checklist, • Communication plan, Contingency plan, • Cost baseline, • Hierarchical schedule, Milestone analysis.	• Project finished in time; • Project does not exceed budget; • Project meets all quality requirements; Stakeholders' needs were satisfied. • Tools and techniques: Cost baseline, • Lessons learned, • Work breakdown structure.

Figure 3.9: Suggested project success factors and criteria (Neverauskas et al. 2013, p.834).

Furthermore, Turner & Zolin (2012) emphasized that any project success criteria should consider business objectives achievement along with achieving "triple constraint" requirements. Additionally, Turner (2009) listed nine measures for project success based on different stakeholders' perceptions and different project time frames. Figure 3.10 displays suggested measures of project success based on different stakeholders' perceptions.

Measure of Success	Stakeholder	Timescale
The project increases the shareholder value of the parent organization	Shareholders	End plus years
The project generates a profit	Board	End plus years
The project provides the desired performance improvement	Sponsor	End plus years
The new asset produced by the project works as expected	Owner	End plus months
The new asset produces a product or provides a service that consumers want to buy	Consumers	End plus months
The new asset is easy to operate	Operators	End plus months
The project is finished on time, to budget, and with the desired quality	All	End
The project team had a satisfactory experience working on the project and it met their needs	Project team	End
The contractors made a profit	Contractors	End

Table 1: Different perceptions of success by different stakeholders over different timescales, after Turner (2009).

Figure 3.10: Measure of project success (Turner 2009 in Turner & Zolin 2012, p.88).

It is interesting that out of the nine listed project success measures listed in figure 3.10, only one measure was perceived important by all project stakeholders; that is the measure related to finishing the project on time, on budget, and within the desired quality. Equally, all other stated measures are more or less related to the successful achievement of “triple constraints” requirements. Furthermore, Shenhar & Dvir (2007) identified five categories for project success: efficiency, impact on project team, impact on customer, business success and future preparation. Also, they suggested that efficiency and impact on project team can be evaluated at end of the project, impact on customer and business case can be assessed during the months following end of project, and the future preparation success can be measured years after project completion. Figure 3.11 displays five categories of project success measures.

Efficiency	Impact on Team	Impact on Customer	Business Success	Preparation for the Future
Meeting schedule	Team satisfaction	Meeting requirements	Sales	New technology
Meeting cost	Team morale	Meeting specification	Profits	New market
Yield, performance, functionality	Skill	Benefit to the customer	Market share	New product line
	Team member growth	Extent of use	ROI, ROE	New core competency
Other defined efficiencies	Team member retention	Customer satisfaction	Cash flow	New organizational capability
	No burnout	Customer loyalty	Service quality	
		Brand name recognition	Cycle time	
			Organizational measures	
			Regulatory approval	

Table 2: Model of project success, after Shenhar and Dvir (2007).

Figure 3.11: Project success measures (Shenhar & Davis 2007 in Turner & Zolin 2012, p.88).

Additionally, Turner & Zolin (2012) extended Shenhar & Dvir (2007) work by defining different stakeholders' types and relating these types to project success measure at different time scales. Moreover, two of the listed stakeholders' types were the project manager and project team in which both are much interested in achieving the triple constraint. Therefore, stakeholder satisfaction that was introduced in Westhuizen & Fitzgerald (2005) can be understood as satisfaction of project manager and project team needs. Thus, project managers' risk propensity could influence their risky decisions related to project success criteria; and these decisions in turn could impact project managers' needs satisfaction where they will be concerned with their: future career path, personal well-being, work reputation, future projects and competency development (Reid 2007; Khang & Moe 2008; Turner et al. 2008). Figure 3.12 displays the influence of project managers' risk propensity on their needs satisfaction.

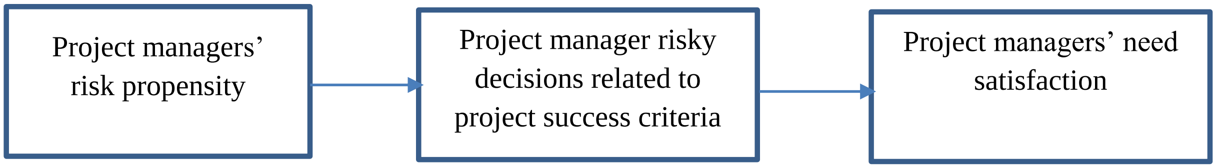


Figure 3.12: Project managers' risk propensity influence on their needs satisfaction.

Furthermore, project managers' are required to take actions to address the project immediate goals related to "triple constraint" and definitely these actions might be influenced by their risk propensity at the time of decision-taking. Figure 3.13 displays project success criteria based on different stakeholders' types.

Results Timescale	Project Output End of Project	Project Outcome Plus Months	Impact Plus Years
Investor or owner	Time Cost Features Performance	Performance Profit Reputation Consumer loyalty	Whole life value New technology New capability New competence New class
Project executive or project sponsor	Features Performance Time and cost	Performance Benefits Reputation Relationships Investor loyalty	Future projects New technology New capability New class
Consumers	Time Price of benefit Features	Benefit Price of product Features Developments	Competitive advantage Price of product Features Developments
Operators/users	Features Performance Documentation Training	Usability Convenience Availability Reliability Maintainability	New technology New capability New competence New class
Project manager and project team	Time Cost Performance Learning Camaraderie Retention Well-being	Reputation Relationships Repeat business	Job security Future projects New technology New competence
Senior supplier (design and/or management)	Completed work Time and cost Performance Profit from work Safety record Risk record Client appreciation	Performance Reputation Relationships Repeat business	Future business New technology New competence
Other suppliers (goods, materials, works, or services)	Time Profit Client appreciation	Reputation Relationships Repeat business	Future business New technology New competence
Public	Environmental impact	Environmental impact Social costs Social benefits	Whole life social cost-benefit ratio

Table 3: The new model of project success.

Figure 3.13: Project success criteria based on stakeholders' types (Turner & Zolin 2012, p.91).

Although, Chan et al. (2002) emphasized the need for comprehensive project success criteria; they also pointed out that the project could be considered successful when meeting its "triple constraint" requirements and achieving client satisfaction. Moreover, they stated that since the goal of all projects is achieving project success; then meeting "triple constraint" objectives can be considered as generally accepted criteria to project goal achievement. According to Chan et al. (2002), project success can be measured at three levels: meeting project objectives level, global approach level and beyond the project level. In line with the above, the first level is all about the macro level that relates project success to project management success in meeting the triple constraints criteria (Maloney 1990). As for the second level, it relates project success to both subjective and objective views which is consistent with the approach of categorizing project success criteria into soft and hard areas. Furthermore, Stevens (1996) referred to time and cost as hard measures while quality and satisfaction as soft measures of project success. Last, the third level relates to project product success and realizing the project benefits (Chan et al. 2002). Figure 3.14 displays the three levels of project success as suggested by Chan et al. 2002.

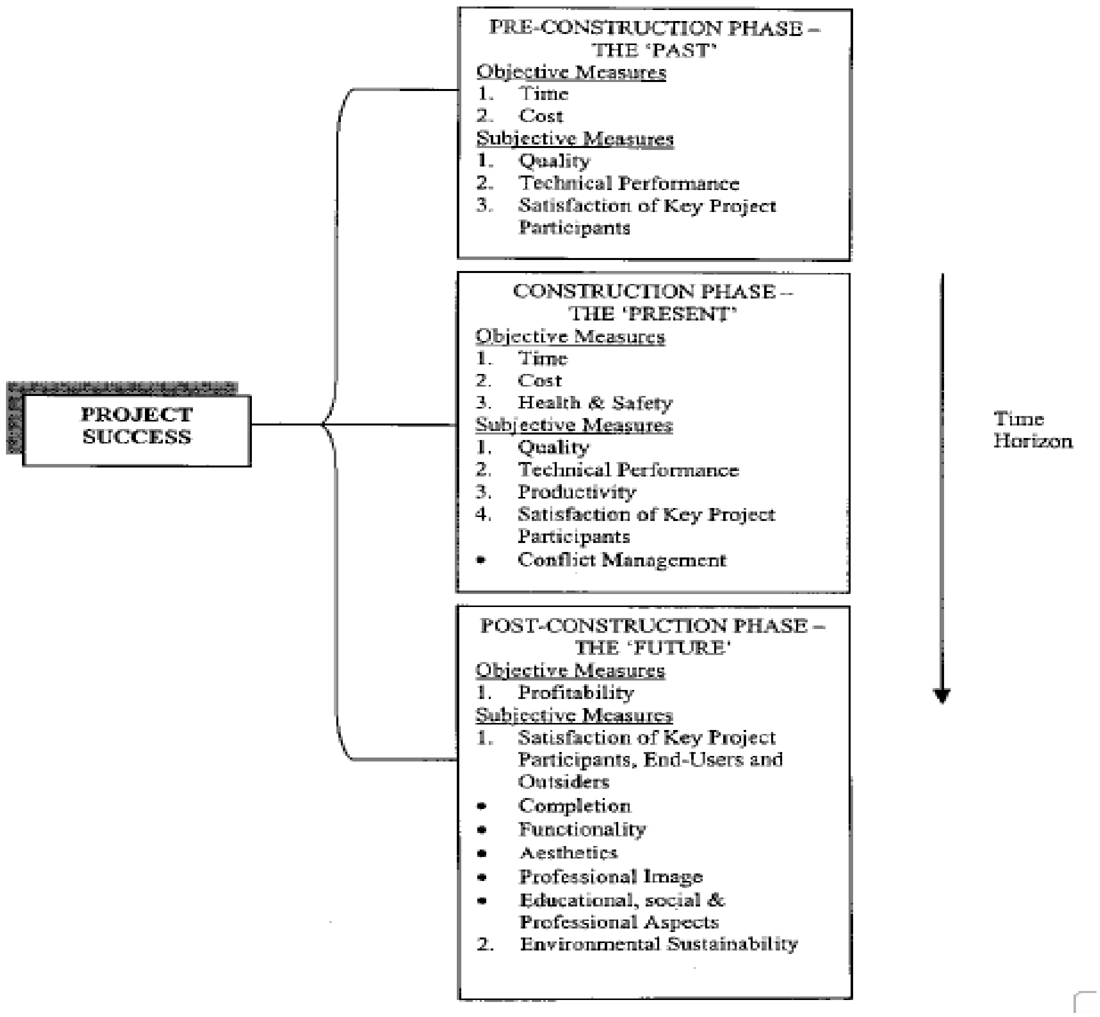


Figure 3.14: Assessment for project success of design projects (Chan et al. 2002, p.124).

Additionally, Chan et al. (2002) framework assumes that project success criteria related to whole project is dynamic and changes over time where they introduced three phases for project success analysis: pre-construction phase, construction phase and post-construction phase. Also, Chan et al. (2002) summarized the project success criteria literature over the last decade covering 1990-2000. Figure 3.15 displays the summary of trends in project success criteria.

Table 1. Summary of Project Success Criteria over Last Decade (1990–2000)

	Objective measures			Subjective measures													
Previous studies	Time and cost	Budget/ financial performance/ profitability	Health and safety	Quality	Meeting technical performance specifications	Project objectives/ goal attainment (technical)	Completion	Functionality	Productivity/ efficiency	Satisfaction of client/ customer, contractor, project manager/ team satisfaction	Expectation/ aspiration of client, contractor, project manager/ team satisfaction	Dispute resolution satisfaction/ conflict management	Absence of conflicts/ legal claims	Professional image	Aesthetics	Educational, social, and professional aspects	Environ-mental sustain-ability
Maloney (1990)	√			√					√								
Norris (1990)		√															
Freeman and Beale (1992)	√	√		√	√				√	√							
Riggs et al. (1992)	√			√	√												
Taylor (1992)	√	√	√	√					√								
Parfitt and Sanvido (1993)	√	√	√	√	√			√		√	√		√	√		√	
Albanese (1994)							√										
Bubshait and Almohawis (1994)	√		√	√													
Naoum (1994)	√			√						√							
Kumaraswamy and Thorpe (1995)	√		√	√						√					√		√
Larson (1995)										√			√				
Chan (1996)	√			√				√		√							
Shenhar et al. (1997)	√	√		√													
Liu and Walker (1998)			√			√					√						√
Al-Meshekeh and Langford (1999)						√						√					
Chua et al. (1999)	√			√													
Atkinson (1999)	√			√													
Lim and Mohamed (1999)	√		√	√			√			√							
Brown and Adams (2000)	√			√													
Cheung et al. (2000)	√			√								√					

Figure 3.15: Project success criteria over the last decade 1990 -2000 (Chan et al. 2002, p.122).

One of the risk propensity constructs that was explained earlier in chapter two was risk tolerance; which can also affect project success. Additionally, Kwak & LaPlace (2005) emphasized the dynamicity of risk tolerance and misunderstanding of many project managers' of project risk tolerance. Moreover, project risk tolerance can be perceived at three levels: organization, stakeholder and project manager. Furthermore, these risk tolerances levels are influenced by different factors (Kwak & LaPlace 2005). First, organization risk tolerance is influenced by organization financial stability and diversity of managed projects. Second, stakeholder risk tolerance is influenced by project goals. Third, project manager risk tolerance is influenced by the organizational culture and job security. Also, project managers' risk propensity can influence their perception of risk tolerance related to the "triple constraint" requirements; i.e. scope, time, and cost. Additionally, each component of "triple constraint" will have a certain agreed risk tolerance between the project manager and the stakeholders. However, a project manager with high risk propensity might be tempted to take risky decisions that make him exceed or breach the risk tolerance for expected benefits; while the a project manager with low risk propensity might be inclined to avoid certain risky decisions and thus miss opportunities that might have been embedded within these risky decisions (Kwak & LaPlace 2005). Moreover, March & Shapira (1987) pointed out that risk can be defined from a decision theory perspective as the distribution of possible impact and their probability in relation to scope, time and cost. Furthermore, the previously mentioned three levels of project risk tolerance can seldom be aligned where organization, stakeholders and project managers' have different perceptions of the impact and probability of project risks (Kwak & LaPlace 2005).Thus, the reference points that project managers' and stakeholders use to assess project risks can affect their risk propensity levels and consequently risk-taking behaviours (Tversky & Kahnemen 1992). Thus, risk tolerance is viewed as a subjective concept specifically in the lack of proper risk analysis and communication. Furthermore, Ross (1984) emphasized continuity of risk tolerance concept due to its human dynamics pointing out that individual decision-takers usually possess low risk propensity levels. Also, Kwak & LaPlace (2005) emphasized the complexity of risk tolerance and its role in shaping individuals' risk propensity. According to Wilemon & Cicero (1970), there are two types of risk that can concern project managers: project management risk and professional risk. Moreover, project management risk relates to uncertainties that hinder project managers' from accomplishing project goals in terms of scope, time and cost. On the other hand, professional risk relates to project managers' concerns about uncertainties that might affect their career path and advancement (Kwak & LaPlace 2005). Additionally, professional risk type could influence project managers' risky decisions related to project triple constraints leading to misalignments with the agreed and defined project risk tolerances; i.e. project managers' might be biased towards having higher risk propensity to take risky decisions that is in favor of their professional growth. Thus, project managers' risk propensity could influence risky decisions related to project management risk and professional risk. Therefore, risk tolerance can be used to measure risk propensity where many tools were designed to relate risk tolerance and propensity to risk probability and impact such as the one developed by the Office of Government Commerce (OGC 2001). Figure 3.16 displays probability and impact matrix in relation to risk tolerance and risk profiles.

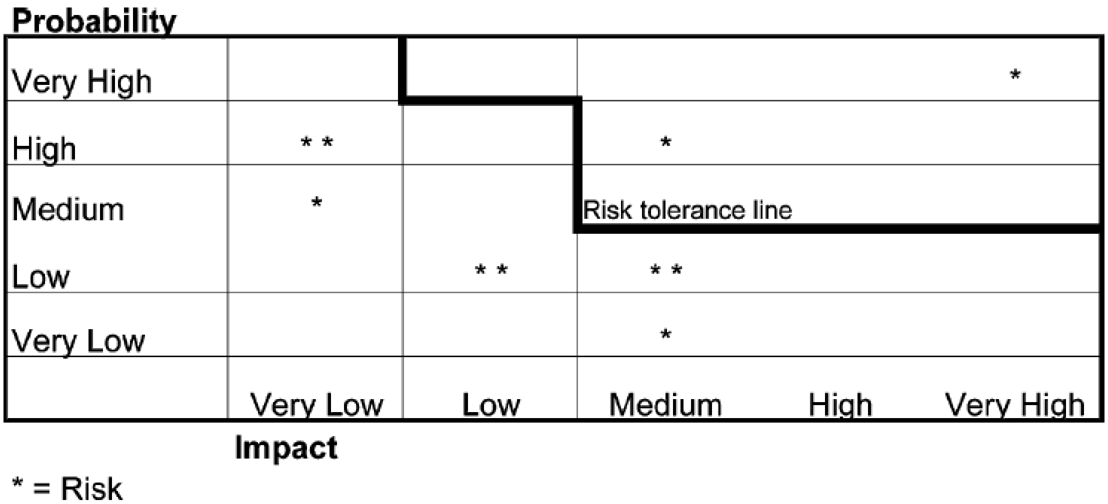


Figure 3.16: Risk profiles and tolerances (Kwak & LaPlace 2005, p.692).

Additionally, the Office of Government Office (OGC) developed a risk profile tool on its website (OGC 2016) that can generate risk profile based on risk tolerances through using information on the project risk register. Again, even with the use of tools such as the risk profile tool; project managers' risk propensity could still influence their risky decisions in different project domains. To elaborate, the risk profile tool will need an input on how much the organization is willing to accept negative risk based on perceived probabilities; and this input might be influenced by the project manager risk propensity. Another way to look at risk tolerance and risk propensity influence on project success domains; is through utility curves (Kwak & LaPlace 2005). Additionally, a concave utility curve demonstrates a risk-averse project manager with low risk propensity; in which case project manager will have low tendency of taking risky decisions so as not to breach risk tolerances related to scope, time and cost. On the other hand, a convex utility curve demonstrates a risk-taker project manager with higher risk propensity; in which case project manager will have high tendency of taking risky decisions in perception of exploiting opportunities although this might results in breaching risk tolerances related to scope, time and cost. Figure 3.17 and Figure 3.18 display the utility curves for risk-averse and risk-taker individuals' respectively.

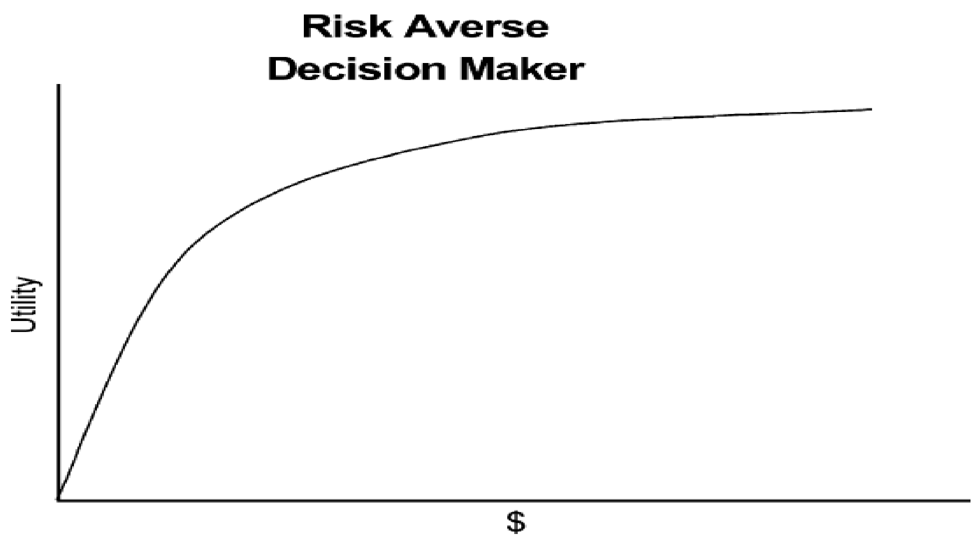


Figure 3.17: Concave utility curve for risk-averse individual (Kwak & LaPlace 2005, p.693).

Figure 3.18: Convex utility curve for risk-taking individual (Kwak & LaPlace 2005, p.693).

The understanding of risk tolerance and its relation to risk propensity can assist project managers' in their efforts of taking risky decisions and managing project risks. Moreover, those risks that are laid above a certain risk tolerance line will have higher priority; which indicates the need for reducing them to acceptable limits (Kwak & LaPlace 2005). Consequently, understanding project managers' risk propensity and its influence on their behaviours and risky decisions can lead to reducing costs, enhancing performance and decreasing project duration. For example, project managers' with low risk propensity would be able to recognize and accept situations with high risk levels to gain benefits of opportunities. However, Ahmad (1998) pointed out that many organizations miss innovation opportunities due to lack of risk-taking behaviours by individuals. Similarly, Kwak & LaPlace (2005) stated that opportunities cannot be utilized and exploited without exercising risk-taking behaviours by project managers'. While organizations might be inclined to reduce overall risk exposure through investing in projects with balanced risks; this might not be the same with the project manager assigned to one project only. To elaborate, an organization might decide to adopt a risk-averse attitude on certain project while the project manager risk propensity level is low. Thus, misaligning organization risk attitude and project managers' risk propensity might lead to conflicts and unfavorable results. To emphasize, Kahneman & Lovallo (1993) stated that organizations' adoption of risk-seeking attitude on a certain project might lead to optimism in estimating cost and time; however an assigned project manager with low risk propensity might be perceived as disloyal to the organization due to risky decisions being taken based on his/her tendency in taking risky decisions; i.e. risk propensity level. Additionally, many project managers' perceive themselves as being sensible risk-takers while their risky decisions in reality are based on much emotion and less facts. Also, Kahneman

& Lovallo (1993) pointed out that project managers' have become known for having a mind of "optimistic denial of uncontrollable uncertainty" where they tend to be optimistic about the outcomes of uncertain events risks that they do not control. Furthermore, project visibility might influence project managers' risk tolerance where some project managers' might have tendency to increase their risk tolerance and adopt high risk propensity in an effort to receive recognition and praise. As a result, Daw (1999) suggested that project managers' need to be trained on understanding their risk tolerance and risk propensity; and those of others by asking themselves four questions:

1. Am I a risk-seeker or risk-averse person?
2. Are my project sponsors risk-seekers or risk-averters?
3. How much is the project beneficial for the organization?
4. What are the existing levels of expertise and experience in the project team?

As a conclusion, many researchers concluded that project failure may occur despite executing successful project management claiming that project management success is not a mandatory condition for project success. However, the focus of this study will be on project success criteria domains which are within the control of the project manager and the study relates to how project managers' risk propensity could influence their project success criteria domains. Additionally, based on the above literature review on project success; it is evident that the most important areas that are within the project manager control are: scope, time and cost. Thus, the study questionnaire will focus on the influence of project managers' risk propensity on risky decisions related to project success criteria in terms of "triple constraint". However, other project success criteria domains will be considered in the dependency structural analysis exercise, such as: quality, resources, risk and stakeholder satisfaction.

3.5 Selecting project success criteria

According to Chan et al. (2002), project success criteria can be categorized into objective and subjective criterions. Additionally, objective criteria can be referred to as hard and tangible measures that include: time, cost, health and safety and profitability. Conversely, subjective criteria can be referred to as soft and intangible measures which include: quality, technical performance, satisfaction, productivity and environmental sustainability (Chan et al. 2002). Moreover, since the study focuses on the influence of project managers' risk propensity on their risky decisions related to project success criteria domains, then only objective measures such as scope, time and cost were included in the research questionnaire. Furthermore, the reason for adopting the triple constraints is that all these factors are more controllable by the project manager than other factors and thus can be impacted by the project manager's risk propensity.

3.5.1 Scope

Scope can be defined as the degree of project completion in meeting the project requirements and specifications (Bubshait & Almohawis 1994). However, scope is linked to quality which refers to total features of a product or service which result in satisfaction of needs (Hatush & Skitmore 1997). Additionally, scope can be expressed in relation to functionality, technical specifications and product appearance. Figure 3.19 displays some scope measurement types.

Year	Author(s)	Measurement
1990	Saarinen and Hobel	Integration of three elements: defects, on-time delivery, and budget compliance—budget and schedule included in designing requirements for quality performance
1992	Sanvido et al.	Degree of conformance to predetermined standard of performance
1996	Stevens	Performance of cost, schedule and safety

Figure 3.19: Types of scope measurement (Chan et al. 2002, p.125).

It can be clearly seen from the above figure that all listed scope measurement types can be applied to almost all project types. Additionally, Molenaar et al. (1999) pointed out three additional scope measurements for construction projects: administrative load, conformity to stakeholders' expectations and overall stakeholders' satisfaction. Furthermore, clear definition of project scope and technical specifications are prerequisites for accurate quality measurement (Moleanaar & Songer 1998). Additionally, the concept of functionality can be also related to project scope; where functionality can be measured by degree of conformance to stakeholders' technical performance specifications (Chan et al. 2002). Moreover, conforming to technical specifications need to be done in consideration to financial aspects for attaining the "fitness for purpose" goal. According to Chan et al. (2002) functionality can be measured after project completion and not during project execution. Thus, functionally and technical performance are closely related to project scope and quality concept and should be considered as project success criteria in construction stage due to the importance of meeting stakeholders' requirements. According to Bannerman (2008), scope dimension in the iron triangle is often limited to meeting project technical specifications. Therefore, the iron triangle can be thought of as a project success criteria that they include economical dimension measured in terms of scope, time and cost.

3.5.2 Time

Bubshait & Almohawis (1994) defined project time as the degree of project completion in the agreed allocated duration. Moreover, time as project success criteria can be measured by time overrun, construction time and speed of construction (Naoum 1994; Al-Meshekeh & Langford 1999). While the of speed of construction measurement is related to construction; the time overrun and construction time measurement types are generic and can be applied across different project types. Figure 3.20 displays different time measurement types.

Year	Author(s)	Measurement	Definition
1994	Naoum	Time overrun	Increase or decrease in percentage in estimated program (in days/weeks)
1996	Chan	Construction time	Number of days from start on site to practical completion of project
1999	Al-Meshekeh and Langford	Speed of construction	Gross floor area (in square meters) divided by the construction time (in days)

Figure 3.20: Types of time measurement (Chan et al. 2002, p.123).

3.5.3 Cost

According to Bubshait & Almohawis (1994), project cost could be defined as the degree of project completion within the agreed estimated project budget. Additionally, project cost can be measured by cost overrun and unit cost (Naoum 1994). Figure .20 displays different types of project cost measurement related to construction industry. While unit cost measurement is more related to construction; cost overrun measurement can be applied to different types of projects. Figure 3.21 displays different cost measurement types.

Year	Author(s)	Measurement	Definition
1994	Naoum	Cost overrun	Increase or decrease in budget (in dollars)
1996	Chan	Unit cost	Cost of building (in dollars) divided by gross floor area (in square meters)

Figure 3.21: Types of cost measurement (Chan et al. 2002, p.125).

It is imperative to remember that time and cost measurements could be perceived from the perspectives of the project manager, project team, contractors, sponsors, etc. Also, Chan et al. (2000) mentioned that time and cost criterions are considered the most desirable project success criterions for design projects. However, other criteria may be considered for other project types. Next is a section linking some important risk propensity constructs that were defined in chapter two to the suggested project success criteria; i.e. scope, time and cost.

3.6 Propensity constructs and project success criteria

Below is an elaboration on important risk propensity constructs; that were mentioned in the chapter two; and their relation to project success criteria. Specifically, the risk propensity constructs that are discussed in relation to project success criteria are: overconfidence/optimism, availability, emotions and estimating probability bias. However full discussion of all other risk propensity constructs and their influence on project risky decisions in relation to project success criteria is detailed in the framework chapter.

3.6.1 Overconfidence

According to Fabricius & Buttgen (2015), project managers' overconfidence may result in biased assessment of their risky decisions. Additionally, a plethora of researchers emphasized the human tendency for over-optimism when taking risky decisions related to project criteria (Pich et al. 2002; Raz et al. 2002; Huff & Prybutok 2008; Shepherd & Cardon 2009). Furthermore, the cognitive of bias “overconfidence” occurs when project managers’ express very high levels of confidence in their abilities to take accurate risky decisions related to time and cost estimates without being aware of it (Moore & Healy 2008). Thus, the “overconfidence” cognitive bias could result in higher risk propensity level and lead to choosing risky behaviours (Nosic & Weber 2010). Also, it is imperative to recognize that in certain types of projects such as: product development; a confident project manager with high risk propensity might be welcomed where risk-taking behaviours becomes a must for accomplishing the project objectives (Brockman et al. 2012). Additionally, “overconfidence” heuristic cognitive construct can influence project manager’s risky decisions related to “triple constraint”. Furthermore, many scholars pointed out the strong link between “overconfidence” and risky behaviour where individuals’ have the tendency to be too certain about the appropriateness and accuracy of their risky decisions. (Hayward et al. 2006; Li and Tang 2010; Nosic´ &Weber 2010). Moreover, Fabricius & Buttgen (2015) referred to “overconfidence” bias as the project managers’ overestimation of their own abilities to make accurate estimates that could be related to “triple constraint”. Also, risk-taking behaviour of project managers’ relates positively to their “overconfidence” where high levels of “overconfidence” lead to high levels of risk-seeking behaviours and vice versa. In all cases, an overconfident project managers’ tend to have higher risk propensity and will be inclined to develop very limited number of risk scenarios; whilst project managers’ with less overconfidence tend to have lower risk propensity and generate more risk scenarios to make sure that risks are being avoided (Newby-Clark et al. 2000). Therefore, project managers’ “overconfidence” can blind them from seeing the size of risks they are undertaking (Van Zant & Moore 2013). As such, “overconfidence” and “availability” cognitive biases can be linked together; where project managers’ “overconfidence” lessen risk “availability” in project managers’ minds which in turn leads to decreasing the perceived threat of project risks (Pachur et al. 2012).

3.6.2 Availability

Pachur et al. (2012) suggested that “availability” heuristic cognitive bias can be related to project managers’ tendency to take risky decisions. Moreover, “availability” heuristic can be used to refer for project managers’ assessment of an event probability by the easiness of recalling the occurrences of similar events (Schwarz et al. 1991). Thus, project managers’ who are able to recall occurrences of similar events from previous projects will experience “availability” heuristic which may trigger and increase their risk propensity. Additionally, Pachur et al. (2012) confirmed that “availability” of risks is highly associated with project managers’ judgements about risk likelihoods occurrences where strong emotions can arouse when risks occur.

3.6.3 Emotions

Pachur et al. (2012) stated that “emotion” heuristic cognitive bias can be related to project managers’ tendency to take risky decisions. Additionally, “emotion” heuristic cognitive bias can be referred to the relationship between project managers’ emotions and the risks they encounter; where King & Slovic (2014) suggested that individuals’ respond emotionally to risks to assess its probability and impact. Although, Pachur et al. (2012) concluded that both heuristics of “availability” and “emotion” interact to influence individuals’ assessment of risks; however, he pointed out that “availability” heuristic might be a better predictor for individuals’ judgments than “emotion” heuristic.

3.6.4 Estimating probabilities bias

Brandstatter & Gussmack. (2013) introduced the concept of "priority heuristic" which refers to individuals' tendency to take risky decisions first based on possible consequences and second on respective likelihoods of these consequences. Additionally, project managers having "priority heuristic" will tend to assess their risky decisions outcomes more than its respective probabilities; however project success cannot be achieved without the proper assessment of both the probabilities and impact of project risks (Oehmen et al. 2014; Teller et al. 2014; PMI 2009). Nevertheless, Fabricius & Buttgen (2015) concluded that risk impact is more influential on project success than risk probability. In conclusion, Fabricius & Buttgen (2015) emphasized that the best solution for agreeing on project success criteria is to adopt the triple constraints (scope, time and cost and) where they defined project success as the adherence of project outcomes to the agreed project plan in terms of scope, time and cost. Additionally, the effect of project managers' risk propensity on project success will vary depending on the project type and objectives. For example, if the project objectives relates to exploiting an opportunity; then a project manager with high risk propensity might be needed. However, if the project objectives relate to mitigating certain threats then a project manager with a low risk propensity would be more appropriate to lead the project. Also, this relates to the basic definition of project risks that were stated earlier in chapter two as uncertain events that might impact the project objectives positively or negatively (Bryde & Volm 2009; Maguire & Hardy 2013; PMI 2009). Also, the risk theories that were explained in chapter two could be related in this chapter to the risk propensity and its effect on project success. Additionally, the theories that were described earlier to explain decision-taking under risk were heuristic approaches, expected utility theory and prospect theory.

Furthermore, when applying any of the above mentioned theories to evaluate project managers' risky decisions, the project manager will need to assess the probability and impact of project risks; and this assessment might be influenced by project managers' tendency to take risky decisions; i.e. risk propensity (Fabricius & Buttgen 2015).

3.7 Summary

The findings of this chapter can be summarized in the following. First, included extensive literature review on project success factors and criteria. Second, differentiated between project management success and project success. Third, it examined the project success criteria domains that can be influenced by project managers' risk propensity. Fourth, it elaborated on the inter-relating factors and multi dimensionality of project success. Fifth, it concluded by selecting the triple constraints (scope, time and cost) as the project success criteria domains that could be highly influenced by project managers' risky decisions and risk propensity.

4 Chapter Four: Theoretical Research Framework

4.1 Introduction

This chapter discusses the research theoretical framework and relationships between research's dependent, moderator and independent variables. Additionally, the chapter will be divided into the following sections: the research conceptual framework that highlights the relationship between research variables, project managers' personality traits influencing risk propensity, research hypotheses development, risk propensity in project management literature, individual project managers' characteristics influencing risk propensity, project success criteria influenced by project managers' risk propensity and the proposed research theoretical framework.

4.2 The research conceptual framework

The research main aim is to investigate the relationship and associations between project managers' personality traits and their tendency to take risky decisions (risk propensity) related to project success criteria. However, there are numerous human personality traits in the literature as well as several project success criteria. Nevertheless, since the research is considering the project manager as a unit of measurement, then only personality traits that could relate to project managers' risk propensity would be considered. Also, only project success criteria that are within the control of the project manager would be considered. Therefore, the research major question is stated below as mentioned in introduction chapter:

RQ: how do project managers' personality traits influence their tendency to take risky decisions (risk propensity) in relation to project success criteria domains?

Additionally, the research question will be investigated through developing hypotheses related to the following areas:

- Risk propensity in project management literature.
- Personality traits influencing project managers' risk propensity.
- Individual characteristics influencing project managers' risk propensity.
- Project success criteria influenced by project managers' risk propensity.

Based on the above, the suggested research conceptual framework is displayed in figure 4.1.

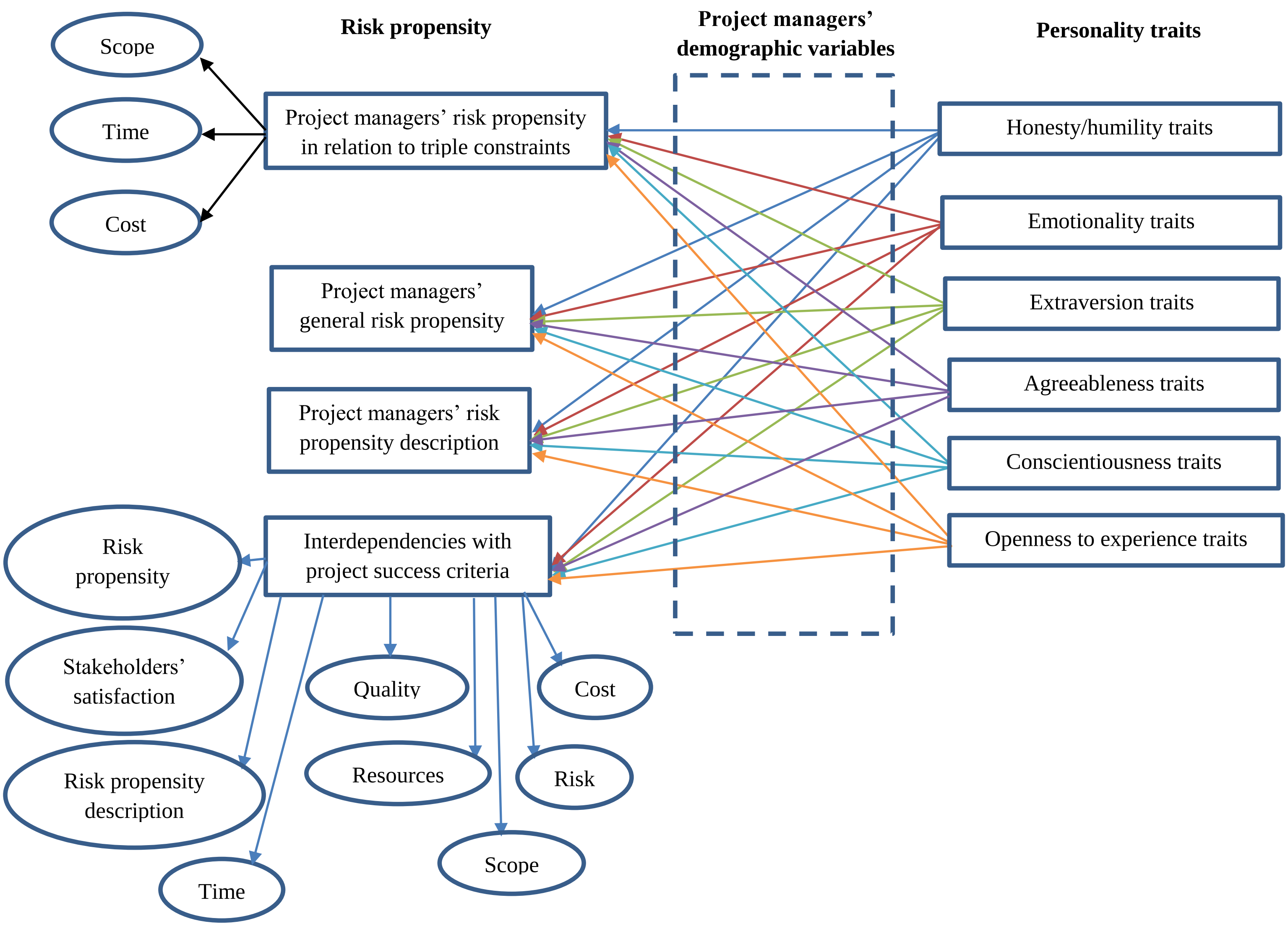


Figure 4.1: Research conceptual framework.

The above research conceptual framework displays the relationship between the research variables: independent, moderator and dependent. Furthermore, independent variables are project managers' personality traits grouped under five clusters: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Moreover, the dependent variables are: the project managers' risk propensity in relation to triple constraints, project managers' general risk propensity, project managers' risk propensity description and interdependencies between traits and project success criteria: scope, time, cost, quality, resources, risk, stakeholder satisfaction, general risk propensity and risk propensity description. Additionally, the framework displays the influence of project managers' demographic variables on the relationship between personality traits variables and risk propensity variables.

4.3 Risk propensity in project management literature

Since the evolution of project management science; emphasis was on achieving project scope within the agreed timeline and budgets. Additionally Crawford et al. (2006) reinforced that risk management has consistent significance on time and cost management. Therefore, project management should be regarded more as an ongoing process rather than just a planning tool. Additionally, not all project elements should be considered as source of uncertainty or critical for the project success where the focus should be only on project elements that can impact dramatically project success. Correspondingly, Jaafari (2001) stated that project uncertainty is the unknown likelihood of occurrence of an event that is closely related to project domains such as: scope, time, cost and quality. Moreover, the Project Management Institute (PMI 2004) mentioned that risk can have a positive or negative effect on at least one project objective such as time, scope and cost. Also, Thayer et al. (1981) stated that almost all engineering development projects face the same problems that results in unsatisfied customers' due to the project being behind schedule and over budget. Similarly, Brooks (1987) emphasized that the lack of project risk management might lead to failure in achieving the project scope, within the agreed time frame and budget. Furthermore, Nikander & Eloranta (1997) expressed the need to identify project elements that can be sources of uncertainty through scanning the internal and external project environments. Additionally, Hillson (2005) stated that project risks arise from the connections between uncertainty of what might happen and project objectives in terms of scope, time and cost. According to Acar & Goc (2011), risky decisions taken by project managers are not only based on the objective evaluation of probability and impact of risks; but also it depends on the personal traits of those project managers. Therefore, there is a need for further research to be done on the domain-specific nature of project managers' risk propensity in different project areas (Acar & Goc 2011). According to Sjoberg et al. (2004), risk propensity has a psychometric aspect in which risk is defined subjectively by project team members' under the influence of many factors such as: mental, social, organizational and cultural factors. Additionally, Petrakis (2005) comprehensively discussed the economic and cultural factors affecting the project team member's risk propensity where he concluded risk propensity increases as project budget increases and as the project payback period shortens. On the other hand; risk propensity decreases when the project is funded majorly from stakeholders own money and it also decreases with bigger project size since variability of project outcomes is affected by project size. Moreover, the project managers' risk propensity can be influenced by the type of industry and its characteristics where some industries experience more changes related to technological advancements as well as instability on the demand of a project product. Moreover, one of the most important aspects of project risk management is the identification of project managers' tolerances, attitudes and propensity towards risk which in turn will influence their risky decisions in relation to project success criteria. Additionally, Huff & Prbutok (2008) stated the project manager as the most important individual involved in the managing the project risks and hence project managers' risk propensity might dramatically influence their risky decisions in relation to project success criteria. Consequently, effective project risk management systems are implemented by individuals and hence the risk propensity of these individuals can have important impact on the successful implementation of risk systems. Furthermore, Helliar et al (2001) mentioned that international research in psychology indicated that individuals propensity towards risk can incorporate some biases that result in inappropriate responses to risks. In line with the above, the PMBOK Guide (2013) emphasized that risk attitude can include many aspects; such as: risk appetite, risk threshold and risk tolerance. All of which might influence risky decisions; i.e. the way individuals and organizations respond to risks related to project success criteria. Additionally, some studies highlighted the relationship between project managers' risk appetite and propensity and its influence on their risky decisions and responses related to project success criteria. While risk appetite has to do with the level or amount of risk an individual is willing to accept for a potential gain; risk propensity is the tendency of an individual to take risky decisions for achieving this potential gain. According to the ISO Guide on Risk Management Vocabulary (2009); risk appetite is defined as the amount and type of risk that an organization is willing to pursue or retain. In the same line; COSO's Enterprise Risk Management Framework (2010) defines risk appetite as the amount of risk an entity is willing to accept in pursuit of value. Figure 4.2 lists definitions of risk appetite among different standards.

Table I. A List of Definitions of the Term "Risk Appetite" Found in the Literature

Source	Definition of "Risk Appetite"
ISO[1,2]	Amount and type of risk that an organization is prepared to pursue or retain
COSO[3]	The amount of risk an entity is willing to accept in pursuit of value (it also refers to the degree of risk, on a broad-based level, that a company or other entity is willing to accept in pursuit of its goals)
HM Treasury's Orange Book[15]	The amount of risk that is judged to be tolerable and justifiable
Institute of Internal Auditors, from its glossary[16]	The level of risk that an organization is willing to accept
Dupoy[17]	The investor's willingness to buy risky assets
Office Government Commerce U.K.[18]	The amount of risk the organization, or a subset of it, is willing to accept
Towers Watson[19]	The total risk that an organization is willing to take to achieve its strategic objectives and meet its obligations to stakeholders
IRMI[20]	The degree to which an organization's management is willing to accept the uncertainty of loss for a given risk when it has the option to pay a fixed sum to transfer that risk to an insurer
BS[21]	Total amount of risk that an organization is prepared to accept, tolerate, or be exposed to at any point in time
BCI[22]	Willingness of an organization to accept a defined level of risk
KMPG[23]	The amount of risk, on a broad level, that an organization is willing to take on, in pursuit of value (or in other words: the total impact of risk an organization is prepared to accept in pursuit of its strategic objectives)
PWC[24]	The quantum of risk that the firm is willing to accept within its overall capacity
Fxtimes[25]	The willingness to take certain risks for a potential gain

Figure 4.2: List of Risk Appetite Definitions among different Standards (Aven 2013, p.464).

There is considerable number of risk appetite definitions that could be summarized into different categories. Additionally, Aven (2013) concluded that risk appetite definitions can be grouped under three categories. Category one refers to risk appetite as the amount of risk an individual is willing to accept. Category two refers to risk appetite as the willingness to accept risk but in pursuit of a certain value. Category three refers to risk appetite as the individual willingness to accept risky activities in pursuit of values. Consequently, high risk appetite indicates willingness to accept high risks in pursuit of values whereas a low risk appetite means willingness to accept low risks in this sense. Moreover, Aven (2013) concluded that risk appetite can be defined as the individual willingness to accept risky activities in search of benefits. However, risk propensity is the tendency of the individual to take risky decisions that might lead to achieving the perceived benefits. Apart from that, Leitch (2010) emphasized that there is no interesting concept behind risk appetite where it is easier to understand risk without using the term risk appetite.

Furthermore, there is much scientific literature in the economics and decision making fields that differentiates between risk attitude and risk appetite. However, Abrahamsen et al (2006) referred to risk attitude as being more aligned with risk appetite. The ISO (2009) defined risk attitude as the organization's method to evaluate and ultimately purse, maintain, accept, or avoid risk. Although there is no agreement on risk attitude definition; all definitions ranges from a certain risk mindset to a selected response to uncertainties driven by perception of project managers (Hillson & Murray 2007). Additionally, Cox (2002) stated that risk attitude exists in the difference between the risk premium (certainty equivalent) and the expected value from risk. In a broader sense; the level of risk appetite in being risk seeker or risk averse can reflect on different risk attitudes for project managers'. Similarly, Aven (2013) stated risk attitude as the project manager's chosen response to risk. Thus, high risk appetite characterizes a person's risk attitude. Additionally, project managers' risk attitudes can be further classified into four broad categories: risk-averse, risk-tolerant, risk-neutral and risk-seeking (Hillson 2009). These four risk attitudes can influence major key points in the project risk management processes ranging from risk identification to risk assessment and risk response planning. Below is a brief description about the four risk attitude (Hillson & Murray-Webster 2007):

Risk-averse: refers to the project manager feeling uncomfortable with uncertainty, having low tolerance for ambiguity and seeking safety when facing risk. People with risk-averse attitude tend to over-react to negative risks and under-react to positive risks.

Risk-tolerance: refers to the project manager being sensibly comfortable with most uncertainty; accepting the fact that it exist in life and projects. People with risk-tolerant attitude tend to accept uncertainty without letting it have major impact on their behaviour.

Risk-neutral: refers to the project manager not being risk-averse or risk-neutral; but rather seeking plans that have high future pay-offs. People with risk-neutral attitude tend to focus on longer term and take actions that lead to major benefits.

Risk-seeking: refers to the project manager being adaptable to risks and not afraid of taking action. People with risk seeking attitude tend to enjoy threats and risks; looking at them as challenges.

According to Kahneman & Tversky (1979), a person is considered to have risk-averse attitude when a certain option is favored to a venture with an equal or greater monetary expectation. Conversely, a person is considered to have risk-seeking attitude when a certain option is rejected in favor to a venture with an equal or lower monetary expectation. Moreover, individuals' risk attitude can be influenced by many factors such as: personality traits and the subjective perception of the situation (Vasvári 2015). Also, strategic risk management in organizations requires the understanding of organizational and personal attitudes towards risk as well as the right analysis of internal and external environments of business and project (Kendrick 2004). Furthermore, attitudes towards risk have attracted the interest of many researchers in the field of neuro-economics and behavioural economics. According to Christopoulos et al. (2009), the activity of a specific brain area (right inferior frontal gyrus) correlates with risk aversion, with more risk averse participants (i.e. those having higher risk premia) also having higher responses to safer options. Additionally, Saunders et al (2014) mentioned six determinants of project uncertainty in their study about conceptualizing uncertainty in safety critical projects. One of these determinants was the "individual" determinant; which relates to the different psychological profiles of project managers perceiving uncertainty in different ways. Finally, Perminova (2008) argued that project managers' attitudes towards uncertainty affect their choice of response actions and their risk propensity; i.e. tendency to take risky decisions. Also Hillson & Muarry Webster (2007) defined risk attitude as project managers' chosen response driven by perception which can be interpreted as project managers' tendency (risk propensity) to take risky decisions in order to achieve perceived benefits related to project success criteria. As a conclusion, project managers' risk propensity in relation to project success criteria (scope, time and cost) can be interpreted as below:

Low risk propensity: project managers' being uncomfortable with uncertainty, and such have low tendency to take risky decisions in order to avoid uncertain outcomes; i.e. low risk propensity. Hence, they will not take risky decisions although it might have positive impact on project success criteria (scope, time and cost). Thus, this research attempts to investigate personality traits that might be associated with project managers' tendency to avoid risky decisions; i.e. low risk propensity-risk averse attitude.

High risk propensity: project managers' being conformable with uncertainty, and such have high tendency to take risky decisions and live with uncertain outcomes; i.e. high risk propensity. Hence, they will take risky decisions that they perceive it have positive impact on project success criteria (scope, time and cost). Thus, this research attempts to investigate personality traits that might be associated with project managers' tendency to take risky decisions; i.e. high risk propensity-risk seeking attitude.

4.4 Personality traits influencing project managers' risk propensity

Chapter two provided an in-depth analysis on different personality traits theories. Traditionally, risk propensity has been looked at as a one dimensional and stable variable across different contexts (Eysenck & Eysenck 1977; Kahneman & Tversky 1979; Paunonen & Jackson 1996). However, recent research in decision-taking theories indicates that risk propensity could be considered as a domain-specific variable (Blais &Weber 2006; Hanoch et al. 2006; Soane & Chmiel 2005; Weller & Tikir 2011). In light of the above, organizations and project managers could benefit from understanding predecessors of certain project domain-specific risks. Specifically, it would beneficial to understand how certain personality traits can influence project managers' tendency to take risky decisions (risk propensity) and behaviours and how these same personality traits can be used as predictive indications of project managers tendency to take risky decisions in certain project success criteria domains. As was mentioned in the literature review related to risk propensity; there are two main risk propensity theories: prospect and dispositional theories. Moreover, the dispositional theory emphasize the issue of risk propensity stability across various domains while the prospect theory emphasize the issue of risk propensity variability in different domains. Hence, it would be of great value to organizations to know how project managers' dispositional variables or personality traits impact their risk propensity through influencing their risk and benefits perceptions related to certain project domains. Moreover, it has always been challenging to discover the human personality structure and traits. Additionally, Lee & Ashton (2009) pointed out the need for having consensus on the basic personality traits that can be used to analyze personality influence and effect in different contexts. However, there was no agreement among scholars on a basic personality structure in almost all of the 20th century. Nevertheless, recently scholars started to agree that personality structure and its variation can best be summarized under five broad independent factors (Lee & Ashton 2009). A plethora of researchers investigated these five factors and expressed them as personality adjectives (Digman &Takemoto-Chock 1981; Goldberg 1990; Tupes & Christal 1992; Saucier & Goldberg 1996). Furthermore, researchers began referring to these personality factors as the “Big Five” factors that include: extraversion, agreeableness, conscientiousness, neocriticism and intellect/imagination (Goldberg 1993). However, many researchers based on empirical investigation and standard lexical studies of personality; rearranged the “Big Five” factors into its final shape through replacing “intellect/imagination” factor by “openness to experience” factor (Wiggins 1996). According to Schoemaker (1990), individuals’ display inconsistent responses to risks across different domains and situations. Moreover, Bormiley & Curley (1992) mentioned that much research was done to understand the dynamic relationship between personality traits and chosen behaviours. For example, Kogan & Wallach (1964) introduced the Choice Dilemma Questionnaire (CDQ) which assessed individuals’ risk-taking behaviour in 12 different situations across different domains. However, Slovic (1964) criticized the Choice Dilemma Questionnaire (CDQ) for displaying weak convergent validity with other risk taking measures where it measure risk-taking as a unidimensional construct. Another attempt to understand the relationship between personality traits and risk propensity was done by adopting a psychometric approach. Furthermore, Weber et al. (2002) introduced a domain-specific risk taking scale (DOSPERT) which assessed risk-taking behaviour across common life domains such as: social, gambling, health, safety and ethical, etc. Additionally, many researchers adopted the domain-specific risk taking scale (DOSPERT) to measure individuals’ risk propensity; such as: Blais & Weber 2006 and Hanoch et al. 2006 where their research indicated that risk-taking is more of a complex variable that is influenced by contextual and dispositional factors. According to Weber et al. (2002), the willingness of an individual to engage in risk-taking behaviours is influenced by three main factors:

- The individuals' risk perception level to certain risky activity.
- The individuals' perception about expected benefits by engaging in certain risky activity.
- The individuals' willingness to accept risk in return for achieving the benefit.

Additionally, Weber et al. (2002) claimed that the first two factors are relatively variant across different domains while the last factor is relatively stable across different domains. Therefore, risk propensity and preferences differ among domains depending on differences of individuals' perceived risks and expected benefits (Mellers et al. 1997). As a result, risk-averse behaviours (low risk propensity) increases with increased levels of risk perception; while risk-seeking behaviour (high risk propensity) increases with increased levels of perceived benefits expectations (Hanoch et al. 2006). Furthermore, risk perceptions are inversely related to risk taking, while perceived benefits are positively related to risk taking, whereas risk perceptions are inversely correlated to perceived benefits of engaging (Weller & Tikir 2011). Also, few studies only examined the relationship between risk propensity and personality in more than one domain; where the majority of studies focused on the effect of personality traits on risk propensity in one domain (Weller & Tikir 2011). Moreover, the studies that were conducted to examine personality traits influence on risk propensity did not address how broad personality traits predict risk-taking behaviour across different domains. However, there are many personality traits that were linked to risk-taking behaviours and risk propensity. According to

Weller & Tikir (2011), only few studies were done to examine the influence of personality traits on individuals' risky decisions in different domains. Nevertheless, Nicholson et al. (2005) stated that certain groups of personality traits can predict risk-taking behaviours across different domains. Moreover, many researchers of trait and dispositional theories claimed the stability of personality traits over time and their variation among individuals and how they influence individual behaviour. Additionally, many tools and scales were developed to measure personality traits and their influence on human behaviours; such as: 16 Personality Factor Questionnaire, Myers-Briggs Type Indicator, Eysenck Personality Questionnaire and the Big Five Personality traits model. However, not all of the previously mentioned scales are suitable for assessing risk propensity and personality traits related to risky decisions where many of these scales measure generic personality traits that not might be linked to risk behaviours. Additionally, some scholars stated that measuring personality using fewer factors are better than using large number factors that might not be necessarily related (Eysenck 1992). Furthermore, almost all the personality traits factors listed in each model are somehow similar to each other. Hence, the research framework included traits that were found in the literature review linked to tendency of taking risky decisions. Below is an elaboration on personality traits that are related to risk propensity and will form the basis for collecting data to answer the main research question.

4.4.1 Openness to Experience

According to DeYoung et al. (2005), this trait has to do with the individual's interest in exploring new things and being creative and perceptive. Moreover, McCrae & John (1992) stated that openness to experience can be treated as a global personality construct that consist of many traits facets. Additionally, openness to experience can be composed of facets such as: ideas, feelings, values, fantasy, aesthetics, and actions (Costa & McCrae 1976). Later, Costa & McCrae (1992) renamed the facets to: preference for variety, intellectual curiosity, fantasy, imagination, attentiveness to inner feelings and aesthetic sensitivity. Similarly, Lee & Ashton (2004) suggested the following facets for openness for experience: aesthetic appreciation, inquisitiveness, creativity and unconventionally. Also, individuals' who are have low openness to experience tend to be more conservative and traditional in their behaviour (Costa & McCrae 1992). Furthermore, openness to experience can be measured using lexical or statement-based self-report questionnaires. Additionally, statement-based questionnaires use more words than lexical scales. According to Garcia et al. (2005), openness to experience is strongly linked with sensation-seeking personality trait. Thus, project managers' with low openness to experience are more inclined to have low risk propensity and adopt a risk-averse attitude and those with high openness to experience tend to have high risk propensity and be more of risk-seekers. Consequently, project managers' with low openness to experience might not be willing to adopt new methods that might impact the triple constraints; such as: new schedule compression techniques, budget reduction techniques or processes that might enhance the project and product quality.

4.4.2 Conscientiousness

According to Thompson (2008), conscientiousness has to do with individuals' being task-oriented, thorough, cautious and meticulous. Moreover, conscientiousness is trait related to organized and self-disciplined individuals who have high need for achievement. Also, individuals' with high conscientiousness tend to have systematic way of thinking and to be deliberate and think carefully before taking any action (Thompson 2008). Thus, project managers' who have high conscientiousness might be inclined to have low risk propensity and adopt risk-averse attitude where they are more interested being organized and analyzing events rather than exploring new adventures. Consequently, project managers' with low conscientiousness might have high risk propensity and be more willing to adopt new methods that might impact the triple constraints where they tend to explore new ideas without fully analyzing their consequences on the project; such as adopting new schedule compression methods, budget reduction techniques or processes that might impact project scope.

4.4.3 Extraversion

Individuals' who are extrovert tend to project their personality traits outward and are characterized by being: outgoing, sociable, and gregarious (Thompson &Edmund 2008). Furthermore, the majority of personality models include extraversion factor and refer to it as extraversion-introversion trait which is considered as single continuum where individuals' cannot be extravert and introvert at the same time. However, Jung (1921) stated that individuals' can have both extraversion and introversion side but with one of them being more dominant than the other. Additionally, individuals' with high extraversion tend to be more energetic, assertive, excited and outgoing. Also, Ashton et al. (2002) pointed out that extrovert individuals' aim to attract attention and be rewarded for their behaviours. Therefore, project managers' who have high extraversion might have high risk propensity and be inclined to adopt a risk-seeking attitude in order to accomplish goals and be rewarded for their achievements. Also, they might be willing to accept risk in order to get social attention from their colleagues and management.

Consequently, project managers' with low extraversion might have low risk propensity and not be willing to experiment new ideas that can have positive impact on the project triple constraints.

4.4.4 Agreeableness

According to Rankin et al. (2004), agreeableness trait is has to do the individual being trusting, empathetic and accommodating with others. Moreover, Thompson (2008) stated that individuals' with high agreeableness are more inclined to be considerate, decent and sympathetic for others'. On the other hand, individuals' with low agreeableness have less empathy to others' and are more concerned with their well-being. Additionally, individuals' with low agreeableness show more skepticism about others' ideas and motives (Grazaino & Eisenberg 1997). Moreover, Matsumoto & Juang (2012) suggested the following facets for agreeableness: trust, frankness, altruism, obedience, and humility. Similarly, Goldberg (1981) suggested more agreeableness facets such as: sociable, cheerful, nurturing and thoughtful. Additionally, Lee & Ashton (2006) suggested six facets for agreeableness: forgiveness, gentleness, flexibility, patience and altruism. Thus, project managers' with high agreeableness might have low risk propensity and tend to be risk-averse since they are inclined to agree with others' in order to preserve relationships at the expense of exploring new challenges and ideas. Consequently, project managers' with low agreeableness might have high risk propensity and be more willing to accept innovative ideas and risks as they perceive as being opportunities to enhance the meeting of triple constraints requirements.

4.4.5 Neuroticism

According to Eysenck & Eysenck, neuroticism refers to individuals' being emotionally unstable and upset. Furthermore, Thompson (2008) pointed out that neuroticism is linked with traits such as: anxiety, dread, worry, jealousy and irritability. Also, individuals' with high neuroticism tend to analyze risks and events in a negative way perceiving these risks as threatening to them. On the other hand, individuals' with low neuroticism are associated with more emotional stability and more in control of their emotions when reacting to risks. Additionally, low neuroticism individuals' usually possess the traits of calmness and steadiness (Passer et al. 2009). However, it is imperative to distinguish between high neuroticism and emotions where individuals' with high neuroticism do not necessarily have negative emotions; where having high positive emotions comes under extraversion and not neuroticism. Furthermore, Passer et al. (2009) postulated that individuals' with high neuroticism and extraversion might experience high levels of both negative and positive emotions referring to it as "emotional roller coaster". Additionally, Lee & Ashton (2004) suggested replacing neuroticism trait with emotionality which refers to individuals' emotional instability including facets such as: fearfulness, anxiety, dependence and sentimentality. Therefore, project managers' with high emotionality (i.e. high neuroticism) might tend to have low risk propensity and be more of risk-averse since they are less emotionally stable and might not accept risks without careful thinking. Consequently, project managers' with high emotionality might be less inclined to take risky decisions related to triple constraints since they tend to thoroughly analyze decisions before finalizing them. Conversely, project managers' with low emotionality (i.e. low neuroticism) might tend to have high risk propensity and be more risk-seekers since their emotional stability would be high which might result in their engagement in risky behaviours.

4.4.6 Greed-avoidance

According to Bulik et al. (1997), greed-avoidance trait is associated with individuals' being shy, uncertain and afraid of experimenting new things. Furthermore, Cheung (2007) suggested the following facets for greed-avoidance trait: pessimism, suspicious, and being dreadful. Also, greed-avoidance trait is positively related to neuroticism where they share many common facets (DeFruyt et al. 2000). Therefore, project managers' with high greed-avoidance trait tend to have lower risk propensity due to being afraid of accepting risks and those who have low greed-avoidance trait tend to higher risk propensity where they enjoy exploring new and uncertain opportunities. Consequently, project managers' with high greed-avoidance might have low risk propensity and be less inclined to take risky decisions related to project success criteria since they tend to thoroughly analyze decisions before finalizing them in order to avoid creating any controversies for them.

4.4.7 Novelty-seeking

The novelty-seeking personality trait is usually associated with individuals' being impulsive, excited, volatile, indecisive and exploratory (Cloninger et al. 1993). Moreover, DeFruyt et al. (2000) reported that novelty-seeking trait is inversely related to harm-avoidance and conscientiousness traits where individuals' having high novelty-seeking trait tend to explore new ventures and without worrying about being harmed. On the other hand, novelty-seeking has positive relationships with the extraversion trait and less positive relationship with openness to experience and impulsivity traits (De Fruyt et al. 2000). Thus, project managers' with low novelty-seeking trait might have low risk propensity and tend to be more risk-averse due to being careful and deliberate when making decisions while those who have high novelty-seeking tend to have higher risk propensity and be more risk-seekers since they are more spontaneous and impulsive when making decisions under risk. Consequently, project managers' with low novelty-seeking might have less tendency to take risky decisions and not willing to experiment new ideas related to triple constraints.

4.4.8 Sensory-processing sensitivity

According to Aron et al. (2012), sensory-processing sensitivity is associated with individuals' sensitivity to events and their overstimulation to it. Moreover, sensory-processing sensitivity (SPS) is also associated with highly sensitive person (HSP) and relates to traits such as empathy and emotional control (Somolewska et al. 2006). Additionally, Lally (2015) suggested the following facets of sensory-processing sensitivity trait: processing depth, overstimulation, empathy and sensitivity. Moreover, Mashek (2004) postulated that individuals' with high sensory-processing sensitivity tend to be low risk takers where they try to avoid overstimulation and analyze things more thoroughly. Furthermore, high sensory-processing sensitivity individuals' get involved in a thorough processing of information about any situation before taking actions; opposite of high novelty-seeking individuals. Also, Smolewska et al. (2006) pointed out an inverse relationship between sensory-processing sensitivity and openness to experience trait. Furthermore, Aron et al. (2012) reported the possibility of positive relationship between the traits of sensory-processing sensitivity and novelty-seeking. However, an individual can have both traits and accept calculated risks. Thus, project managers' who have high sensory-processing sensitivity such as empathy; might have low risk propensity and tend to be more risk-averse since they are inclined to in-depth processing of information before accepting risks. Consequently, project managers' with high empathy might have high risk propensity and prefer to avoid any risky options related to triple constraints since they are highly sensitive to any unfavorable outcomes.

4.4.9 Perfectionism

According to Stoeber et al. (2010), perfectionism personality trait is the individuals' attempt for achieving high standards along with excessive self-criticism and caring too much for others' perception about them. Furthermore, Frost et al. (1990) suggested the following facets for perfectionism trait: organization, high expectations, criticism, high standards, being doubtful and avoiding mistakes. Similarly, Cattel & Mead (2008) suggested the following facets for perfectionism trait: organization, obsession, precision, controlled and self-discipline. Additionally, Halmi et al. (2000), distinguished between socially-oriented perfectionism and self-oriented perfectionism. Furthermore, socially-oriented perfectionism is related to the belief that an individual will get valued by others only when they are perceived as being perfect, whilst self-oriented perfectionism refers to the individual's desire to become perfect. Moreover, Hamachek (1978) introduced two types of perfectionism: normal and neurotic where normal perfectionists tend to seek perfection with enjoyment and without lowering their self-esteem; however, neurotic perfectionists tend to seek perfectionism through setting unrealistic goals and get depressed when they fail in achieving them. Furthermore, Stoeber & Otto (2006) suggested two dimensions for perfectionism: perfectionistic strivings which is related to perfectionism positive facets; and perfectionistic concerns which is related to perfectionism positive sides.

Additionally, individuals' with low perfectionistic concerns and high perfectionistic strivings tend to be also having high agreeableness trait tendency. Moreover, Rice et al. (2007) pointed out the strong association between adaptive perfectionism and conscientiousness personality traits. However, the maladaptive side of perfectionism is closely linked to neuroticism trait and cognitive dissonance bias (Rice et al. 2007). Thus, project managers' with high perfectionism tend to over analyze any decision that might negatively affect the triple constraints. Consequently, project managers' with high perfectionism tend to have low risk propensity and be more risk-averse since they do not accept risks until they thorough analyzed the events in order to avoid mistakes and being criticized

4.4.10 Rigidity

According to Peskine et al. (2004), rigidity is a personality trait related to individuals' inflexibility, indecisiveness and obedience to rules. Similarly, Stewin (1983) referred to rigidity trait as stubbornness and rejection of others' views along with lack of empathy. Thus, project managers' with high rigidity might have low risk propensity and tend to be more of risk-averse since they will have high inclination to preserve things as they are and will be reluctant to accept changes or modifications. Consequently, project managers' with high rigidity are inclined to avoid risky decisions related to triple constraints and prefer to follow the standard procedures and policies. Conversely, project managers' with low rigidity might have high risk propensity and tend to be more flexible and embracing of challenges and risks which result in adoption of risk-seeking attitude.

4.4.11 Impulsivity

According to Eysenck & Eysenck (1977), impulsivity personality trait is related to individuals' being impatient and deciding quickly in taking risks without proper planning or consideration of the consequences. Furthermore, impulsivity was introduced by some researchers as impulse-control referring to individuals' ability to do proper and thorough planning before taking risky decisions (Lee & Ashton 2004). Moreover, it is postulated that impulsivity is based on two components: behaving without planning and choice of shorter-term wins over longer ones (Rachlin 2000). Additionally, there should be clear distinction between impulsivity and compulsivity traits. Furthermore, while both impulsivity and compulsivity are related by acting without deliberation; impulsivity relates to unplanned reactions in response to an apparent instant gain, while compulsivity relates to responding to perceived negative risk or threat (Engel et al. 2005). Furthermore, Barratt (1959) pointed out strong positive relationship between impulsivity trait and the traits of extraversion and novelty-seeking. Furthermore, Patton et al. (1995) suggested the following facets for impulsivity trait: attention, self-control, cognitive difficulty, persistence, cognitive incapability and motor impulsiveness. Similarly, Eysenck et al. (1985) concluded two other major facets under impulsivity; that is: venturesomeness and empathy. However, impulsivity relates to behaving without thorough thinking about the risks or consequences of behaviour; while venturesomeness relates to taking action while being aware of consequences. Also, McCloseky et al. (2009) postulated the following facets for impulsivity: sensation-seeking, anxiety, depression, empathy and social appeal. Thus, project managers' with low impulsivity might have low risk propensity and tend to be more of risk-averse while those with high impulsivity might have higher risk propensity and tend to be more of risk-seekers since they accept risk quickly without thorough thinking of their decision consequences. Consequently, project managers' with low impulsivity might not be willing to venture into opportunities and prefer to be patient and cautious before doing any changes that might affect the project triple constraints criteria.

Based on the above literature review, below is a suggested grouping of personality traits -related to human risk behaviour- which can influence individuals' risk propensity and their tendency to take risky decisions in relation to project success criteria. Additionally, the personality traits were grouped under six major clusters: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Thus, the decision was taken to consider these personality traits clusters as global factors for project managers' personality traits. Moreover, all personality traits were grouped under them based on the above literature review.

4.5 Developing the research hypotheses

Below is a further description of the global personality traits clusters and its influence on project managers' risk propensity in relation to project success criteria. Also, under each personality cluster a hypothesis was developed to test its influence on project managers' risk propensity.

4.5.1 Honesty/humility

According to Weller & Tikir (2011), individuals who have low honesty/humility are inclined to challenge social norms and traditions. Additionally they do not like following policies and might get engaged in taking risky activities in order to achieve their goals. Moreover, the honesty/humility factor is usually linked to equality, genuineness, unsureness and lack of greed (Ashton et al. 2004). Thus, individuals' with low honesty/humility might have tendency to take risky decisions while those of high honesty/humility might be more inclined to avoid taking risk-averters. Furthermore, Lee & Ashton (2004) suggested four facets to describe the honesty/humility construct: sincerity, fairness, greed avoidance and modesty. However, Ashton & Lee (2008) pointed out that honesty/humility trait is positively associated with risky behaviours. Additionally, honesty/humility trait has strong links with other traits related to the psychopathy and selfishness where these traits are associated with risk-taking behaviours. Thus, project managers' with low honesty/humility tend to take risky decisions (Blair 2007). Additionally, "honesty/humility" trait will be measured as a multi-dimensional variable consisting of the following eight facets: sincerity, fairness, greed avoidance, modesty, kindness, amiability, hindsight and competitiveness. Moreover, high honesty/humility will influence project managers' risk propensity resulting in them avoiding risky decisions that might impact project scope, schedule or cost. Conversely, project managers' with low honesty/humility will influence project managers' risk propensity resulting in them taking risky decisions that would benefit the project objectives. Also, project managers' demographic variables might influence the effect of honesty/humility on project managers' risk propensity in relation to project success criteria. Section 6 include an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1A: there is no difference on rating honesty/humility traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2A: demographic factors will influence respondents' mean rating of honesty/humility traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3A: honesty/humility traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4A: demographic factors will have an influence on the relationship between honesty/humility traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

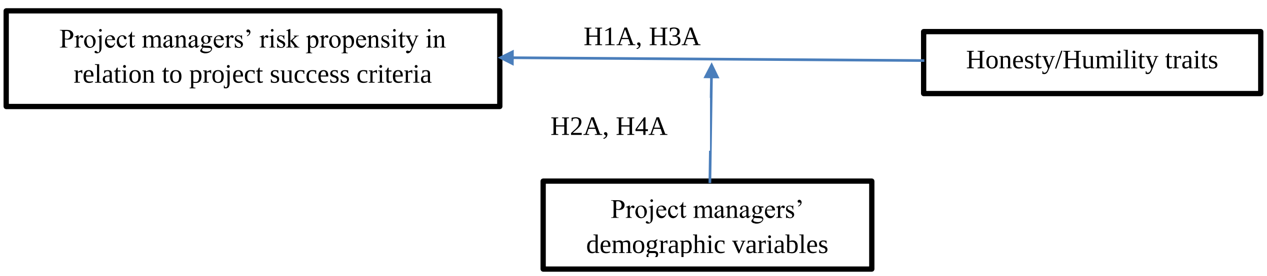


Figure 4.3: Honesty/humility traits hypotheses.

4.5.2 Emotionality

Emotionality is linked to anxiety and neuroticism where Peters & Slovic (1996) reported that anxiety and fear result in lower risk-taking behaviours. Additionally, lexical studies of personality traits linked emotionality to traits such as: dread, sentimentality, dependence, and emotional reactivity versus self-assurance, roughness, and courage. According to Lee et al. (2005), high emotionality is usually linked to risk-averse behaviours. Also, research indicated that fearful and anxious individuals tend to over-estimate risks (Butler & Matthews 1987) where Stober (1997) emphasized that anxiety and fear influence individuals' evaluation of subjective probabilities and impacts for negative and positive risks. However, Weller & Tikir (2011) suggested that emotionality influences risk propensity by modulating an event perceived risk and not expected benefits. Furthermore, Lee & Ashton (2004) suggested four facets to describe the emotionality construct: fearfulness, anxiety, dependence and sentimentality. According to Klein & Kunda (1994), individuals' with low emotionality tend to be more of risk-seekers and vice versa. Additionally, "emotionality" trait will be measured as a multi-dimensional variable consisting of the following thirteen facets: fearfulness, anxiety, dependence, sentimentality, anger, depression, self-conscientiousness, impulse-control, vulnerability, harm-avoidance, cognitive dissonance, expected emotions and high benefits. Moreover, high emotionality might influence project managers' risk propensity making them more risk-averse tending to objectively analyze changes before taking risky decisions related on project scope, schedule or cost. Conversely, project managers' with low emotionality might have high risk propensity and tend to be more risk-seekers. Also, demographic variables will influence the effect of emotionality on project managers' risk propensity in relation to project success criteria. Section 6 include an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1B: there is no difference on rating emotionality traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2B: demographic factors will influence respondents' mean rating of emotionality traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3B: emotionality traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4B: demographic factors will have an influence on the relationship between emotionality traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

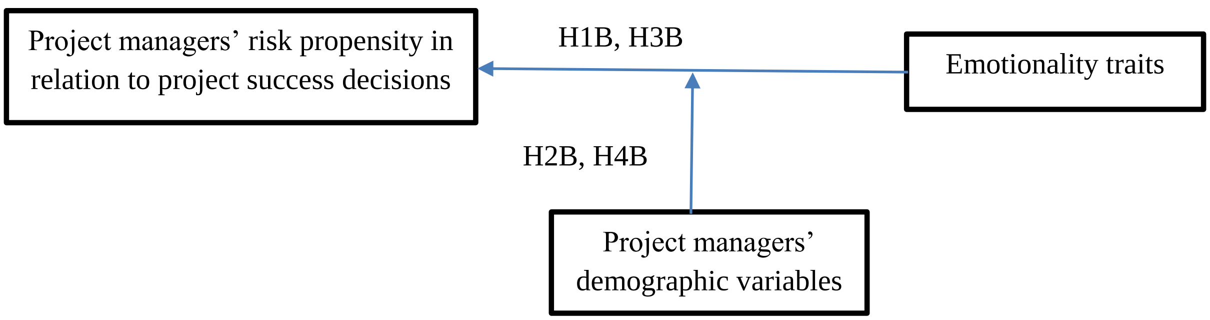


Figure 4.4: Emotionality traits hypotheses.

4.5.3 Extraversion

A plethora of researchers referred extraversion to traits such as: sociability, optimism, assertiveness and dynamism (Eysenck& Eysenck 1977; Tellegen 1985; McCrae & Costa 1992). Moreover, Lee & Ashton (2004) added more traits to extraversion dimension such as: talkativeness, and joyfulness versus nervousness, apathy, and quietness. Additionally, there are different and contradicting views about the relationship between extraversion and risk propensity. Additionally, many scholars reported positive relationship between extraversion and risk-taking behaviour (Cook et al. 1998, Vollrath et al. 1999; Terracciano et al. 2008). However, other researchers reported negative relationship between extraversion and risk-taking behaviour (Kendler et al 1999; Vollrath et al. 1999). Nevertheless, some scholars pointed out the lack of evidence in linking extraversion to risk-taking behaviour (Watson et al. 1993; Lee et al. 2005).

Furthermore, Lee & Ashton (2004) suggested four facets to describe the extraversion: expressiveness, social boldness, sociability, and liveliness. According to Eysenck (1973), extraversion is closely linked to high need for stimulation and sensation-seeking and individuals'' having high extraversion tend to be more accepting to risk. Thus, project managers' with high extraversion might have higher tendency to take risky decisions. Additionally, "extraversion" trait will be measured as a multi-dimensional variable consisting of the following eleven facets: expressiveness, social-boldness, sociability, liveliness, assertiveness, excitement-seeking, cheerfulness, optimism, confidence, halo-effect and framing. Moreover, low extraversion will influence project managers' risk propensity making them more of risk-averse tending to be less assertive in pursuing opportunities and not in engaging in risky-behaviours related to project success criteria due to low excitement-seeking and activity-levels. Conversely, project managers' with high extraversion might have higher risk propensity and tend to be more risk-seekers and might engage in risky behaviours related to project success criteria due to high levels of excitement-seeking and energy levels. Also project managers' demographic variables might influence the effect of extraversion on project managers' risk propensity in relation to project success. Section 6 include an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1C: there is no difference on rating extraversion traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2C: demographic factors will influence respondents' mean rating of extraversion traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3C: extraversion traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4C: demographic factors will have an influence on the relationship between extraversion traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

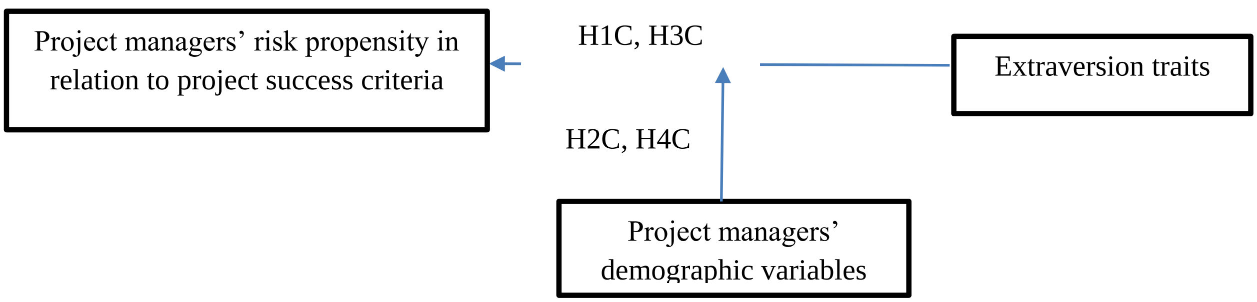


Figure 4.5: Extraversion traits hypotheses.

4.5.4 Agreeableness

The agreeableness trait define the individual's inclination for cooperation and getting along with others (Weller & Tikir 2011). Moreover, agreeableness trait is closely linked to traits such as: patience, tolerance and forgiveness, tolerance and good-naturedness (Lee & Ashton 2004). On the other hand, individuals' with low agreeableness tend to be more stubborn, argumentative, criticizing and short-tempered (Weller & Tikir 2011). Furthermore, many researchers reported that individuals' with low agreeableness tend to be strongly associated with high risk propensity in different domains (Schmitt 2004; van Dam et al. 2005; Terracciano et al. 2008). However, Lee et al. (2005) pointed out that agreeableness trait is moderately linked to risk propensity behaviours. Furthermore, Lee & Ashton (2004) suggested four facets to describe the agreeableness: forgiveness, gentleness, flexibility, and patience. According to West & Hall (1997), individuals' with low agreeableness are more inclined towards accepting challenge and have high risk propensity due to their stubbornness and not considering their risky decisions consequences on others'. Thus, it could be assumed that project managers' with low agreeableness tend to have higher risk propensity and be more risk-seekers. Additionally, agreeableness trait will be measured as a multi-dimensional variable consisting of the following eight facets: forgiveness, gentleness, flexibility, patience, trust, morality, altruism and sympathy. Moreover, high agreeableness might influence project managers' risk propensity making them more of risk-averse when deciding matters related to project success due to their patience with the status quo. Conversely, project managers' with low agreeableness might have higher risk propensity and tend to be more risk-seekers where they might engage in risky behaviours related to project success criteria due to their stubbornness and insistence of doing things their own way. Also project managers' demographic might influence the effect of emotionality on project managers' risk propensity in relation to project success. Section 6 include an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1D: there is no difference on rating agreeableness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2D: demographic factors will influence respondents' mean rating of agreeableness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3D: agreeableness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4D: demographic factors will have an influence on the relationship between agreeableness traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

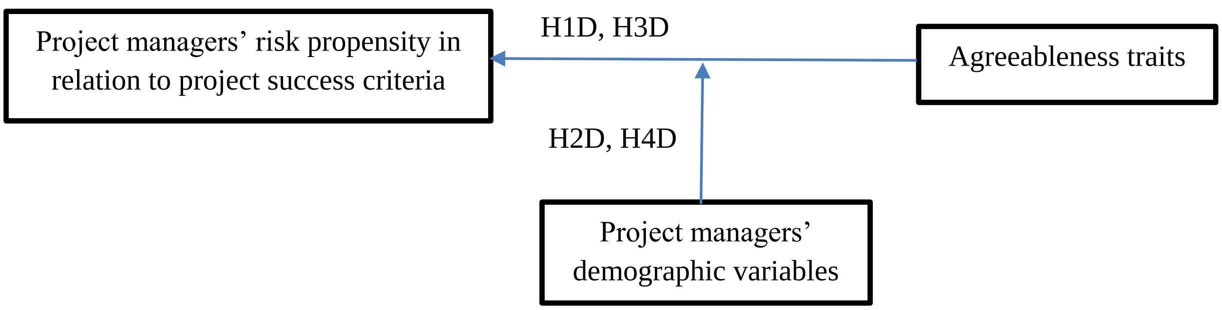


Figure 4.6: Agreeableness traits hypotheses.

4.5.5 Conscientiousness

According to Weller & Tikir (2011), conscientiousness trait refers to individuals' who are organized, accurate, careful and disciplined. Also, conscientiousness is linked to traits such as: hard work, caution and meticulousness. Moreover, conscientiousness is associated with task-based activities where individuals' with high conscientiousness considerately calculate the risks and benefits of any activity resulting in having low tendency for taking risky decisions. However, individuals' with low conscientiousness tend to be more chaotic, irresponsible and more inclined to take risky decisions (Trobst et al. 2000; Terracciano & Costa 2004; Terracciano et al. 2008). Furthermore, Lee & Ashton (2004) suggested four facets to describe conscientiousness: organization, diligence, perfectionism, and prudence. According to Hogan & Ones (1997), individuals' with high conscientiousness are more inclined to be risk-averse where their achievement desire is limited to situations that they highly control. Moreover, individuals' with high conscientiousness will seek to achieve benefits through systematic and disciplined efforts rather through getting involved in risk-taking behaviours (Nicolson et al. 2005). Additionally, conscientiousness trait will be measured as a multi-dimensional variable consisting of the following eighteen facets: organization, diligence, perfectionism, prudence, competence, achievement-striving, self-discipline, availability, confirmation, familiarity, scale, consistent, representativeness, forward-thinking, estimating probabilities, chain-processes, scenario-bias and redundant-inputs. Moreover, high conscientiousness will influence project managers' risk propensity making them more of risk-averse when dealing with risks that relate to project success criteria since they seek to have all things in order and be disciplined and cautious in dealing with changes. Conversely, project managers' with low conscientiousness might have higher risk propensity where they tend to be more risk-seekers and might engage in risky behaviours related to project success criteria due to having low self-discipline and being less cautious. Also project managers' demographic variables might influence the effect of emotionality on project managers' risk propensity in relation to project success. Section 6 includes an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1E: there is no difference on rating conscientiousness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2E: demographic factors will influence respondents' mean rating of conscientiousness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3E: conscientiousness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4E: demographic factors will have an influence on the relationship between conscientiousness traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

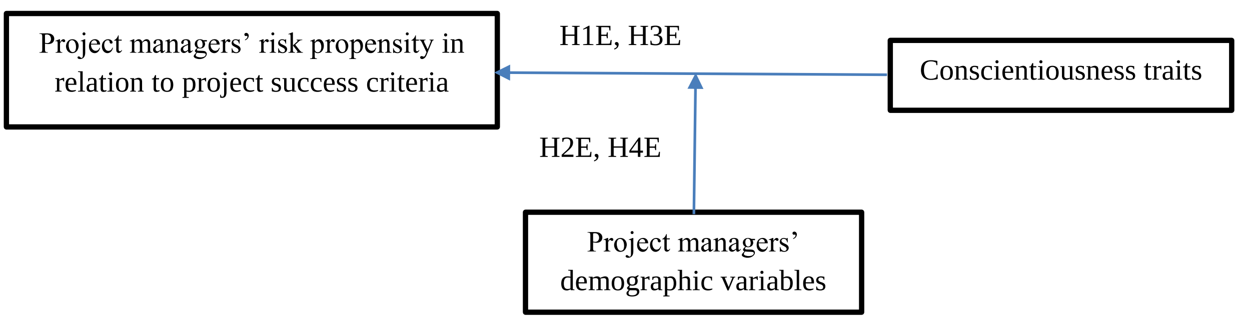


Figure 4.7: Conscientiousness traits hypotheses.

4.5.6 Openness to experience

The openness trait refers to individuals' being open for new ventures and experiences where they tend to be creative, innovative, originality and unconventional (Weller & Tikir 2011). On the other hand, individuals' with low openness tend to be uncreative, less intrusive and more conservative. Also, it is important to note that openness to experience dimension include intellect facet relating to intellectual curiosity and inquisitiveness and not to intelligence as a mental ability. Moreover, Lee & Ashton (2004) pointed out that general mental intelligence is a matter of cognitive ability related to non-personality construct opposite of inquisitiveness which is a matter of behavioural tendency related to personality constructs. Moreover, Ashton & Lee (2007) postulated that openness to experience trait is associated with tendency to engage in taking risky decisions that result in acquiring new experiences. Although many researchers pointed out the positive relationship between openness and risk-seeking behaviours (Lee et al. 2005; Nicholson et al. 2005; Terracciano et al. 2008); others stated that there is no evidence on the existence of such a relationship (Trobst et al. 2000;Terracciano & Costa 2004). Furthermore, Lee & Ashton (2004) suggested four facets to describe the openness to experience: aesthetic appreciation, inquisitiveness, creativity, and unconventionality. According to McCrae & Costa (1997), openness to experience is equal and complimenting to other traits such as: venturesomeness, experimentation, ambiguity tolerance and innovation. Additionally, openness to experience trait will be measured as a multi-dimensional variable consisting of the following seven facets: inquisitiveness, creativity, unconventionally, imagination, intellect, liberalism and variety-seeking. Moreover, low openness to experience might influence project managers' risk propensity making them more of risk-averse when dealing with risks that relate to project success criteria since they like following conventional methods and have little intellectual curiosity as well as less desire for exploring options. Conversely, project managers' with high openness for experience might have higher risk propensity where they tend to be more risk-seekers and might engage in risky behaviours related to project success criteria due to seeking varieties in options and having high creative and liberal thinking. Also, project managers' demographic variables influence the effect of emotionality on project managers' risk propensity in relation to project success. Section 6 includes an elaboration of these moderator variables. Based on the above, the following hypotheses were formulated:

H1F: there is no difference on rating openness to experience traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H2F: demographic factors will influence respondents' mean rating of openness to experience traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).

H3F: openness to experience traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

H4F: demographic factors will have an influence on the relationship between openness to experience traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).

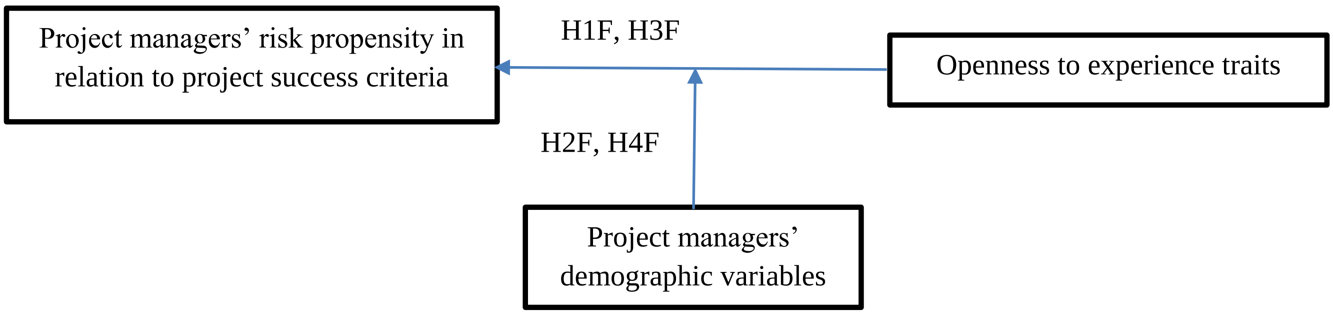


Figure 4.8: Openness to experience traits hypotheses.

Therefore, it can be concluded from the above that the traits of extraversion and openness to experience might have positive relationship with risk propensity where project managers' possessing high levels of these traits might high risk propensity levels and tend to be risk-seekers where they are more inclined to take risky decisions that might positively impact project success criteria. Conversely, the traits of honesty/humility, agreeableness and conscientiousness might have negative relationship with risk propensity and project managers' possessing high levels of these traits might tend to have low risk propensity and tend to be risk-averters where they are more inclined to avoid taking risky decisions that might impact project success criteria. Figure 4.9 summarizes generic description for all above-mentioned personality traits that were used in the research framework.

Honesty/humility	Emotionality	Extraversion	Agreeableness	Conscientiousness	Openness to Experience
Sincerity: assesses genuinely relating to others.	**Fearfulness:** assesses tendency to fear.	**Expressiveness:** assesses tendency to be passionate and intense in communicating with others.	**Forgiveness:** assess willingness to forgive and trust others again.	**Organization:** assesses tendency for being organized and ordered.	**Inquisitiveness:** assess tendency to seek information and experience things.
Fairness: assesses tendency to avoid dishonesty.	**Anxiety:** assesses tendency to being worry in different contexts.	**Social boldness:** assesses being comfortable in social situations.	**Gentleness:** assesses tendency to be unimportant and soft in dealing with others.	**Diligence:** assesses tendency for working hard.	**Creativity:** assesses tendency for experimentation and innovation.
Greed-avoidance: assesses tendency to be not interested in luxurious and high status possessions.	**Dependence:** assesses need for emotional support.	**Sociability:** assesses tendency to enjoy social interactions.	**Flexibility:** assesses willingness to cooperate and offer compromises.	**Perfectionism:** assesses tendency for being detailed and thorough.	**Unconventionally:** accept tendency for accepting the unusual.
Modesty: assesses tendency to be modest and ordinary.	**Sentimentality:** assesses tendency to have strong emotions with others.	**Liveliness:** assesses energy and excitements.	**Patience:** assesses tendency for being calm and not losing temper quickly.	**Prudence:** assesses tendency to be deliberate, cautious and careful.	**Imagination:** tendency to be imaginative.
Kindness: sharing credit with others.	**Anger:** assesses tendency to be angry and frustrated.	**Assertiveness:** assesses tendency to be socially forceful in expression and actions.	**Trust:** tendency to be sincere with others.	**Competence:** belief in own self-efficacy.	**Intellect:** tendency for intellectual curiosity.
Amiability: tendency to be indecisive and following to others.	**Depression:** assesses tendency of feeling sad and lonely.	**Excitement-seeking:** tendency for being stimulated by surrounding.	**Morality:** tendency to be frank and straightforward with others.	**Achievement-striving:** need for personal achievement.	**Liberalism:** tendency to examine current values and readiness to change.

Hindsight: tendency to predict decision outcomes.	**Self-conscientiousness:** assesses tendency to be shy and socially anxious.	**Cheerfulness:** tendency to experience positive emotions.	**Altruism:** tendency to be concerned about others' wellbeing.	**Self-discipline:** tendency to finish tasks in spite of being bored.	**Variety-seeking:** tendency to experiment new things.
Competitiveness: tendency to compete with others.	**Impulse control:** assesses tendency to pursue desires without thinking.	**Optimism:** tendency to be optimistic.	**Sympathy:** tendency to feel with others and agree with them.	**Cautiousness:** tendency to think thoroughly before acting.	
	Vulnerability: assess general weakness to stress.	**Confidence:** tendency to be confident about decisions.		**Availability:** assess dependency of making decisions based on past experiences.	
	Harm-avoidance: assess tendency to avoid causes of harm or unpleasantness.	**Halo effect:** tendency to exaggerate the consequences of decisions.		**Confirmation:** tendency to take decisions that confirm self-beliefs.	
	Cognitive dissonance: tendency to hold conflicting beliefs, values and emotional reactions.	**Framing:** tendency to be neutral when making decisions.		**Familiarity:** tendency to make decisions based on previous familiar situations.	
	Expected emotions: tendency to take risk decisions to experiment the feeling.			**Scale:** tendency to ignore consequences while making decisions.	
	High benefits: tendency to take risk decisions that			**Consistent:** tendency to be consistent when	

	conform to self-perceptions.			making decisions.	
				Representativeness: Tendency to consider correlations between different events.	
				Forward-thinking: tendency to take decisions for longer term objectives.	
				Estimating probabilities: tendency to use simple experimental methods when making decisions.	
				Chain processes: tendency to consider the interaction between all contextual decision variables.	
				Scenario bias: tendency to consider broad range of possibilities when making decisions.	
				Redundant inputs tendency to map event determinants to outcomes.	

Figure 4.9: Generic descriptions and relationships of personality traits related to risk propensity.

The traits listed in the table above were interpreted in a project management context and described in statements used in the research survey so that they reflect project managers' tendency for taking risky decisions (risk propensity) in relation to project success criteria (scope, time and cost) during execution phase. Figure 4.10 includes list the traits, their relevant statements and references.

Honesty/Humility traits		**References**
Sincerity	I would not please others to get my risky decisions approved.	IPIP (2016), Lee &Ashton (2008)
Fairness	I follow company rules no matter what are the consequences.	IPIP (2016), Lee &Ashton (2008)
Greed-Avoidance	I would not take risky decisions for the sake of impressing others.	IPIP (2016), Lee &Ashton (2008)
Modesty	I often think that my risky decisions are better than others' risky decisions.	IPIP (2016), Lee &Ashton (2008)
Kindness	I tend to be kind to others' even if they are not kind to me.	IPIP (2016), Peterson & Seligman, (2004)
Amiability	I would not get offended if others' opposed my risky decisions.	IPIP (2016), Goldberg et al. (2006)
Hindsight	I am inclined to see the risk event as having been predictable after its occurrence.	Boussabaine (2014)
Competitive	I enjoy competing with others when taking risky decisions.	IPIP (2016), Gough (1990)
Emotionality traits		
Fearfulness	I feel fear when thinking about the consequences of my risky decisions.	IPIP (2016), Lee &Ashton (2008)
Anxiety	I get upset by unpleasant thoughts that come into my mind when thinking	IPIP (2016),

	about my risky decisions.	Lee &Ashton (2008)
Dependence	I feel I need reassurance from others' when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Sentimentality	I tend to feel others' emotions when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Anger	I easily get angry if others' opposed my risky decisions.	IPIP (2016), Costa & McCrae (1992)
Depression	I feel down when thinking about the consequences of my risky decisions.	IPIP (2016), Costa & McCrae (1992)
Self-consciousness	I feel I am able to stand up for myself and defend my risky decisions.	IPIP (2016), Costa & McCrae (1992)
Impulse-control	I keep my emotions under control when taking risky decisions.	IPIP (2016), Hogan & Ones (1997)
Vulnerability	I can easily become overwhelmed by risk events when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Harm avoidance	I would avoid taking risky decisions that might possibly harm project success.	IPIP (2016), Costa & McCrae (1992)
Cognitive dissonance	I tend to encounter conflicting beliefs, values and emotional reactions when taking risky decisions.	Boussabaine (2014)
Expected emotions	I would take risky decisions so that I can find out how their outcome will make me feel.	Boussabaine (2014)
High benefits	I would take risky decisions based on my perceptions that high project benefits could be achieved.	Boussabaine (2014)
Extraversion traits		
Expressiveness	I can easily express myself using different words when explaining my risky decisions.	IPIP (2016), Lee &Ashton (2008)

Social Boldness	I feel comfortable taking risky decisions in a group.	IPIP (2016), Lee &Ashton (2008)
Sociability	I enjoy debating my risky decisions with others.	IPIP (2016), Lee &Ashton (2008)
Liveliness	I tire out quickly when discussing my risky decisions.	IPIP (2016), Lee &Ashton (2008)
Assertiveness	I take charge and try leading others' when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Excitement- seeking	I can be reckless and act wildly when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Cheerfulness	I try to radiate joy among others' when discussing risky decisions.	IPIP (2016), Costa & McCrae (1992)
Optimism	I look at the bright side of suggested risky decisions.	IPIP (2016), Scheier et al. (1994)
Confidence	I tend to be confident about my risky decisions outcomes.	IPIP (2016), Peterson & Seligman, (2004)
Halo effect	I tend to enlarge the consequences of my risky decisions.	Boussabaine (2014)
Framing	I frame risk problems in a neutral way.	Boussabaine (2014)
Agreeableness Traits		
Forgiveness	I am inclined to forgive and forget those who oppose my risky decisions.	IPIP (2016), Lee &Ashton (2008)
Gentleness	I avoid criticizing others' shortcomings when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Flexibility	I can adjust my risky decisions based on others' feedback.	IPIP (2016), Lee &Ashton (2008)
Patience	I am usually a patient person when taking risky decisions.	IPIP (2016),

		Lee &Ashton (2008)
Trust	I trust others' and believe in their good intentions when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Morality	I observe societal ethical standards when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Altruism	I provide comfort and support to others' when taking risky decisions.	IPIP (2016), Costa & McCrae (1992)
Sympathy	I sympathize with others' who oppose my risky decisions.	IPIP (2016), Costa & McCrae (1992)
Conscientiousness Traits		
Organization	I prefer a structured approach for taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Diligence	I tend to push myself very hard to succeed in taking the right risky decisions.	IPIP (2016), Lee &Ashton (2008)
Perfectionism	I thoroughly check all details before taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Prudence	I consider my options carefully and tend to be cautious and self-controlled when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Competence	I rely on my knowledge and abilities to make appropriate risky decisions.	IPIP (2016), Gough (1990)
Achievement-striving	I try to turn risky decisions into actions.	IPIP (2016), Costa & McCrae (1992)
Self-discipline	I go straight for discussing risky decisions goals without wasting time.	IPIP (2016), Costa & McCrae (1992)
Availability	I depend on my past experiences when taking risky decisions.	Boussabaine (2014)

Confirmation	I look at reasonable sources of evidence when taking risky decisions.	Boussabaine (2014)
Familiarity	I take risky decisions based on previous familiar situations.	Boussabaine (2014)
Scale	I consider risks impact and magnitude when taking risky decisions.	Boussabaine (2014)
Consistent	I tend to have a consistent approach for taking risky decisions across the project time frame.	Boussabaine (2014)
Representativeness	I draw conclusions based on small number of past experiences when taking risky decisions.	Boussabaine (2014)
Forward-thinking	I take risky decisions that allow for the achievement of long term objectives.	Boussabaine (2014)
Estimating probabilities	I use simple experimental methods in estimating risk probabilities when taking risky decisions.	Boussabaine (2014)
Chain processes	I examine the interaction between all contextual variables when taking risky decisions.	Boussabaine (2014)
Scenario bias	I cover broad range of possibilities when taking risky decisions.	Boussabaine (2014)
Redundant inputs	I map risk causes to outcomes when taking risky decisions.	Boussabaine (2014)
Openness to Experience Traits		
Inquisitiveness	I can read challenging material if it is relevant to my risky decisions.	IPIP (2016), Lee &Ashton (2008)
Creativity	I look for creative response strategies when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Unconventionality	I am receptive to ideas that might seem strange or radical when taking risky decisions.	IPIP (2016), Lee &Ashton (2008)
Imagination	I enjoy daydreaming about the consequences of my risky decisions.	IPIP (2016), Costa & McCrae (1992)
Intellect	I like making complex risky decisions.	IPIP (2016), Costa & McCrae (1992)

Liberalism	I tend to believe that there is no absolute right or wrong risky decisions.	IPIP (2016), Costa & McCrae (1992)
Variety-seeking	I seek adventure through exploring variety of solutions when taking risky decisions.	IPIP (2016), Hogan & Ones (1997)

Figure 4.10: Traits descriptions within project management and risky decisions context.

4.6 Individual characteristics influencing project managers' risk propensity

According to Schwer & Yucelt (1984) risk propensity vary for persons with different socioeconomic individualities. Below is a brief description on important individual factors and characteristics that might moderate the influence of personality traits on project managers' risk propensity and their tendency to take risky decisions.

4.6.1 Demographic Determinants:

4.6.1.1 Age

According to Kogan & Wallach (1964); age differences impact risk-taking tendency. Furthermore, MacCrimmon & Wehrung (1986) did a study on 509 high level executives from Canada and the United States and reported that older executives had lower risk propensity where they tend to be risk-averse. However, Cohn et al. (1975) reported that older individuals' might have higher risk propensity and inclined to be more risk-seekers. Similarly, Pavic & Vojinic (2012) postulated that older executives are more risk-seekers compared to younger executives. Also, some researchers emphasized that the age-risk relationship is determined by many other behavioural variables that correlate with age (Fischhoff 1992). Moreover age will be measured as a continuous variable where participants will ask to select the bracket of where age fits.

4.6.1.2 Gender

Kogan & Wallach (1964) reported that females have less risk propensity than males where they tend to be more risk averse when they are unsure of their risky decisions outcomes and less risk averse when they are sure of their risky decisions outcomes. Additionally, Slovic (1964) pointed out that females tend to be more risk-averse as they age more than males where he claimed that females are more biased towards certainty-seeking. Similarly, many researcher emphasized the effect of gender differences on risk propensity and behaviours (Kogan & Wallach 1964; Higbee & Lafferty 1972; Bromiley & Curley 1992; Fischhoff 1992). However, Pavic & Vojinic (2012) reported that gender variable was statistically insignificant which suggest that there is no difference in risk-taking behaviours between males and females. Moreover, gender will be coded as 1 for male and 2 for female.

4.6.1.3 Education

According to MacCrimmon & Wehrung (1986); individuals' with lower level of education have lower risk propensity where they tend to be more risk averse than those of higher level of education. Similarly, MacCrimmon & Wehrung (1986) pointed out that managers with higher education have higher levels of risk propensity where they are inclined to seek risks than those of lower education. On the other hand, McInish (1982) reported lack of evidence on relationship between education and risk propensity. Similarly, Pavic & Vojinic (2012) concluded that managers' with higher education are more risk-takers than those of lower level of education. Moreover, education will be coded as 1 (completed high school), 2 (completed college), and 3 (completed post graduate studies).

4.6.1.4 Nationality

Ronen (1986) stated that national culture should be considered as a major factor that influence decision making process in risky situations. Similarly, Farmer & Richman (1965) that social and cultural factors could be considered as risk determinants where they emphasized that cultural acceptance affect risk perceptions. Certain cultures may show more tendencies for being risk averse than other cultures. For example, executives from Greece and Central Europe are more risk averse in comparison to executives from Spain who are also more risk averse than executives from the United States. (Cummings, Harnett & Stevens 1971). In line with the above, Harnett & Cummings (1980) found that European executives are more risk averse than US executives. Additionally, Bass & Burger (1979) reported that U.S and Japanese executives have higher tendencies for risk than executives from other cultures. On the other hand, some scholars claimed that national culture is not to be considered as a risk determinant. Moreover, MacCrimmon & Wehrung (1986) found no substantial variances in risk propensity levels between US and Canadian executives. Similarly, Hopkins et al (1977) found no significant differences between Japanese and US executives risk propensity levels. Although there is still no consensus among scholars on considering national culture as a determinant influencing risk propensity; when all the above findings are taken together; there is strong indicate that national culture can be considered as a determinant influencing individuals' tendency to take risky decisions. Consequently, the purpose of this research is to study the effect of national culture on risk propensity and risk perception. Moreover, nationality will be coded where participants will be asked to indicate their nationality.

4.6.1.5 Dependents

Pavic & Vojinic (2012) reported a positive relationship between risk propensity and number of managers' dependents. Furthermore, project managers' with lower dependents (or no dependents) have higher risk-taking propensity than those with higher dependents. Moreover, managers' with more dependents will need to consider the consequences of their decisions on their dependents; thus they might be inclined to have lower risk propensity and be more of risk-averters (MacCrimmon & Wehrung 1990). Moreover, dependents will be coded where participants will be asked to indicate the number of their dependents.

4.6.2 Work-related Determinants

4.6.2.1 Experience level

According to MacCrimmon & Wehrung (1986); executives with greater experience tend to have lower levels of risk propensity and be more risk averse since they are more inclined to try tested options and would be unlikely to take risky decisions. Additionally, experience can be measured using the tenure and length of employment; i.e. number of years in occupied position and number of total years within the organization. Moreover, experience will measured as a continuous variable where participants will be asked to indicate their experience years.

4.6.2.2 Position

According to MacCrimmon & Wehrung (1986); executives with greater authority and closer to top management tend to have higher level of risk propensity and be more of risk-seekers. Similarly, Swalm (1966) reported that risk-averse risk behaviours are usually associated with lower-level positions than higher-level positions. Moreover, respondents'' current position will be measured as a categorized variable coded as follows:1 as project manager, 2 as engineer, 3 as functional manager, 4 as consultant, 5 as administrator.

4.6.3 Organizational Determinants

4.6.3.1 Industry nature

Laughhunn et al. (1980) claimed that individuals' tendency to take risks varies according to the industry such as in banking; where bank managers usually have lower risk propensity levels and are more risk-averse than managers in other industries. However, MacCrimmon & Wehrung (1986) reported the insignificance difference in risk propensity among managers from industries such as manufacturing and petrochemicals. Moreover, nature of industry will be measured as a categorized variable coded as follows:1 as manufacturing, 2 as information technology, 3 as transport, 4 as advertising, 5 as hotel, 6 as trading, 7 as banking, 8 as consulting, and 9 as other.

4.6.3.2 Organization type

According to Williams & Narendran (1999), managers' in non-government organizations have higher levels of risk propensity and are more risk-seekers than those in government ones. Additionally, managers' in government organizations are usually limited in their decision-making options due to high bureaucratization and formal procedures (March & Shapira 1987). Moreover, organization type will be measured as a categorized variable coded as follows: 1 for government, 2 for semi government, 3 for private, and 4 for not-for-profit.

4.6.3.3 Organizational size

According to Begley & Boyd (1987); managers' in small organizations tend to have higher levels of risk propensity and are more risk seekers than their colleagues in large organizations.

Similarly, MacCrimmon & Wehrung (1986) pointed out the relationship between risk propensity and organization size claiming that managers' in large organizations' have lower risk propensity levels and are more of risk-averters than those in smaller ones. Moreover, this inverse relationship between organization size and tendency to take risky decisions could be the result of bureaucratic and formal procedures in large organizations that decrease managers' influence on decisions-under-risk. Moreover, organizational size will be measured as a categorized variable coded as follows: 1 (99 employees or less), 2 (100-499 employees), 3 (500-999 employees), 4 (1,000-4,999 employees), 5 (5000 employees or more).

4.6.3.4 Organizational risk

According to Williams & Narendran (1999), the higher the organization tolerance for accepting risks; the higher would be the managers' tendency in taking risky decisions. Thus, managers' tend to adopt the same risk-attitude as that of their organizations. Moreover, Douglas & Wildavsky (1982) pointed out that managers' risk values are influenced by the organizational risk preferences towards being risk-averse or risk-seeking. Similarly, Schein (1985) suggested that managers' who perceive their organization as having high risk propensity and risk-seeking attitude will have higher tendency to take risky decisions.

4.7 Project success criteria influenced by project managers' risk propensity

The study major question is how project managers' personality traits can influence their risk propensity; i.e. their tendency to take risky decisions related to project success criteria. Additionally, the study addresses whether project managers' personality traits influence on their risk propensity will remain stable and consistent across all project success criteria domains or is it domain-specific. Therefore, the study aims at analyzing the causal relationship between project managers’ risk propensity and project success criteria domains. Additionally, since the unit of analysis is the project manager; the decision was taken to limit project success to project success criteria and exclude product success criteria. Furthermore, project managers such as: project managers, project expeditors, project coordinators have certain level of control on project management domains; such as: scope, time and cost. However, project managers’ control over the product project success and benefit realization is very limited since project managers’ job ends with closing the project and project benefits could be realized long time after project product delivery. Additionally, the study focus is on project success criteria and not success factors. Furthermore, Collins & Baccarini (2003) differentiated between project success criteria and project success factors by referring to success criteria as means for measuring project success while success factors as means to enable the attainment of success. Also, project success criteria can be broken down into two components: project management success and project product success. Furthermore, Collins & Baccarini (2003) listed three aspects for achieving project management success:

- Achieving triple constraints requirements (scope, time and cost).
- Ensuring the quality of project management processes.
- Achieving project stakeholders (primarily project team and owner) needs satisfaction.

As for project product success; Collins & Baccarini (2003) stated that achieving product success is linked to the final project product effects; such as: achieving project owners’ strategic organizational goals and satisfaction of project product users’ needs.

Based on the literature review in chapter two related to project success criteria and the above mentioned aspects, the researcher decided to limit project success to project domains that can be influenced by project managers'; specifically: scope, time, cost. Also the reason for choosing the project success criteria as area of this study focus is because project success can influence project product success and not vice versa (Baccarini 1999). Also, project product success is affected by time where product success can be judged over years after project completion. On the other hand, project success can be judged over shorter period of times of whether the project has successfully met the project constraints requirements. Hence, the survey will include project the three most important project success criteria as discussed above; i.e. triple constraints: scope, time and cost. However, other success criteria will be included in the dependency structure analysis; specifically: quality, resources, risk and stakeholder satisfaction.

4.8 Proposed research theoretical framework

The research theoretical framework proposes a causal relationship between project managers' personality traits and their risk propensity in relation to project success criteria. Additionally, project managers' personality traits will be considered as independent variables that includes traits/facets that relate to project managers' risk propensity where they will be clustered under five global factors: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Furthermore, each of these global factors will include specific traits related to risk propensity as listed in figure 10. However, there will be demographic moderator variables that will influence the effect of these traits on project managers' risk propensity. Also, the moderator variables will be clustered around three factors: demographic, work-related and organizational. As for the dependent variable; it will be the project managers' risk propensity in relation to project success criteria. Hence, and based on the above literature review and hypotheses formulation; figure 4.11 displays a suggested research theoretical framework diagram.

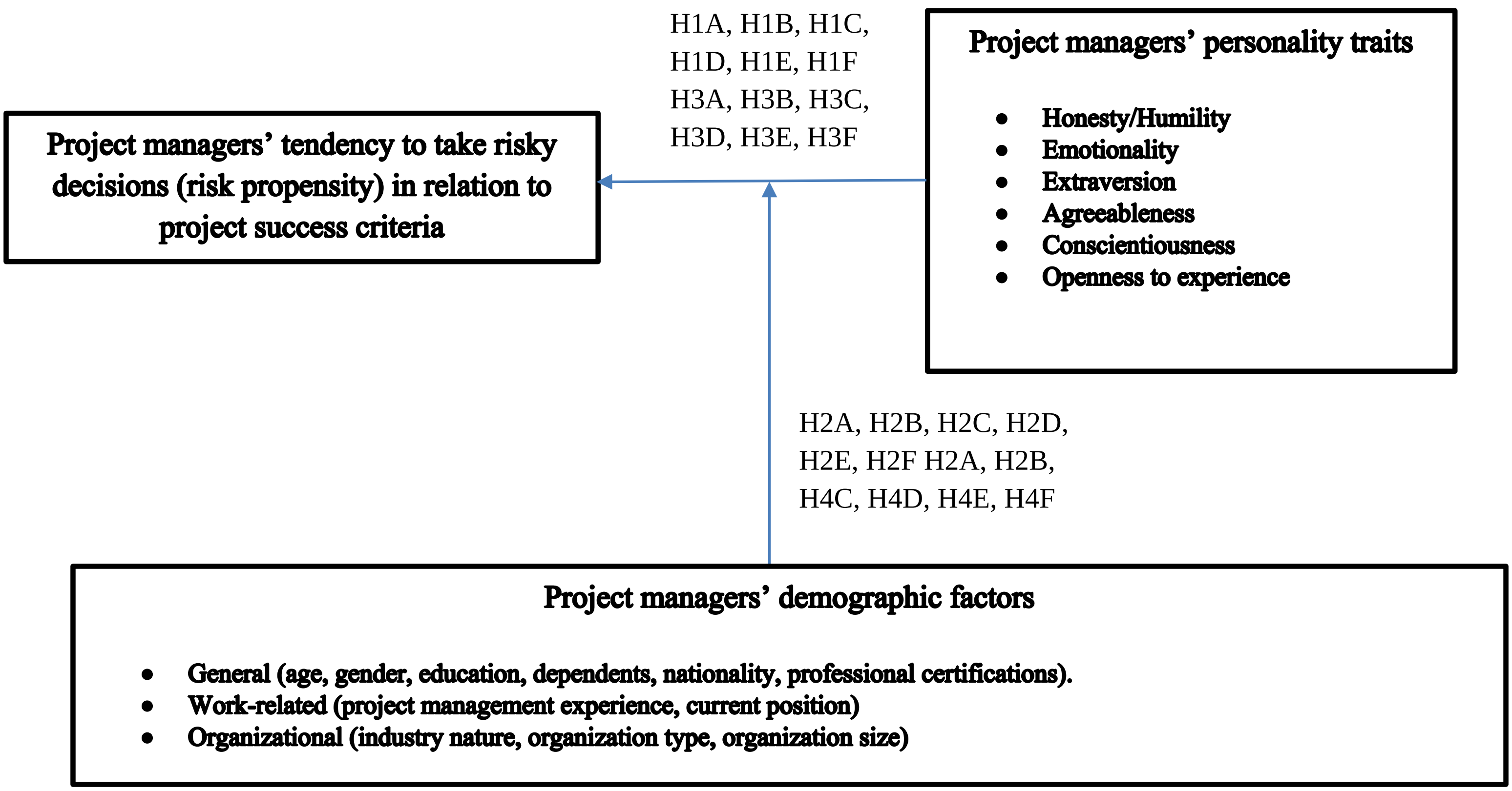


Figure 4.11: Research theoretical framework.

4.9 Summary

There were many key findings in this chapter. First, research major question and conceptual framework were designed based on extensive literature review done in previous chapters. Second, it framed risk propensity within the project management context. Third, it extracted the personality traits that could influence project managers' risk propensity in relation to project success criteria. Fourth, it extracted individual characteristics that might influence the relationship between project managers' traits and their risk propensity. Fifth, it designed all hypotheses between research independent and dependent variables. Last, it ended with a proposed theoretical research framework of the influence of project managers' traits on their risk propensity in relation to project success criteria.

5 Chapter Five: Research Methodology

5.1 Introduction

This chapter discusses the research methodology that was followed during the study where it highlights the adopted research philosophy, paradigm, approach and methods. Additionally, the chapter includes comparison of different tools that were used for measuring individuals' risk propensity. Also, there is discussion on the questionnaire design, structure and questions types. Furthermore, the chapter includes feedback received from relevant academicians on questionnaire validation and amendments based on the feedback. Moreover, the chapter includes discussion on several statistical analyses techniques that were used to analyze the collected data as well as elaboration on the dependency structural analysis that was used for investigating the dependencies between project managers' personality traits and project success criteria. Finally, the layout for the applied research process is presented, discussion on the sample composition and size, pilot study, ethical considerations and limitations.

5.2 Research philosophy

According to Carr (2006), methodology refers to principles and theoretical rationale which justifies the most appropriate research methods for the studied field. Furthermore, research methodology is usually based on a certain philosophy which is considered as a form of a priori theoretical knowledge. Therefore, the methods used in any research should be justified by a research methodology which is also justified by the research philosophy. Saunders et al. (2016) mentioned that the thinking basis for research topic can be either rational or creative thinking. Additionally, using both thinking techniques will ensure that the researcher will engage both their heads and hearts into the research. Furthermore, rational thinking could be considered more of an objective approach that includes searching for research topic using existing resources such as available literature on past research. On the other hand, creative thinking is more of a subjective approach which depends more on thinking about the research outside the box using techniques such as brainstorming. Figure 5.1 includes some examples on rationale and creative thinking techniques.

Rational thinking	Creative thinking
• Examining your own strengths and interests	• Keeping a notebook of ideas
• Looking at past project titles	• Exploring personal preferences using past projects
• Discussion	• Relevance trees
• Searching the literature	• Brainstorming
• Scanning the media	

Figure 5.1: Thinking bases used for generating research topics (Saunders et al. 2016, p. 31).

The researcher thinking basis about the research will also influence the adopted research philosophy. According to the Oxford Dictionary (2001), philosophy could be defined as the study relating to the essentials of knowledge, realism and existence. Additionally, the lack of research philosophy when designing research will adversely impact research outcomes and quality (Easterby-Smith et al. 2012). Furthermore, the adopted research philosophy reflects the researcher perceptions and views of the surrounding world which ultimately will influence the chosen research strategies and methods for the study. Moreover, Johnson & Clark (2006) pointed out that researchers philosophical backgrounds affect research strategy and their understanding of the investigated research topic. Additionally, Bryman & Bell (2015) stated two research thinking philosophies: ontology and epistemology. Also, Tashakkori &Teddlie (1998) suggested that researchers should not consider research philosophy as two opposite sides of ontology versus epistemology, qualitative versus quantitative, or interpretivism versus positivism but rather as a philosophy continuum. Additionally, Saunders et al. (2016) defined ontology as the nature of reality relating it to researchers' assumptions about the way the world works. Furthermore, there are two aspects of ontology: objectivism and subjectivism where objectivism refers to individuals' belief that social entities exist in reality that is external and independent of individuals; whilst, subjectivism refers to understanding social phenomena through individuals' perceptions and meanings (Bryman & Bell 2015). On the other hand, epistemology is related to what is considered as acceptable knowledge in a particular field of study (Saunders et al. 2016). While, ontology has to do with how researchers' view their surrounding world; epistemology has to do with how to enquire into reality (Easterby-Smith et al. 2012). Furthermore, Bryman (2012) referred to epistemology as a knowledge theory while Neuman (2011) referred to it as the philosophical background for knowledge creation in certain field of study. Hence, epistemology can be referred to as the knowledge on how we got knowledge about certain area of study. Additionally, Kinght & Turnbull (2008) categorized epistemology into classical and modern epistemology where classical epistemology is concerned with addressing general issues such as politics and morals. On the other hand, modern epistemology is concerned with deriving knowledge within natural sciences contexts which is referred to as positivism.

5.2.1 Positivism

Remenyi et al. (1998) pointed out that researchers who adopt positivism research philosophy reflects a natural scientist position where they prefer working with facts and real data. Furthermore, Saunders et al. (2016) stated that positivists are "resources" researchers who collect research data through observations and using existing theories for developing research hypotheses that can be tested resulting in further theory developments. Additionally, positivist researchers' are usually characterized with being factual, real and objective individuals' (Saunders et al. 2016). Also, Bryman (2012) pointed out that positivist researchers tend to conduct research in an objective manner while observing reality and separating themselves from the subject of study. Therefore, positivist researchers' claim that they are external to the data collection process and their influence on the data sources is minimal. Hence, positivist researchers' will be independent and neutral when collecting the data without being affected or affecting the research subject; i.e. the project manager (Remenyi et al. 1998). Furthermore, Gill & Johnson (2010) emphasized that positivist researchers' depend on highly structured research methodology so that reproduction can be facilitated. Therefore, positivist researchers usually depend on quantitative methods and statistical analysis when collecting data for their research (Bryman & Bell 2015) where positivism characteristics will be evident when testing the research hypotheses. Similarly, Neuman (2012) mentioned that positive epistemological philosophy is applied through using methods that are related to natural sciences research. Nevertheless, Gill & Johnson (2010) pointed out the trouble of applying natural sciences methods to social sciences due to difficulty in directly observing the phenomenon and difficulty for testing theory through data collection. Additionally, Easterby-Smith et al. (2012) claimed that positivism epistemology is not much appropriate for social sciences research since it only focus on the soft elements of social sciences such as individuals' behaviour and thoughts and suggested interpretivism as a replacement for positivism in social sciences research. Also, Easterby-Smith et al. (2012) emphasized the aim of positivism research philosophy to generate theories where they can be tested objectively through comparing them with facts and generalized by having an appropriate sample of the studied population. However, Bryman (2012) stated that positivism approach is limited to knowledge development based on facts; which depends on having prior ontological assumptions. Another philosophical position that relates to positivism is realism which relates to the question of whether researched objects exist independent of researchers' knowledge of their own existence (Saunders et al. 2016). Thus, realism relates to scientific enquiry in which researchers' see reality through their senses and researched objects exist independently from researchers' mind. Hence, both positivism and realism approach knowledge development through scientific approaches.

5.2.2 Interpretivism

According to Saunders et al. (2016) interpretivism can be referred to as understanding the differences among individuals' in their roles as social actors. Furthermore, interpretivism philosophy highlights the need to conduct research on individuals' rather than on objects. Moreover, interpretivism is based on cerebral thoughts: phenomenology (making sense of the surrounding world) and symbolic interactionism (continually interpreting the surrounding social world) where humans' adjust their emotions based on their own feelings about their interpretations of the social world (Bryman & Bell 2015). Additionally, interpretivism can be looked at as the contrast for positivism where it focuses on understanding individuals' behaviour rather than focusing on explaining that behaviour as is the case with positivism (Bryman 2012). According to Saunders et al. (2016), interpretivist researchers are more of "feelings" researchers who focus on individuals' attitude and feelings rather than being "resources" researcher as with the positivist researchers. Therefore, under interpretivism philosophy reality reflects subjectivity and not separated from researcher existence (Easterby-Smith et al. 2012). Consequently, interpretivist researchers aim more at analyzing individuals' behaviours and experiences rather than explaining its causes. Therefore, interpretivist researchers derive knowledge by using qualitative data through a prior ontological subjective assumptions (Bryman 2012). Furthermore, positivism and interpretivism epistemologies philosophies can be linked to empirical and theoretical research. According to Remeny et al. (1998), theoretical research is usually done through analyzing other researchers work and drawing conclusions so it is based on secondary data. On the other hand, empirical research is done through analyzing primary data collected by the researcher. In addition to positivism and interpretivism epistemology philosophies, there is another philosophical aspect that need to be considered when conducting the research; that is axiology. According to Saunders et al. (2016), axiology refers to the influence of researchers' values on research choices. Furthermore, understanding axiology is important where individuals' values can be used to understand and guide their actions and behaviours. Moreover, Heron (1996) postulated that researchers' establish their axiological skills through using their values as foundation for making choices and judgements about the research and its strategy.

5.2.3 Pragmatism

Guba & Lincoln (1994) argued that research philosophical considerations questions comes before questions related to research methods and that researchers' need to chooses their philosophical position and choose between positivism and interpretivism research philosophies. However, Saunders et al. (2016) emphasized the possibility of adopting more than one research philosophy in reality. Moreover, pragmatism is referred to as research philosophy where researchers' do not adopt choose a certain research philosophy and that research questions are the more critical basis of epistemology, ontology and axiology. Furthermore, pragmatist researchers' tend to design their research while having variations in their research philosophical positions and thus allowing them to adopt mixed research methods; i.e. both qualitative and quantitative methods. Also, Tashakkori &Teddlie (1998) pointed out that researchers' need to consider research philosophy as a continuum rather than opposite philosophical positions.

Based on the above, the researcher of this study is inclined to adopt a positivism philosophical research approach due to the following reasons:

- The research nature in being an investigation on a social science area and Saunders et al. (2016) pointed out that positivism is more suitable for social science research.
- The highly structure methodology that will be used in collecting and analyzing the data where Bryman & Bell (2015) emphasized that positivism is associated with high structured methodologies.
- The dependence on quantitative methods for collecting the data.
- The research aim at explaining project managers' tendency to take risky decisions (risk propensity) based on their personality traits and explaining risk propensity causes rather than explaining risk propensity itself.

The adoption of positivism philosophy will enable the researcher to work with the real data collected from project managers' through research questionnaire. Additionally, being positivist will allow the researcher to conduct the research in an objective manner where he will not have any influence on the collected data by considering himself as being external to the data collection process and independent from the study subject; i.e. project managers. Finally, positivism philosophy will allow the researcher to apply a highly structured methodology that depends on quantitative methods and statistical analysis of the research data; something appealing for the researcher.

5.3 Research paradigm and approach

According to Guba & Linclon (1995), research paradigm is referred to as the elementary belief system that directs the research investigation of research method choice in relation to ontological and epistemologically considerations. Similarly, Saunders et al. (2016) defined research paradigm as the way of investigating certain social phenomenon in an attempt to explain and understand it. Figure 5.2 displays the relationship between research paradigms, philosophies and methods using the onion metaphor.

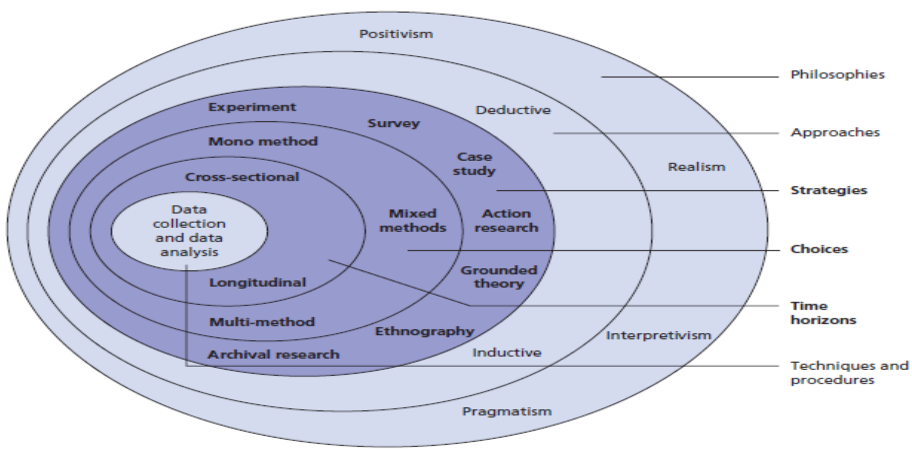


Figure 5.2: The research onion (Saunders et al. 2016, p. 124).

Additionally, Figure 5.3 summarizes the relationships and comparisons between research philosophies and paradigms.

	Positivism	Realism	Interpretivism	Pragmatism
Ontology: *the researcher's view of the nature of reality or being*	External, objective and independent of social actors	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: *the researcher's view regarding what constitutes acceptable knowledge*	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements	Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data
Axiology: *the researcher's view of the role of values in research*	Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative, but can use qualitative	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

Figure 5.3: Research philosophies and paradigms comparisons (Saunders et al. 2016, p. 136).

Moreover, Burrell & Morgan (1982) introduced a categorization of social science research paradigms' with consideration to the epistemologies and ontologies discussed above. Furthermore, the four paradigms are plotted based on four dimensions: subjectivist and objectivist (related to ontology) and radical change and regulation (related to organizational affairs). Figure 5.4 summarizes the four research paradigms as suggested by Burrell & Morgan (1982).

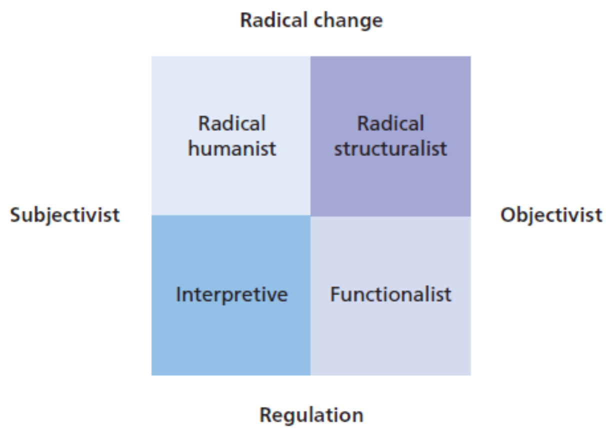


Figure 5.4: Four research paradigms for social theory analysis (Saunders et al. 2016, p. 133).

Furthermore, the researcher find himself placed himself in the quadrant of having functionalist paradigm that is located on the objectivist and regulatory dimensions. This is because the functionalist paradigm is one which depends on person being objectivist which is linked with the adopted research philosophy of positivism. Also, regulatory dimension is considered rather than radical change dimension because the research is more concerned with the rational explanation of project managers' risky decisions in relation to specific project success criteria. Moreover, the functionalist paradigm is the paradigm which most business and management research operates from (Saunders et al. 2016). Consequently, researchers' should be clear about the theories they used when designing their research. Moreover, Easterby-Smith et al. (2012) suggested that understanding research approaches facilitates proper choice of research design and strategies and eventually adopting the research design that is suitable for research constraints. Moreover, there are two research approaches that researchers' adopt when designing their research: deductive and inductive. Furthermore, deductive approach has to do with developing theories and hypotheses and testing them. On the other hand, inductive approach has to do with developing theories through data collection and analysis (Bryman & Bell 2015). Also, deduction approach is more attached with positivism while induction approach more linked to interpretivism. Consequently, deductive approach is more suitable for natural sciences research since it provides explanation and anticipation for phenomenon which eventually leads to controlling them (Collis & Hussey 2003). Also, Robson (2002) listed sequential steps for deductive research: hypothesis deduction related to testing relationship between variables, hypothesis expression and variable measurements, hypothesis testing and examining the outcomes for confirmation or modification. Opposite of deductive approach, the theory development would follow data collection and analysis under inductive approach. Furthermore, Saunders et al. (2016) stated that induction approach followers are being criticized for following a rigid methodology without being flexible in the phenomena explanations. Also, since inductive approach followers are more interested in the events context; then smaller samples of subjects are needed opposite of deduction approach which need a larger sample for generalization purposes (Easterby-Smith et al. 2012). Figure 5.5 provides a summary of comparison between deductive and inductive research approaches.

Deduction emphasises	Induction emphasises
• scientific principles • moving from theory to data • the need to explain causal relationships between variables • the collection of quantitative data • the application of controls to ensure validity of data • the operationalisation of concepts to ensure clarity of definition • a highly structured approach • researcher independence of what is being researched • the necessity to select samples of sufficient size in order to generalise conclusions	• gaining an understanding of the meanings humans attach to events • a close understanding of the research context • the collection of qualitative data • a more flexible structure to permit changes of research emphasis as the research progresses • a realisation that the researcher is part of the research process • less concern with the need to generalise

Figure 5.5: Inductive and deductive research approaches (Saunders et al. 2016, p. 145).

Hence, deductive research approach would be more suitable for this research for the following reasons that are all linked to deductive research characteristics:

- The research aims at describing how project managers' personality traits influence their tendency to take risky decisions (risk propensity) rather than understanding the reasons for their risky decisions.
- The research attempts to explain a causal relationship between several variables.
- The research includes testing hypotheses.
- The research will deploy a highly structured research methodology for repetition purposes.
- The researcher will be independent of the observed social object.
- The research facts will be measured quantitatively.

- The research will be done on sufficient selected samples in order to facilitate the research results generalization.

Adopting deductive approach will allow the researcher to investigate existing theories on the influence of personality traits on risk propensity and test the research developed hypotheses. Also, deduction approach is more attached with positivism which was adopted earlier by the researcher as a research philosophy. Consequently, deductive approach is more suitable for this research because it provides explanation of the influence of project managers' personality traits on their risk propensity in relation to project success criteria. Finally, the sequential steps for conducting the research in a deductive approach will be: hypotheses deduction related to testing relationship between project managers' personality traits and their risk propensity, expressing the hypotheses and measuring the variables of traits and risk propensity, testing the hypotheses and examining the outcomes for hypotheses confirmation or modification.

5.4 Research methods

According to Kogan & Wallach (1964), there has always been difficulty in measuring risk propensity due to its contextual and personal nature where risk differs along key situational dimensions and individuals' perceptions of risky situations are not the same. Nevertheless, Williams & Narendran (1999) designed a risk propensity assessment instrument that varied risk along dimensions extracted from extensive literature review. Additionally, the researchers did a pilot testing on working managers where factor analysis was used to design 10 business risk scenarios that manipulated risk outcome degree, the individual's personal exposure to risk, risk outcome uncertainty and managerial risk-related expectations. Furthermore, each of the 10 scenarios included relevant background information related to the risk decision. Also, in each scenario the following factors were differed: the individual's risk outcome degree, the individual's personal risk exposure, uncertainty of risk outcome and managerial risk expectations. Moreover, the researchers' also analyzed differences in risk propensity levels due to country-specific cultural influences. Also, many researchers assessed risk propensity through the use of a single item such as MacCrimmon & Wehrung (1986) and Williams & Narendran (1999). The following sections will address: measurement of project managers' personality traits in relation to their risk propensity, questionnaire design and structure, statistical analyses techniques used to analyze the collected data.

5.5 Research process

Figure 5.6 illustrates the research process steps that was undertaken to achieve this research objectives and aims.

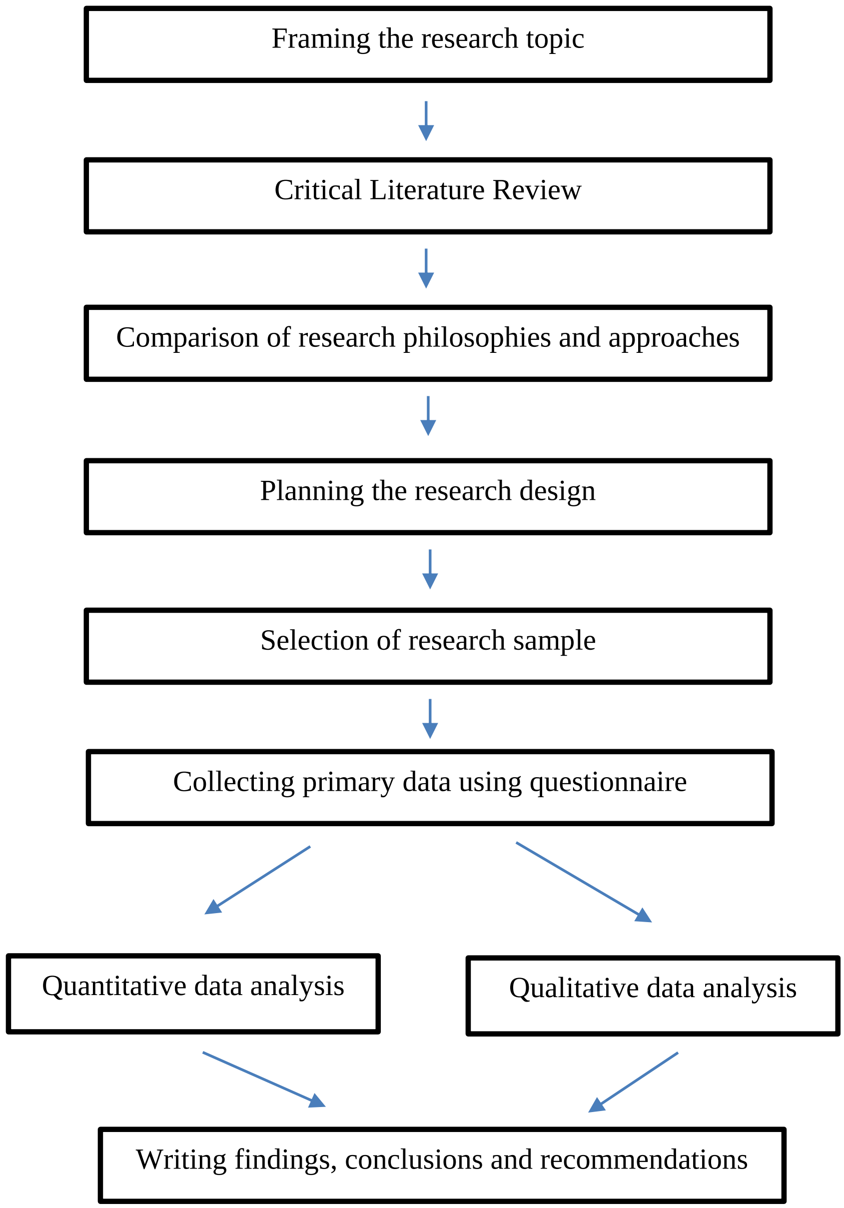


Figure 5.6: Research process.

The research process began with framing the research topic by investigating project managers' personality traits influence on their tendency to take risky decisions in relation to project success criteria. Hence, extensive literature review was done on personality traits relevant to risk propensity, risk-taking behaviour and propensity definitions. Also, association between risk propensity and project success criteria was explored. Additionally, certain research philosophy and approach was adopted after thorough analysis and comparison of existing research philosophies and paradigms. Then the appropriate research methodology was presented and qualitative and quantitative data were collected and analyzed using different statistical analysis techniques. Finally, the research process ended with discussing the findings and presenting all conclusions and recommendations.

5.6 Measurement of personality traits in relation to risk propensity

According to Petrakis (2005) there are three different methods that can be used for measuring risk propensity: first, through observing individuals' behaviour in a hypothetical situation; second, through observing individuals' behaviours in natural risk occurrence situations; and third through measures that are derived from self-reported attitudes. Considering that this research is an empirical research that aims to collect primary data in order to investigate the influence of project managers' personality traits on their risk propensity in relation to project success criteria; using a self-reported assessment for measuring risk propensity would be the most appropriate method. Furthermore, it will be more convenient and easier to collect the research data using a self-reported assessment where risk is subjective defined based on individuals' psychometric paradigms of risk perceptions. Moreover, Nicholson et al. (2005) used The Risk Taking Index assessment claiming its suitability to risk attitude research because it considers the domain-specific nature of risk propensity. Figure 5.7 shows sample of the Risk Taking Index assessment.

Risk Taking Index (RTI)
also known as the Risk Propensity Scale

from Nicholson, N., Soane, E., Fenton-O'Creevy, M., & Willman, P. (2005). Personality and domain-specific risk taking. *Journal of Risk Research, 8*(2), 157-176.

We are interested in everyday risk-taking. Please could you tell us if any of the following have ever applied to you, *now* or in your adult *past*?
1 = never, 2 = rarely, 3 = quite often, 4 = often, 5 = very often

	Now	*Past*
a) recreational risks *(e.g. rock-climbing, scuba diving)*	1 2 3 4 5	1 2 3 4 5
b) health risks *(e.g. smoking, poor diet, high alcohol consumption)*	1 2 3 4 5	1 2 3 4 5
c) career risks *(e.g. quitting a job without another to go to)*	1 2 3 4 5	1 2 3 4 5
d) financial risks *(e.g. gambling, risky investments)*	1 2 3 4 5	1 2 3 4 5
e) safety risks *(e.g. fast driving, city cycling without a helmet)*	1 2 3 4 5	1 2 3 4 5
f) social risks *(e.g. standing for election, publicly challenging a rule or decision)*	1 2 3 4 5	1 2 3 4 5

Figure 5.7: Risk taking index assessment (Nicholson et al. 2005, p.174).

However, other researchers' assessed risk propensity through the use of forced answer options related to different scenarios. For example, Williams & Narendran (1999) developed ten business risk scenarios to measure risk propensity where each scenario included brief summary about the situation existing circumstances, expectations, probability valuations and degree of personal involvement. Additionally, each scenario was followed by two choices: the risky decision and the safer decision. Moreover, after choosing between the two options; individuals' were asked to rate the riskiness of their decision by a 5 point response set ranging from 1 being very safe to 5 being very risky. Eventually, the dependent variable measuring risk propensity was created by adding the risky response scores across all 10 scenarios for individual participants. Another example on the use of the Choice Dilemma Questionnaire (CDQ) was apparent in the work of Endriulaitienė & Martišius (2010) in their attempt to assess the personal and situational factors affecting risk propensity. Additionally, their questionnaire consisted of: sociodemographic information, Eysenck's personality questionnaire, two risk-taking propensity measures (dispositional and behavioural) based on Kogan and Wallach's (1964) Choice Dilemma Questionnaire and a behavioural risk-taking scale. Figure 5.8 shows sample of Kogan and Wallach's (1964) Choice Dilemma Questionnaire that was adopted by Endriulaitienė & Martišius (2010).

Example from Kogan and Wallach's Choice Dilemma Questionnaire

Mr. G, a competent chess player, is participating in a national chess tournament. In an early match he draws the top-favoured player in the tournament as his opponent. Mr. G has been given a relatively low ranking in view of his performance in previous tournaments. During the course of his play with the top-favoured man, Mr. G notes the possibility of a deceptive though risky manoeuvre which might bring him quick victory. At the same time, if the attempted manoeuvre should fail, Mr. G would be left in an exposed position and defeat would almost certainly follow.

Imagine that you are advising Mr. G. Listed below are several probabilities or odds that Mr. G deceptive play would succeed. Please check the lowest probability that would consider acceptable for the risky play in question to be attempted.

The chances are 1 in 10 that the play would succeed.
The chances are 3 in 10 that the play would succeed.
The chances are 5 in 10 that the play would succeed.
The chances are 7 in 10 that the play would succeed.
The chances are 9 in 10 that the play would succeed.
Place a check here if you think Mr. G should not attempt the risky play, no matter what the probabilities.

Figure 5.8: Kogan and Wallach's CDQ (Endriulaitienė & Martišius 2010, p.97).

Additionally, Endriulaitienė & Martišius (2010) investigated the impact of different demographic factors and personality traits on risk-taking propensity through the use of surveys that consisted of socio-demographic information and a questionnaire to measure risk propensity at dispositional and behavioural levels. Additionally, the used questionnaires for measuring risk propensity at dispositional level was the Eysenck's Personality Questionnaire that measures four personality traits: extraversion, social desirability, emotional stability ad rigidity. As for measuring risk propensity at behavioural level, it was done using a behavioural risk-taking scale. Moreover, the researchers used linear regression analyses to investigate the relationship between personality traits and risk-taking propensity. Furthermore, the researchers reported that individual's with high extraversion tend to have higher risk propensity while neuroticism and social desirability were not associated with risk propensity. Moreover, the research concluded by stating that personality traits and gender influence risk propensity in different life domains. According to Dohmen et al. (2011), researchers' always encounter problems when investigating topics related to risk propensity while trying to measure it. Furthermore, measuring risk propensity through offering incentives to subjects' choices is not convenience or feasible. However, using surveys on small samples also limit the researcher statistical powers. Furthermore, Dohmen et al. (2011) solved this problem by running a survey on large samples of population along with doing filed experiments for testing the questionnaire variables behavioural validity. Also, they asked participants to participate in a paid lottery game after completing the survey. Additionally, the purpose of their research was to investigate the existence of a stable trait that influence and drive risk propensity in different life domains. A second example on using survey as research method for measuring risk propensity was the work of Huff & Prybutok (2008) where they sent a 1,287 surveys and received response rate of 36.2%. Their research examined the influences of project manager's risk propensity and past experiences on their decisions. Additionally, they used a 2x2x2x2 factorial and manipulated the data on two levels. Figure 5.9 and figure 5.10 show sample of the questionnaire used by Huff & Prybutok (2008).

Appendix B: Manipulation Questions

Given the scenario described above, how likely do you personally feel that the project will be **completed on time**? (Please circle the number that best represents your decision.)

Definitely will not be completed on time	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Definitely will be completed on time

Given the scenario described above, how likely do you personally feel that the project will be **completed on budget**? (Please circle the number that best represents your decision.)

Definitely will not be completed on budget	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Definitely will be completed on budget

Given the scenario described above, how likely do you personally feel that the project will be **completed as specified**? (Please circle the number that best represents your decision.)

Definitely will not be completed as specified	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Definitely will be completed as specified

Given the scenario described above, how likely do you personally feel that the project will be **profitable in the marketplace**? (Please circle the number that best represents your decision.)

Definitely will not be successful in the marketplace	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Definitely will be successful in the marketplace

Would you recommend **CONTINUING** the project? 1. Yes 2. No

Figure 5.9: Manipulation questions using experimental scenarios (Huff & Prybutok 2008, p.46).

Appendix C: Risk-Propensity Questions (Based on Sitkin-Weingart)

As the manager of the INFORMATION YOUR WAY project, you face a decision that affects your organization's financial future. Given this circumstance, how would you rate:

your tendency to choose more or less risky alternatives based on the assessment of others on whom you must rely?

Extremely LESS than others	Much LESS than others	A little LESS than others	Equal to others	A little MORE than others	Much MORE than others	Extremely MORE than others
1	2	3	4	5	6	7

your tendency to choose more or less risky alternatives that rely upon analyses high in technical complexity?

Extremely LESS than others	Much LESS than others	A little LESS than others	Equal to others	A little MORE than others	Much MORE than others	Extremely MORE than others
1	2	3	4	5	6	7

your tendency to choose more or less risky alternatives that could have a major impact on the strategic direction of your organization?

Extremely LESS than others	Much LESS than others	A little LESS than others	Equal to others	A little MORE than others	Much MORE than others	Extremely MORE than others
1	2	3	4	5	6	7

your tendency to initiate a strategic corporate action that has the potential to backfire?

Extremely LESS than others	Much LESS than others	A little LESS than others	Equal to others	A little MORE than others	Much MORE than others	Extremely MORE than others
1	2	3	4	5	6	7

your tendency to support a decision when you are aware that relevant analyses were done while missing several pieces of information?

Extremely LESS than others	Much LESS than others	A little LESS than others	Equal to others	A little MORE than others	Much MORE than others	Extremely MORE than others
1	2	3	4	5	6	7

Figure 5.10: Risk propensity using Sitkin-Weingart scale (Huff & Prybutok 2008, p.47).

Additionally, Weller & Tikir (2011) used survey as research method to examine the influence of individuals' personality traits on domain specific risk taking. Additionally, the survey was administrated on small group assemblies each containing a maximum of four subjects where they were asked to complete a one hour self-reported survey. Moreover, the domain specific risk taking was measured using the Domain Specific Risk Taking (DOSPERT) questionnaire that was developed by Blais & Weber (2006) while the personality traits were measured using the HEXACO-PI tool developed by Lee & Ashton (2004). Moreover, the researchers conducted path analysis models to examine if perceived benefits and risks mediate the effect of personality traits on risk-taking propensity where they obtained reliable confidence intervals and p-values by conducting 2000 bootstraps. Figure 5.11 shows the path model for all investigated domains.

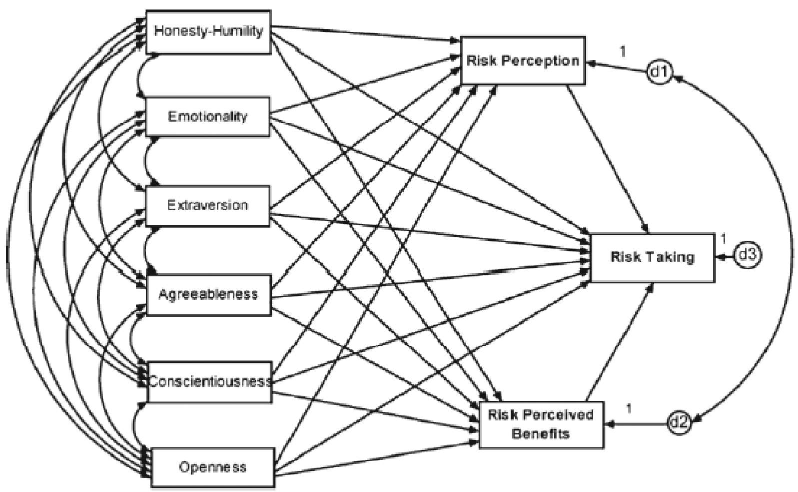


Figure 5.11: Starting path model for all domains (Weller & Tikir 2011, p. 187).

Similarly, Acar & Goc (2011) did a study on predicting risk perceptions and propensity through individuals' personality traits where they used survey as research method. Additionally, they used convenience sampling where candidates were selected based on their closeness to researchers and availability. Furthermore, convenience sampling allows for collecting data in an easy and convenient way without much expenses. Also, the researchers designed their survey and asked subjects to complete it during face-to-face interviews. Moreover, the survey consisted of risk factors measured using Likert scale, a part for measuring ambiguity tolerance using the MacDonald AT-20 tool that was developed by MacDonald (1970), a part related to demographical information (such as: experience, education and profession) and a final part to collect organizational information (such as: organization size and geographical span). Also, Nicholson et al. (2005) used a self-reported survey to investigate the influence of personality traits on risk propensities and attitudes. Additionally, they used the NEO-PI tool to measure personality traits through 240-items while risk propensity was measured using a 12-item Likert scale. Moreover, they did confirmatory factor analysis using the AMOS 3.6.1 which is a structural equation modeling package resulting in five theoretical models. Similary, Pavic & Vojinic (2012) used survey research method for collecting data to investigate the empirically the influence of managers' demographic and professional characteristics on their risk attitude and propensity. Furthermore, the survey consisted of choice dilemma questionnaire part and general part for demographical information. Also the data was analyzed using ordinal logistic regression tests that included all professional and demographical variables.

Based on the above, it is clear that many researchers who did studies on risk propensity adopted an empirical approach and used surveys as the primary tool in data collection. Also, a plethora of researchers adopted surveys as the major research method when investigating individuals' risk propensity such as: Endriulaitienė & Martišius (2010), Nicholson et al. (2005), Schwer & Yucelt (1984), Williams S. & Narendran S. (1999), Dohmen et al. (2011). Consequently, and due to the nature of the study; the researcher decided to adopt survey as the primary research method for collecting data related to project managers' personality traits, demographic information and their risk propensity. Moreover, the reason for adopting the survey method is due to the adoption of positivism as a research philosophy and deductive method as a research approach. Furthermore, the use of survey will allow for sizable sample of the research population and for generalization of results. Another reason for adopting survey as the research method is due to the purpose of the study which is an explanatory research purpose. According to Saunders et al. (2016), explanatory research purpose is where the research aims at establishing causal relationships between different studied variables in order to examine a certain situation through explaining these relationships. Moreover, it is imperative for researchers to be clear about their research purpose in which it influence their research questions. However, Robson (2002) pointed out that research purpose may change over the research duration where in addition to explanatory research purpose there are the exploratory and descriptive research purposes. Also, Saunders et al. (2016) postulated that survey method is generally associated with deductive research approach and can be used for different research purposes. Additionally, surveys can be used for suggesting reasons for existing relationships among variables (Saunders et al. 2016). Additionally, surveys allow researchers to collect large amounts of quantitative data from large population in a very efficient and standardized way. Furthermore, the collected data can be analyzed quantitatively through descriptive and inferential statistics which can allow for easy comparison. However, the sample used for research should be representative of the population and high response rates should be achieved where Dilman (2007) suggested designing the survey in a clear manner in order to get higher response rates. Also, Hewson et al. (2003) stated that surveys can be administrated either via email or website in which website channel will be through creating a web link for participants to complete the questionnaire. Hence, the web link for completing the survey will be distributed to subjects through different channels such as: direct email, social media (LinkedIn, Facebook, etc.) and project managers' networks.

5.7 Questionnaire design and structure

According to Saunders et al. (2016), questionnaires are used as part of survey research method. Moreover, there are numerous definitions for the term questionnaire in which narrow definitions limit it to only respondents answering questions and recording them; while broader definitions include the follow-up interviewing with respondents that could be administrated face-to-face or by telephone (Oppenheim 2000). However, Saunders et al. (2016) referred to questionnaires as a general term that includes data collection techniques, structured interviews, telephone and online questionnaires. Furthermore, questionnaires are considered as one of the most popular data collection methods under survey strategy due to respondents answering same questions and because it allows for responses collection from large samples before doing quantitative analysis. On the other hand, Bell (2005) argued that producing good questionnaires is not an easy task where researchers need to ensure that precise data is being collected for answering the research questions. Additionally, the questionnaire design affect response rates, reliability and validity of the collected data. Furthermore, Saunders et al. (2016) suggested maximizing the questionnaires response rates, validity and reliability through careful questionnaire design, clear layout, pilot testing and planned execution. Additionally, the researcher adopted questionnaires as the primary research method under the survey strategy due to the nature of the research in being descriptive and explanatory research. Moreover, Robson (2002) suggested that questionnaires are not fit for exploratory research that might include large open-ended questions. Similarly, Saunders et al. (2016) pointed out that questionnaires are good to use with standardized questions and for descriptive and explanatory research. Furthermore, this research has some descriptive part where it aims at investigating the project managers' risk propensity and hence questionnaires will enable the researcher to describe the inconsistency of different project managers' risk propensities. Additionally, the questionnaire will include a part asking respondents' to describe themselves as being carefree or carful person. However, the research is primarily considered as an explanatory one that aims to investigate and explain the relationships between different variables within a cause-effect relationship. Thus, the researcher aims to use questionnaire primary research method in order to investigate influence of project managers' personality traits on their risk propensity where according to Jankowicz (2005), questionnaires require less skills to administer than other methods such as semi-structured interviews. Moreover, the questionnaire design differs according to the adopted administration method. Furthermore, self-administrated questionnaires can be completed online using the Internet or the intranet. Figure 5.12 displays different types of questionnaires.

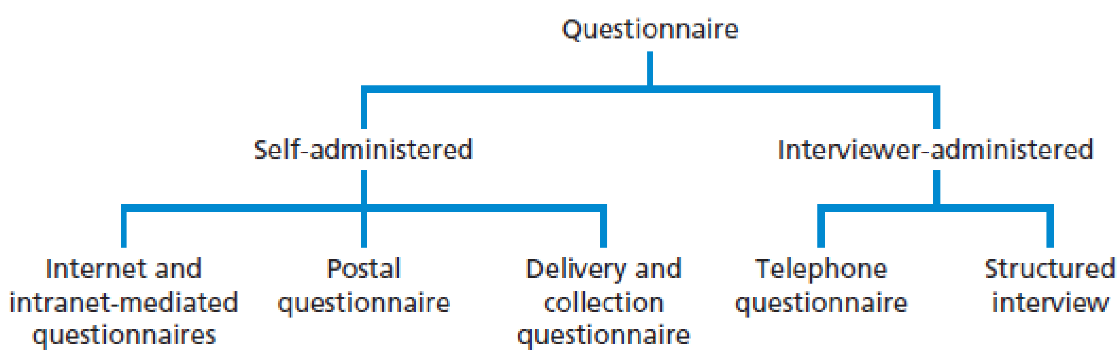


Figure 5.12: Different questionnaire types (Saunders et al. 2016, p. 440).

5.8 Type of questions

It is imperative to define the questionnaire questions very precisely and accurately prior to data collection where there is only one chance to collect data from respondents and might be difficult to approach them in the future for further information or clarifications. Additionally, since the research is explanatory in nature; the questions will aim to investigate the influence of project managers' personality traits on their tendency to take risky decisions (risk propensity) through administrating the questionnaire to a representative sample at a fixed time which is during execution of projects. Furthermore, explanatory research requires proper conceptualization of the suggested defined theory before designing the questionnaire questions (Ghauri & Gronhaug 2005). Moreover, the relationships that need be clear prior to designing the questions are the ones between dependent, independent and moderator variables. According to Dillman (2007), there are three data variables types that can be collected through the use of questionnaires: opinion, behaviour and attributes. Additionally, the type of data variable will influence the wording of the questionnaire statements and questions. While opinion variables are related to recording respondents' feelings and perceptions about things; behaviour and attributes data variables records the respondents' actions, characteristics and experiences. Furthermore, behavioural data variables deal with individuals' or organizations' actions while attributes variables are related to the respondents' characteristics. Due to the nature of this research as explanatory one; the designed questionnaire will include more of attribute data such as demographic variables and personality traits and characteristics. Also, to ensure that collected data will answer the research questions and objectives the following steps can be followed (Saunders et al. 2016): deciding on research strategy (descriptive or explanatory), subdividing the research questions into investigative questions, mapping the research variables to the questions and developing the type of measurements. Figure 5.13 displays a suggested data collection requirement table.

Research question/objective:			
Type of research:			
Investigative questions	**Variable(s) required**	**Detail in which data measured**	**Check measurement question included in questionnaire ✓**

Figure 5.13: Data requirements table (Saunders et al. 2016, p. 447).

Additionally, the questionnaire questions should be designed based on the data that need to be collected where Bourque & Clark (1994) suggested three techniques for designing research questions: adopting them from previous questionnaires, adapting them from previous questionnaires or developing them. Furthermore, adopting and adapting research questions might be more convenient for comparison purposes and also for reliability assessment. However, developing questions provide researchers' with more flexibility and accuracy in measuring the required data. Moreover, research questions and their coding schemes can be found in many sources such as existing questionnaires, journal articles and internet-based question banks such as the Economic and Social Research Council (ESRC 2016). Furthermore, the researcher decided to adapt many of the questionnaire questions from the International Personality Item Pool (IPIP) which include more than 3,000 items and over 250 scales that can be copied or edited without asking permission or paying fees according to the founders. The reason for this free source is because it is being supported by a government grant and individual donations to support scientific collaboration for the development of advanced measures of personality and other individual differences (IPIP 2016). According to Dillman (2007), most researchers use combination of open and closed questions in their questionnaires. Additionally, open-ended questions give the opportunity for respondents to elaborate on their answers while closed-ended questions limit respondents to select their answer from some suggested alternatives (Fink 2003). Although, closed-ended or forced-answered questions require little writing from respondents and easier for comparisons purposes; they cannot be easily analyzed and interpreted as the case with open-ended questions. Furthermore, Saunders et al. (2016) listed six types of research closed-ended questions: list, category, ranking, rating, quantity and matrix. Table 5.1 summarizing types of research questions.

Question Type	**Definition**
Open-ended	Useful when unsure of the response, and when you a detailed answer is required. It is widely in-depth and semi-structured interviews.
List	Offers a list of items where respondents can select any of them.
Category	Only one response can be selected from a given set of categories.
Ranking	Respondents are being asked to place something in order.
Rating	A rating device is used to record respondents responses
Quantity	Respondents are asked to give a response as a number giving the amount;
Matrix	Respondents’ responses to two or more questions can be recorded using the same grid.

Table 5.1: Research questions types.

For the purpose of this research in collecting opinion data about project managers' personality traits and their risk propensity levels, the researcher decided to adopt the most common question type that was used by previous researchers'; which is rating question. Additionally rating questions commonly use Likert-style rating scale where respondents choose their level of agreement with suggested statements usually on a rating scale consisting of four to seven points (Corbetta 2003). Also, rating questions responses should be presented in a straight line and using same order of response categories to avoid confusion (Dillman 2007). Additionally, Saunders et al. (2016) emphasized the need to use both positive and negative statements for ensuring careful response selection by respondents. Figure 5.14 displays response categories for different types of rating questions.

Type of rating	Five categories	Seven categories
Agreement	Strongly agree Agree Neither agree nor disagree/not sure/uncertain* Disagree Strongly disagree	Strongly agree Agree/moderately agree/mostly agree* Slightly agree Neither agree nor disagree/not sure/uncertain* Slightly disagree Disagree/moderately disagree/mostly disagree* Strongly disagree
Amount	Far too much/nearly all/very large* Too much/more than half/large* About right/about half/some* Too little/less than half/small* Far too little/almost none/not at all*	Far too much/nearly all/very large* Too much/more than half/large* Slightly too much/quite large* About right/about half/some* Slightly too little/quite small* Too little/less than half/small* Far too little/almost none/not at all*
Frequency	All the time/always* Frequently/very often/most of the time* Sometimes/about as often as not/about half the time* Rarely/seldom/less than half the time* Never/practically never*	All the time/always* Almost all the time/almost always* Frequently/very often/most of the time* Sometimes/about as often as not/about half the time* Seldom Almost never/practically never* Never/not at all*
Likelihood	Very Good Reasonable Slight/bit* None/not at all*	Extremely Very Moderately Quite/reasonable* Somewhat Slight/bit* None/not at all*

Figure 5.14: Response categories for different rating questions (Saunders et al. 2016, p. 459).

The decision was taken to measure project managers' personality traits using "agreement" type of rating with five categories: strongly agree, agree, neutral, disagree and strongly disagree. Many researchers who investigated relationship between individuals' personality traits and risk propensity adopted the same type of rating for measuring personality traits, such as: Nicholson et al. (2005), Weller & Tikir (2011), Blais & Weber (2006) and Lee & Ashton (2004). As for measuring project managers' risk propensity; the scale developed by Sitkin & Weingart (1995) and also used by Huff & Prybutok (2008) was adopted and adapted from seven categories into six categories as follows: extremely less than others, much less than others, a little less than others, a little more than others, much more than others, extremely more than others. Furthermore, the first three categories relate more to tendency of avoiding risky decisions (lower risk propensity) while the last three categories relate more to tendency of taking risky decisions (higher risk propensity).

5.9 Measurements

Quantitative research data need to be measured, analyzed and processed carefully so that they are converted from raw data to useful information. Additionally, quantitative and statistical analysis can assist researchers to examine and describe the relationship between research variables so that research questions can be answered. Furthermore, quantitative data can be grouped under categorical and numerical data. According to Brown & Saunders (2008), categorical data refers to classifying data into sets according to certain identified characteristics where it can be further classified into descriptive (nominal) data and ranked data. Moreover, descriptive data relates to counting occurrences number under each category or variable where it is difficult to numerically define the category or rank it (Saunders et al. 2016). Furthermore, descriptive data can be grouped under dichotomous data and ordinal (ranked) data. Additionally, dichotomous data is where the variable is divided into two categories such as the case of asking respondent about their gender (male or female). On the other hand, ordinal data is more precise where respondents are asked about their level of agreement with certain statements such as the case with rating or scale questions. However, Blumberg et al. (2008) pointed out that ordinal data can be analyzed as numerical interval data if the data values have similar size gaps. According to Brown &

Saunders (2008), numerical data refers to quantifiable data that can be measured or counted in quantities. Also, numerical data is considered more precise than categorical data since data values can be assigned certain positions on a numerical scale and because more statistical tests can be applied on them. Additionally, numerical data can be classified into interval or ratio data and alternatively into continuous and discrete data. Furthermore, interval data relates to stating the interval difference between two data values for a certain variable where the values can only be subtracted or added but cannot be divided or multiplied. However, ratio data refers to calculating the relative ratio difference between two data values for a certain variable (Saunders et al. 2016). According to Dancey & Reidy (2008), continuous data is referred to data that can take any value while being measured accurately. Conversely, discrete data can be measured more precisely where each case can take a finite integer of values from a scale that measures variations in discrete units. Nevertheless, discrete and continuous data definitions will depend the way data values are measured. In conclusion, it is imperative to understand data types when quantitatively analyzing the data for two reasons. First, choosing accurate and precise measurement scale results in wider range of analytical techniques and the collected data can be regrouped to less precise level for further analysis; such as was done in the research where respondents' were grouped into three positions categories (project manager, functional/administrator, consultant/engineer) and three experience level categories (less than 7 years, 8-19 years, 20 years and above). Second, it is easier to generate appropriate statistics for data types when using software analysis. Figure 5.15 displays summary of the above discussed data types.

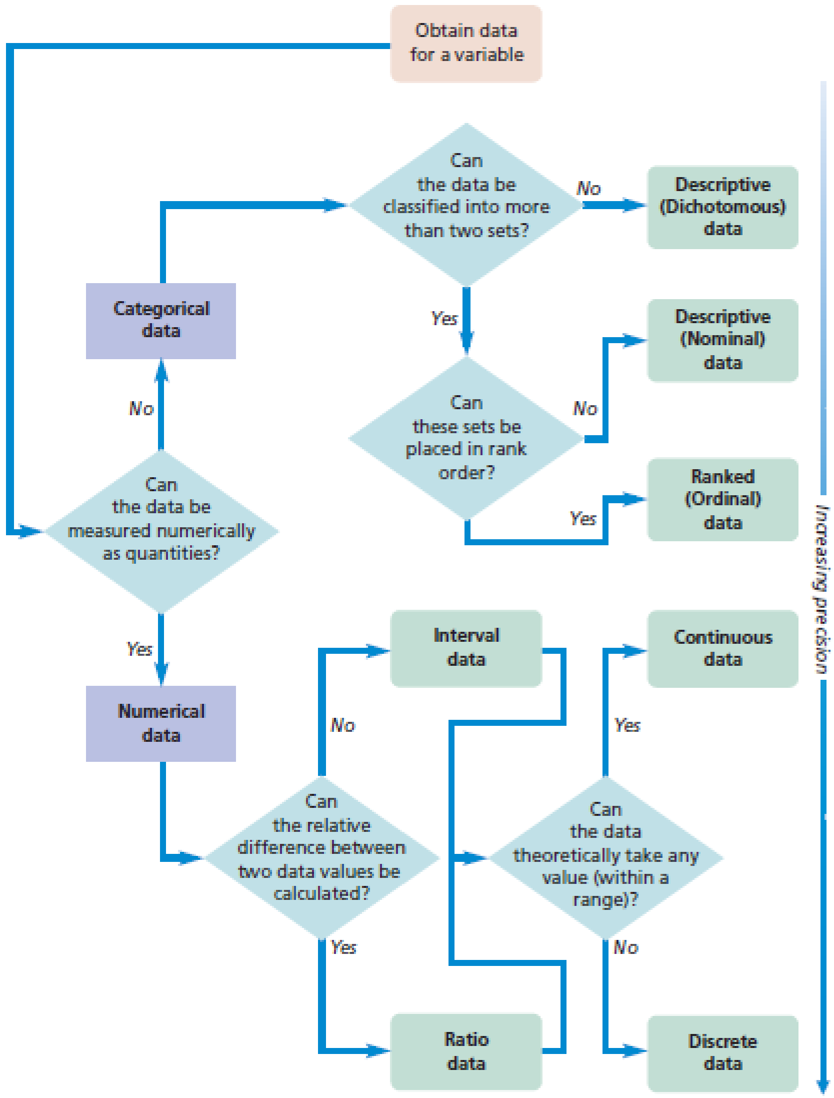


Figure 5.15: Data Types (Saunders et al. 2016, p. 499).

Consequently, the research data was collected using a questionnaire that was divided into two parts:

5.9.1 General part

Used in collecting project managers' data related to individual characteristics such as: demographics, work-related, organizational data. Below are more details about the individual characteristics that were collected:

5.9.1.1 Demographic

- Age : measured as continuous variable
- Gender: coded as 1 (male) and 2 (female)
- Education: coded as 1 (high school), 2 (college), 3 (bachelor), and 4 (post graduate).
- Ethnicity: coded as 1 (Arab), 2 (Asian), 3 (African), 4 (Caucasian), 5 (Others)
- Dependents: coded as 1 (none), 2 (one), 3 (two), 4 (three), 5 (four or more)
- Professional certifications: 1 (PMP), 2 (PRINCE2), 3 (RMP), 4 (MoR), 5 (Other)

5.9.1.2 Work-related

- Project experience: measured as categorical variable where codes as follows: 1 (one year or less), 2 (2-7 years), 3 (8-13 years), 4 (14-19 years) and 4 (20 years or more).
- Current position: measured as categorical variable where codes as follows: 1 (project manager), 2 (engineer), 3 (functional manager), 4 (consultant) and 5 (administrator) and 6 (others).

5.9.1.3 Organizational

- Nature of industry: coded as a categorized variable measured as follows: 1 (manufacturing), 2 (information technology), 3 (transportation), 4 (construction), 5 (hospitality), 6 (commercial retail), 7 (financial and banking), 8 (consulting), and 9 (adverting) and 10 (others).
- Organization type: coded as 1 (government), 2 (semi-government), 3 (private) and 4 (not-for-profit).
- Organizational size: coded as 1 (99 or less employees), 2 (100-499 employees), 3 (500-999), 4 (1000-4,999) and 5 (5,000 or more employees).

5.9.2 Specific part:

The questionnaire included a specific part to measure the project managers' personality traits that influence their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost). Additionally, these personality traits were extracted from the literature review as discussed in framework chapter. Moreover, the personality traits were grouped under six global variables: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Furthermore, each global construct was measured through specific personality traits where each personality trait was measured through the defined statements that were listed in framework chapter. Additionally, Weller & Tikir (2011) concluded that relationships between personality traits and risk-taking behaviours are dependable on risk domains. Moreover, they postulated that not all personality traits have same degree of influence on risky decisions and risk propensity; where some traits have more influence on risky decisions and risk propensity in specific domains. Furthermore, both risk perceptions and perceived benefits influence the difference in risk-taking in across different domains. To clarify, an increased level of risk perception results in lowering the probability for individuals' to engage in risky activity; whereas an increased level of perceived benefits lead to increasing the probability of individuals' engaging in risky activity. Thus, an individual having high risk perception will tend to have lower expected benefits from engaging in risky activity (Weller & Tikir 2011). Moreover, the collected data was analyzed using descriptive statistics, analysis of variance, correlation analysis, multiple linear regression analysis and dependency structure analysis. The description and aim of these tests are included in the coming sections.

5.10 Questionnaire data coding

The items used in the questionnaire were coded by the Survey Monkey software that was used in collecting responses data. However, certain coding system were followed when entering the data into the SPSS software to ensure the right clustering of the items under the global variables. Furthermore, the personality traits were grouped as suggested by Lee & Ashton (2009) into six global personality clusters that can be summarized under the HEXACO acronym: humility/honesty, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Hence, the following coding was followed when grouping the personality items: H: humility/honesty items, E: emotionality items, X: extraversion items, A: agreeableness items, C: conscientiousness items and O: openness to experience items. All items under each cluster were numbered where each item was coded using a letter and a series number (e.g.: A1, A2, etc.). Additionally, all other variables were coded based on the question number which they appear under it.

5.11 Questionnaire validation

For validation purposes, the questionnaire was sent to seven researchers/academics that were cited in the literature review and their work formed the foundation for this research. Only four of the seven researchers responded back with feedback. Additionally, the questionnaire was piloted by five senior project practitioners/consultants and feedback was received from all five. Appendix I include list of the seven researchers/academics that were contacted for validating the questionnaire. Moreover, below is summary of received feedback and taken actions.

5.11.1 Feedback One: from Nigel Nicolson

Paper: Nicholson, N., Soane, E., Fenton-O'Creevy, M. & Willman, P. (2005). Personality and domain specific risk taking, *Journal of Risk Research*, vol.8, pp. 157–176.

<u>Feedback:</u>

1. Clarifying the statements question.

2. Changing the items scale.

3. Rephrasing some of the items.

4. Piloting the questionnaire on some project practitioners.

<u>Actions Taken:</u>

1. Question scenario was simplified and clarified as per below:

   Before: *Assume you are a project manager making risk decisions related to project success criteria (scope, time and cost) during the execution phase. Below is a series of* *statements about you, please read each statement and decide how much you agree or disagree with that statement.*

After: *Assume you are a project manager taking* ***risky decisions*** *related to project success criteria (scope, time and cost) during the execution phase.* ***Please rate your agreement level with the following statements.***

2. Scale was changed as per below:

   Before:

1	2	3	4	5
Very uncomfortable	Uncomfortable	Indifferent	Comfortable	Very comfortable

   After:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. All statements were reviewed and appropriate changes were done to ensure clarity and simplicity of each statement.
4. Questionnaire was piloted on five senior project practitioners/consultants and there feedback was taken into consideration in the revising the questionnaire (Refer to next section).

5.11.2 Feedback two: from Michael Ashton

Paper: Ashton, M. C., Lee, K., & de Vries, R. E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality Factors: A review of research and theory. Personality and Social Psychology Review, 18, 139-152.

Feedback:

1. Rephrasing some of the statements items.
2. Ensuring anonymity of respondents.
3. Including item statements that indicate low levels to control overall elevation of responses.
4. Reconsidering the interval gaps for organization size.

Actions Taken:

1. Statements were rephrased to make them more desirable and easy to understand.
2. Included some item statements to have high levels and other to have low levels to control elevation of overall responses.
3. Thorough proofreading was done by English language experts.
4. Options for question related to organization size were changed as per below:

Before:

3. Organization size: number of employees:

- ☐ 1000 or less
- ☐ 1001 - 2000
- ☐ 2001 - 3000
- ☐ 3001 - 4000
- ☐ 4001 - 5000
- ☐ More than 5000

After:

3. Organization size: total number of employees:

- ☐ 99 or less
- ☐ 100 - 499
- ☐ 500 - 999
- ☐ 1000 - 4,999
- ☐ 5,000 or more

5.11.3 Feedback Three: from Emrah Acar

Paper: Acar, E. & Goc, Y. (2011). Prediction of risk perception by owners' psychological traits in small building contractors. *Construction Management and Economics*, vol. 29, pp. 841-852.

Feedback:

1. Reconsidering the cut-off points for organization size and age groups.
2. Adding open ended-questions related to risk management.
3. Piloting the survey on some professionals.

Actions Taken:

1. Reviewed cut-off points for demographic variables such as organization size and age.
2. Added two open ended-questions related to accountability and benefits. Both questions have some listed options and also allow for typing own responses.
3. The survey was piloted on five senior project practitioners/consultants.

5.11.4 Feedback Four: from Ivan Pavic

Paper: Pavic, I. & Vojinic, P. (2012). The Influence of Demographical and Professional Characteristics on Managers' Risk Taking Propensity. *Advances in Management and Applied Economics*, vol. 2 (4), p.171.

Feedback:

1. The questionnaire is too long and complicated in some parts.
2. Including more options for education question.
3. Including more options for industry nature question.

Actions Taken:

1. The questionnaire was shortened by having 65 statement items instead of 75 statement items.
2. More industries were added in question related to industry nature and the option to type other industries was enabled.

Feedback received from project practitioners/consultants:

1. Too many statements appearing on the screen and respondent need to scroll up and down many times to view the items scale.
2. The statements related to risky decisions tendency question was repeated three times with having one word changed at the end (scope, time and cost) which might cause some confusion.

Actions taken:

1. Re-organizing the statements so that only 9-10 statements appear on the screen where no need for respondent to scroll as the scale and statements all appearing on the screen. The result was seven screen pages of statements instead of five.
2. The three domains at end of each risk attitude tendency question were bolded in blue color to avoid confusion (scope, time and cost).

The questionnaire was sent to 525 respondents identified from the researcher company database. All of them has a project management role and involved in projects. Project roles varies from senior to junior, i.e. project manager, program manager, project coordinator, project engineer, Head of PMO, project consultant, project analyst, projects control manager, etc.

5.12 Questionnaire reliability and validity

Researchers must ensure the reliability of the used questionnaire to make sure that respondents understand the questions same way as researcher does. Additionally, reliability refers to the consistency of the questionnaire questions to generate consistent results with different respondents and under different contexts. According to Mitchell (1996), there are three approaches that can be used to measure questionnaires reliability: test re-test, internal consistency and alternative form. Furthermore, test re-test approach relates to administrating the questionnaire twice to respondents so that both times data can be correlated under almost similar conditions (Saunders et al. 2016). However, the research decided not to apply the “test re-test” reliability test due to difficulty of asking respondents to answer the questions twice and due to lower chances in having the respondents answering the questions in similar way especially if the time between administrating the two questionnaires was long. Additionally, internal consistency reliability test refers to the correlation of respondents responses to each questionnaire question with other questions within the same questionnaire. Furthermore, the most common method for internal consistency calculation is Cronbach's alpha where researcher decided to apply it due to its easiness of use. The final approach for reliability testing is the "alternative form" where respondents' responses are compared to alternative forms of the same group of questions within the questionnaire. However, respondents might feel tired after some time of answering same question in different forms and be inclined to always use the same answer. Hence, the researcher decided to test the research questionnaire using internal consistency test; specifically Cronbach's alpha where all items under each personality risk traits will be measured for internal consistency based on correlations between the items. Additionally, the purpose of this measurement will be to ensure that all the items under the construct are measuring the construct with similar scores. According to Hair et al. (1995), reliability is referred to as the degree of which two indicators or more share their measurement of a certain construct. Also, the items must be independent and comparable in order to be reliable where reliability will be measured using Cronbach's Alpha coefficient as it being the first measurement to ensure the questionnaire quality (Churchill 1979). Moreover, a reliable measure should have a minimum score of 0.5-0.6 on a scale from 0 to 1 (Nunnally 1967). Figure 5.16 displays the process that was followed for testing the items reliability.

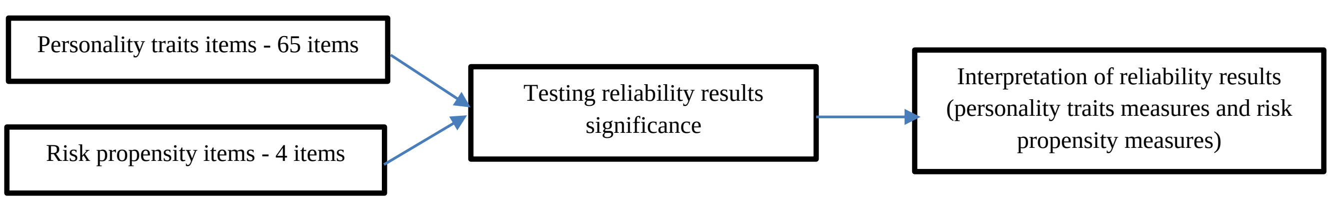


Figure 5.16: Reliability analysis process.

There are many types of validity that can be considered for this research: internal, content, predictive and construct validity. Furthermore, internal validity is related to the questionnaire ability to measure what it is supposed and intended to measure and that it is representing reality of what is being measured. However, since the researcher know that reality is being measured (project managers' risk propensity in relation to project success criteria); then this validity type becomes irrelevant to the research. According to Cooper & Schindler (2008) most researchers refers to content validity when validating questionnaires where it refers to the adequacy of the measurement questions in measuring the investigative questions (Cooper & Schindler 2008). Furthermore, predictive validity (which is also referred to as criterion-related validity) is related to the questionnaire questions ability in generating accurate future predictions. As for construct validity, it refers to the ability of the questionnaire questions in measuring the research constructs and variables. Due to the importance of validating the ability of questionnaire measurement questions in measuring the research investigative questions and constructs; the researcher decided to check two relevant types of validity: content and construct. Furthermore, content validity was done through careful and thorough literature review. Also, the questionnaire content validity was checked by having some experts in the fields to assess the questions and its usefulness and appropriateness to the researched topic. Moreover, four academicians that researched the topic of personality traits influence on risk propensity and four experience project managers were contacted to validate the questionnaire questions where actions were taken based on their feedback. Additionally, the researcher aimed at applying construct validity on the questionnaire since it is more suitable to constructs related to attitude scales and personality traits (Saunders et al 2016). Hence, construct validity was applied to ensure that the questionnaire is measuring what it is said to be measured. Moreover, construct validity was accomplished by analyzing the existence of convergent validity with another questionnaire that is designed to measure the same or similar construct (Huff et al. 1997). Figure 5.17 displays the process of checking the questionnaire content and construct validity.

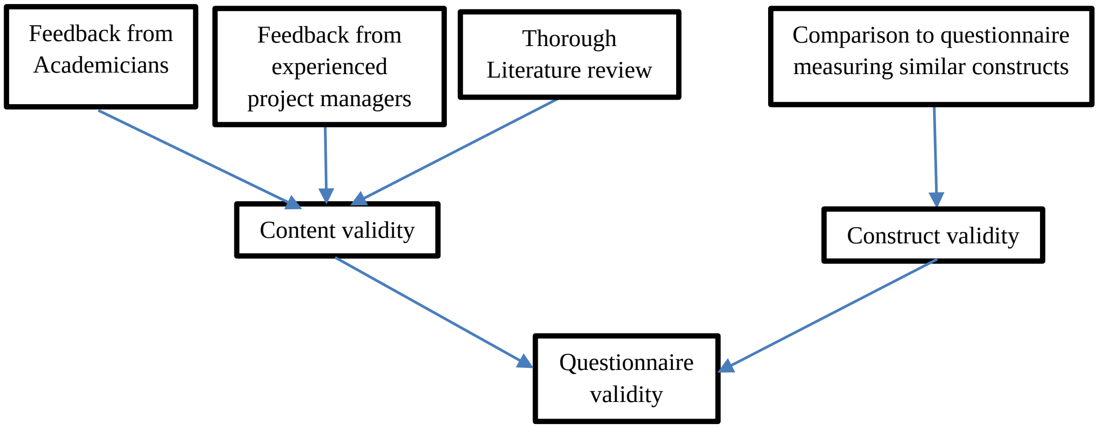


Figure 5.17: Questionnaire validation process.

5.13 Statistical analysis

Tukey (1977) introduced the exploratory data analysis (EDA) approach for research data analysis where it emphasizes using diagrams for analyzing and interpreting the data leading to better choice of analysis techniques. Moreover, Saunders et al. (2016) pointed out the need to have research questions and objectives in the researcher mind while analyzing the data. Many researchers use frequency distribution tables for summarizing and displaying data related to individual variables as well as categorical data. Additionally, bar charts can be used for showing occurrence frequencies where histograms can also be used for showing lowest and highest values for intervals of continuous data. Moreover, pictograms can be used for using pictures instead of bars for representing the data. Also, line graphs can be used for showing trends by presenting numerical variables and longitudinal data where in each time period the data values are connected with a line to show a certain trend (Anderson et al. 1999). Furthermore, Morris (2003) suggested the use of pie charts for displaying numerical and categorical data through grouping the data so as not to exceed six segments in the pie chart. Hence, some demographic data frequencies were reported using pie charts and some were grouped under fewer clusters such as the data related to position and experience levels. Furthermore, it is imperative to establish the values distribution for variables comprising numerical data where a histogram or frequency polygon can be used for continuous data; while bar chart or frequency polygon can be used for discrete data (Saunders et al. 2016). Additionally, frequency polygons will enable researchers to notice positively or negatively skewedness within the data distribution as well as symmetrically or normal distribution. Also, the distribution curve pointedness or flatness can be compared with the normal distribution which is referred to as kurtosis indicator (Dancey & Reidy 2008). Hence, kurtosis and skewedness values were reported for all research variables. Figure 5.18 displays the statistical analysis steps.

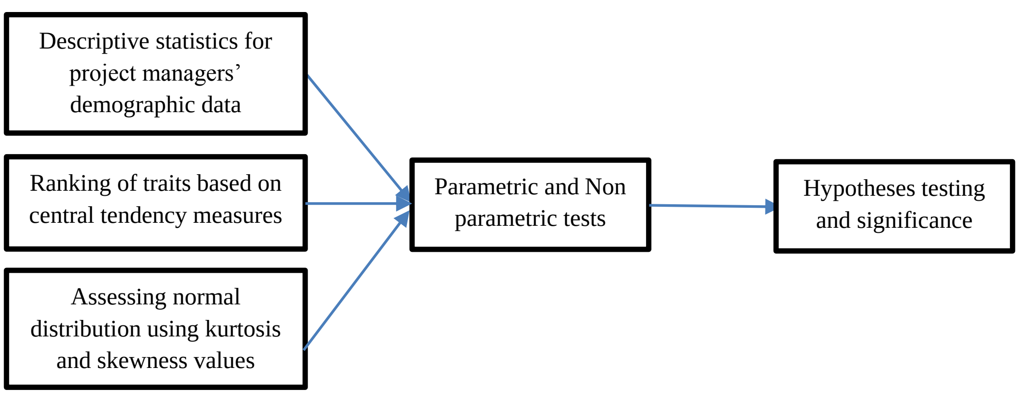


Figure 5.18: Statistical analysis steps.

However, for comparing variables for purpose of examining their interdependence; cross tabulation or contingency tables can be used while stacked bar charts can be used for variables totals comparisons. Moreover, scatter graphs can be used for examining relationships between ranked and numerical data variables where dependent variables will be plotted against the vertical axis. Also, relationships between variables can be positive or negative where the strength of relationships can be evaluated statistically using regression or correlation techniques. Moreover, descriptive statistics can enable researchers to numerically describe and compare variables where descriptive statistics can have two facets: central tendency and dispersion. Furthermore, central tendency can be measured through: mode (most frequently occurred values), median (mid value after ranking the data), and mean (average of all values). Figure 5.19 displays descriptive statistics by data type.

To calculate a measure of:		Categorical		Numerical	
		Descriptive	Ranked	Continuous	Discrete
Central tendency that . . .	. . . represents the value that occurs most frequently	Mode			
	. . . represents the middle value			Median	
	. . . includes all data values (average)			Mean	
Dispersion that . . .	. . . states the difference between the highest and lowest values			Range (data need not be normally distributed but must be placed in rank order)	
	. . . states the difference within the middle 50% of values			Inter-quartile range (data need not be normally distributed but must be placed in rank order)	
	. . . states the difference within another fraction of the values			Deciles or percentiles (data need not be normally distributed but must be placed in rank order)	
	. . . describes the extent to which data values differ from the mean			Variance, or more usually, the standard deviation (data should be normally distributed)	
	. . . compares the extent to which data values differ from the mean between variables			Coefficient of variation (data should be normally distributed)	
	. . . allows the relative extent that different data values differ to be compared			Index numbers	

Figure 5.19: Descriptive statistics by data type (Saunders et al. 2016, p. 528).

It is equally important to describe the dispersion of the data values around the central tendency as well as describing the central tendency for variables. Moreover, data dispersion can be measured using two techniques: inter-quartile range (difference within the middle fifty percent of values) and standard deviation (difference of values from the mean). Also, Saunders et al. (2016) suggested that inter-quartile range and standard deviation measures can be calculated for numerical and categorical data (when numerical codes are being used). The significance or hypothesis testing relates to comparing the collected data with theoretical expectation in order to eliminate the possibility of having results due to random variation in the research sample (Robson 2002). Additionally, there are two major significance or hypotheses testing: parametric and non-parametric statistics. Moreover, parametric statistics are considered as more influential because they use numerical data while non-parametric statistics are used with non-normally distributed data (Blumberg et al. 2008). Moreover, the probability of significance test (p-value) can give indication of the relationship significance where p-values less than 0.05 indicates the existence of significant relationship between variables where the research hypotheses can be accepted and the null hypotheses can be rejected. Also, the association between two variables can be tested using the chi-square test which assesses the probability of data in a contingency table to be occurring by chance alone in comparison to expectations if the variables are independent of each other (Dancy & Reidy 2008). Furthermore, Kolmogorov-Smirnov test can be applied to test ranked data in relation to the difference between two groups of data and check if the research sample is different from the research population where the sample was selected (Kanji 2006). Moreover, independent groups t-test can be used for assessing the difference between two data groups through the groups mean comparison. Also, paired p-test can be used to assess the probability of difference between two variables (each half of the pair). Additionally, one-way analysis of variance (ANOVA) can be used to assess the probability of three or more groups being different by chance where (ANOVA) test analyzes spread of research data values between different groups of data through comparing their means. Furthermore, F-ratio can be used to interpret the statistical significance of the data. Figure 5.20 display the ANOVA analysis steps.

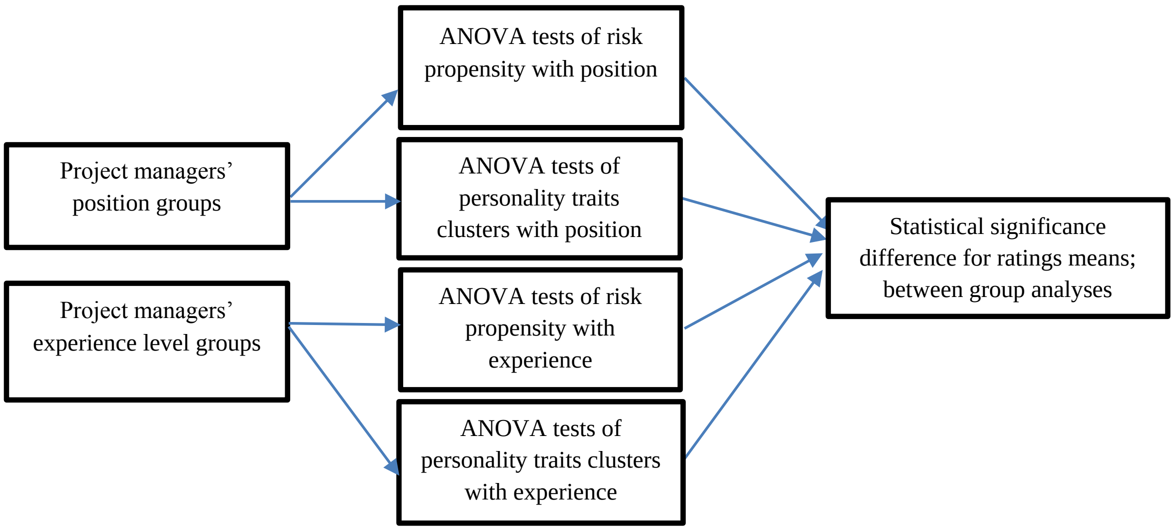


Figure 5.20: Analysis of variance (ANOVA) steps.

Furthermore, the strength of relationships between the research's variables should be assessed where there could be two forms of relationships between variables. First, correlation was used to assess how changing one variable (personality traits) can lead to change in another variable (risk propensity) without knowing which variable caused the other variable to change. Second, cause-effect relationship where a change in independent variables (personality traits) can lead to change in dependent variables (risk propensity). Additionally, the strength between the two numerical variables was measured using a correlation coefficient; where it takes a value from -1 indicating negative correlation to +1 indicating positive correlation (Saunders et al. 2016). Figure 5.21 shows possible values of correlation coefficients.

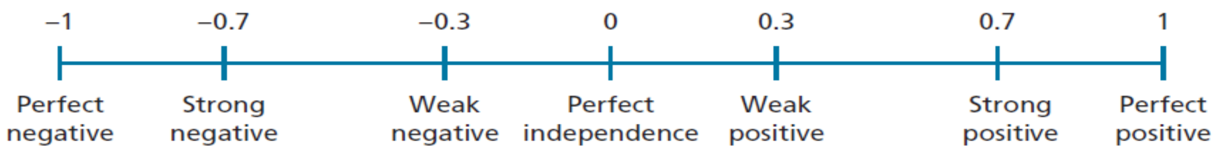


Figure 5.21: Correlation values (Saunders et al. 2016, p. 554).

Moreover, Pearson's product moment correlation coefficient was applied to assess the relationship strength between two numerical variables (personality traits and risk propensity) that are selected from a random sample. However, Spearman's rank correlation coefficient was not applied because it assess the relationship strength between two ranked variables that are selected from random sample. Also, because of having more than two independent variables; multiple regression analyses were performed. Additionally, the proposed hypotheses was also tested using ordinal logistic regression. Figure 5.22 displays the correlation process steps.

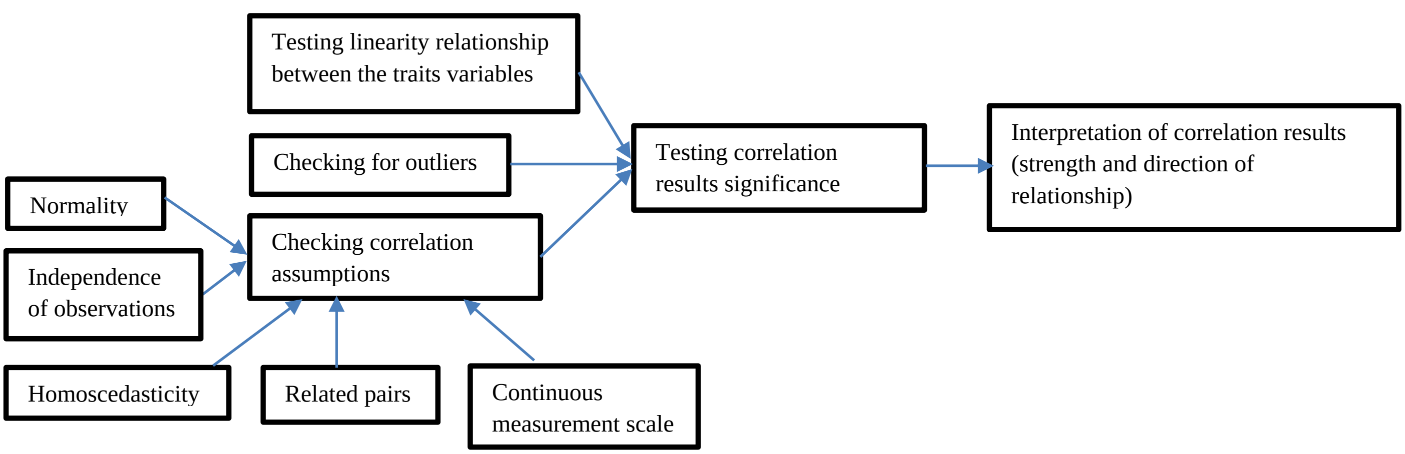
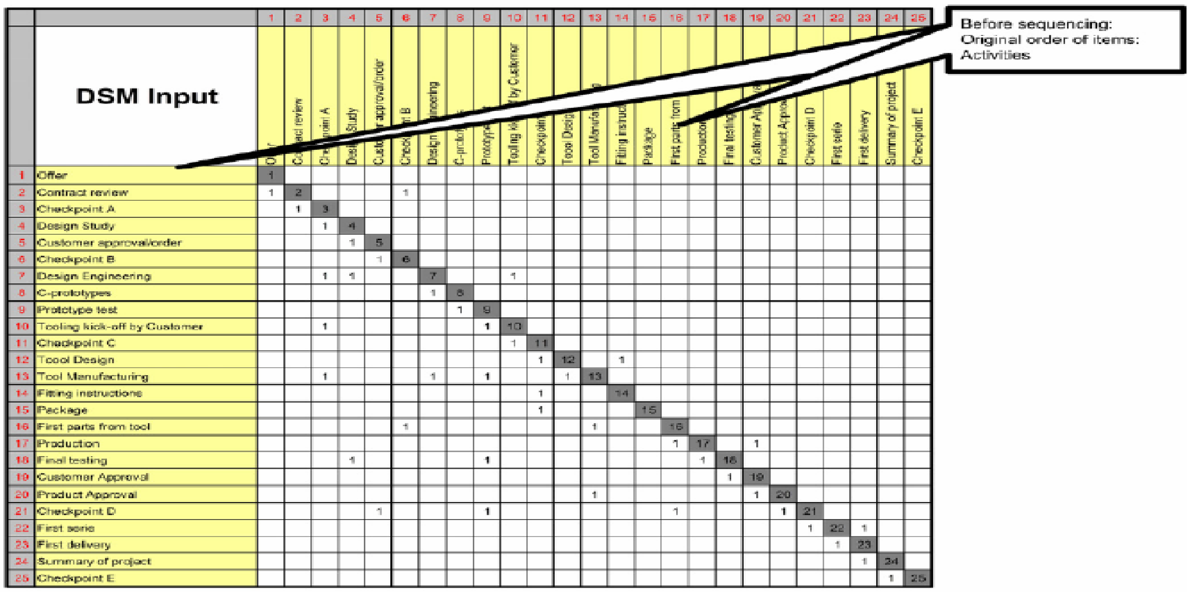


Figure 5.22: Correlation analysis process.

5.14 Dependency structure Matrices analysis

Dependency structure matrix (DSM) was identified as a powerful technique for identifying and managing relationships among certain activities (Eppinger et al. 2004). Moreover, the concept was applied in different fields ranging from aerospace to construction and manufacturing (Charlesraj 2004). Also, the dependency structure matrix tools were applied in project sequence planning where it has the advantage of providing systematic mapping among network elements that is easy to understand regardless of the network size (Yassine et al. 1999). Furthermore, dependency structure matrix can be useful technique for examining systems' structures where it applies graph theoretic clustering algorithms in order to group the highly related elements within a network (Danilovic & Browning 2007). Also, dependency structure matrix tool was used by project managers to understand organizational structures and be able to examine the organizational interfaces represented by project stakeholders' matrix (Danilovic & Browning 2007). Furthermore, dependency structure matrix can represent relationships between different kinds of systems' elements such as: product components, team members, activities and system parameters (Eppinger 2001). Moreover, a system model can be considered as a graph where a node will represent the system element and an edge will represent the relationship between two elements. Also, an arrow between the two elements will indicate the impact from one element to another in a directed graph. All elements are displayed in a matrix containing identical row and column captions where the diagonal cells show the system elements while off-diagonal cells will show the dependency among the system elements (Browning 2001). Moreover, the strength of the interdependencies between the elements can be represented by using numbers of 1, 2 and 3 in the off-diagonal cells and by using different colors to show the dependency strength (Danilovic

& Browning 2007). However, the interdependencies between the elements can represented using a binary code of 0 and 1 in the off-diagonal cells to indicate the existence of direct relationships between the elements/nodes. Figures 5.23 and 5.24 display samples of the dependency structure matrix and the multi-domain network visualization output.



	DSM Input	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	Offer	1																								
2	Contract review	1	2				1																			
3	Checkpoint A		1	3																						
4	Design Study			1	4																					
5	Customer approval/order				1	5																				
6	Checkpoint B					1	6																			
7	Design Engineering			1	1			7			1															
8	C-prototypes							1	8																	
9	Prototype test								1	9																
10	Tooling kick-off by Customer			1						1	10															
11	Checkpoint C										1	11														
12	Toool Design											1	12		1											
13	Tool Manufacturing			1				1		1			1	13												
14	Fitting instructions											1			14											
15	Package											1				15										
16	First parts from tool						1							1			16									
17	Production																1	17		1						
18	Final testing				1					1								1	18							
19	Customer Approval																		1	19						
20	Product Approval													1						1	20					
21	Checkpoint D					1				1							1				1	21				
22	First serie																					1	22	1		
23	First delivery																						1	23		
24	Summary of project																							1	24	
25	Checkpoint E																								1	25

Figure 5.23: Dependency structure matrix.

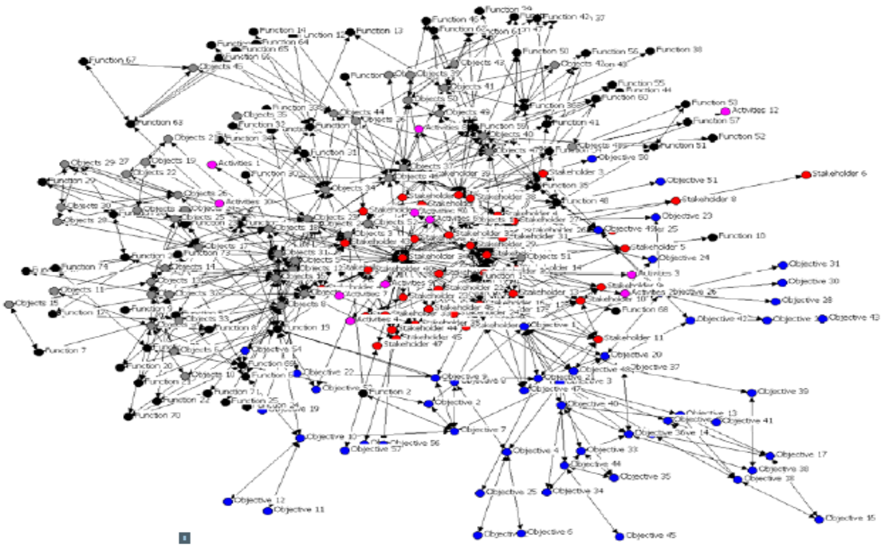


Figure 5.24: Multi-domain network visualization.

According to Pimmler & Eppinger (1994), the elements relationships in the dependency structure matrix (DSM) can be related to one of four categories: material, information, energy and spatial. Thus, depending on the elements and nodes definitions; the dependency structure matrix technique can be applied in different contexts. Furthermore, Browning (2001) distinguished between static-based and time-based dependency structure matrices (DSM). Moreover, a static-based DSM consists of elements/nodes that are independent of time where all nodes exist simultaneously and thus rows and columns ordering reflects groupings and not time flow (Browning 2001). However, elements interactions within the time-based DSM are established on directed graph that includes feedforward and feedback interfaces; i.e. in two directions. Additionally, the dependency structure matrix relationships, purposes and context should be clear to all those engaged in completing it for successful analysis using the DSM (Dong 1999). It is imperative to determine the purpose of using the dependency structure matrix (DSM) and the questions it is intended to answer. Failing to do so, might result in every person focusing on different purposes while completing the matrix. In summary, dependency structure matrix is considered a network modelling tool that analyze a design structure and displays the existing interactions among tis components. Many terms has been used by researchers to refer to Dependency structure matrix such as: design structure matrix, dependency system model and deliverable source map. According to Eppinger & Browning (2012) the use of dependency structure matrix has many advantages such as: representing large and complex systems in small space (conciseness), providing system level view (visualization), understanding basic structure of complex system (intuitive understanding), applying powerful analyses in graph theory and linear algebra (analysis) and modifying the basic matrix with useful graphics (flexibility).

In conclusion, the proposed methodology in using dependency structure matrix in this research is to apply the single domain type; by having personality traits repeated in both rows and columns in matrix. Then, asking 3-4 experienced project managers to fill the off-diagonal cells by either 0 or 1 value to indicate if there is a direct relationship among: the traits themselves, among the traits and the project success criteria (scope, time, cost, quality, risk, resources, stakeholder satisfaction), among the traits and the project managers' risk attitude description (being careful or carefree person). Additionally, the results of the matrix will be analyzed using Gehpi software (version 0.9.1) which is a visualization and manipulation software. Different layouts for the entire network and sub-networks will be tested; where a network layout is an algorithm that position the network nodes in the 2-D or 3-D graphic space where a line leading from one node in the network to another node indicates that there is correlation between the nodes. Figure 5.25 displays the dependency matrices development and analysis.

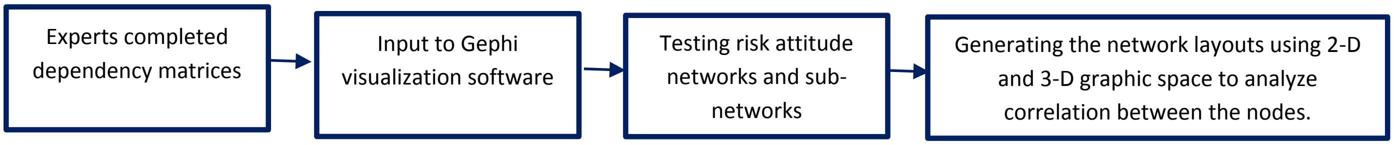


Figure 5.25: Dependency matrices development.

Furthermore, several ego network filters were applied on the network to investigate the interdependencies between project managers' personality traits and project success criteria domains. Each project success criteria domain was selected as a focal node (an "ego") to determine its connections to personality traits (which are called "alters") where each ego is treated as its own case. Also, several network statistics were performed on each network, such as: size, density, distance and total network clustering coefficient. Additionally, many measures were used in analyzing the ego network nodes characteristics such as: clustering coefficients and centrality measures (degree, betweeness, closeness and eigenvector).

5.15 Sample composition and size

According to Saunders et al. (2016), the research sample size can influence the statistic test that is used to assess the statistical significance of research variables relationships. Moreover, it is difficult to achieve a significant test statistic using a small sample. On the other hand, relationships and difference becomes more significant using large samples (Anderson 2003) because sample size start getting closer to population size. Therefore, small research populations can result in indifferent statistical tests while very large population samples can result in exaggeratedly sensitive statistical tests. According to Ghasemi & Zahediasl (2012), large samples of more than 30 or 40 lead to normal sampling distributions regardless of the data shape.

Hence, to ensure achieving significant results through having normally distributed data and applying parametric statistical tests; the research sample was 103 project managers' out of 525 respondents' who received the questionnaire (19.6% response rate).

5.16 Pilot study

Gelsne (2011) suggested that pilot study is beneficial for testing many proposed research aspects, such as: interest of participants in the research topic and clarification for research questions and statements. However, pilot studies should be used in developing ideas and research plans and not viewed as a study in itself (Gelsne 2011). Above all, the pilot study should be used for examining the research methods and process rather than for collecting data. Hence, the researcher undertook a pilot study by sending the research questionnaire to 15 respondents' to check the: the questionnaire validity, completion time, list of questions and research method. Also, adjustments were done according to the results of the pilot study. At a later stage; the pilot study sample were added to the research target population where it proved to be valid.

5.17 Ethical considerations

According to Flick (2014); defined research ethics as the actions that should be applied to protect the research participants'. To ensure the ethics of the research; the researcher explained the research aim and methodology to participants in the body of the email while avoiding making false speeches about the benefits of the research to participants. Moreover, the researcher aimed to avoid any harm caused to research participants by following an international code of ethics such as: the British Psychological Society (BPS) Code of Conduct; i.e. Ethical Principles and Guidelines. Furthermore, Flick (2014) indicated that informed consent specifies that participants' should understand the risks and benefits of participating in the research. Equally, informed consent is participants' agreement to participate in the research based on information given to them by researchers. Moreover, the consent should be given voluntarily by participants in a way that protects their dignity and rights (Flick 2014). Hence, the research was conducted based on informed consent. Appendix II include research invitation letter.

5.18 Limitations

The study limitations can be summarized in the following: first, in the difficulty of accurately measuring certain personality traits that related to risk propensity. A second limitation is related to the issue of generalizability as the study sample will be based on selected project managers within specific industries. Thus, future research is recommended in different industries and nations on the influence of different human factors on project managers' tendency in taking risky decisions and considering other factors such as: group, organizational and situational factors.

5.19 Summary

There were many key findings in this chapter. First, adopted research methodology was justified and explained in terms of philosophy, paradigm and methods. Second, comparison between research tools used in similar topics and selecting questionnaire as the primary research tool. Third, detailed the questionnaire design and structure where it was validated using academicians and experts in the topic field. Fourth, introduced statistical techniques that will be used in analyzing collected data. Fifth, research process layout was presented along with discussions on research sample composition and size. Last, issues related to pilot study, ethical considerations and limitations were discussed and presented.

6 Chapter Six: Descriptive Statistics and Ranking Analysis

6.1 Introduction

This chapter discusses the collected data descriptive statistics. Additionally, it provides ranking of the collected data according to their means in order to decide the most appropriate data analyses techniques. Furthermore, the chapter includes suggestions for grouping the data based on certain demographic variables such as position and project management years of experience. Finally, the chapter also includes ranking respondents' ratings of personality traits according to their mean scores in comparison to all traits and in compassion to traits within each personality cluster.

6.2 Research questionnaire

The primary tool used to collect respondents' responses was a questionnaire designed by the researcher and distributed to project practitioners who assume the role of the project manager across: different positions, different industries and different countries. In literature review and framework chapters, there was identification of personality traits that might influence project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria. In this chapter, both personality traits and project domain-specific risk propensities were ranked in order of importance based on respondents' ratings. Consequently, the ranking of the data will save efforts and time and lead to better analysis through focusing more on the most important traits that influence project managers' risk propensity rather than following data trends. Additionally, the questionnaire was distributed to targeted respondents through different channels; specifically through: direct email, email links, social media channels (LinkedIn, Facebook, WhatsApp, etc.). Moreover the questionnaire was designed using SurveyMonkey software and sent by direct email to 525 targeted respondents that were selected from the researcher company database (which contains the contacts of around 55,000 professional person). Moreover, the selected respondents' were assuming project manager role and their designations were related to project management. Specifically, the targeted respondents covered almost 40 project designations. Furthermore, the questionnaire was also posted on several LinkedIn groups of project professionals such as: Consultant Network, Highly Effective Project Managers, PhD Programme and Project Management. Research of Project Management, the Project Manager Network and Worldwide Management Consultants. Furthermore, the collected total responses were 103 -out of targeted population of 525- which composed 19.6 % of the targeted sample size. This is considered an acceptable response rate considering the questionnaire length (Akintoye 2000). Table 6.1 summarizes the collected responses sources. Research questionnaire is provided in Appendix III.

Responses Collector	**Targeted Population**	**Total Responses**
Email Invitations	487	65
Social Media Post	28	28
Survey Link	10	10
Totals	525	103
Total Response Rate	103 / 525 = 19.6 %	

Table 6.1: Research sample responses collectors.

6.3 Descriptive statistics

Below is description of data breakdown for respondents' general and demographic information.

6.3.1 Age

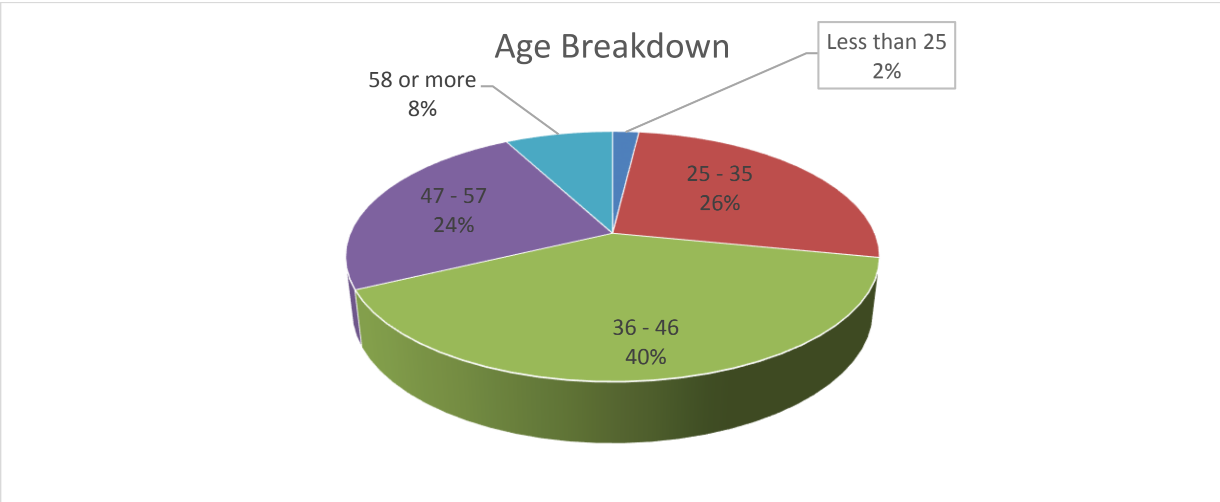


Figure 6.1: Research sample age breakdown.

The findings showed the respondents age description as follows: 41 respondents (40%) with an age between 36-46 years, 27 respondents (26%) with an age between 25-35 years, 25 respondents (24%) with an age between 47-57 years, 8 respondents (8%) with an age of 58 or more and 2 respondents (2%) with an age less than 25 years. Furthermore, in order to statistically be able to do mean group comparisons the above age brackets were clustered around three groups:

Group 1: 35 years and below = 28%

Group 2: 36-46 years = 40%

Group 3: 47 years and above = 32%

6.3.2 Gender

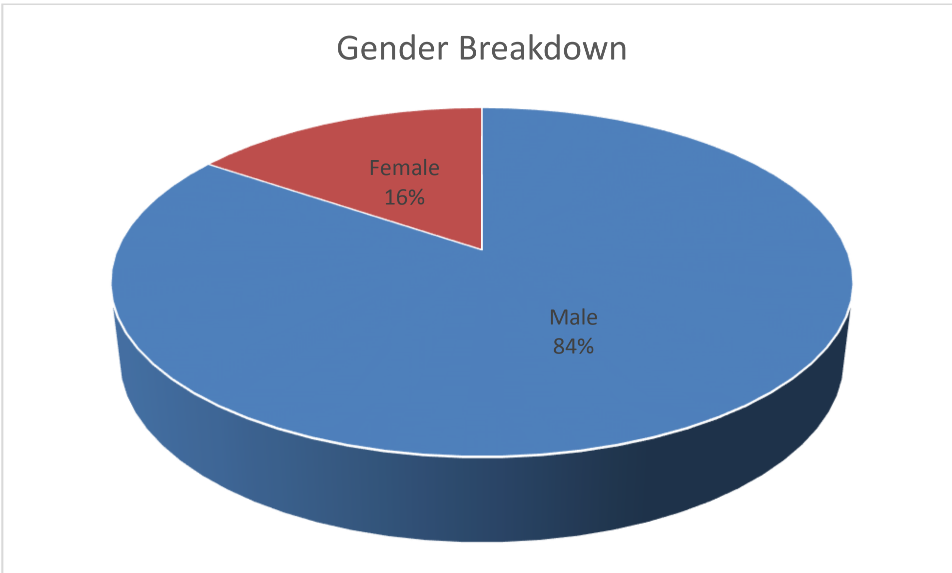


Figure 6.2: Research sample gender breakdown.

The findings showed the respondents gender description as follows: 87 respondents (84%) were males and 16 respondents (16%) were females. However, it will be difficult to do any gender group statistical analysis due to very large difference in the count between the male and female groups.

6.3.3 Highest attained level of education

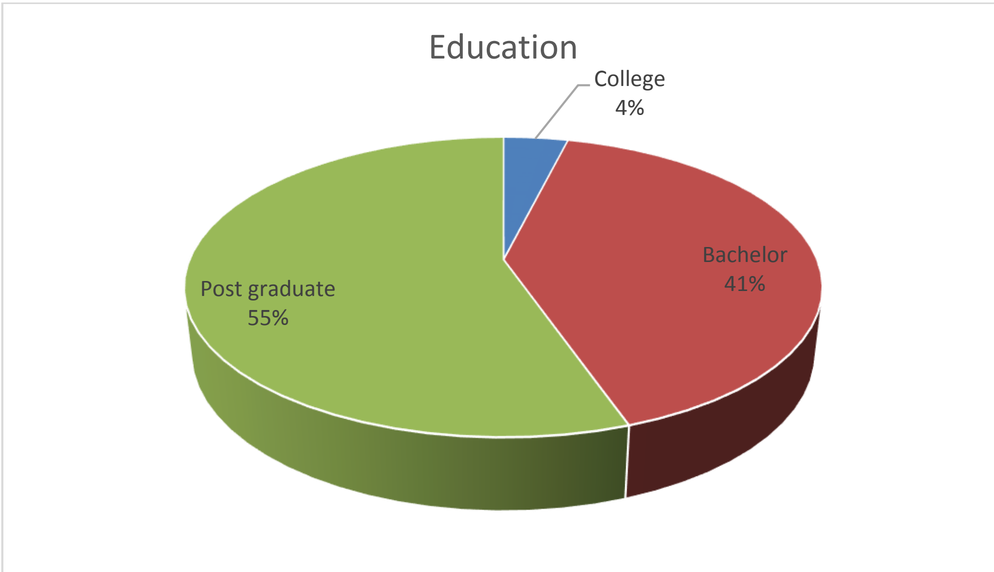


Figure 6.3: Research sample education level breakdown.

The findings showed the respondents education description as follows: 57 respondents (55%) with post graduate education, 42 respondents (41%) with bachelor education and, 4 respondents (4%) with college education. Furthermore, since respondents with college education constitute only 4% of the total respondents' sample; then it was merged with the respondents group of bachelor education where the clustered two education groups will be as follows:

Group 1: college and bachelor = 45%

Group 2: post graduate = 55%

6.3.4 Number of dependents

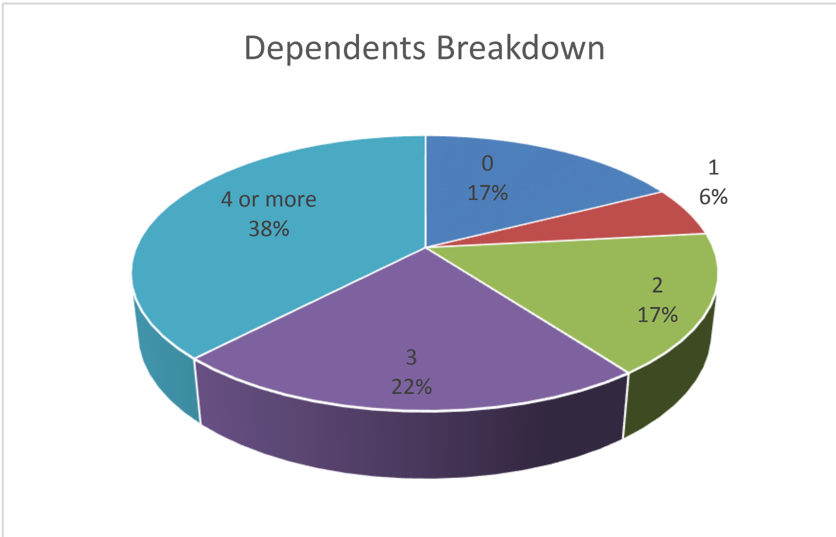


Figure 6.4: Research sample number of dependents breakdown.

The findings showed the respondents number of dependents description as follows: 39 respondents (38%) with 4 or more dependents, 23 respondents (22%) with 3 dependents, 18 respondents (17%) with no dependents, 17 respondents (17%) with 2 dependents and 6 respondents (6%) with 1 dependent. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: 0-2 dependents = 40%

Group 2: 3 dependents = 22%

Group 3: 4 and more dependents = 38%

6.3.5 Race

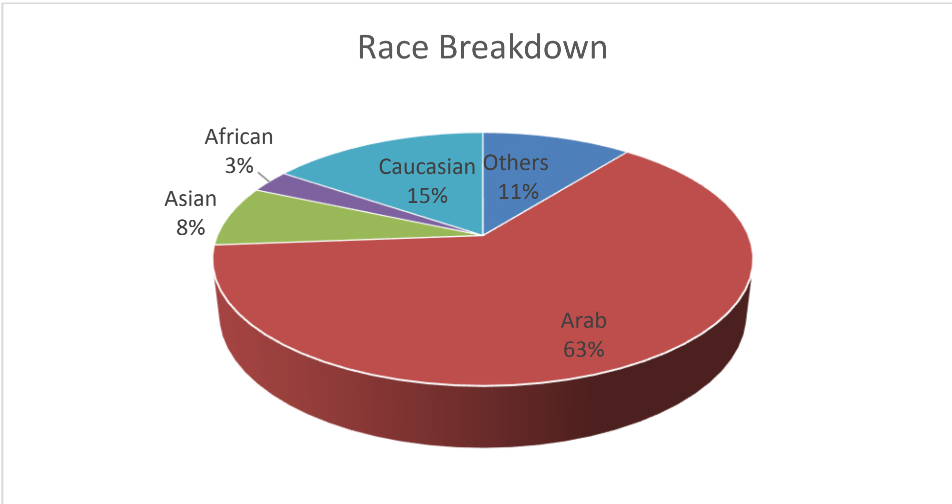


Figure 6.5: Research sample race breakdown.

The findings showed the respondents race description as follows: 65 respondents (63%) were Arabs, 16 respondents (15%) were Caucasians, 8 respondents (8%) were Asians, 3 respondents (3%) were Africans and 11 respondents (11%) from other races. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: Arabs = 63%

Group 2: Non-Arabs = 37%

6.3.6 Professional certifications

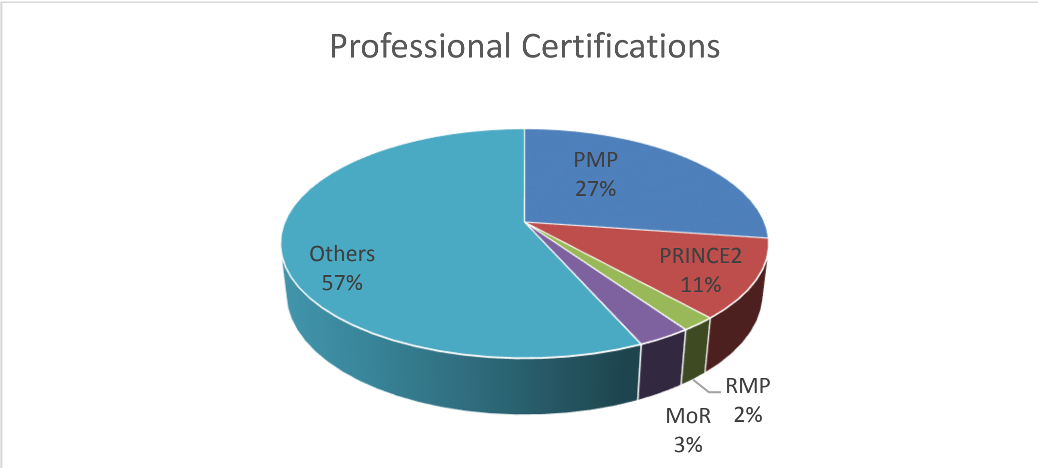


Figure 6.6: Research sample professional certifications breakdown.

The findings showed the respondents professional certification description as follows: 27 respondents (26%) with PMP certification, 11 respondents (11%) with PRINCE2 certification, 2 respondents (2%) with RMP certification, 3 respondents (3%) with MoR certification, 56 respondents (54%) with other professional certification and 4 respondents (4%) with no professional certifications. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: professional certifications related to project management = 43%

Group 2: others = 57%

6.3.7 Years of experience in managing projects

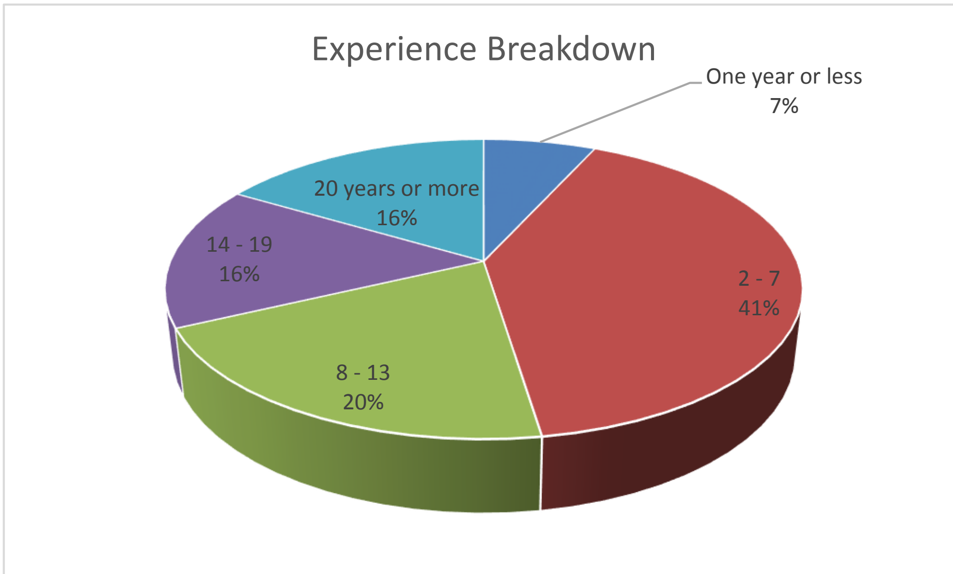


Figure 6.7: Research sample years of project experience breakdown.

The findings showed the respondents years of experience in managing projects description as follows: 42 respondents (41%) with 2-7 years of experience, 21 respondents (20%) with 8-13 years of experience, 17 respondents (16%) with 20 years and more years of experience, 16 respondents (16%) with 14-19 years of experience, and 7 respondents (7%) with one year or less of experience. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: 0-7 years of experience = 48%

Group 2: 8-19 years of experience = 36%

Group 3: 20 years and above of experience = 16%

6.3.8 Current position

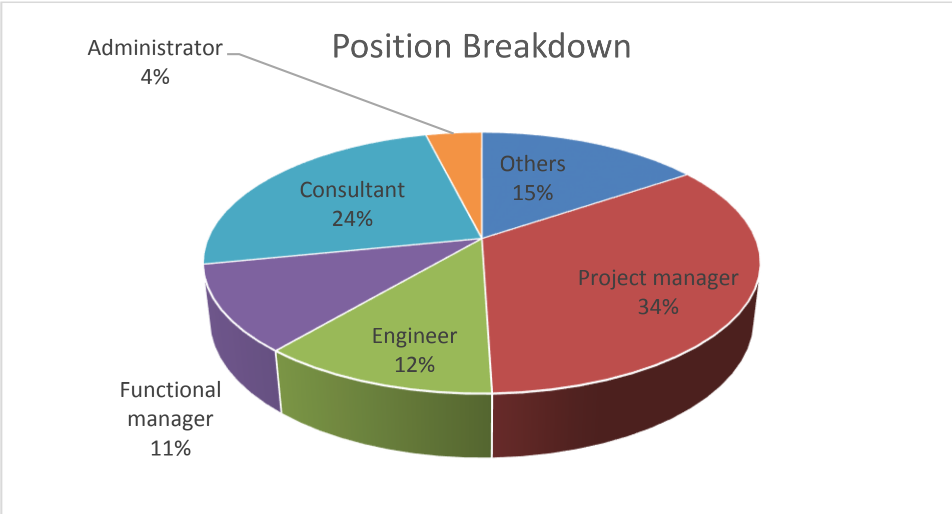


Figure 6.8: Research sample current position breakdown.

The findings showed the respondents current position description as follows: 35 respondents (34%) were project managers, 25 respondents (24%) were consultants, 12 respondents (12%) were engineers, 11 respondents (11%) were functional managers, 4 respondents (4%) were administrators and 16 respondents (15%) were holding other positions. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: project manager = 34%

Group 2: consultant/engineer = 36%

Group 3: functional manager/administrator = 15%

6.3.9 Nature of industry

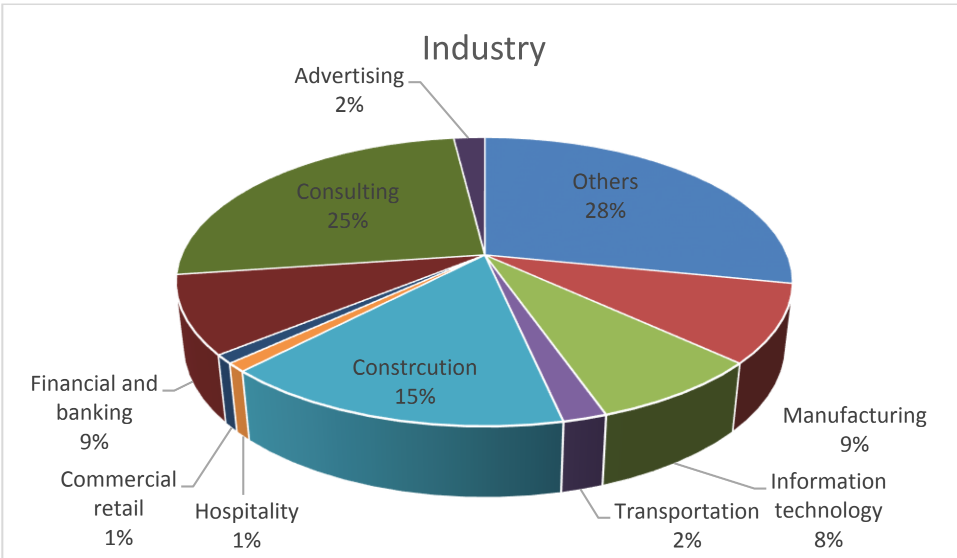


Figure 6.9: Research sample nature of industry breakdown.

The findings showed the respondents industry nature as follows: 26 respondents (25%) were working in consulting, 16 respondents (15%) were in construction, 9 respondents (9%) were in financial and banking, 9 respondents (9%) were in manufacturing, 8 respondents (8%) were in information technology, 2 respondents (2%) were in advertising, 1 respondent (1%) was in commercial retail, 1 respondent (1%) was in hospitality and 29 respondents (28%) were in other industries. Furthermore, there will be no additional grouping for the industry nature groups since there will be no additional statistical analysis done based on them.

6.3.10 Organization type

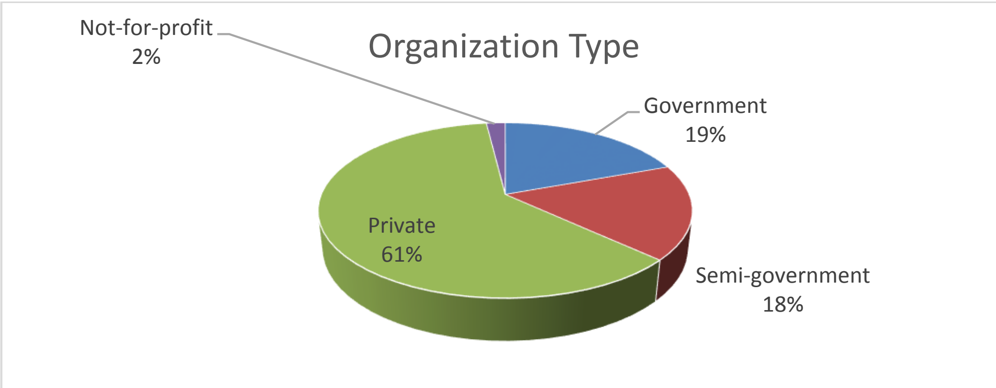


Figure 6.10: Research sample organization type breakdown.

The findings showed the respondents organization type description as follows: 63 respondents (61%) were working in private entities, 20 respondents (19%) were working for government entities, 18 respondents (18%) were working for semi-government entities and 2 respondents (2%) were working for not-for-profit entities. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: private = 61%

Group 2: others = 39%

6.3.11 Organization size

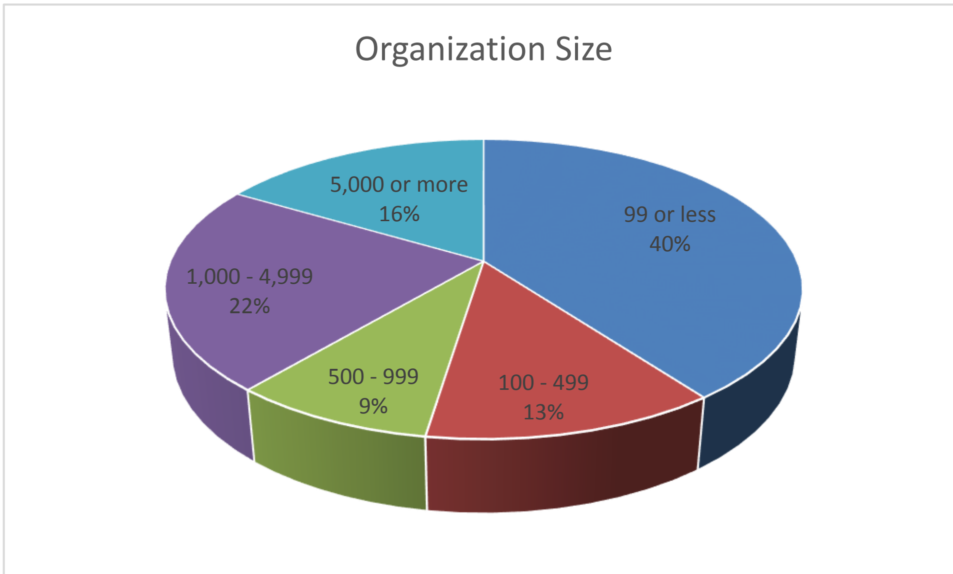


Figure 6.11: Research sample organization size breakdown.

The findings showed the respondents organization size as follows: 41 respondents (40%) were working in organization with 99 employees or less, 23 respondents (22%) were working in organizations with 1,000-4,999 employees, 17 respondents (16%) were working for organizations with 5,000 employees or more, 13 respondents (13%) were working for organizations with 100-499 employees and 9 respondents (9%) were working for organizations with 500-999 employees. Furthermore, to allow for groups mean comparison the above groups were clustered as below:

Group 1: 499 or less = 53%

Group 2: 500 and above = 47%

6.4 Ranking analysis

In order to identify the most important and critical independent factors; a priority ranking was done based on the average mean of respondents choices to personality traits. Additionally, the questionnaire consisted of 65 personality traits grouped under six personality clusters. A plethora of researchers suggested to rank questionnaire data by analyzing it statistically using average weighted mean, standard deviation, coefficient of variation and severity indices (Field 2005; Morgan et al. 2004; Punch 2006). Furthermore, both Statistical Package for Social Sciences (SPSS) and Microsoft Excel were used for quantitative statistical analysis and data ranking. Moreover, the personality traits were ranked based on respondents' position, project experience level and overall. The reason for using the demographics of position and project experience in ranking the data; is because due to having sufficient number of cases under each of their groups. Also, these two demographic variables were the most commonly used by other researchers in the project management field (Huff & Prybutok 2008). Figure 6.13 displays the personality clusters used in ranking respondents mean ratings.

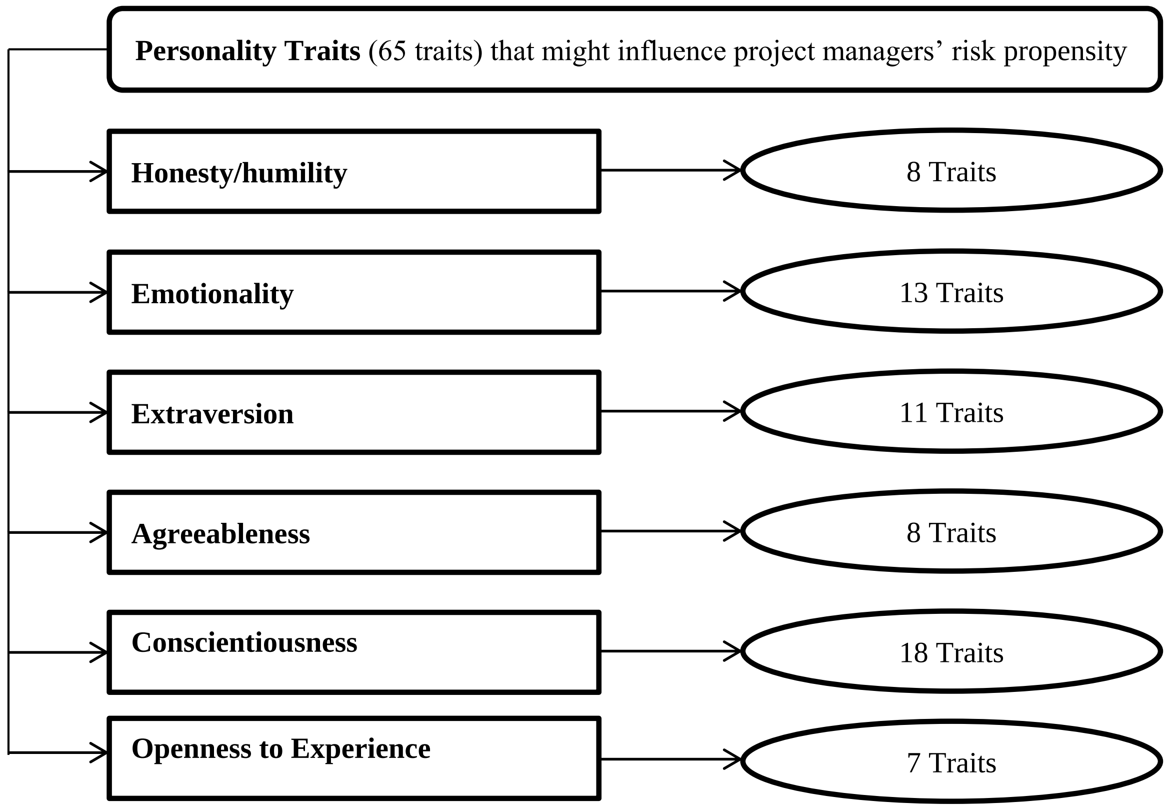


Figure 6.12: personality traits clusters.

6.4.1 Ranking parameters

6.4.1.1 Mean-weighted rating

The mean weighted rating of each personality traits was computed to indicate its importance of as perceived by respondents'. Moreover, the choices ranged from 1(being strongly disagree) to 5 (being strongly agree); therefore, the moderate point for personality traits was 3. Below is the mean-weighted average formula:

$$\text{Mean weighted rating} = [\sum (R*F)] / n$$

Where;

R = Rating of each personality trait (1, 2, 3, 4, 5)

F = Frequency of responses

n = Total number of responses (n = 103)

6.4.1.2 Severity index

The severity index was calculated to rank the indicators based on rating weight where higher severity index indicates a more significant factor/personality trait.

$$\text{Severity Index (S.I)} = \{[\sum(W*F)] / n\} * 100\ \%$$

Where;

W = Weight of each rating (1/5, 2/5, 3/5, 4/5, 5/5)

F = Frequency of responses

n = Total number of responses (n = 103)

6.4.1.3 Coefficient of variation

The coefficient of variation was calculated for comparison of the responses' relative variability where it is expressed as standard deviation as a percentage of the mean. Moreover, the lower the coefficient of variation; the better the variability. Below is the coefficient of variation formula:

Coefficient of variation (COV) = (S / M) * 100 %

Where;

S = Standard Deviation

M = Weighted mean sample

6.4.1.4 Kendall mean ranking

The Kendall mean ranking was computed using SPSS to measure the rank correlation; which is the similarity of the traits ratings by each of the respondents (Kendall 1938) where higher Kendall mean ranking indicates similar rating of the trait by respondents' and vice versa.

6.4.2 Ranking results analysis

There were 65 five statements provided for respondents' in the questionnaire where each statement represents a certain personality trait that might influence risk propensity in relation project success criteria (scope, time and cost). Additionally, respondents' were asked to rate each personality trait according to their agreement level on whether the personality trait influence their risky decisions in relation project success criteria. Furthermore, the rating that was used was a five-point Likert scale (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree). Moreover, respondents' were also asked to rate their tendency to take risky decisions in comparison to others by using a six-point Likert scale (1= extremely less than others; 2 = much less than others; 3 = a little less than others; 4 = more less than others; 5 = much more than others; 6 = extremely more than others). Additionally, the ranking of the factors was done based on respondents' position and experience level in managing projects. Therefore, the respondents' position and experience level data were grouped into less categories in order to allow for better analysis of the data. Furthermore, the position data was re-grouped from 6 categories into 4 categories: project manager (34%), consultants/engineer (36%), functional manager/administrator (15%) and others (15%). The justification for this re-grouping is that functional managers and administrators report to functional departments while consultants and engineers are within the same technical job family. Figure 6.13 shows the position breakdown re-grouping.

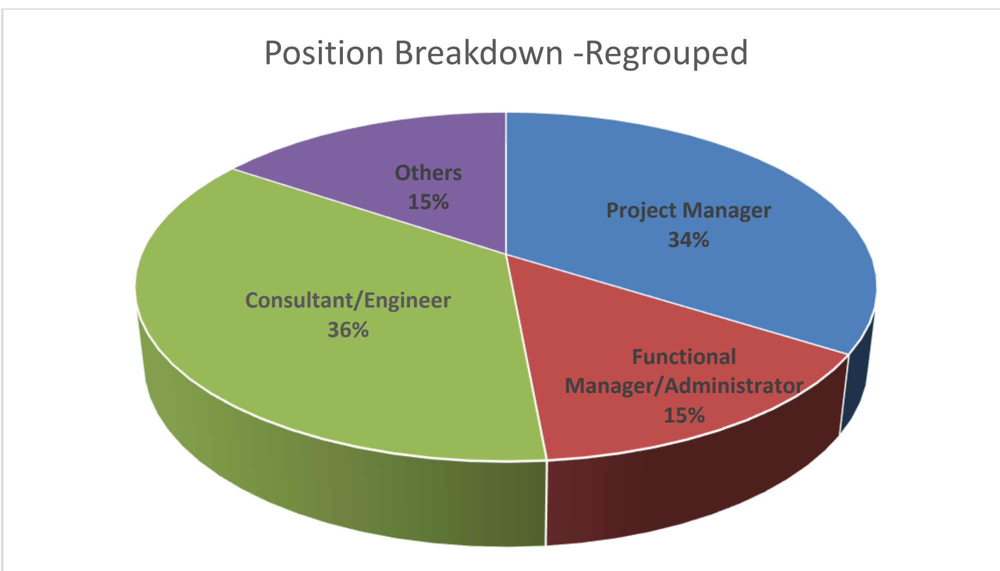


Figure 6.13: Research sample re-grouped position breakdown.

Additionally, the experience level data was re-grouped from 5 categories into 3 categories: 0-7 years (48%), 8-19 years (36%) and 20 years and above (16%). Figure 6.14 shows the experience breakdown re-grouping.

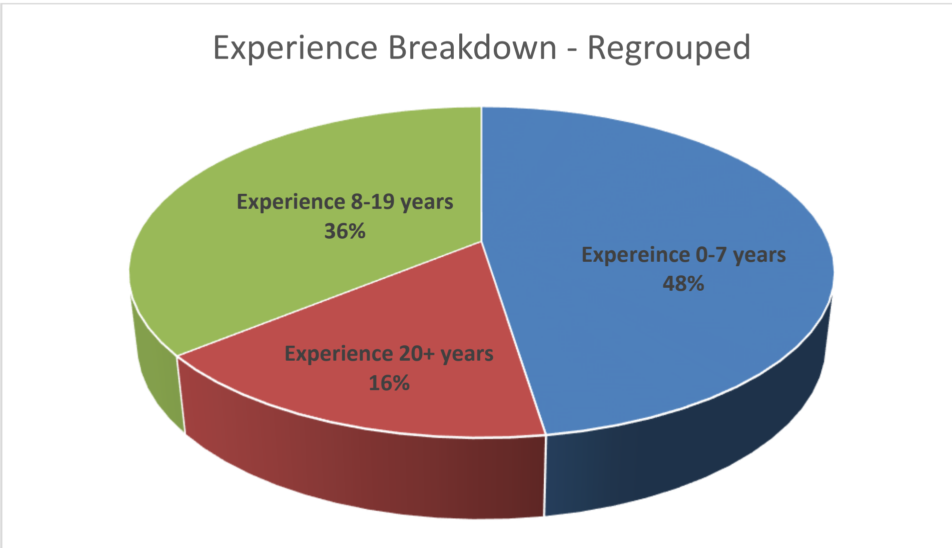


Figure 6.14: Research sample re-grouped experience breakdown.

The average weighted mean for all personality traits varied from 2.01 to 4.33, with the overall mean of 3.57. Additionally, the severity index ranged from 40.19% to 86.6 %. Also, among the top 15 ranked personality traits; 9 of the traits belong to conscientiousness personality cluster where the highest weighted mean trait was C11-scale with a mean of 4.33, severity index of 86.6% and coefficient of variance of 15.64. Furthermore, the top 15 ranked traits had a minimum mean value of 4.05 (related to O1-inqusitivenss and O2-creativity; which is still higher than the average overall mean of 3.57) and minimum severity index value of 80.97%; which means that the first 15 ranked traits are perceived to be more important by respondents'. Also, personality trait C11-scale ranked as the 1st out of all the 65 traits and it is where it was ranked first by

Consultants/Engineer and Project Managers' groups. However, Functional Managers'/Administrators ranked it as 2nd. Also, respondents' with experience between 0-7 years and with 8-19 years; both ranked it 1st. Whereas, respondents' with more than 20 years ranked it as 3rd. Below are the ranking results and analysis as per personality traits clusters and risk propensity domains.

6.4.3 Honesty/Humility factors

The honesty/humility cluster consisted of eight personality traits out of which only one ranked among the top 15; which is H3-greed avoidance (5th rank). Moreover, the H3-greed avoidance factor had a mean of 4.16 and severity index of 83.11%. It was also ranked as 4th by project managers and 2nd by project practitioners with experience of 20 years and above. Table 6.2 displays honesty/humility ranking results within overall traits while table 6.3 displays honesty/humility ranking results within the cluster.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Overall ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
H1	3.36	1.16	67.18	34.59	4.33	51	11	49	44	51	43	48
H2	3.28	1.11	65.63	33.71	4.11	58	37	45	50	47	44	50
H3	4.16	1.05	83.11	25.39	6.03	4	21	15	7	10	2	5
H4	3.04	0.94	60.78	30.88	3.57	49	59	52	54	57	51	53
H5	3.60	1.02	72.04	28.39	4.82	42	35	29	38	33	40	38
H6	3.86	0.86	77.28	22.35	5.29	23	7	31	32	14	24	26
H7	3.30	0.88	66.02	26.77	4.18	43	52	50	48	50	47	49
H8	3.02	1.12	60.39	37.10	3.67	53	53	55	53	55	60	55

Table 6.2: Importance ranking of honesty/humility traits within overall traits.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Cluster ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
H1	3.36	1.16	67.18	34.59	4.33	6	2	5	4	6	4	4
H2	3.28	1.11	65.63	33.71	4.11	8	5	4	6	4	5	6
H3	4.16	1.05	83.11	25.39	6.03	1	3	1	1	1	1	1
H4	3.04	0.94	60.78	30.88	3.57	5	8	7	8	8	7	7
H5	3.60	1.02	72.04	28.39	4.82	4	4	2	3	3	3	3
H6	3.86	0.86	77.28	22.35	5.29	2	1	3	2	2	2	2
H7	3.30	0.88	66.02	26.77	4.18	3	6	6	5	5	6	5
H8	3.02	1.12	60.39	37.10	3.67	7	7	8	7	7	8	8

Table 6.3: Importance ranking of honesty/humility traits within the same cluster.

6.4.4 Emotionality factors

The emotionality cluster consisted of thirteen personality traits out of which only one ranked among the top 15; which is E7-self-conscientiousness (2nd rank). Moreover, the E7-self-conscientiousness had a mean of 4.30 and severity index of 86.02%. It was also ranked as 1st by functional manager/administrator group and experience of 20 years and above group. Table 6.4 displays emotionality ranking results within overall traits while table 6.5 displays emotionality ranking results within the cluster.

Code	**Mean**	**Standard deviation**	**Severity index**	**Coefficient of variation**	**Kendall mean ranking**	**Overall ranking**						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
E1	2.75	1.02	54.95	37.00	5.81	59	57	59	57	60	57	59
E2	2.61	1.05	52.23	40.21	5.39	61	60	60	61	59	59	60
E3	3.36	0.97	67.18	28.84	7.80	50	42	40	45	46	54	47
E4	3.37	0.94	67.38	27.88	7.66	48	44	44	49	44	38	46
E5	2.18	0.97	43.69	44.29	3.99	63	65	63	64	64	63	64
E6	2.56	0.88	51.26	34.41	5.02	60	58	61	62	61	55	61
E7	4.30	0.67	86.02	15.56	10.69	2	1	6	2	2	1	2
E8	3.99	0.77	79.81	19.38	9.43	20	13	17	20	9	35	20
E9	2.79	0.91	55.73	32.82	5.93	56	62	58	56	58	61	58
E10	3.64	1.09	72.82	30.00	8.69	41	30	32	35	35	23	35
E11	3.42	1.01	68.35	29.41	7.93	46	40	39	47	40	53	44
E12	2.34	1.13	46.80	48.45	4.42	62	63	62	60	63	64	63
E13	3.56	1.03	71.26	28.79	8.25	35	55	42	36	37	45	40

Table 6.4 Importance ranking of emotionality traits within overall traits.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Cluster ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
E1	2.75	1.02	54.95	37.00	5.81	9	8	9	9	10	9	9
E2	2.61	1.05	52.23	40.21	5.39	11	10	10	11	9	10	10
E3	3.36	0.97	67.18	28.84	7.80	7	5	5	5	7	7	7
E4	3.37	0.94	67.38	27.88	7.66	6	6	7	7	6	4	6
E5	2.18	0.97	43.69	44.29	3.99	13	13	13	13	13	12	13
E6	2.56	0.88	51.26	34.41	5.02	10	9	11	12	11	8	11
E7	4.30	0.67	86.02	15.56	10.69	1	1	1	1	1	1	1
E8	3.99	0.77	79.81	19.38	9.43	2	2	2	2	2	3	2
E9	2.79	0.91	55.73	32.82	5.93	8	11	8	8	8	11	8
E10	3.64	1.09	72.82	30.00	8.69	4	3	3	3	3	2	3
E11	3.42	1.01	68.35	29.41	7.93	5	4	4	6	5	6	5
E12	2.34	1.13	46.80	48.45	4.42	12	12	12	10	12	13	12
E13	3.56	1.03	71.26	28.79	8.25	3	7	6	4	4	5	4

Table 6.5: Importance ranking of emotionality traits within same cluster

6.4.5 Extraversion factors

The extraversion personality traits cluster consisted of eleven personality traits out of which only one ranked among the top 15; which is X5- assertiveness (7th rank). Moreover, the X5-assertiveness factor had a mean of 4.14 and severity index of 82.72%. It was also ranked as 9th by project managers, 3rd by functional managers and 5th by project practitioners with experience between 8-19 years. Table 6.6 displays emotionality ranking results within overall traits while table 6.7 displays emotionality ranking results within the cluster.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Overall ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
X1	4.03	0.76	80.58	18.86	7.54	28	8	5	24	7	13	16
X2	3.83	0.92	76.70	23.97	7.09	26	10	34	28	29	25	28
X3	3.63	0.87	72.62	24.08	6.35	31	31	36	30	43	39	36
X4	2.36	0.83	47.18	35.04	3.05	64	61	64	63	62	62	62
X5	4.14	0.70	82.72	16.94	8.00	9	3	12	10	5	6	7
X6	2.01	1.05	40.19	52.37	2.65	65	64	65	65	65	65	65
X7	3.41	0.89	68.16	26.13	5.65	45	47	48	42	48	46	45
X8	3.78	0.87	75.53	23.13	6.89	39	29	26	14	41	34	30
X9	4.02	0.70	80.39	17.41	7.59	13	4	24	17	21	14	17
X10	3.02	1.00	60.39	33.11	4.68	54	49	53	55	53	58	56
X11	3.74	0.77	74.76	20.51	6.51	40	33	28	33	30	32	33

Table 6.6 Importance ranking of extraversion traits within overall traits.

Code	**Mean**	**Standard deviation**	**Severity index**	**Coefficient of variation**	**Kendall mean ranking**	**Cluster ranking**						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
X1	4.03	0.76	80.58	18.86	7.54	4	3	1	4	2	2	2
X2	3.83	0.92	76.70	23.97	7.09	3	4	6	5	4	4	4
X3	3.63	0.87	72.62	24.08	6.35	5	6	7	6	7	7	7
X4	2.36	0.83	47.18	35.04	3.05	10	10	10	10	10	10	10
X5	4.14	0.70	82.72	16.94	8.00	1	1	2	1	1	1	1
X6	2.01	1.05	40.19	52.37	2.65	11	11	11	11	11	11	11
X7	3.41	0.89	68.16	26.13	5.65	8	8	8	8	8	8	8
X8	3.78	0.87	75.53	23.13	6.89	6	5	4	2	6	6	5
X9	4.02	0.70	80.39	17.41	7.59	2	2	3	3	3	3	3
X10	3.02	1.00	60.39	33.11	4.68	9	9	9	9	9	9	9
X11	3.74	0.77	74.76	20.51	6.51	7	7	5	7	5	5	6

Table 6.7: Importance ranking of extraversion traits within same cluster.

6.4.6 Agreeableness factors

The agreeableness personality traits cluster consisted of eight personality traits out of which only one ranked among the top 15; which is A6- morality (14^{th} rank). Moreover, the A6- morality factor had a mean of 4.05 and severity index of 80.97%. It was also ranked as 11^{th} by consultant/engineer and 5^{th} by project practitioners with experience of 20 years and above. Table 6.8 displays agreeableness ranking results within overall traits while table 6.9 displays agreeableness ranking results within the cluster.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Overall ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
A1	3.60	0.96	72.04	26.75	4.25	33	39	38	39	38	27	37
A2	3.65	0.94	73.01	25.65	4.33	27	41	37	34	32	37	34
A3	4.01	0.92	80.19	22.95	5.28	19	23	20	11	27	16	18
A4	3.77	0.83	75.34	22.15	4.71	30	36	30	29	31	36	31
A5	3.58	0.77	71.65	21.59	3.96	32	43	41	41	39	33	39
A6	4.05	0.65	80.97	15.99	5.29	18	18	11	16	16	5	14
A7	3.99	0.73	79.81	18.40	5.10	21	20	14	18	23	21	21
A8	3.23	0.85	64.66	26.42	3.09	47	48	51	51	49	49	51

Table 6.8: Importance ranking of agreeableness traits within overall traits.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Cluster ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
A1	3.60	0.96	72.04	26.75	4.25	7	5	6	6	6	4	6
A2	3.65	0.94	73.01	25.65	4.33	4	6	5	5	5	7	5
A3	4.01	0.92	80.19	22.95	5.28	2	3	3	1	3	2	2
A4	3.77	0.83	75.34	22.15	4.71	5	4	4	4	4	6	4
A5	3.58	0.77	71.65	21.59	3.96	6	7	7	7	7	5	7
A6	4.05	0.65	80.97	15.99	5.29	1	1	1	2	1	1	1
A7	3.99	0.73	79.81	18.40	5.10	3	2	2	3	2	3	3
A8	3.23	0.85	64.66	26.42	3.09	8	8	8	8	8	8	8

Table 6.9: Importance ranking of agreeableness traits within same cluster.

6.4.7 Conscientiousness factors

The conscientiousness personality traits cluster consisted of eighteen personality traits out of which only nine factors ranked among the top 15. Furthermore, C11- scale personality trait was ranked as 1st with a mean of 4.33 and severity index of 86.6 %. Additionally it was also ranked as 1st by the following groups: project manager, consultant/engineer, practitioners' with experience between 0-7 years and practitioners' with experience between 8-19 years. Also, it was ranked as 2nd by functional manager/administrator and 3rd by practitioners with experience 20 years and above. The other factors that were ranked among the top 15 factors were:

- C1- organization personality trait ranked as 8th with a mean of 4.14 and severity index of 82.72%.
- C2- diligence personality trait ranked as 9th with a mean of 4.08 and severity index of 81.55%.
- C3- perfectionism personality trait ranked as 11th with a mean of 4.07 and severity index of 81.36%.
- C4- prudence personality trait ranked as 3rd with a mean of 4.19 and severity index of 83.88%.
- C5- competence personality trait ranked as 10th with a mean of 4.08 and severity index of 81.55%.
- C9- confirmation personality trait ranked as 4th with a mean of 4.16 and severity index of 83.11%.
- C14- forward-thinking personality trait ranked as 12th with a mean of 4.06 and severity index of 81.17%.

- C17- scenario bias personality trait ranked as 6h with a mean of 4.15 and severity index of 82.91%.

Table 6.10 displays conscientiousness ranking results within overall traits while table 6.11 displays conscientiousness ranking results within the cluster.

Code	**Mean**	**Standard deviation**	**Severity index**	**Coefficient of variation**	**Kendall mean ranking**	**Overall ranking**						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
C1	4.14	0.80	82.72	19.46	10.80	10	17	3	8	6	10	8
C2	4.08	0.85	81.55	20.80	10.41	5	24	21	4	26	11	9
C3	4.07	0.85	81.36	21.01	10.23	16	6	7	3	20	28	11
C4	4.19	0.79	83.88	18.90	10.96	6	12	2	5	3	18	3
C5	4.08	0.74	81.55	18.07	10.16	12	14	19	19	11	4	10
C6	3.95	0.71	79.03	17.85	9.26	22	15	22	26	22	15	22
C7	3.78	0.86	75.53	22.84	8.27	34	34	35	23	34	31	29
C8	3.94	0.71	78.83	18.05	9.12	24	16	25	25	24	17	23
C9	4.16	0.71	83.11	17.10	10.63	3	25	8	9	4	9	4
C10	3.88	0.69	77.67	17.77	9.08	15	32	27	27	25	26	25
C11	4.33	0.68	86.60	15.64	12.04	1	2	1	1	1	3	1
C12	3.53	1.07	70.68	30.39	7.63	37	56	46	43	36	42	42
C13	3.10	1.01	61.94	32.45	5.47	57	50	54	52	56	50	52
C14	4.06	0.70	81.17	17.19	9.97	8	19	13	12	17	7	12
C15	3.54	0.88	70.87	24.92	7.27	38	45	43	40	42	41	41
C16	3.90	0.79	78.06	20.14	9.05	25	22	18	22	28	29	24
C17	4.15	0.71	82.91	17.03	10.66	7	5	4	6	8	19	6
C18	3.99	0.91	79.81	22.88	10.01	14	28	10	21	13	20	19

Table 6.10: Importance ranking of conscientiousness traits within overall traits.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Cluster ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
C1	4.14	0.80	82.72	19.46	10.80	7	8	3	6	4	5	5
C2	4.08	0.85	81.55	20.80	10.41	3	11	11	3	13	6	6
C3	4.07	0.85	81.36	21.01	10.23	11	3	5	2	9	13	8
C4	4.19	0.79	83.88	18.90	10.96	4	4	2	4	2	9	2
C5	4.08	0.74	81.55	18.07	10.16	8	5	10	9	6	2	7
C6	3.95	0.71	79.03	17.85	9.26	12	6	12	14	10	7	11
C7	3.78	0.86	75.53	22.84	8.27	15	15	15	12	15	15	15
C8	3.94	0.71	78.83	18.05	9.12	13	7	13	13	11	8	12
C9	4.16	0.71	83.11	17.10	10.63	2	12	6	7	3	4	3
C10	3.88	0.69	77.67	17.77	9.08	10	14	14	15	12	12	14
C11	4.33	0.68	86.60	15.64	12.04	1	1	1	1	1	1	1
C12	3.53	1.07	70.68	30.39	7.63	16	18	17	17	16	17	17
C13	3.10	1.01	61.94	32.45	5.47	18	17	18	18	18	18	18
C14	4.06	0.70	81.17	17.19	9.97	6	9	8	8	8	3	9
C15	3.54	0.88	70.87	24.92	7.27	17	16	16	16	17	16	16
C16	3.90	0.79	78.06	20.14	9.05	14	10	9	11	14	14	13
C17	4.15	0.71	82.91	17.03	10.66	5	2	4	5	5	10	4
C18	3.99	0.91	79.81	22.88	10.01	9	13	7	10	7	11	10

Table 6.11 Importance ranking of conscientiousness traits within same cluster.

6.4.8 Openness to experience factors

The openness to experience personality traits cluster consisted of seven personality traits out of which only two ranked among the top 15; where both had close mean and severity index. Furthermore, the O1- inquisitiveness personality trait ranked as 13th with a mean of 4.05 and severity index of 80.97%. Also, O2- creativity factor had a mean of 4.05 and severity index of 80.97% but was ranked 15th. Interestingly, while the O1-inquistivness trait was ranked as 9th by functional manager/administrator; the O2-creativity trait was ranked as 27th by the same group. This could be due to nature of functional jobs that need more adherence to rules and policies rather than being creative. Table 6.12 displays openness to experience ranking results within overall traits while table 6.13 displays openness to experience ranking results within the cluster.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Overall ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
O1	4.05	0.77	80.97	19.06	4.94	11	9	16	15	12	12	13
O2	4.05	0.78	80.97	19.37	4.87	17	27	9	13	18	8	15
O3	3.84	0.87	76.89	22.67	4.44	29	38	23	31	15	30	27
O4	2.94	1.01	58.83	34.27	2.87	55	54	56	59	54	56	57
O5	3.03	1.00	60.58	33.16	2.75	52	51	57	58	52	48	54
O6	3.75	0.99	74.95	26.35	4.40	36	26	33	46	19	22	32
O7	3.42	1.07	68.35	31.35	3.74	44	46	47	37	45	52	43

Table 6.12: Importance ranking of openness to experience traits within overall traits.

Code	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Cluster ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
O1	4.05	0.77	80.97	19.06	4.94	1	1	2	2	1	2	1
O2	4.05	0.78	80.97	19.37	4.87	2	3	1	1	3	1	2
O3	3.84	0.87	76.89	22.67	4.44	3	4	3	3	2	4	3
O4	2.94	1.01	58.83	34.27	2.87	7	7	6	7	7	7	7
O5	3.03	1.00	60.58	33.16	2.75	6	6	7	6	6	5	6
O6	3.75	0.99	74.95	26.35	4.40	4	2	4	5	4	3	4
O7	3.42	1.07	68.35	31.35	3.74	5	5	5	4	5	6	5

Table 6.13 Importance ranking of openness to experience traits within same cluster.

6.4.9 Risk propensity factors

The risk propensity factors consisted of four items related to project managers' risk propensity in relation to scope, time, cost and general domains. Furthermore, risk propensity related to general domain was ranked as 1st by all respondents' within position and experience levels groups with a mean of 4.05 and severity index of 64.56. Also, risk propensity related to scope domain was ranked as 2nd by all respondents' within position and experience levels groups with a mean of 3.75 and severity index of 56.63. However, risk propensity related to time domain was ranked 3rd only within mean overall ranking with a mean of 3.73 and severity index of 56.31. Finally, risk propensity related to cost was ranked 4th only within mean overall ranking with a mean of 3.53 and severity index of 49.19. Figure 6.14 displays the risk propensity domains ranking.

Risk propensity domain	Mean	Standard deviation	Severity index	Coefficient of variation	Kendall mean ranking	Ranking						
						Project Manager	Functional Manager/Administrator	Consultant/Engineer	Exp. 0-7	Exp. 8-19	Exp. 20+	**Overall ranking**
Scope	3.75	1.20	56.63	32.08	2.38	2	2	2	2	2	2	2
Time	3.73	1.21	56.31	32.57	2.48	1	3	3	3	2	3	3
Cost	3.53	1.28	49.19	36.28	2.28	4	2	4	4	3	4	4
General	4.05	0.99	64.56	24.55	2.86	1	1	1	1	1	1	1

Table 6.14: Importance ranking of risk propensity domains.

6.4.10 Kendall's W (Kendall's' coefficient of concordance) analysis

The Kendal's coefficient indicate the agreement level among respondents' with the personality traits ranking of importance where it can range from 0 (no agreement) to 1 (complete agreement). Furthermore, the null hypothesis should be rejected with significance level less than 0.05 due to lack of agreement between respondents on the importance ranking. On the other hand, the alternative hypothesis should be accepted with significance level of p > 95% indicating agreement among respondents' on factors importance ranking. Hence, the data is reliable since all Kendal's coefficients of personality traits clusters have significance value less than 0.05 as shown in figure .29. Also, Kendalls' W values indicate that there is some agreement among respondents' on the importance ranking of the personality traits where the Kendall's W (Kendall's' coefficient of concordance) formula is provided below:

Kendall's W (Kendall's' coefficient of concordance) = 12 S/(m^2 (n^3-n).

Where;

S= sum of squared deviations.

m=number of respondents'.

n=number of personality traits items.

Table 6.15 shows Kendall's coefficients of concordance.

Personality	**Degree of freedom**	**Kendall's coefficient (W)**	**Significance**
Honesty/Humility	7	0.143	0.000
Emotionality	13	0.338	0.000
Extraversion	10	0.376	0.000
Agreeableness	7	0.146	0.000
Conscientiousness	17	0.131	0.000
Openness to Experience	6	0.254	0.000
Overall	65	0.276	0.000

Table 6.15: Kendall's coefficients of concordance for personality traits clusters.

6.5 Assessing data normality

This section discusses different methods that can be used for exploring relationships between the research variables and differences between the research groups. Moreover, the section provides comparison between the different techniques that were used to assess the data normality such as: the skewness and kurtosis values, the Kolmogorov-Simrnov and Shapiro-Wilk tests and histograms shapes. Also, the section highlighted the statistical tests that requires normality of the data and those that do not require data normality. Finally, it ends with checking the reliability of the research questionnaire items and testing the internal consistently between the items used to measure project managers' personality traits.

6.5.1 Background on statistical techniques

There are many statistical techniques that can be employed to analyze the collected research data. However, the challenge is for the researcher to choose the correct statistical technique that could lead to proper analysis of the data. Furthermore, statistical techniques could be divided into two main types: techniques used to explore the relationship among variables and those used to explore the differences between groups (Pallant 2016). Additionally, the first type of statistical analysis is used to measure the relationship strength among different variables whereas the second type of statistical analysis is used to inspect if there is a statistically significant difference among a number of groups by comparing their mean scores on one or more dependent variable. (Pallant 2016). Hence, techniques from both types were performed to answer the research questions where the researcher explored the relationship among project managers' personality traits (independent variables) and their risk propensity in relation to project success criteria (dependent variables). Also, the analysis included investigating the differences between groups on these variables (such as position and project experience level). Table 6.16 summarizes the statistical techniques that were performed for data analysis; where many of them were also used in previous research that had similar topic.

Exploring relationships among variables	**Exploring differences between groups**
Pearson correlation	One-way variance analysis (ANOVA)
Multiple regression	Data ranking
Logistic regression	Mean-weighted rating:
Dependency structural analysis	Severity index
	Coefficient of variation
	Kendall rank coefficient

Table 6.16: Methods used for data statistical analysis.

Each of the above listed statistical technique has its own objective and assumptions that need to be checked prior to using it. Moreover, there are different factors that need to be taken into consideration when choosing any of these statistical techniques such as: research questions types, questionnaire items types and scale, collected data nature and the assumptions that must be met before using any statistical techniques. Additionally, one of the most important assumptions that need to be considered before choosing the technique is whether the research data is a normal data or non-normal data. Moreover, many of the above mentioned techniques are considered as parametric statistical techniques that require the use of normal data. According to Pallat (2016), parametric statistics are considered as more powerful techniques; however, their assumptions are more stringent such as assuming normality of the underlying distribution of population scores from where the sample has been drawn. Additionally, each different parametric technique has its own additional assumptions (such as Pearson correlation and ANOVA). Therefore, the assumptions of each technique will be discussed thoroughly before applying it to make sure that these assumptions are met. However, in cases where the assumptions are not met; there will be other options to be considered such as using non-parametric technique; such as: the Kruskal-Wallis, Mann-Whitney and Chi-square tests. This is a normal situation with social science research where many attributes that need to be measured (such as personality traits) are not normally distributed and show strong skewness towards either the lower or high end of a scale. Also, according to Cone & Foster (1993) argued that parametric techniques can still be used with non-normal data with the hope that it will not invalidate the research findings especially if the research sample size is a good one. Another option when dealing with non-normal data is to manipulate the data so that it meets the statistical techniques assumptions; such as normal distribution (Tabackhnick & Fidell 2001).

Based on the above, the first taken step for choosing right statistical techniques was to check data normality in order to decide on using parametric or non-parametric tests. The next section details the normality tests that were applied on the research data to check its normality.

6.5.2 Assessing data normality

Normality tests are used to compare the shape of the research sample distribution to the shape of a normal curve. Moreover, normality is used to describe a symmetrical, bell-shaped curve where the greatest frequency of scores are in the middle with smaller frequencies towards the extreme (Gravetter & Wallnau 2000). Additionally, these normality tests assumes that if the research sample is normally shaped; then the population from which it was taken from is normally distributed and hence normality can be assumed. Furthermore, normality can be assessed using the skewness and kurtosis values, the Kolmogorov-Simrnov and Shapiro-Wilk tests and histograms shapes. According to Field (2009) and Oztuna et al. (2006), normality assumption is critical for making accurate conclusions about reality. However, with large research sample sizes of more than 30; the violation of normality assumption would not cause any major problems when analysing the data (Ghasemi & Zahediasl 2012, Pallat 2016). Hence, parametric tests can be still used even if the data is not normally distributed where data distribution can be ignored with large sample sizes (Elliot & Woodward 2007; Altman & Bland 1995). Also, Ghasemi & Zahediasl (2012) mentioned that according to the theory of central limit: when the sample data is approximately normal then the sampling distribution will be also normal; and that in large samples of more than 30 or 40; sampling distributions tends to be normal regardless of the data shape. Also, the means of these random samples from any distribution will have normal distribution (Altman & Bland 1995). Additionally, normality can be seen visually by looking at the normal plots (Field 2009, Altman & Bland 1995). Furthermore, the visual inspection of normality can be checked through looking at the frequency distributions/histograms, probability-probability/P-P plot, stem-and-leaf plot and quantile-quantile/Q-Q plot (Field 2009). According to Elliot & Woodward (2007), normality tests are considered supplementary to graphical and visual normality assessments. Moreover, there are many normality tests than can be used such as: Kolmogorov-Smirnov (K-S) test, Lilliefors corrected K-S test, Shapiro-Wilk test, Anderson-Darling test, Cramer-von Mises test, D'Agostino skewness test, Anscombe-Glynn kurtosis test, D'Agostino-Pearson omnibus test, and the Jarque-Bera test (Ghasemi & Zahediasl 2012). However, among the above tests K-S and Shapiro-Wilk are considered the most common normality tests used by researchers where both can be done using SPSS (Oztuna et al. 2006).

In conclusion, data distribution could be ignored and data normality could be assumed due to having sample of 103 where according to a plethora of researchers; the violation of normality assumption would not cause any major problems when analyzing the data in large samples of more than 30 or 40 in which sampling distributions tends to be normal regardless of the data shape (Altman & Bland 1995, Elliot & Woodward 2007, Ghasemi & Zahediasl 2012, Pallat 2016). However, as precautious act data normality was checked using two methods. First, using skewness and kurtosis values. Second, using visual inspection of normal plots and frequency distributions histograms. Moreover, the reasons for using these two methods are due to their simplicity, accuracy and being commonly used methods for assessing data normality.

6.5.3 Assessing normality of personality traits scores using skewness and kurtosis values

As discussed in the previous section, data normality could be checked using descriptive statistics through the interpretation of the variable skewness and kurtosis values. Furthermore, the skewness value indicates the symmetry of the distribution while the kurtosis value provides information about the distribution "peakedness". Moreover, a perfect normally distributed data will have zero values for skewness and kurtosis (Tabackhnick & Fidell 2013). However, in reality research data are often skewed and kurtotic; therefore, a small departure from zero would not be considered a problem as long as the measure are not too large to compare to their standard errors. Consequently, the measure can be divided by its standard error to get the z-value where the skewness and kurtosis z-values should be somewhere in the span of -1.96 to + 1.96 to assume normality (Pallant 2016, George & Mallery 2010). Additionally, George & Mallery (2010) stated that the values for skewness and kurtosis should be between -2 and +2 for the data to be considered as acceptable in proofing normal univariate distribution. Similarly, Ghasemi & Zahediasl (2012) stated that at significance level $p < 0.05$; the z-value should have an absolute value greater than -1.96 or less than +1.96; while it should be greater than -2.58 or less than +2.58 at significance level $p < 0.01$; and greater than -3.29 or less than +3.29 at significance level $p < 0.001$. However, in small sample sizes (less than 200); the z-values of ±1.96 are considered sufficient to establish data normality; while for samples larger than 200 (with small standard errors) the criteria should be ± 2.58 (Ghasemi & Zahediasl 2012). Hence, z-values for the personality traits were be calculated using the following formulas: where the z-value range should be between -1.96 and +1.96 since the sample size is 103 (which is less than 200).

- Z-value (skewness) = skewness value/standard error (skewness).
- Z-value (kurtosis) = kurtosis value/standard error (kurtosis).

Consequently, all personality traits had z-values of skewness and kurtosis within the range of -1.96 to + 1.96. Also, z-values of skewness and kurtosis were calculated for the personality traits at the clusters level where all values were within the range of -1.96 to + 1.96 indicating normality of the data as shown in table 6.17.

Personality traits variables	Skewness value	Skewness standard error	Skewness z-value	Kurtosis value	Kurtosis standard error	Kurtosis z-value	Normality decision -1.96<z-value <+1.96
Honesty/humility	0.131	0.238	0.550	-0.543	0.472	-1.150	Normal
Emotionality	-0.376	0.238	-1.580	0.891	0.472	1.888	Normal
Extraversion	0.131	0.238	0.550	-0.006	0.472	-0.013	Normal
Agreeableness	-0.024	0.238	-0.101	-0.438	0.472	-0.928	Normal
Conscientiousness	-0.121	0.238	-0.508	-0.172	0.472	-0.364	Normal
Openness To Experience	0.265	0.238	1.113	0.021	0.472	0.044	Normal

Table 6.17: z-values of personality traits variables.

It can be concluded from the above table; that the research data is a little skewed and kurtotic for the research sample, but it does not differ significantly from normality since all z-values are within the range of -1.96 and +1.96. Also, all skewness and kurtosis values are within the range of -2 to +2 and thus; it can be assumed that the data is approximately normally distributed in terms of skewness and kurtosis. Furthermore, many researchers emphasized that normality of data is not required for performing parametric tests specifically when the research sample is large; where some indicated the need of the sample to be only larger than 30 in order to assume data normality (Field 2009, Pallat 2016). However, the results of frequency distributions and P-P plots showed that all personality traits follow normal distribution pattern where straight diagonal lines was seen in all P-P plot and data were almost under the bell-shape in all histograms.

6.5.4 Checking for outliers

Many of the statistical techniques mentioned at the beginning of this chapter are sensitive to outliers; which are data values either above or below the majority of all other data. This section inspect the research data for the existence of outliers. Additionally, descriptive statistics information was used to check if there are any outliers that can affect the data analysis. Furthermore, data outliers were checked using SPSS Boxplots where there were no outliers among the data. Additionally, the variables 5% trimmed mean was calculated by SPSS through removing the top and bottom 5% of the data and recalculating new mean values for all personality traits. Moreover, comparing the 5% trimmed mean values with the original mean values indicated absence of outliers. Also, when comparing the 5% trimmed mean values of the variables to the original mean values; it was clear that the extreme data are not having lot of influence on the mean where the two means were very close to each other. Table 6.18 displays the comparison between original mean values and 5%trimmed mean values for honesty/humility traits. Furthermore, the same analysis was done on all personality traits items where the 5% trimmed means were always too much close to original mean values indicating absence of outliers.

Personality traits variables	Original mean	5% trimmed mean
H1	3.3592	3.3867
H2	3.2816	3.3128
H3	4.1553	4.2497
H4	2.9612	2.9229
H5	3.6019	3.6672
H6	3.8641	3.9045
H7	3.3010	3.3236
H8	3.0194	3.0216

Table 6.18: The original mean and 5% trimmed mean for honesty/humility items.

6.5.5 Reversing negatively worded items

Pallat (2016) emphasized the need to reverse the negatively worded items before checking the scale reliability. Furthermore, the research questionnaire included three items that were negatively worded in order to reduce response bias. Also the 65 items used in the questionnaire to measure the personality traits were grouped under six clusters as was justified in the literature review chapter. Therefore, before performing statistical analyses on the data; the negatively worded items in the questionnaire needed to be reversed. Additionally, the three items that were negatively worded in the questionnaire were related to the following traits: modesty (H4), liveliness (X4) and confirmation (C9). Hence, these negatively worded items needed to be reversed before doing any further statistical analysis to make sure that high score indicates high level of each personality trait. Also, reversing the negatively worded items was done in SPSS using the "transform" and "record into same variable" functions.

6.6 Reliability tests

It is imperative that the questionnaire scales be tested for its internal consistency; which basically refers to the consistency degree between the scales items indicating how much these items hang together within each scale (Pallat 2016). Hence, the reliability internal consistency test indicates whether scale items are measuring the same underlying construct or not. Furthermore, Cronbach's alpha coefficient is considered as the most common indicator of scales internal consistency measure in which usually a value of Cronbach's alpha 0.7 or more indicates high degree of reliability (Pallat 2016). However, the Cronbach's alpha value is usually very sensitive to the items number under each scale where short scales (with 10 items or less) tend to have very low Cronbach's alpha value of 0.5 or lower. According to Briggs & Cheek (1986); it is better to report the mean interim item correlation when having low number of items under a scale where they recommended an optimal range between 0.2-0.4 for inter-item correlation. Hence, it is expected that Cronbach's alpha values for some of the research scales will be low since they are less than 10 values; specifically: honesty/humility scale, agreeableness and openness to experience scales. Additionally, the type of research sample using the scales can affect the scales reliability. However, it is more important to check the reliability of the personality traits items altogether (65 items) rather than checking the items reliability as per personality cluster. This is due to the research aim in addressing the influence of project managers' personality traits (regardless of how they are clustered) on their risk propensity in relation to project success criteria. According to George & Mallery (2003), there are certain acceptable ranges for Cronbach's alpha coefficients where they provided a rule of thumb that a Cronbach's alpha coefficient between 0.7 and 0.8 could be considered as acceptable range for internal consistency of the scales items. However, shorter scales with few items (10 or less) can result in very low Cronbach's alpha coefficient which is normal in social science research (Briggs & Cheek 1986). Figure .5 provides some guidelines on Cronbach's alpha values interpretations.

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Figure 6.15: Cronbach's alpha ranges (George & Mallery 2003, p.231).

6.6.1 Personality traits scale reliability

The personality traits scale consisted of 65 items clustered around six personality clusters: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. Additionally, the reliability between all 65 personality traits was good where Cronbach's alpha was equal to .835 for the 65 items under the personality traits scale.

Reliability Statistics

Cronbach's Alpha	Number of Items
.835	65

Table 6.19: Reliability statistics for personality traits scale.

Furthermore, reliability tests were performed on each of the six clusters items to check the inter-consistency of each personality traits cluster items where results indicated acceptable and good reliability values between each cluster items.

6.6.2 Risk propensity scale reliability

The risk propensity scale consisted of 4 items where the reliability between all four items was good in which Cronbach's alpha was equal to .835.

Reliability Statistics

Cronbach's Alpha	Number of Items
.736	4

Table 6.20: Reliability statistics for risk propensity scale.

6.7 Summary

There were many key findings in this chapter. First, data descriptive statistics were presented and analyzed. Second, appropriate data analyses techniques were decided based on ranking analysis done on respondents' ratings of personality traits within each cluster. Third, data were grouped based on demographic variables. Fourth, collected data was assessed for normality where results showed data was normal. Fifth, reliability tests showed that items related to dependent variable (risk propensity) and independent variable (personality traits) were both reliable.

7 Chapter Seven: Correlation Tests

7.1 Introduction

This chapter discusses the results of performed correlations tests. Additionally, the chapter lists assumptions that were checked before performing correlation tests, relation between correlation tests and the derived hypotheses in framework chapter. Also, detailed correlation results are discussed between each of the six personality cluster traits (acting as independent variables) and risk propensity related to each project success criteria domains; i.e. scope, time, cost and general domains (acting as dependent variables). Finally, a table summary of all significantly correlated traits with risk propensities is provided end of the chapter.

7.2 Assumptions and relevance to research questions

Correlation coefficients such as the Pearson product-moment correlation provide researchers' a numerical summary of the strength and direction of the linear relationship between two research variables (Pallat 2016). Furthermore, Pearson correlation coefficients can range from -1 (negative correlation where the increase in one variable results in decrease in another variable) to +1 (positive correlation where the increase in one variable results in increase in another variable). Hence, the absolute correlation coefficient value indicates the relationship strength between the two variables while the coefficient sign indicates the direction of this relationship. Additionally, correlation coefficients of -1 or +1 indicates a perfect correlation between the two variables in which the value of the first variable can be known exactly by looking at the value of the first variable. Whilst, a correlation coefficient of zero indicates the non-existence of relationship between two variables. Moreover, it is important to note that while correlation coefficients can be used to explore the relationship between two variables (strength and direction); it is does not assist researchers in predicting the value of one variable by knowing the value of another variable (Pallat 2016). Also, the correlation between two variables can be inspected using scatterplots where scores from the two variables are plotted along the X-axis and Y-axis in which a straight line on the scatterplot indicates a perfect correlation between the two variables. However, a scatterplot with circle of points indicates no correlation between the variables. According to Gravetter &Wallnau (2000), there are many considerations that need to be taken into account when analysing the correlation results. Specifically, the following need to be consider when performing correlation techniques:

- Non-linear relationships: Pearson correlation coefficient can only indicates the linear relationship between variables; i.e. straight line relationship and is not suitable for non-linear relationships. However, the results showed linear relationship between all research variables.
- Outliers: outliers can affect dramatically the correlation coefficients specifically for sample size. However, there were no outliers existing within the research data as was discussed in the data normality chapter.
- Correlation versus causality: the analysis results might be influenced due to mediating cofounding variables between the independent variables (personality traits) and dependent variables (risk propensities). Hence, the mediating variables that might exist in the research based on the literature review were measured during the data collection; such as: experience level, gender, position, organization size, etc.

- Statistical versus practical significance: correlation coefficients will be compared to previous research related to the topic to indicate correlation practical significance. Furthermore, while correlation statistical significance can be reached with large samples; practical significance of the correlation might be limited (Pallat 2016).
- Assumptions: there are certain assumptions that need to be considered when performing correlation and parametric tests. Moreover, it is imperative to check these assumptions prior to performing any statistical test. Specifically, below is a list of some general assumptions that need to be met for correlation and some parametric tests (Pallat 2016):
    - *Measurement level:* measurement scale should be continuous; e.g. interval or ratio. Furthermore, this was the case with research scale where both independent (personality traits) and dependent (risk propensities) variables were measured using continuous Likert scales. Additionally, some of the independent variables were dichotomous with more than two values, e.g.: experience level and position. However, still measurement level assumption can be met provided that in each category there are approximately same number of people (something that was considered when grouping the cases for experience and position questions).
    - *Related pairs:* every respondent provided answers/scores on both independent and dependent variables. This assumption was met where only questionnaires filled completely by respondents were considered in the analysis.
    - *Independence of observations:* it was made sure that all respondents are independent of each other so they were not influenced by each other.

- *Normality:* normality tests were performed on all variables to check the scores are normally distributed. Refer to data normality tests chapter for more details.
- *Linearity:* relationship between variables (traits and risk propensities) was checked to be linear where straights lines appeared on the scatterplots.
- *Homoscedasticity:* scores variability for each research variable was similar to scores variability to all other variables where scatterplots had an almost equal cigar shape along its length.

Correlation results will assist in measuring association of relationships between research variables and answering research question of how do project managers' personality traits associate with tendency of project managers' to take risky decisions (risk propensity) in relation to project success criteria. Specifically, purpose of performing correlation tests is to answer the following research questions:

- Is there any association between project managers' personality traits and their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost)? **(Related to hypotheses stated in framework chapter: H3A, H3B, H3C, H3D, H3E, and H3F).**
- Is there any association between project managers' demographic factors and their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost)? **(Related to hypotheses stated in framework chapter: H4A, H4B, H4C, H4D, H4E, and H4F).**

According to George & Mallery (2003), the association strength between variables can be categorized into three categories (small, medium, large) based on the correlation coefficient value. Furthermore, these categories will be used to describe the association strength in the performed correlation tests. Figure 7.1 shows suggested correlations coefficients interpretations.

r=.10 to .29 or r=–.10 to –.29	small
r=.30 to .49 or r=–.30 to –.4.9	medium
r=.50 to 1.0 or r=–.50 to –1.0	large

Figure 7.1: Correlation coefficients interpretations (George & Mallery 2003).

7.3 Correlation Analyses

Below are correlation analyses results between traits in each personality cluster and risk propensity domains. Additionally, only significance correlations were reported (at 0.05 and 0.01 levels). Also, only significantly correlated traits will be used in multiple regression analyses where better regression results are reached when there are significant correlations between dependent and independent variables (Pallat 2016). Additionally, purpose of these correlations tests is to inspect if there is relationship between project managers' personality traits and their risk propensity related to project success criteria domains. In other words, is there any association between project managers' personality traits and their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost)?

Also, the relationship between project managers' personality traits and risk propensity in relation to project success criteria domains was investigated using Pearson product-moment correlation coefficient. Also, preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity

7.3.1 Honesty/ humility cluster

There was a small positive correlation between H1-sincerity trait and general risk propensity [r=.256, n=103, p<.01], where high level of sincerity traits is associated with high level of risk propensity related to general domain. Also, there was a small positive correlation between H1-sincerity trait and risk propensity related to cost domain [r=.225, n=103, p<.05]; where high level of sincerity trait is associated with high level of risk propensity related to cost domain. Furthermore, the H6-amiability trait had a small positive correlation with risk propensity related to cost domain [r=.234, n=103, p<.05]; in which high level of amiability is associated with high level of risk propensity related to cost domain. Table 7.1 summarizes honesty/humility traits correlations analyses results.

	Risk propensity related to cost domain	**Risk propensity related to general domain**
H1	.225*	.256**
H6	.234*	n/a

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7.1: Significant correlations between honesty/humility traits and risk propensity variables.

7.3.2 Emotionality cluster

There was a small negative correlation between E2-anxiety trait and risk propensity in relation to general domain [r= -.198, n=103, p<.01], where high level of anxiety trait is associated with low level of risk propensity in relation to general domain. Also, there was a small negative correlation between E3-dependence trait and risk propensity related to time [r= -.2, n=103, p<.05]; where high level of dependence trait is associated with low level of risk propensity related to time domain. Furthermore, the E3-dependence trait had a medium negative correlation with risk propensity related to cost [r= -.353, n=103, p<.01]; in which high level of dependence trait is associated with low level of risk propensity related to cost domain. Moreover, E3-dependence trait had a low negative correlation with risk propensity related to general domain [r= -.242, n=103, p<.05]; in which high level of dependence trait is associated with low level of risk propensity related to general domain. Finally, the E10-harm avoidance trait had a small negative correlation with risk propensity related to general domain [r= -.201, n=103, p<.05]; in which high level of harm-avoidance trait is associated with low level of propensity related to general domain. Table 7.2 summarizes the emotionality traits correlations analyses results.

	Risk propensity related to time domain	**Risk propensity related to cost domain**	**Risk propensity related to general domain**
E2	n/a	n/a	-.198*
E3	-.200*	-.353**	-.242*
E10	n/a	n/a	-.201*

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7.2: Significant correlations between emotionality traits and risk propensity variables.

7.3.3 Extraversion cluster

There was a small positive correlation between X1-expressivness trait and risk propensity related to scope [r=.255, n=103, p<.01], where high level of expressiveness trait is associated with high level of risk propensity related to scope domain. Also, there was a small positive correlation between X1-expressiveness trait and risk propensity related to general domain [r=.206, n=103, p<.05]; where high level of expressiveness trait is associated with high level of risk propensity related to general domain. Furthermore, the X2-social boldness trait had a small positive correlation with risk propensity related to general domain [r=.266, n=103, p<.01]; in which high level of social boldness trait is associated with high level of risk propensity related to general domain. Moreover, there are three emotionality traits that have small positive correlation with risk propensity related to scope domain. Specifically, high level of X4-liveliness [r=.194, n=103, p<.05], X5-assertiveness [r=.297, n=103, p<.01], X7-cheerfulness [r=.216, n=103, p<.05] are associated with high levels of risk propensity related to scope domain. Table 6.3 summarizes the extraversion traits correlations analyses results.

	Risk propensity related to scope domain	**Risk propensity related to general domain**
X1	.255**	.206*
X2	n/a	.266**
X4	.194*	n/a
X5	.297**	n/a
X7	.216*	n/a

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 7.3: Significant correlations between extraversion traits and risk propensity variables.

7.3.4 Agreeableness cluster

The results showed no significant correlation (at 0.01 and 0.05 significance levels) between any of the agreeableness traits and risk propensity domains.

7.3.5 Conscientiousness cluster

There was a medium positive correlation between the traits of C5-comptence [r=.354, n=103, p<.01], C18-redundant inputs [r=.355, n=103, p<.01] and risk propensity related to scope, where high level of competence and redundant inputs traits are associated with high level of risk propensity related to scope domain. Also, the following traits has small positive correlation with risk propensity related to scope domain: C4-prudence [r=.288, n=103, p<.05], C7-self-discipline [r=.2, n=103, p<.05], C9-confirmation [r=.207, n=103, p<.05], C14- forward-thinking [r=.240, n=103, p<.05] , C16-chain processes [r=.244, n=103, p<.05]. Hence, high levels of prudence, self-discipline, confirmation, forward-thinking and chain processes traits are associated with high level of risk propensity related to scope domain. Furthermore, C4-prudence trait [r=.208, n=103, p<.05] has a small positive correlation with risk propensity related to time where high level of prudence trait is associated with high level of risk propensity related to time domain. Finally, there were three traits that had small positive correlation with risk propensity related to general domain: C8-availability [r=.226, n=103, p<.05], C14- forward-thinking [r=.208, n=103, p<.05], C18- redundant inputs [r=.206, n=103, p<.05]. Therefore, high levels of availability, forward-thinking and redundant inputs traits are associated with high level of risk propensity related to general domain. Table 7.4 summarizes the conscientiousness traits correlations analyses results.

	Risk propensity related to scope domain	Risk propensity related to time domain	Risk propensity related to general domain
C4	.288**	.208*	n/a
C5	.354**	n/a	n/a
C7	.200*	n/a	n/a
C8	n/a	n/a	.226*
C9	-.207*	n/a	
C14	.240*	n/a	.208*
C16	.244*	n/a	
C18	.355**	n/a	.206*

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 7.4: Significant correlations between conscientiousness traits and risk propensity variables.

7.3.6 Openness to experience cluster

There was a small positive correlation between O2-creativity trait [*r*=.221, *n*=103, *p*<.05] with risk propensity related to scope domain where high level of creativity trait is associated with high level of risk propensity in relation to scope domain. Furthermore, there were two traits that had medium positive correlations with risk propensity related to scope domain: O3-unconventionality [*r*=.308, *n*=103, *p*<.01] and O5-intellect [*r*=.436, *n*=103, *p*<.01] where high levels of unconventionality and intellect traits are associated with high levels of risk propensity related to scope domain. Moreover, the O5-intellect trait also had a small positive correlation[*r*=.256, *n*=103, *p*<.01] with risk propensity related to time domain; in which high level of intellect trait is associated with high level of risk propensity related to time domain. Additionally O5-intellect trait had a medium positive correlation [*r*=.401, *n*=103, *p*<.01] with risk propensity related to general domain where high level of intellect trait is associated with high level of risk propensity related to general domain. Furthermore, the O7-variety-seeking trait had a small positive correlation [*r*=.220, *n*=103, *p*<.05] with risk propensity related to general domain where high level of variety-seeking trait is associated with high level of risk propensity related to general domain. Table 7.5 summarizes the openness to experience traits correlations analyses results.

	Risk propensity related to scope domain	**Risk propensity related to time domain**	**Risk propensity related to general domain**
O2	.221*	n/a	n/a
O3	.308**	n/a	n/a
O5	.436**	.256**	.401**
O7	n/a	n/a	.220*

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7.5: Significant correlations between openness to experience and risk propensity variables.

7.3.7 Demographic variables

Age had positive correlation [*r*=.220, *n*=103, *p*<.05] with risk propensity related to scope domain and positive correlation [*r*=.240, *n*=103, *p*<.05] with risk propensity related to time domain; where high level of age (i.e. older project managers) is associated with high levels of risk propensity related to scope and time domains. Also, organization size had small negative correlation [*r*=-.241, *n*=103, *p*<.05] with risk propensity related to scope domain and small negative correlation [*r*=-.217, *n*=103, *p*<.05] related to time domain; where high level of organization size (i.e. larger number of employees) is associated with low level of risk attitude related to scope and time domains. Additionally, education level had a small positive correlation [*r*=.196, *n*=103, *p*<.05] with risk propensity related to general domain where high level of education (i.e. post graduate degrees) is associated with high level of risk propensity related to general domain. Furthermore, the project managers' perceived benefits from taking risky decisions had a small negative correlation [*r*=-.256, *n*=103, *p*<.01] related to scope domain. As for the remaining moderator variables (number of dependents, race, experience, position, organization type); there was no statistical significance correlation between any of them and risk propensity domains. Table 7.6 shows the demographic variables correlations analyses results.

	Risk propensity related to scope domain	**Risk propensity related to cost domain**	**Risk propensity related to general domain**
Age	.220*	.240*	n/a
Education	n/a	n/a	.196*
Organization size	-.241*	-.217*	n/a
Perceived benefits	-.256**	n/a	n/a

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7.6: Significant correlations between moderator variables and risk propensity variables.

According to Pallat (2016), significance of correlation coefficients can be influenced by the research sample size. Furthermore, small sample size (less than 100) may show moderate correlations but without reaching statistical significance at traditional p<0.5. On the other hand, large size samples of more than 100 responses can have small correlations that maybe statistically significant. Hence, many statistical researchers recommend that the focus should be on the amount of variance between variables and that significance should be reported by researchers but ignored. Table 7.7 summarizes all significant correlations analyses results.

	Risk propensity related to Scope domain	Risk propensity related to time domain	Risk propensity related to cost domain	Risk propensity related to general domain
H1	n/a	n/a	.225*	.256**
H6	n/a	n/a	.234*	n/a
E2	n/a	n/a	n/a	-.198*
E3	n/a	-.200*	-.353**	-.242*
E10	n/a	n/a	n/a	-.201*
X1	.255**	n/a	n/a	.206*
X2	n/a	n/a	n/a	.266**
X4	.194*	n/a	n/a	n/a
X5	.297**	n/a	n/a	n/a
X7	.216*	n/a	n/a	n/a
C4	.288**	.208*	n/a	n/a
C5	.354**	n/a	n/a	n/a
C7	.200*	n/a	n/a	n/a
C8	n/a	n/a	n/a	.226*
C9	-.207*	n/a	n/a	n/a
C14	.240*	n/a	n/a	.208*
C16	.244*	n/a	n/a	n/a
C18	.355**	n/a	n/a	.206*
O2	.221*	n/a	n/a	n/a
O3	.308**	n/a	n/a	n/a
O5	.436**	.256**	n/a	.401**
O7	n/a	n/a	n/a	.220*
Age	.220*	n/a	.240*	n/a
Education	n/a	n/a	n/a	.196*
Organization size	-.241*	n/a	-.217*	n/a
Perceived benefits	-.256**	n/a	n/a	n/a

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7.7: Summary of significant correlation tests results.

7.4 Summary

There were many key findings in this chapter. First, correlation analyses were linked to relevant research questions. Second, assumptions for performing correlation tests were checked where all requirements been met. Third, correlations tests results were presented and discussed under each personality cluster. Last, all significantly correlated traits with risk propensity domains were summarized at end of chapter.

8 Chapter Eight: Hypotheses Testing

8.1 Introduction

This chapter provides results of one way analysis of variance (ANOVA) tests. Furthermore, one-way between-groups analysis of variance (ANOVA) tests were performed for each of personality traits clusters to investigate impacts of position and experience on respondents' ratings of personality traits within each cluster. Also, one-way between-groups analysis of variance (ANOVA) tests were conducted to investigate impacts of position and experience on respondents' ratings of risk propensity in relation to scope, time, cost and general risk domains.

8.2 One way analysis of variance (ANOVA) analysis

One-way analysis of variance (ANOVA) tests were computed to compare the mean scores of more than two groups within certain demographic variables in relation to their answers to risk propensity items as well as their answers to personality traits items. Furthermore, to conduct (ANOVA) test; there need to be one independent variable (that has more than one level relating to different groups); and one continuous dependent variable (Pallat 2016). Hence, ANOVA tests were performed and reported between the following variables:

- Risk propensity items with position and experience groups.
- Honesty/humility personality trait items with position and experience groups.
- Emotionality personality trait items with position and experience groups.
- Extraversion personality trait items with position and experience groups.
- Agreeableness personality trait items with position and experience groups.

- Conscientiousness personality trait items with position and experience groups.
- Openness to experience personality trait items with position and experience groups.

Moreover, computed ANOVA tests types were the between-groups analyses (independent groups design) of variance since the interest is to compare the mean of scores for different subjects in different groups. Hence, ANOVA tests resulted in comparing the variance of scores between different groups (which is due to the independent variable) and variance of scores within each of the different groups (which is due to chance). According to Pallat (2016); differences of scores means' between groups and within the groups can be measured using F-ratio; where F-ratio is the variance between groups divided by the variance within groups. Consequently, a large F-ratio indicates more variability between the groups caused by the independent variable than variability within each of the groups (caused by chance or error). Thus, a significant F-ratio (less than 0.05) indicates that null hypothesis of having equality of population mean scores could be rejected. However, in case the F-ratio is significant and null hypothesis is rejected; then post-hoc tests could be conducted to investigate the groups that have significant difference between their mean scores. Additionally, the effect size of the difference in the mean scores of the different groups could be examined using eta squared value where:

Eta squared = Sum of squares between-groups / total sum of squares

According to Cohen (1998); an eta value of 0.01 indicates small effect size; eta value of 0.06 indicates medium effect and eta of 0.14 indicates large effect size. However, Pallat (2016) emphasized that with large research samples; significant result of ANOVA test does not necessarily means large actual difference between the groups mean scores; in which small differences between mean scores can be statistically significant even if the difference between the groups is of small practical importance. Hence, other factors than statistical significance need to be considered when doing ANOVA analysis. Also, test of homogeneity of variance was conducted to examine if the score variances is the same for each of the different groups within the independent variable. Furthermore, Leven's test was used for testing homogeneity of variance where insignificant Leven's test (more than 0.05) indicates that the assumption of homogeneity of variance was not violated. However, if Leven's test was significant and the homogeneity assumption was violated; then robust tests of equality of means represented in the Welsh and Brown-Forsythe tests results were checked.

8.3 ANOVA testing results

As mentioned above, one way between-groups analysis of variance (ANOVA) tests were performed to compare the variance in the mean ratings between groups within position and experience variables in relation to their answers on risk propensity items as well as their answers on personality traits items. Furthermore, results from ranking analysis -mentioned in descriptive statistics chapter- divided research subjects into three position groups (group 1: project manager, group 2: functional manager/administrator, group 3: consultant/engineer) and three experience groups (group 1: 0-7 years, group 2: 8-19 years, group 3: 20 years and above). Moreover, Leven's test of homogeneity of variance assumption was tested and ANOVA analyses were done at significance level of $p < 0.05$.

8.3.1 Risk propensity items with position variable

The results showed insignificant difference between position groups and their mean scores related to risk propensity items at significance level of $p < 0.05$. Table 8.1 displays ANOVA results of risk propensity items with position variable.

Risk propensity domain	F-ratio	Sig.
Scope	1.520	.225
Time	1.410	.250
Cost	.115	.892
General	.247	.782

Table 8.1: ANOVA test of risk propensity items with position variable.

8.3.2 Risk propensity items with experience variable

The results showed insignificant difference between experience groups and their mean scores related to risk propensity items at significance level of $p < 0.05$. Table 8.2 displays ANOVA results of risk propensity items with experience variable.

Risk propensity domain	F-ratio	Sig.
Scope	.888	.415
Time	.818	.444
Cost	.595	.554
General	.513	.600

Table 8.2: ANOVA test of risk propensity items with experience variable.

8.3.3 Honesty/humility items with position variable

The results showed statistically significant difference at the $p < 0.5$ level in H1-sincerity [$F(2, 84)=3.84$, $p = 0.025$] and H2-fairness [$F(2, 84)=5.55$, $p = 0.005$] traits scores for three position groups. Furthermore, post-hoc comparisons for H1-sincereity using Tukey test indicated that the mean score for group 1-project manager ($M = 2.97$, $SD = 1.12$) was significantly different from group 3-consultant/engineer ($M = 3.93$, $SD = 1.03$). However, group 2- functional manager/administrator ($M = 3.35$, $SD = 1.18$) did not differ significantly from either group 1 or 3. Nevertheless, despite reaching statistical significance between the mean scores of groups 1 and 3, the actual difference in mean scores between the groups was medium where the effect size measured by eta squares was 0.08. Also, post-hoc comparisons for H2-fairness using Tukey test indicated that the mean score for group 1-project manager ($M = 2.77$, $SD = 1.08$) was significantly different from group 2- functional manager, administrator ($M = 3.54$, $SD = 1.04$). However, group 3- consultant/engineer ($M = 3.53$, $SD = 0.99$) did not differ significantly from either group 1 or 2. Nevertheless, despite reaching statistical significance between the mean scores of groups 1 and 2, the actual difference in mean scores between the groups was medium where the effect size calculated by eta squares was 0.12. Table 8.3 displays ANOVA results of honesty/humility items with position variable.

Honest/humility traits	F-ratio	Sig.
H1	3.835	.025
H2	5.553	.005
H3	.648	.526
H4	1.274	.285
H5	1.757	.179
H6	.287	.751
H7	.184	.833
H8	.119	.888

Table 8.3: ANOVA test of honesty/humility items with position variable.

8.3.4 Honesty/humility items with experience variable

The results showed insignificant difference between experience groups and their mean scores related to honesty/humility traits at significance level of $p < 0.05$. Table 8.4 displays ANOVA results of honesty/humility items with experience variable.

Honest/humility traits	F-ratio	Sig.
H1	2.032	.136
H2	.638	.531
H3	.389	.679
H4	2.182	.118
H5	.051	.950
H6	1.657	.196
H7	1.433	.243
H8	1.996	.141

Table 8.4: ANOVA test of honesty/humility items with experience variable.

8.3.5 Emotionality items with position variable

The results showed insignificant difference between position groups and their mean scores related to emotionality traits at significance level of $p < 0.05$. Table 8.5 displays ANOVA results of emotionality items with position variable.

Emotionality traits	F-ratio	Sig.
E1	.262	.770
E2	.865	.425
E3	3.694	.029
E4	1.445	.241
E5	.896	.412
E6	.468	.628
E7	.006	.994
E8	.955	.389
E9	.857	.428
E10	.653	.523
E11	1.325	.271
E12	.296	.745
E13	2.914	.060

Table 8.5: ANOVA test of emotionality items with position variable.

8.3.6 Emotionality items with experience variable

The results showed that Leven's test of homogeneity of variance assumption was not violated with the exception of E4. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for E4. Also, there was a statistically significant difference at the $p < 0.5$ level in E9-vulnerability $[F(2, 100)=3.21, p = 0.045]$ trait scores for three experience groups. Furthermore, post-hoc comparisons for E9-vulnerability using Tukey test indicated that the mean score for group 2: 8-19 (M = 2.73, SD = 0.962) was significantly different from group 3: 20 + (M = 2.35, SD = 0.862). However, group 1: 0-7 (M = 2.98, SD = 0.85) did not differ significantly from either group 1 or 3. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and 3, the actual difference in mean scores between the groups was small where the effect size measured by eta squares was 0.06. Table 8.6 displays ANOVA results of emotionality items with experience variable.

Emotionality traits	F-ratio	Sig.
E1	1.697	.188
E2	.291	.748
E3	1.287	.281
E4	.962	.386
E5	.522	.595
E6	2.664	.075
E7	.423	.656
E8	2.679	.074
E9	3.207	.045
E10	.893	.412
E11	.907	.407
E12	3.036	.052
E13	.222	.802

Table 8.6: ANOVA test of emotionality items with experience variable.

8.3.7 Extraversion items with position variable

The results showed a statistically significant difference at the $p < 0.5$ level in X1-expressiveness [$F(2, 84)=4.40$, $p = 0.015$] trait scores for three position groups. Furthermore, post-hoc comparisons for X1-expressiveness using Tukey test indicated that the mean score for group 1-project manager ($M = 3.80$, $SD = 0.72$) was significantly different from group 2- functional manager, administrator (M = 4.30, SD = 0.74). However, group 3- consultant, engineer (M = 3.93, SD = 0.70) did not differ significantly from either group 1 or 2. Nevertheless, despite reaching statistical significance between the mean scores of groups 1 and 2, the actual difference in mean scores between the groups was medium where the effect size calculated by eta squares was 0.09. Table 8.7 displays ANOVA results of extraversion items with position variable.

Extraversion traits	**F-ratio**	**Sig.**
X1	4.397	.015
X2	.229	.796
X3	.074	.929
X4	2.240	.113
X5	.305	.738
X6	1.719	.185
X7	.726	.487
X8	1.794	.173
X9	.215	.807
X10	.597	.553
X11	1.669	.195

Table 8.7: ANOVA test of extraversion items with position variable.

8.3.8 Extraversion items with experience variable

The results showed that Leven's test of homogeneity of variance assumption was not violated with the exception of X6. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for X6. Also, there was a statistically significant difference at the $p < 0.5$ level in X8-optimisim [$F(2, 100)=5.12$, $p = 0.008$] trait scores for three experience groups. Furthermore, post-hoc comparisons for X8-optimisim using Tukey test indicated that the mean score for group 1: 0-7 ($M = 4.04$, $SD = 0.73$) was significantly different from group 2: 8-19 ($M = 3.95$, $SD = 0.99$). However, group 3: 20+ ($M = 3.71$, $SD = 0.77$) did not differ significantly from either group 1 or 2. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and 3, the actual difference in mean scores between the groups was medium where the effect size measured by eta squares was 0.09. Table 8.8 displays ANOVA results of extraversion items with experience variable.

Extraversion traits	F-ratio	Sig.
X1	1.424	.246
X2	.093	.912
X3	2.221	.114
X4	.337	.715
X5	.110	.896
X6	1.414	.248
X7	2.528	.085
X8	5.116	.008
X9	.245	.783
X10	1.026	.362
X11	.155	.857

Table 8.8: ANOVA test of extraversion items with experience variable.

8.3.9 Agreeableness items with position variable

The result showed that Leven's test for homogeneity of variance assumption was not violated with the exception of A7. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for A7. Also, there was insignificant difference between position groups and their mean scores related to emotionality traits at significance level of $p < 0.05$. Table 8.9 displays ANOVA results of agreeableness items with position variable.

Agreeableness traits	F-ratio	Sig.
A1	.640	.530
A2	1.541	.220
A3	.747	.477
A4	.680	.509
A5	1.475	.235
A6	2.845	.064
A7	1.823	.168
A8	.049	.952

Table 8.9: ANOVA test of agreeableness items with position variable.

8.3.10 Agreeableness items with experience variable

The results showed that Leven's test of homogeneity of variance assumption was not violated with the exception of A7. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for A7. Also, there was insignificant difference between experience groups and their mean scores related to agreeableness traits at significance level of $p < 0.05$. Table 8.10 displays ANOVA results of agreeableness items with experience variable.

Agreeableness traits	F-ratio	Sig.
A1	.714	.492
A2	.032	.969
A3	.576	.564
A4	.465	.630
A5	.756	.472
A6	.855	.428
A7	.088	.916
A8	.375	.688

Table 8.10: ANOVA test of agreeableness items with experience variable.

8.3.11 Conscientiousness items with position variable

The results showed that Leven's test of homogeneity of variance assumption was not violated with exception for traits of C1 and C8. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for both C1 and C8. Also, there was a statistically significant difference at the $p < 0.5$ level in C1-organization [$F(2, 84)=3.26$, $p = 0.043$] and C9-confirmation [$F(2, 84)=3.375$, $p = 0.039$] traits scores for three position groups. Furthermore, Post-hoc comparisons for C1-organization using Tukey test indicated that the mean score for group 2-functional manager, administrator ($M = 4.35$, $SD = 0.59$) was significantly different from group 3-consultant, engineer ($M = 3.80$, $SD = 1.01$). However, group 1- project manager ($M = 4.06$, $SD = 0.76$) did not differ significantly from either group 2 or 3. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and

3, the actual difference in mean scores between the groups was medium where the effect size calculated by eta squares was 0.07. Also, post-hoc comparisons for C9-confirmation using Tukey test indicated that the mean score for group 2- functional manager, administrator (M = 1.76, SD = 0.60) was significantly different from group 3- consultant, engineer (M = 2.27, SD = 0.80). However, group 1- project manager (M = 1.80, SD = 0.68) did not differ significantly from either group 2 or 3. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and 3, the actual difference in mean scores between the groups was medium where the effect size calculated by eta squares was 0.07. Table 8.11 displays ANOVA results of conscientiousness items with position variable.

Conscientiousness traits	F-ratio	Sig.
C1	3.260	.043
C2	1.063	.350
C3	1.447	.241
C4	2.343	.102
C5	.522	.596
C6	.178	.837
C7	.181	.834
C8	.158	.854
C9	3.375	.039
C10	1.488	.232
C11	.509	.603
C12	3.070	.052
C13	.722	.489
C14	1.645	.199
C15	.933	.397
C16	1.685	.192
C17	1.008	.369
C18	2.320	.105

Table 8.11: ANOVA test of conscientiousness items with position variable.

8.3.12 Conscientiousness items with experience variable

The results showed insignificant difference between experience groups and their mean scores related to conscientiousness traits at significance level of $p < 0.05$. Table 8.12 displays ANOVA results of conscientiousness items with experience variable.

Conscientiousness traits	**F-ratio**	**Sig.**
C1	.030	.970
C2	1.464	.236
C3	2.050	.134
C4	.824	.442
C5	1.006	.369
C6	.754	.473
C7	2.562	.082
C8	.319	.727
C9	.440	.645
C10	.248	.781
C11	.666	.516
C12	.013	.987
C13	2.916	.059
C14	.369	.692
C15	.314	.731
C16	.387	.680
C17	.438	.646
C18	.141	.869

Table 8.12: ANOVA test of conscientiousness items with experience variable.

8.3.13 Openness to experience items with position variable

The results showed that Leven's test of homogeneity of variance assumption was not violated with exception of O6. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for O6. Also, there was a statistically significant difference at the $p < 0.5$ level in O2-creativity trait score [$F(2, 84)=3.58$, $p = 0.032$] for three position groups. Furthermore, post-hoc comparisons for O2-creativity trait using Tukey test indicated that the mean score for group 2- functional manager, administrator ($M = 4.24$, $SD = 0.64$) was significantly different from group 3- consultant, engineer ($M = 3.67$, $SD = 0.72$). However, group 1- project manager ($M = 3.94$, $SD = 0.84$) did not differ significantly from either group 2 or 3. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and 3, the actual difference in mean scores between the groups was medium where the effect size calculated by eta squares was 0.08. Table 8.13 displays ANOVA results of openness to experience items with position variable.

Openness to experience traits	F-ratio	Sig.
O1	.412	.664
O2	3.581	.032
O3	1.855	.163
O4	.183	.833
O5	.597	.553
O6	.147	.864
O7	.418	.660

Table 8.13: ANOVA test of openness to experience items with position variable.

8.3.14 Openness to experience items with experience variable

The results showed Leven's test of homogeneity of variance assumption was not violated with the exception of O6. However, robust tests of equality of means (both Welch and Brown-Forsythe) showed homogeneity of variance for O6. Also, there was a statistically significant difference at the $p < 0.05$ level in O6-Liberalism trait [$F(2, 100)=3.35$, $p = 0.039$] trait for three experience groups. Furthermore, post-hoc comparisons for O6-Liberalism using Tukey test indicated that the mean score for group 1: 0-7 ($M = 3.50$, $SD = 1.02$) was significantly different from group 2: 8-19 ($M = 4.0$, $SD = 0.91$). However, group 3: 20+ ($M = 3.94$, $SD = 0.90$) did not differ significantly from either group 1 or 2. Nevertheless, despite reaching statistical significance between the mean scores of groups 2 and 3, the actual difference in mean scores between the groups was small where the effect size measured by eta squares was 0.07. Table 8.14 displays ANOVA results of openness to experience items with experience variable.

Openness to experience traits	F-ratio	Sig.
O1	.100	.905
O2	.295	.745
O3	1.278	.283
O4	.106	.899
O5	1.321	.272
O6	3.354	.039
O7	2.045	.135

Table 8.14: ANOVA test of openness to experience traits with experience variable.

Additionally, ANOVA analyses tests were performed between each cluster items and all other moderator variables; i.e. other than position and experience factors. Consequently, no significant results were worth reporting.

8.4 Summary

There were many key findings in this chapter. First, results of one way between-groups analysis of variance (ANOVA) were presented and discussed. Second, homogeneity of variance was tested and not violated for all ANOVA tests. Third, results showed that project managers' ratings of their personality traits and risk propensity were not impacted by their positions and experience level (with few exceptions related to some personality traits). Fourth, effect size of difference in the mean scores for different groups was examined using eta squared value indicating small to medium effect size in most cases.

9 Chapter Nine: Multiple and Logistic Regression Tests

9.1 Introduction

This chapter discuss analyses of multiple and logistic regressions. Additionally, the chapter details analyses of multiple regressions tests performed between each of the six personality traits clusters and project managers' risk propensity in relation to project triple constraints; i.e. scope, time and cost. Moreover, only personality traits that had significant correlation with risk propensity variables were used in multiple regression analyses. Furthermore, project managers' demographic variables were also added to each regression equation to investigate their effect on relationship between personality traits and risk propensity variables. Finally, logistic regression was performed to investigate ability of predicting project managers' risk propensity description of being carefree (high tendency to take risky decisions; i.e. high risk propensity) or careful person (low tendency to take risky decisions; i.e. low risk propensity) through using personality traits as predictor independent variables.

9.2 Multiple regression tests

Multiple regression tests are used to explore relationships between dependent and independent variables. Moreover, one dependent continuous variable should be used in multiple regression analysis while more than one independent variable can be used that could be continuous or dichotomous (Pallat 2016). Additionally, correlation results can be used as basis for multiple regression for having better significance of results where complicated exploration of variables interrelationships can be done using multiple regression analysis. Additionally, multiple regression analysis will be used to examine how much research independent variables (project managers' personality traits) can be able to predict dependent variables (project managers' risk propensity in relation to scope, time, cost and general domains). Furthermore, models resulted from multiple regression analyses will allow examination of relative contribution of each personality trait to risk propensity as well as provide information about the model as a whole. Additionally, there are different types of multiple regression analyses; such as standard, sequential and stepwise. However, standard or simultaneous type will be used due to the research questions nature. According to Pallat (2016); in a standard multiple regression all independent variables (predictors of dependent variable) are entered into the regression equation simultaneously in which every independent variable is assessed in terms of its predictive power over that obtainable by all other independent variables. Hence, significantly correlated traits in every personality cluster will be entered into the regression equation simultaneously to assess each personality trait in terms of its predictive power over that obtained by all other personality traits within the same cluster. Additionally, standard multiple regression is the most used type for psychological research where it can examine how much unique variance each of the independent variable explained in the dependent variable (Pallat 2016). Nevertheless, there are many assumptions that need to be checked before doing multiple regression analysis; such as (Tabachnick & Fidell 2013):

- Sample size: relates to generalizability issue to check if results can be generalized with other research samples. Moreover, researchers offered different guidelines for sample size used in multiple regression; such as: 15 subjects per predictor (Stevens 1996), $N > 50 + 8m$ (Tabachnick & Fidell 2013). Under both conditions; this research sample of 103 cases meet these requirements.

- Multicollinearity and singularity: referring to relationship among predictors. In terms of multicollinearity; the research sample passed this condition since there were no high correlations between independent variables where high correlations exist when r =0.9 and above (Pallat 2016). Also, there is no singularity issue since there is no one independent variable (personality trait) that is combined from other independent variables (personality traits).
- Outliers: checking for extreme low or high scores was already done in the descriptive statistics chapter for all dependent (risk propensity) and independent variables (personality traits). Also, standardized residual plots were used for identifying outliers where all variables where within the range of -3.3 to +3.3 in which according to Tabachnick & Fidell (2013); outliers are those variables with standardized residual values exceeding the limits of 3.3 (above +3.3 or less than -3.3).
- Normality, linearity, homoscedasticity and independence of residuals: relates to ratings distribution and relationships among variables. Furthermore, these assumptions were checked using residual scatterplots which showed that data were normal (residuals normally distributed among the predicted dependent variables scores), linear (residuals had straight lines relationship with predicted dependent variables) and homoscedastic (the residuals variance for all predicted dependent variables ratings).

Hence, the following research questions were answered through doing multiple regression analyses:

- Are there any associations between project managers' personality traits and their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time, cost and general domains)?
- Do demographic factors influence the relationship between project managers' personality traits and their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time, cost and general domains)?
- Can project managers' personality traits be used to predict their tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time, cost and general domains)?

To answer the above questions; multiple regression analyses were performed several times in every personality traits cluster; in which only significantly correlated traits were used as independent variables and regressed against risk propensity in relation to scope, time, cost and general domains. The reason for using only significantly correlated traits is because regression analysis gives better results when there is a good degree of correlation between the dependent variable and the independent factors in the regression equation; usually with a Pearson correlation of around 0.3 (Pallat 2016). Hence, below are results of multiple regression analyses done by personality cluster basis between significantly correlated traits with dependent variables of risk propensity in relation to scope, time, cost and general domains. Furthermore, each section includes a summary table highlighting traits (independent variables) that contributed to prediction of risk propensity (dependent variables) in which standardized beta coefficients were used for comparison of traits contribution to the model because they have been converted into the same scale. However, unstandardized coefficients were used in constructing the regressions equations (Pallat 2016). Additionally, only the following demographic variables had significant correlations with risk propensity domains: age, education, organization size and perceived benefits. Thus, these demographic variables were added as moderator variables in each regression equation in a stepwise manner to investigate their influence on the relationship between project managers' personality traits and their risk propensity. All significantly correlated items were summarized at end of correlation section.

9.2.1 Honesty/ humility cluster

There were only two honesty/humility traits that had significant correlation with risk propensity. Specifically, H1-sincerity and H6-amibaility had significant correlation with risk propensity in relation to cost domain while only H1-sincerity had significant correlation with risk propensity related to general domain.

9.2.1.1 Cost domain

Multiple regression analysis was conducted to see if H1-sincerity and H6-amibaility predicted project managers' risk propensity in relation to project cost. Using enter method it was found that personality traits H1-sincerity and H6-amibaility explain significant amount of the variance in risk propensity related to cost domain where ($F(2, 100) = 5.03$, $p < 0.01$, $R^2 = 0.091$, $R^{2\ \text{adjusted}} = 0.073$). Furthermore, the analysis shows that both H1-sincerity (Beta = 0.193, $t(102) = 2.0$, $p < 0.05$) and H6-amibaility (Beta = 0.204, $t(102) = 2.12$, $p < 0.05$) did significantly predict values of risk propensity related to cost where the equation constant was also significant ($t(102) = 2.65$, p<0.01). Table 9.1 displays results of multiple regression analyses between risk propensities related to cost domain and correlated honesty/humility traits.

Risk propensity related to cost domain = 1.65+0.213H1+0.303H6

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted}$ =0.073 Sig. = 0.008		$R^{2\ adjusted}$ =0.089 Sig. = 0.007		$R^{2\ adjusted}$ =0.065 Sig. = 0.022		$R^{2\ adjusted}$ =0.092 Sig. = 0.006		$R^{2\ adjusted}$ =0.069 Sig. = 0.018	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
H1	0.193	0.048	0.170	0.082	0.193	0.050	0.181	0.061	0.189	0.054
H6	0.204	0.037	0.162	0.103	0.209	0.036	0.177	0.071	0.210	0.033

Table 9.1: Results of honesty/humility regressions related to cost domain.

In conclusion, the original model suggested that both H1-sincerity and H6-amibaility are significant predictors of project managers' risk propensity in relation to cost domain. Furthermore, the linear regression model with traits H1-sincerity and H6-amibaility explains 7.3% of project managers' risk propensity in relation to cost domain. Also, demographic variables did not affect the relationship between H1-sincerity, H6-amibaility and project managers' risk propensity related to cost domain.

9.2.1.2 General domain

Multiple regression analysis was conducted to see if H1-sincerity predicted project managers' risk propensity in relation to general domain. Using enter method it was found that personality trait H1-sincerity explain significant amount of the variance in risk propensity related to general domain where (F(1, 101) = 7.12, p < 0.01, R^2 =0.066 , $R^{2\ adjusted}$ =0.056). Furthermore, the analysis shows that H1-sincerity (Beta = 0.26, t(102) = 2.67, p< 0.01) did significantly predict values of risk propensity related to general domain where the equation constant was also significant (t(102) = 11.33, $p < 0.01$). Table 9.2 displays results of multiple regression analyses between risk propensities related to general domain and correlated honesty/humility traits.

Risk propensity related to general domain = 3.31+0.219H1

	Model		Age		Education		Organization size		Perceived benefits	
	$R^{2\ adjusted}$ =0.056 Sig. = 0.009		$R^{2\ adjusted}$ =0.070 Sig. = 0.010		$R^{2\ adjusted}$ =0.086 Sig. = 0.004		$R^{2\ adjusted}$ =0.065 Sig. = 0.013		$R^{2\ adjusted}$ =0.056 Sig. = 0.021	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
H1	0.256	0.009	0.229	0.020	0.257	0.008	0.243	0.013	0.251	0.010

Table 9.2: Results of honesty/humility regressions related to general domain.

In conclusion, the original model suggested that H1-sincerity is a significant predictor of project managers' risk propensity in relation to general domain. Furthermore, the linear regression model with trait H1-sincerity explains 5.6% of project managers' risk propensity in relation to general domain. However, demographic variables of age, education, organization size did affect the relationship between H1-sincerity and project managers' risk propensity related to general domain. Specifically, age and education had the highest influence on the relationship.

9.2.2 Emotionality cluster

There were only three emotionality traits that had significant correlation with risk propensity. Specifically, E3-dependence had significant correlation with risk propensity in relation to time, cost and general domains. Whereas E2-anxiety E10-harm-avoidance had significant correlations with risk propensity related to general domain.

9.2.2.1 Time domain

Multiple regression analysis was conducted to see if E3-dependence predicted project managers' risk propensity in relation to time domain. Using enter method it was found that personality trait E3-dependence explains significant amount of the variance in risk attitude related to time domain where ($F(1, 101) = 4.19$, $p < 0.05$, $R^2 = 0.04$, $R^{2\ adjusted} = 0.03$). Furthermore, the analysis shows that E3-dependence (Beta = -0.20, $t(102) = -2.0$, $p < 0.05$) did significantly predict values of risk propensity related to time domain where the equation constant was also significant ($t(102) = 10.7$, $p < 0.01$). Table 9.3 displays results of multiple regression analyses between risk propensities related to time domain and correlated emotionality traits.

Risk propensity related to time domain = 4.57-0.25E3

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted} = 0.03$ Sig. = 0.043		$R^{2\ adjusted} = 0.022$ Sig. = 0.124		$R^{2\ adjusted} = 0.022$ Sig. = 0.125		$R^{2\ adjusted} = 0.021$ Sig. = 0.131		$R^{2\ adjusted} = 0.037$ Sig. = 0.056	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
E3	-0.200	0.043	-0.194	0.054	-0.197	0.048	-0.200	0.044	-0.194	0.049

Table 9.3: Results of emotionality regressions related to time domain.

In conclusion, the original model suggested that E3-dependence is a significant predictor of project managers' risk propensity in relation to time domain. Furthermore, the linear regression model with trait E3-dependence explains 3% of project managers' risk propensity in relation to time domain. Also, demographic variables did not affect the relationship between E3-dependence and project managers' risk propensity related to time domain.

9.2.2.2 *Cost domain*

Multiple regression analysis was conducted to see if E3-dependence predicted project managers' risk propensity in relation to cost domain. Using enter method it was found that personality trait E3-dependence explain significant amount of the variance in risk propensity related to time domain where ($F(1, 101) = 14.4$, $p < 0.01$, $R^2 = 0.125$, $R^{2\ adjusted} = 0.116$). Furthermore, the analysis shows that E3-dependence (Beta = -0.353, $t(102) = -3.8$, $p < 0.01$) did significantly predict values of risk attitude related to time domain where the equation constant was also significant ($t(102) = 11.9$, $p < 0.01$). Table 9.4 displays results of multiple regression analyses between risk propensities related to cost domain and correlated emotionality traits.

Risk propensity related to cost domain = 5.1-0.468E3

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted} = 0.116$ Sig. = 0.000		$R^{2\ adjusted} = 0.142$ Sig. = 0.000		$R^{2\ adjusted} = 0.108$ Sig. = 0.001		$R^{2\ adjusted} = 0.155$ Sig. = 0.000		$R^{2\ adjusted} = 0.109$ Sig. = 0.001	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
E3	-0.353	0.00	-0.322	0.001	-0.355	0.00	-0.352	0.000	-0.351	0.000

Table 9.4: Results of emotionality regressions related to cost domain.

In conclusion, the original model suggested that E3-dependence is a significant predictor of project managers' risk propensity in relation to cost domain. Furthermore, the linear regression model with trait E3-dependence explains 11.6% of project managers' risk propensity in relation to cost domain. However, demographic variables of age, education, organization size and perceived benefits did affect the relationship between E3-dependence and project managers' risk propensity related to cost domain. Specifically, age and organization size had the highest influence on the relationship.

9.2.2.3 General domain

Multiple regression analysis was conducted to see if E2-anxiety, E3-dependence and E10-harm-avoidance predicted project managers' risk propensity in relation to general domain. Using enter method it was found that three personality traits E2-anxiety, E3-dependence and E10- harm avoidance explain significant amount of the variance in risk propensity related to general domain where ($F(3, 99) = 4.04$, $p < 0.01$, $R^2 = 0.109$, $R^{2\ adjusted} = 0.082$). Furthermore, the analysis shows that all three traits did not significantly predict value of risk propensity related to general domain where E2-anxiety (Beta = -0.165, t(102) = -1.7, ns) , E3-dependence (Beta = -0.173, t(102) = -1.74, ns) and E10- harm avoidance (Beta = -0.171, t(102) = -1.8, ns) where the equation constant was significant (t(102) = 12.1, p <0.01). Table 9.5 displays results of multiple regression analyses between risk propensities related to general domain and correlated emotionality traits.

Risk propensity related to general domain = 5.62-0.157E2-0.177E3-0.156E10

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted} = 0.082$ Sig. = 0.009		$R^{2\ adjusted} = 0.095$ Sig. = 0.008		$R^{2\ adjusted} = 0.112$ Sig. = 0.003		$R^{2\ adjusted} = 0.105$ Sig. = 0.005		$R^{2\ adjusted} = 0.089$ Sig. = 0.011	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
E2	-0.165	0.093	-0.154	0.115	-0.185	0.057	-0.176	0.070	-0.184	0.064
E3	-0.173	0.085	-0.149	0.137	-0.150	0.130	-0.167	0.092	-0.162	0.106
E10	-0.171	0.081	-0.175	0.073	-0.176	0.068	-0.184	0.058	-0.176	0.072

Table 9.5: Results of emotionality regressions related to general domain.

In conclusion, the original model suggested that E2-anxiety, E3-dependence and E10- harm avoidance are insignificant predictors of project managers' risk propensity in relation to general domain. Furthermore, the linear regression model with traits E2-anxiety, E3-dependence and E10- harm avoidance explain 8.2% of project managers' risk propensity in relation to general domain. Also, demographic variables did not affect the relationship between these three traits and project managers' risk propensity related to general domain.

9.2.3 Extraversion cluster

There were only five extraversion traits that had significant correlation with risk propensity. Specifically, X1-expressiveness, X4-liveliness, X5-assertivenss and X7-cheerfulness had significant correlations with risk propensity in relation to scope. Whereas X1-expressiveness and X2-social boldness had significant correlations with risk propensity related to general domain.

9.2.3.1 Scope domain

Multiple regression analysis was conducted to see if X1-expressiveness, X4-liveliness, X5-assertivenss and X7-cheerfulness predicted project managers' risk propensity in relation to scope domain. Using enter method it was found that four personality traits X1-expressiveness, X4-liveliness, X5-assertivenss, and X7-cheerfulness explain significant amount of the variance in risk propensity related to scope domain where ($F(4, 98) = 4.31$, $p < 0.01$, $R^2 = 0.15$, $R^{2\ adjusted} = 0.115$). Furthermore, the analysis shows that only X5-assertivenss (Beta = 0.205, $t(102) = 2.0$, $p<0.05$) significantly predict value of risk propensity related to scope domain while all remaining traits did not have significant prediction of risk propensity related to scope domain where X1-expressiveness (Beta = 0.138, $t(102) = 1.4$, ns) , X4-liveliness(Beta = 0.101, $t(102) = 1.03$, ns), X7-cheerfulness(Beta = 0.158, $t(102) = 1.70$, ns) and where the equation constant was also insignificant ($t(102) = 0.176$, ns). Table 9.6 displays results of multiple regression analyses between risk propensities related to scope domain and correlated extraversion traits.

Risk propensity related to scope domain = 0.154+0.218X1+0.147X4+0.351 X5+0.213 X7

	Model		Age		Education		Organization size		Perceived benefits	
	$R^{2\ adjusted}$ =0.115 Sig. = 0.003		$R^{2\ adjusted}$ =0.124 Sig. = 0.003		$R^{2\ adjusted}$ =0.124 Sig. = 0.003		$R^{2\ adjusted}$ =0.130 Sig. = 0.002		$R^{2\ adjusted}$ =0.206 Sig. = 0.000	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
X1	0.138	0.178	0.094	0.374	0.092	0.388	0.108	0.296	0.112	0.246
X4	0.101	0.304	0.098	0.320	0.118	0.232	0.094	0.334	0.197	0.044
X5	0.205	0.044	0.189	0.063	0.199	0.049	0.186	0.066	0.200	0.038
X7	0.158	0.099	0.170	0.075	0.164	0.086	0.156	0.099	0.168	0.064

Table 9.6: Results of extraversion regressions related to scope domain.

In conclusion, the original model suggested that only X5-assertivenss is a significant predictor of project managers' risk propensity in relation to scope domain. Furthermore, the linear regression model with traits X1-expressiveness, X4-liveliness, X5-assertivenss and X7-cheerfulness explains 11.5% of project managers' risk propensity in relation to scope domain. However, demographic variables of perceived benefits did affect the relationship between these traits and project managers' risk propensity related to scope domain.

9.2.3.2 General domain

Multiple regression analysis was conducted to see if X1-expressiveness and X2-social boldness predicted project managers' risk propensity in relation to general domain. Using enter method it was found that personality traits X1-expressiveness and X2-social boldness explain significant amount of the variance in risk propensity related to general domain where ($F(2, 100) = 5.00$, $p < 0.01$, R^2 =0.091 , $R^{2\ adjusted}$ =0.073). Furthermore, the analysis shows that only X2-social boldness (Beta = 0.228, t(102) = 2.3, p< 0.05) significantly predict values of risk propensity related to scope while X1-expressiveness (Beta = 0.15, t(102) = 1.5, ns) did not significantly predict values of risk propensity related to cost where the equation constant was also significant ($t(102) = 4.0$, $p <0.01$). Table 9.7 displays results of multiple regression analyses between risk propensities related to general domain and correlated extraversion traits.

Risk propensity related to general domain = 2.330+0.192X1+0.247X2

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted}$ =0.073 Sig. = 0.008		$R^{2\ adjusted}$ =0.08 Sig. = 0.010		$R^{2\ adjusted}$ =0.081 Sig. = 0.010		$R^{2\ adjusted}$ =0.084 Sig. = 0.009		$R^{2\ adjusted}$ =0.08 Sig. = 0.010	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
X1	0.147	0.141	0.102	0.329	0.107	0.298	0.106	0.301	0.144	0.145
X2	0.228	0.023	0.225	0.024	0.222	0.027	0.248	0.014	0.239	0.017

Table 9.7: Results of extraversion regressions related to general domain.

In conclusion, the original model suggested that only X2-social boldness is a significant predictor of project managers' risk propensity in relation to general domain. Furthermore, the linear regression model with traits X1-expressiveness and X2-social boldness explain 7.3% of project managers' risk propensity in relation to general domain. However, demographic variables of age, education, organization size and perceived benefits did not affect the relationship between these traits and project managers' risk propensity related to general domain.

9.2.4 Conscientiousness cluster

There were only eight conscientiousness traits that had significant correlation with risk propensity. Specifically, C4-prudence, C5-comptence, C7-self-discpline, C9-confirmation, C14-forward-thinking, C16-chain processes and C18-redundant inputs had significant correlations with risk propensity in relation to scope domain. Whereas C4-prudence had significant correlations with risk propensity related to time domain. Moreover, C8-availability, C14-

forward-thinking and C18-redundant inputs had significant correlations with risk propensity in relation to general domain.

9.2.4.1 Scope domain

Multiple regression analysis was conducted to see if C4-prudence, C5-comptence, C7-self-discpline, C9-confirmation, C14-forward-thinking, C16-chain processes and C18-redundant inputs predicted project managers' risk propensity in relation to scope domain. Using enter method it was found that seven personality traits C4-prudence , C5-comptence, C7-self-discpline, C9-confirmation, C14-forward-thinking , C16-chain processes , C18-redundant inputs explain significant amount of the variance in risk propensity related to scope domain where ($F(7, 95) = 3.85$, $p < 0.01$, $R^2 = 0.221$, $R^{2\ adjusted} = 0.164$). Furthermore, the analysis shows that only C5-competence (Beta = 0.251, $t(102) = 2.3$, $p<0.05$) and C18-redundant inputs (Beta = 0.279, $t(102) = 2.3$, $p<0.05$) significantly predict value of risk propensity related to scope domain while all remaining five traits did not have significant prediction of risk propensity related to scope domain where C4- prudence (Beta = 0.094, $t(102) = 0.72$, ns), C7-self-discipline (Beta = 0.071, $t(102) = 0.67$, ns), C9-confirmation (Beta = 0.083, $t(102) = 0.67$, ns) C14-forward-thinking (Beta = 0.103, $t(102) = 1.0$, ns), C16-chain processes (Beta = -0.065, $t(102) = -0.53$, ns) and where the equation constant was also insignificant ($t(102) = -0.68$, ns). Table 9.8 displays results of multiple regression analyses between risk propensities related to scope domain and correlated conscientiousness traits.

Risk propensity related to scope domain =

-0.949+0.143C4+0.409C5+0.098C7+140C9+0.177C14-0.099C16+0.368C18

	Model		Age		Education		Organization size		Perceived benefits	
	$R^{2\ adjusted}$ =0.164 Sig. = 0.001		$R^{2\ adjusted}$ =0.180 Sig. = 0.001		$R^{2\ adjusted}$ =0.175 Sig. = 0.001		$R^{2\ adjusted}$ =0.172 Sig. = 0.001		$R^{2\ adjusted}$ =0.238 Sig. = 0.000	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
C4	0.094	0.476	0.068	0.606	0.086	0.509	0.088	0.503	0.072	0.570
C5	0.251	0.025	0.194	0.092	0.209	0.067	0.222	0.048	0.233	0.029
C7	0.071	0.503	0.118	0.278	0.131	0.243	0.064	0.541	0.067	0.503
C9	0.083	0.504	0.058	0.641	0.089	0.473	0.062	0.618	-0.053	0.672
C14	0.103	0.319	0.104	0.311	0.089	0.386	0.098	0.342	0.048	0.633
C16	-0.065	0.596	-0.08	0.509	-0.085	0.489	-0.087	0.479	-0.063	0.592
C18	0.279	0.026	0.290	0.020	0.291	0.020	0.277	0.026	0.274	0.022

Table 9.8: Results of conscientiousness regressions related to scope domain.

In conclusion, the original model suggested that only C5-comptence and C18-redundant are significant predictors of project managers' risk propensity in relation to scope domain. Furthermore, the linear regression model with traits C4-prudence, C5-comptence, C7-self-discpline, C9-confirmation, C14-forward-thinking, C16-chain processes and C18-redundant explain 16.4% of project managers' risk propensity in relation to scope domain. Also, only perceived benefits affected the relationship between these traits and project managers' risk propensity related to scope domain. However, all remaining demographic variables of age, education and organization size did not affect the relationship between the above mentioned traits and project managers' risk propensity related to scope domain.

9.2.4.2 Time domain

Multiple regression analysis was conducted to see if C4-prudence predicted project managers' risk propensity in relation to time domain. Using enter method it was found that personality trait C4-prudence explain significant amount of the variance in risk propensity related to time domain where ($F(1, 101) = 4.57$, $p < 0.05$, $R^2 = 0.043$, $R^{2\ adjusted} = 0.034$). Furthermore, the analysis shows that C4-prudence (Beta = 0.208, $t(102) = 2.14$, $p< 0.05$) did significantly predict values of risk propensity related to time domain where the equation constant was also significant ($t(102) = 3.8$, $p <0.01$). Table 9.9 displays results of multiple regression analyses between risk propensities related to time domain and correlated conscientiousness traits.

Risk propensity related to time domain = 2.391+0.319C4

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted} = 0.034$ Sig. = 0.035		$R^{2\ adjusted} = 0.026$ Sig. = 0.100		$R^{2\ adjusted} = 0.025$ Sig. = 0.105		$R^{2\ adjusted} = 0.025$ Sig. = 0.106		$R^{2\ adjusted} = 0.053$ Sig. = 0.025	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
C4	0.208	0.035	0.203	0.042	0.205	0.039	0.211	0.035	0.232	0.019

Table 9.9: Results of conscientiousness regressions related to time domain.

In conclusion, the original model suggested that only if C4-prudence is a significant predictor of project managers' risk propensity in relation to time domain. Furthermore, the linear regression model with traits C4-prudence explains 3.4% of project managers' risk propensity in relation to time domain. Also, only perceived benefits affected the relationship between these traits and project managers' risk propensity related to time domain. However, all remaining demographic variables of age, education and organization size did not affect the relationship between the above C4-prudence and project managers' risk propensity related to scope domain.

9.2.4.3 General domain

Multiple regression analysis was conducted to see if C8-availability, C14-forward-thinking and C18-redundant inputs traits predicted project managers' risk propensity in relation to general domain. Using enter method it was found that three personality traits C8-availability, C14-forward-thinking and C18-redundant inputs explain significant amount of the variance in risk attitude related to general domain where ($F(3, 99) = 3.42$, $p < 0.05$, $R^2 = 0.094$, $R^{2\ adjusted} = 0.066$). Furthermore, the analysis shows that all three traits did not significantly predict value of risk attitude related to general domain where C8-availability (Beta = 0.161, $t(102) = 0.154$, ns) , C14-forward-thinking (Beta = 0.113, $t(102) = 1.1$, ns) and C18-redundant inputs (Beta = 0.17, $t(102) = 1.7$, ns) where the equation constant was significant ($t(102) = 2.5$, $p < 0.05$). Table 9.10 displays results of multiple regression analyses between risk propensities related to general domain and correlated conscientiousness traits.

Risk propensity related to general domain = 1.793+0.224C8+0.16C14+0.18C18

	Model		Age		Education		Organization size		Perceived benefits	
	$R^{2\ adjusted} = 0.066$ Sig. = 0.020		$R^{2\ adjusted} = 0.080$ Sig. = 0.016		$R^{2\ adjusted} = 0.077$ Sig. = 0.019		$R^{2\ adjusted} = 0.068$ Sig. = 0.027		$R^{2\ adjusted} = 0.071$ Sig. = 0.024	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
C8	0.161	0.128	0.132	0.215	0.134	0.208	0.156	0.139	0.171	0.106
C14	0.113	0.289	0.118	0.263	0.104	0.327	0.102	0.339	0.099	0.352
C18	0.166	0.092	0.158	0.107	0.161	0.100	0.53	0.122	0.172	0.080

Table 9.10: Results of conscientiousness regressions related to general domain.

In conclusion, the original model suggested that C8-availability, C14-forward-thinking and C18-redundant inputs traits are insignificant predictors of project managers' risk propensity in relation to general domain. Furthermore, the linear regression model with C8-availability, C14-forward-thinking and C18-redundant inputs traits explain 6.6% of project managers' risk propensity in relation to general domain. However, demographic variables of age, education, organization size and perceived benefits did not affect the relationship between these traits and project managers' risk propensity related to general domain.

9.2.5 Openness to experience cluster

There were only four openness to experience traits that had significant correlation with risk propensity. Specifically, O2-creativity, O3- unconventionality and O5-intellect had significant correlations with risk propensity in relation to scope domain. Whereas O5-intellect had significant correlations with risk propensity related to time domain. Moreover, O5-intellect and O7-varity-seeking had significant correlations with risk propensity in relation to general domain.

9.2.5.1 Scope domain

Multiple regression analysis was conducted to see if O2-creativity, O3- unconventionality and O5-intellect traits predicted project managers' risk propensity in relation to scope domain. Using enter method it was found that three personality traits O2-creativity, O3- unconventionality and O5-intellect explain significant amount of the variance in risk propensity related to scope domain where ($F(3, 99) = 9.94$, $p < 0.01$, $R^2 = 0.231$, $R^{2\ adjusted} = 0.208$). Furthermore, the analysis shows that only O5-intellect (Beta = 0.372, $t(102) = 4.02$, $p<0.01$) significantly predict value of risk propensity related to scope while all the two remaining traits did not significantly predict value of risk propensity related to scope domain where O2-creativity (Beta = 0.072, $t(102) = 0.74$, ns) , O3- unconventionality (Beta = 0.173, $t(102) = 1.74$, ns) where the equation constant was also insignificant ($t(102) = 1.63$, ns). Table 9.11 displays results of multiple regression analyses between risk propensities related to scope domain and correlated openness to experience traits.

Risk propensity related to scope domain = 1.04+0.11O2+0.24O3+0.45O5

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted}$ =0.208 Sig. = 0.000		$R^{2\ adjusted}$ =0.205 Sig. = 0.000		$R^{2\ adjusted}$ =0.202 Sig. = 0.000		$R^{2\ adjusted}$ =0.242 Sig. = 0.000		$R^{2\ adjusted}$ =0.242 Sig. = 0.000	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
O2	0.072	0.462	0.078	0.428	0.071	0.469	0.023	0.817	0.101	0.294
O3	0.173	0.085	0.160	0.114	0.167	0.100	0.175	0.075	0.170	0.083
O5	0.372	0.000	0.351	0.000	0.361	0.000	0.374	0.000	0.330	0.001

Table 9.11: Results of openness to experience regressions related to scope domain.

In conclusion, the original model suggested that only O5-intellect trait is a significant predictor of project managers' risk propensity in relation to scope domain. Furthermore, the linear regression model with O2-creativity, O3- unconventionality and O5-intellect traits explain 20.8% of project managers' risk propensity in relation to scope domain. However, demographic variables of age, education, organization size and perceived benefits did not affect the relationship between these traits and project managers' risk propensity related to general domain.

9.2.5.2 Time domain

Multiple regression analysis was conducted to see if O5-intellect predicted project managers' risk propensity in relation to time domain. Using enter method it was found that personality trait O5-intellect explain significant amount of the variance in risk propensity related to time domain where ($F(1, 101) = 7.1$, $p < 0.01$, $R^2 =0.065$, $R^{2\ adjusted} =0.056$). Furthermore, the analysis shows that O5-intellect (Beta = 0.256, $t(102) = 2.70$, $p< 0.01$) did significantly predict values of risk propensity related to time domain where the equation constant was also significant (t(102) = 7.53, $p < 0.01$). Table 9.12 displays results of multiple regression analyses between risk propensities related to time domain and correlated openness to experience traits.

Risk propensity related to time domain = 2.792+0.309O5

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted}$ =0.056 Sig. = 0.009		$R^{2\ adjusted}$ =0.047 Sig. = 0.034		$R^{2\ adjusted}$ =0.047 Sig. = 0.033		$R^{2\ adjusted}$ =0.047 Sig. = 0.034		$R^{2\ adjusted}$ =0.055 Sig. = 0.021	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
O5	0.256	0.009	0.260	0.012	0.263	0.010	0.256	0.009	0.239	0.016

Table 9.12: Results of openness to experience regressions related to time domain.

In conclusion, the original model suggested that only O5-intellect trait is a significant predictor of project managers' risk propensity in relation to time domain. Furthermore, the linear regression model with O5-intellect trait explains 5.6% of project managers' risk propensity in relation to time domain. However, demographic variables of age, education, organization size and perceived benefits did not affect the relationship between these traits and project managers' risk propensity related to time domain.

9.2.5.3 General domain

Multiple regression analysis was conducted to see if O5-intellect and O7-varity-seeking traits predicted project managers' risk propensity in relation to general domain. Using enter method it was found that personality traits O5-intellect and O7-varity-seeking explain significant amount of the variance in risk propensity related to general domain where ($F(2, 100) = 10.80$, $p < 0.01$, R^2 =0.178, $R^{2\ adjusted}$ =0.161). Furthermore, the analysis shows that only O5-intellect (Beta = 0.370, t(102) = 3.97, $p < 0.01$) significantly predict values of risk propensity related to general domain while O7-varity-seeking (Beta = 0.13, t(102) = 1.43, ns) did not significantly predict values of risk propensity related to general domain where the equation constant was also significant (t(102) = 6.9, p <0.01). Table 9.13 displays results of multiple regression analyses between risk propensities related to general domain and correlated openness to experience traits.

Risk propensity related to general domain = 2.517+0.366O5+0.124O7

	Model		**Age**		**Education**		**Organization size**		**Perceived benefits**	
	$R^{2\ adjusted}$ =0.161 Sig. = 0.000		$R^{2\ adjusted}$ =0.160 Sig. = 0.000		$R^{2\ adjusted}$ =0.163 Sig. = 0.000		$R^{2\ adjusted}$ =0.167 Sig. = 0.000		$R^{2\ adjusted}$ =0.155 Sig. = 0.000	
Variables	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
O5	0.370	0.000	0.341	0.001	0.339	0.001	0.372	0.000	0.361	0.000
O7	0.133	0.156	0.140	0.137	0.143	0.275	0.108	0.260	0.137	0148

Table 9.13: Results of openness to experience regressions related to general domain.

In conclusion, the original model suggested that only O5-intellect trait is a significant predictor of project managers' risk propensity in relation to general domain. Furthermore, the linear regression model with O5-intellect and O7-varity-seeking traits explains 16.1% of project managers' risk propensity in relation to general domain. However, demographic variables of age, education, organization size and perceived benefits did not affect the relationship between these traits and project managers' risk propensity related to general domain.

9.3 Logistic regression tests

The purpose of performing logistic regression is investigate the ability of predicting project managers' tendency to take risky decisions (risk propensity) using personality traits as predictor independent variables resulting in categorizing project managers' as being carefree or careful persons; which will be referred to as risk propensity description. Furthermore, carefree project managers’ might have higher tendency to take risky decisions; i.e. having high risk propensity. Whereas careful project managers’ might have lower tendency to take risky decisions; i.e. low risk propensity. Additionally, the predictor independent continuous variables were the personality traits related to each personality cluster. Moreover, the Forced Entry method logistic regression was used since other techniques such as stepwise (forward and backward) were criticised by many researchers because they can be seriously influenced by the data random variation and by the removed variables from the model based on statistical grounds (Tabachnick & Fidell 2013). Furthermore, logistic regression test does not necessarily require normality distribution of the dependent variable data; however, it does require meeting the assumptions of: sample size, multicollinearity and outliers. Both multicollinearity and outliers of independent variables (personality traits items) were tested in the previous section on multiple regression where the data met these requirements. However, the research sample structure might influence logistic regression results. Specifically, out of the 103 cases; only 11 cases choose to describe themselves as carefree person while the remaining 92 chose to describe themselves as careful person. Furthermore, this might cause a problem in the analysis since there are limited cases in one of the categorical predictors; i.e. carefree person. Nevertheless, logistic regression was performed to check the significance of any results and to assess how well the personality traits (predictor variables) explain or predict project managers’ risk propensity description (categorical dependent variable). Moreover, the relative importance of each predictor variable as well as the interactions among the variables were be checked. Below are the results of logistic regression using risk propensity description (carefree, careful) as categorical dependent variable and project managers’ personality traits as independent continuous variables.

Classification Table

Observed			Predicted		
			Risk propensity description		Percentage correct
			Carefree person	Careful person	
Step 0	Risk propensity description	Carefree person	0	11	0.0
		Careful person	0	92	100.0
	Overall Percentage				89.3

Table 9.14: Baseline of SPSS prediction of risk propensity description.

Table 9.14 displays the result of logistic regression analysis without entering any independent variables (baseline) where the percentage of correctly classified cases as guessed by SPSS was 89.3%. Hence, SPSS is guessing that all cases would describe themselves as careful person which is due to having a higher percentage of respondents describing themselves as being careful person. Furthermore, this percentage will be used later on as a baseline to check if the set of predictor variables will improve the accuracy of SPSS predictions.

Trait Cluster	Omnibus Tests of Model Coefficients			Hosmer and Lemeshow Test			ModelSummary			Percentage Accuracy Classification	
	Chi-square	df	Sig.	Chi-square	df	Sig.	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square	Step 0	Step 1
honesty/Humility	17.60	8.00	0.02	10.25	8.00	0.25	52.40	0.16	0.32	89.30	91.30
emotionality	30.69	13.00	0.00	6.12	8.00	0.64	39.31	0.26	0.52	89.30	91.30
extraversion	17.56	11.00	0.09	6.25	8.00	0.62	52.43	0.16	0.32	89.30	89.30
agreeableness	21.70	8.00	0.01	9.31	8.00	0.32	48.30	0.19	0.39	89.30	91.30
conscientiousness	44.24	18.00	0.00	13.80	8.00	0.09	25.75	0.35	0.71	89.30	97.10
openness to expereince	20.95	7.00	0.00	7.97	8.00	0.44	49.04	0.18	0.37	89.30	89.30

Table 9.15: Summary of logistic regression results for all personality traits clusters.

Table 9.15 displays the significance of the regression models and the improvement in the prediction accuracy. Furthermore, the Omnibus tests of model coefficients indicates how the model performs where it test the model goodness of fit. Hence, values of sig. $p < 0.05$ indicates a high significance which show that the model is better than SPSS guess which assumed that all cases will describe themselves as being careful person. Also, it can be clearly seen that most of logistic regression models (six models; one for each personality trait cluster) are highly significant where p values were all less than 0.05 with the exception of regression model related to extraversion cluster where p was higher than 0.05 and that is why there was no improvement in the prediction accuracy related to extraversion cluster where both SPSS and the model total percentage correct was 89.3. Moreover, the Hosmer and Lemeshow test also test the regression model goodness of fit; where poor fit is indicated by significance value less than 0.05. Since all significance values were greater than 0.05 ($p>0.05$); then this test further supports the model. Additionally, the model summary section in the table can be used to test the usefulness of the model in which the Cox & Snell and the Nagelkerke R squares provide indication of how much the model can explain the variation amount in the dependent variable (ranging from zero to one values). For example, the two values for honesty/humility cluster were 0.157 and 0.319 respectively suggesting that between 15.7 % and 31.9% of the variability in risk propensity description can be explained by honesty/humility set of variables. Finally, the last section in the table indicates how well the regression model can be able to predict the correct category for each case. For example, the percentage correct value for the honesty/humility model was 91.3% (also referred to as percentage accuracy classification (PAC); where the model was able to correctly classify 91.3% of cases overall; which is higher than the 89.3% prediction accuracy of SPSS baseline. Additionally, it can be seen that majority of the six regression model had a higher percentage accuracy classification (PAC) than the SPSS baseline with the exception of models related to extraversion and openness to experience clusters where the percentage accuracy classification (PAC) was same as predicted by SPSS.

	B	**S.E.**	**Wald test**	**df**	**Sig.**
H3-greed-avoidance	0.75	0.35	4.66	1	0.03
E12-expected emotions	-1.24	0.58	4.57	1	0.03
X6-excitement-seeking	-0.79	0.40	3.88	1	0.05
X11-framing	1.34	0.65	4.34	1	0.04
A7-altruism	1.69	0.74	5.24	1	0.02
A8-sympathy	-1.46	0.73	4.02	1	0.05
C15-estimating probabilities	3.07	1.41	4.77	1	0.03
C17-scenario bias	7.52	3.56	4.47	1	0.03
O2-creativity	1.87	0.78	5.81	1	0.02
O5-intellect	-1.45	0.63	5.36	1	0.02

Table 9.16: Summary of logistic regression results for significant personality traits.

Table 9.16 summarizes the personality traits which had Beta coefficient that was significant at level of $p < 0.05$. Additionally, the table summarizes the contribution of each of the predictor variables in its relevant regression model. Furthermore, the Wald test indicates the statistic value for each of the significant predictor variables where all of them contributed significantly to the predictive ability of its relevant regression model. Moreover, Beta coefficients can be used in regression equations to calculate the probability of a case classified as being carefree or careful person. Additionally, it is worth mentioning that Beta coefficient values are ranging from positive to negative which indicates the relationship direction between the personality trait and the risk propensity description. For example, since traits E12, X6, A8 and O5 have a negative Beta coefficient; then an increase in these variable scores will result in decreased probability in the cases describing themselves as being careful person. On the other hand, H3 , X11, A7, C15, C17 and O2 all have positive Beta coefficients which indicates that an increase in these variables scores will result in increased probability in cases describing themselves as being careful person. Hence, it can be concluded that the following project managers' traits: E12-expected emotions, X6-excitement-seeking, A8-sypmathy and O5-itellect might influence project managers' risk propensity description negatively having them more of being carefree person with higher tendency to take risky decisions; i.e. higher risk propensity. Whilst, the following project managers' traits: H3-greed-avoidance, X11-framing, A7-altruism, C15-estimating probabilities, C17-scenario-bais and O2-creativity might influence project managers' risk propensity description positively having them more of being careful person with lower tendency to take risky decisions; i.e. lower risk propensity.

9.4 Summary

There were many key findings in this chapter. First, multiple regression assumptions were tested and passed. Second, analyses results were presented and discussed for each personality traits cluster. Third, results showed that project managers' demographic variables had minimal effect on the relationship between traits and risk propensity variables. Last, logistic regression analysis results were presented and discussed; where there are specific traits that are associated with carefree project managers with high risk propensity; and other traits that are associated with careful project managers with low risk propensity.

10 Chapter Ten: Risk Propensity and Success Criteria Dependencies

10.1 Introduction

This chapter discusses the dependency matrices analyses that were developed to investigate the influence of project managers' personality traits on their risk propensity in relation to project success criteria domains. Moreover, the project success criteria domains covered more than the three domains (scope, time and cost) that were used in the research analysis. Specifically, four more domains were added: quality, resources, risk and stakeholders' satisfaction. Also, the chapter includes the dependency matrices analysis for the influence of personality traits on project managers' general risk propensity as well as their risk propensity description. Finally, the chapter also included analysis of the used network node measures as well as analysis of the combined centrality measure plots.

10.2 Dependency structural analysis

Dependency matrices and social network analysis were used in the research for better understanding of the relationship between project managers' personality traits and their risk propensity in relation to project success criteria. Specifically, graphical network analyses were developed to investigate the influence of project managers' personality traits on their risky decisions related to the following project success criteria: scope, time, cost, quality, risk, resources, and stakeholders' satisfaction. Additionally, the analysis was expanded to include the influence of project managers' personality traits on their general risk propensity and their risk propensity description; i.e. being carefree or careful person. Three expert project managers were involved in developing the dependency matrices; the experts were presented with a matrix that includes items related to independent variables (65 personality traits items) along with dependent variables items (project success criteria items as well as risk propensity items). The experts were asked to indicate if there are relationships or influence level between the different variables (Mapping matrix is provided in Appendix IV). Consequently, the results of this exercises were fed into the Gephi software (version 0.9.1) which is a visualization and manipulation software. Different layouts for the entire network and sub-networks were tested; where a network layout is an algorithm that position the network nodes in the 2-D or 3-D graphic space where a line leading from one node in the network to another node indicates that there is correlation between the nodes. Eventually, the "force atlas" algorithm layout was adopted were it is suitable for laying out networks with scale-free distribution of node degree and small world network (one that have small distances between all nodes). Figure 10.1 displays the dependency matrices development process.

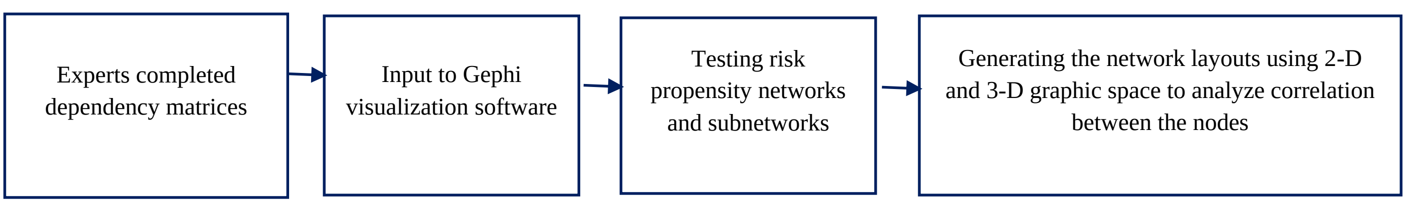


Figure 10.1: Dependency matrices development process.

Several network statistics were performed on each network, such as: centrality measures, graph density, clustering coefficients and average path length. Table 10.1 summarizes social network components that were used in analysing the risk propensity networks properties. Figure 10.2 shows a social network sample.

Component	Description
Social Network	A finite set (or sets) of actors and the relations defined on them. It consists of three elements: (1) a set of actors; (2) each actor has a set of individual attributes; and (3) a set of ties that defines at least one relation among actors.
Graph	A common way to visually represent social networks, consisting of two dimensions: actors and relations (also called nodes and edges).
Node	Nodes are the entities in graph (also called vectors). For example, if we consider Facebook friends as a graph, then every friend is a node. In this study a node represents a risk propensity trait and success criteria.
Edge	These are the relationships between nodes. For example, if we consider Facebook friends as a graph then every friendship is an edge. In this study the edge represents the influence that may exist between traits an success criteria

Table 10.1: Social network analysis components.

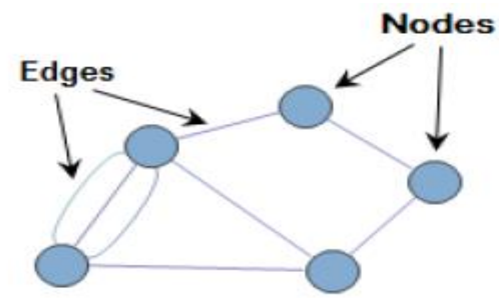


Figure 10.2: Social network sample.

Also, the following measures are normally used in describing the graphs: size, density, distance and clustering coefficient. Below is a description of each of these measures. Table 10.2 displays the graph measures that were used in the analysis.

Graph Measures	**Description**
Size	A measure of the number of actors (nodes) in a complete or egocentric network.
Density	The number of ties in the network reported as a fraction of the total possible number of ties.
Distance	The number of “steps” between any two actors in a network.
Total clustering coefficient	The average clustering coefficient of all network nodes.

Table 10.2: Graph measures descriptions.

Furthermore, all network graphs were multimode where the network nodes belonged to more than one category; specifically: personality traits category and project success criteria category. Also, directed graph type was used in the networks analysis; in which the relationship between the connecting nodes is not valid in both directions opposite of undirected graph type where relationship between connecting nodes is valid in both directions. Figure 10.3 displays difference between directed and undirected graphs.

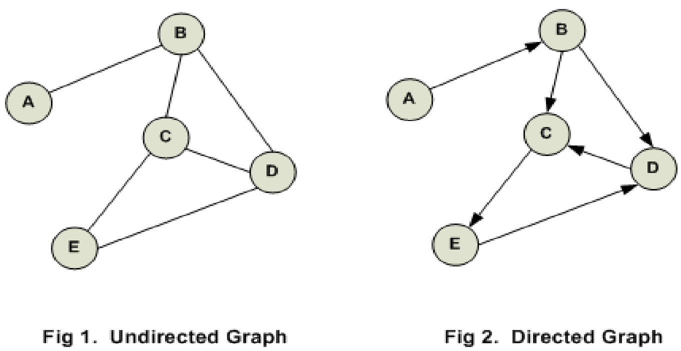


Figure 10.3: Directed and undirected graph samples.

Additionally, the networks that were constructed using the Gephi software were all unweighted. Moreover, a weighted network is one in which edges between nodes do not have weights assigned to them opposite of weighted network where edges between nodes have weights assigned to them to reflect the relationship strength between the nodes. This is due to the input collected from the experts; where they were only asked to indicate whether there was influence between the variables listed on the dependency matrix sheet without assigning any weights on influence degree. Figure 10.4 shows a weighted network sample.

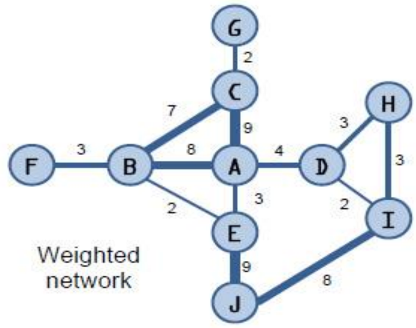


Figure 10.4 weighted network sample.

Furthermore, ego network filter was performed in each network analysis where a focal node (an "ego") was selected to determine its connections to other nodes (which are called "alters") where each ego is treated as its own case. Additionally, the focal nodes that were selected in the ego network analysis were those related to the project success criteria mentioned earlier in this section. Figure 10.5 shows an ego-centric network sample.

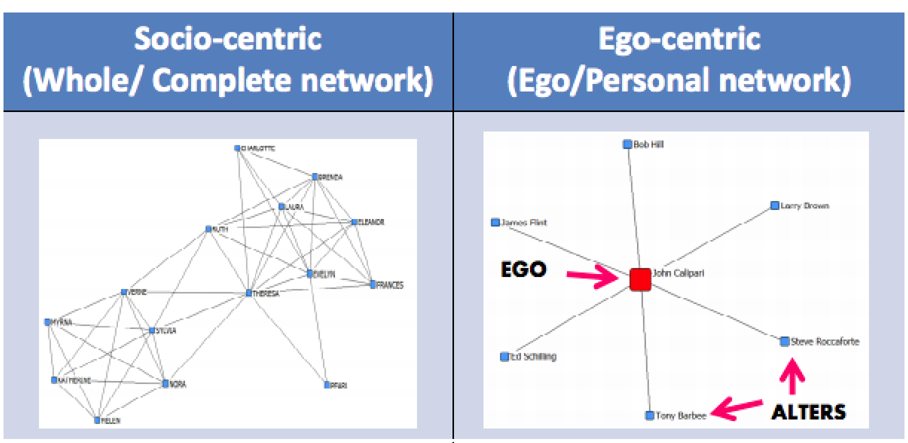


Figure 10.5: Ego-centric network sample.

Also, the measures that were used in analysing the network characteristics were clustering coefficients and centrality measures. According to De Nooy et al. (2005), the network clustering coefficient of a certain node with "N" neighbours can be defined as the number of directed interactions or links that exist between the node's "N" neighbours, divided by number of possible directed interactions that could exist between the node's neighbours. According to Boussabaine (2014), network centrality measures the degree to which relationships within a network are concentrated around one or more key network nodes. Also, centrality measures can be explained as the network degree of similarity to a star network where the centre node in a star network connects to all other star network nodes while all other nodes do not have any other connections to each other (Scott 2011). Furthermore, the most common centrality measures that are used in network analysis components are: degree, and Betweeness and closeness. As for closeness centrality, it is also a network measure that is derived from the mean distance of a node to all other nodes in the network. According to De Nooy et al. (2005), a node closeness centrality is the number of other nodes divided by the sum of all distances between this node and all other nodes. Also, Betweeness centrality is a network measure that could be defined as the number of geodesic paths (shortest paths between two nodes) that pass through a certain node. Furthermore, nodes with high degree centrality measure would also possibly have high Betweeness and closeness centrality measures (De Nooy et al. 2005). Table 10.3 summarizes network nodes measures that were used in the analysis.

Node Measures	**Description**
Clustering coefficient	A measure of a network's actors' tendency to "group together" into pockets of dense connectivity.
Degree centrality measure	An important node is involved in large number of interactions. The number of edges connected with a particular node.
Betweeness centrality measure	An important node lies on a high proportion of paths between other nodes in the network.
Closeness centrality measure	An important node is typically "close" to, and can communicate quickly with, the other nodes in the network. Length of the average shortest path between a given node and all other nodes in a graph.
Eigenvector	An important node is connected to important neighbours. This is a measure of influence of a given node in the whole network. The notion is how well-connected a given node is with other well connected nodes in the network.

Table 10.3: Node measures.

In this study, the network nodes measures shown in table 10.3 were used to interpret the personality trait networks node measures. Table 10.4 displays the interpretation of personality traits networks node measures.

Node Measures	Description
Clustering coefficient	A measure of the network's personality traits tendency to "group together" into pockets of dense connectivity.
Degree centrality measure	It measures how many personality traits this trait is directly connected to (directly influence). A trait node that has a high degree centrality can gain influence over others. Also, traits nodes that have a high degree occupy a structural position (network location) that serves as a source or channel for significant influence over other traits nodes. It is expected that central trait nodes are located near or at the centre of the network. Trait nodes that have low degree are expected to have a peripheral influence, because they have few or no relations, and thus are located at the periphery of a network diagram.
Betweeness centrality measure	How likely a particular personality trait to be the most direct influence between two personality traits in the network. This measures the extent to which a personality trait has potential to control of over other traits.
Closeness centrality measure	This measure how fast can a particular personality trait influence reach other trait nodes in the network. A trait node that is close to many others can quickly interact and influence them without going through many intermediary trait nodes.

Eigenvector	This measures how well a particular personality trait is connected (associated) to other well connected traits.
Ego network	Each trait node or decision criteria can be considered as an ego. Thus, the network of influence/interaction of trait/criteria is an ego network. That is to say, ego is focal node (e.g. cost) which is connected directly to traits nodes (called alters) and their associated ties (if there is any). This is important in analysing how ego is influenced and altered by traits nodes and responds proportionally. It is important to determine how many of traits of particular type (personality traits cluster) are in ego's network neighbourhood.
Network density	Normally networks are categorised loose (low density) or tight (high density) as it is well understood that dense networks are associated with small and stable structure which are associated with a high degree of cohesion. If the network density is close to the value of 1; this signify there may be a considerable influence interaction between the network personality traits.

Table 10.4: Personality traits networks and node measures.

To discover the underlying properties of the most influential independent personality traits with success criteria, networks characteristics plots were used to detect any universal emerging properties. Table 10.5 displays the combined centrality measure plots.

Combined centrality measurements	Attributes
Degree and Closeness	To discover which personality trait has the centrality attribute to have more direct connection to other traits in the network.
Degree and Betweeness	To discover which personality trait has more direct connection to other traits and how it control/influence of other traits.
Degree and Eigenvector	Discover which trait with the more direct influence to other traits and whether it is connected to the most central (high degree) traits.
Closeness and Betweeness	To discover which trait has the closest distance to other traits and whether it has most of the shortest paths.
Closeness and Eigenvector	To discover the location of the traits in terms of closeness to other traits and whether is connected to most central traits.
Betweeness and Eigenvector	To discover which traits are controlling the influence between other traits and whether these traits are connecting to the most central traits.

Table 10.5: Combined centrality measures plots.

10.3 Risk propensity ego networks analyses

This section presents the results of risk propensity dependency network as well as all ego networks. Specifically, the following ten networks were generated using visualization and manipulation software (Gephi version 0.9.1): risk propensity dependency, scope, time, cost, quality, resources, risk, stakeholder satisfaction, general risk propensity and risk propensity description.

10.3.1 Risk propensity dependency network

The risk propensity network is generated based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some personality traits have more influence on some project success criteria than other traits. Moreover, the network shows the risk propensity network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.6 shows the risk propensity dependency network.

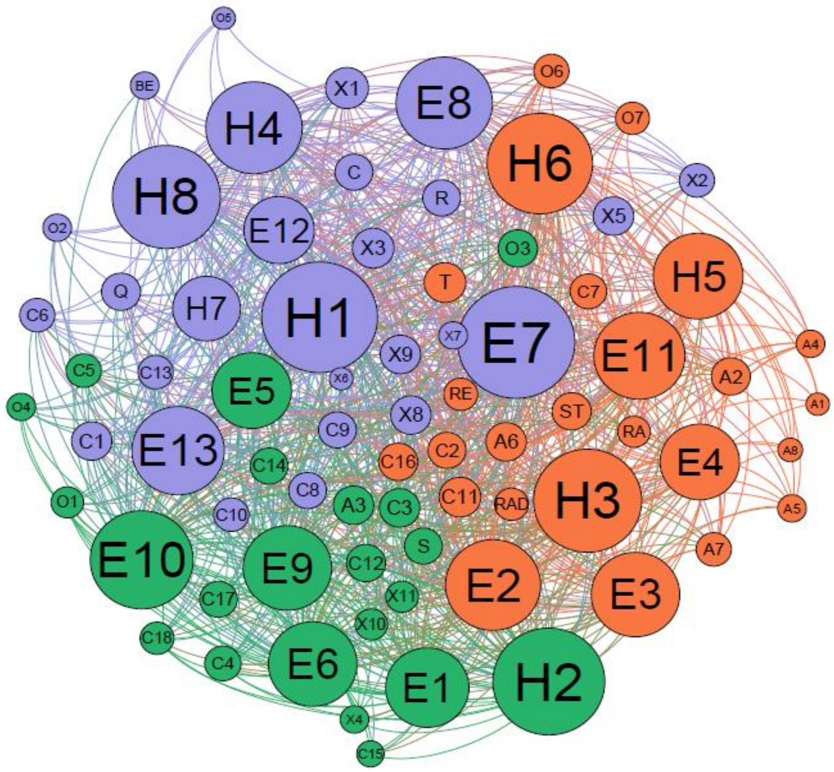


Figure 10.6: Risk propensity dependency network.

10.3.1.1 General characteristics

The topological characteristics of the risk propensity dependency network are shown in the table below where the number of nodes (also referred to as actors or victors) were 75 and edges (also referred to as arcs) were 999. Consequently, and by looking at the network graph; it can be clearly seen that the risk propensity dependency network is a dense network; a fact that is supported by looking at the sum of the network centrality measures of degree, closeness and Betweeness. Also, the high standard deviation 21.4 suggests a large level of heterogeneity within the risk propensity dependency network. Table 10.6 displays the general characteristics of the risk propensity dependency network.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	26.64	0.208	7.427	0.684	0.498	
Standard Deviation	21.358	0.335	13.525	0.188	0.210	
Sum	1998	15.571	557	51.265	37.314	
Variance	456.177	0.112	182.943	0.035	0.044	
Minimum	5	0.0	0	0.244	0.111	
Maximum	77	0.806	46.778	1.000	0.800	
Network Density						0.18

Table 10.6: General characteristics of the risk propensity dependency network.

10.3.1.2 Network density

The risk propensity dependency network density is referred to as the number of actual connections between all variables divided by the number of possible interaction connections. Additionally, network density describes the overall linkage between personality traits (independent variables) and their influence on project managers' risky decisions related to project success (dependant variables). Furthermore, the network density is also a measure of the linkage between the dependant variables where the value of the network density can range from 0 to 1. According to Boussabaine (2013), a density close to value of 1 indicates that all risk variables are strongly linked to each other, whereas a density of 0.5 indicates medium level of interaction between risk variables at the cluster level. However, a density value close to 0 indicates weak interaction between traits variables. Thus, the network density is low since its value is 0.18 which suggests low level of interaction among the network variables indicating that not all personality traits have same level of influence on risky decisions related to project success criteria.

10.3.1.3 Network clustering coefficient

The clustering coefficient measures the degree to which risk propensity determinants interact with each other and influence project managers' risky decisions in relation to project success criteria domains. Furthermore, the average clustering coefficient of the risk propensity dependency network is 0.498 where it measures the degree to which personality traits interact with each other and influence project managers' risk propensity when taking risky decisions. Figure. 10.7 shows how clustering coefficients of risk propensity dependency network nodes are inversely related to the risk nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risk propensity related to certain project success domains) and out-degree (which is the measure of the number of edges pointing from a node, which could be interpreted as the ability of this node to influence project managers' risk propensity in other domains). The results imply that when clustering coefficient increasers the degree decreases. Similarly when the degrees increases the clustering coefficient decreases.

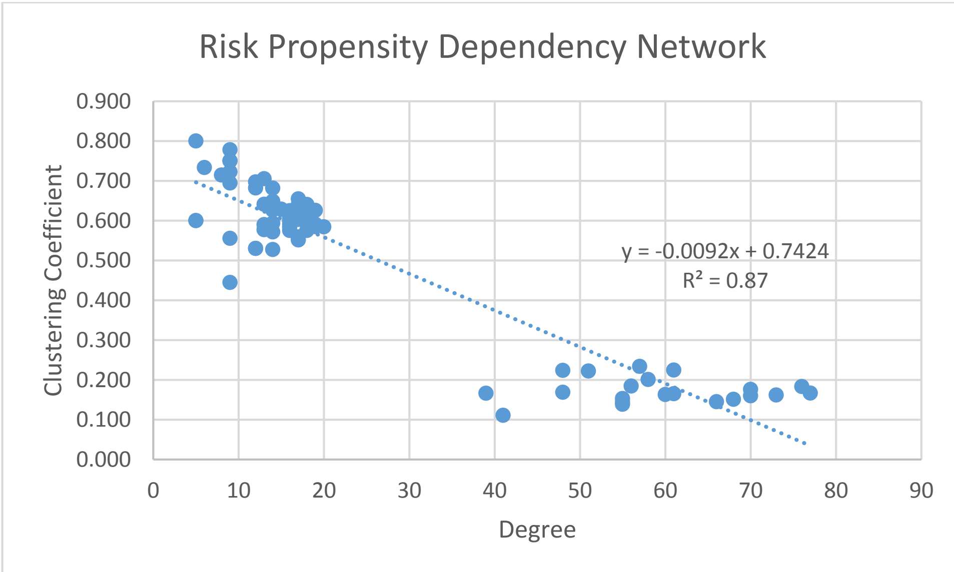


Figure 10.7: Clustering coefficients versus degree of risk propensity dependency network.

10.3.1.4 Network centrality measures

In general terms, centrality can be explained as *"the degree to which a network approaches the configuration of a star network. A star network has 1 node in the center that connects to all other nodes. No nodes have connections to any other node except the central node"* (Scott 2011). Additionally, there are several centrality measures that are used in the analysis of networks and their components. The most commonly used centrality indices are degree, closeness, betweeness and eigenvector. Table 10.7 displays the values these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
O5	Intellect	5	0	0	0.244	0.800
A1	Forgiveness	5	0	0	0.267	0.600
X6	Excitement-seeking	5	0	0	0.275	0.600
A8	Sympathy	6	0	0	0.306	0.733
C15	Estimating Probabilities	8	0	0	0.425	0.714
BE	Benefits	9	0	0	0.497	0.778
O2	Creativity	9	0	0	0.431	0.556
O4	Imagination	9	0	0	0.403	0.444
A4	Patience	9	0	0	0.488	0.750
A5	Trust	9	0	0	0.490	0.750
X7	Cheerfulness	9	0	0	0.499	0.722
X4	Liveliness	9	0	0	0.446	0.694
O1	Inquisitiveness	12	0	0	0.574	0.530
RA	General Risk Propensity	12	0	0	0.660	0.697
X10	Halo Effect	12	0	0	0.551	0.530
X11	Framing	12	0	0	0.638	0.682
O7	Variety-seeking	13	0	0	0.654	0.577
C18	Redundant Inputs	13	0	0	0.660	0.590
RE	Resources	13	0	0	0.699	0.641
RAD	Risk Propensity Description	13	0	0	0.706	0.705
O6	Liberalism	14	0	0	0.720	0.637

C13	Representativeness	14	0	0	0.734	0.648
X2	Social Boldness	14	0	0	0.751	0.681
C6	Achievement-striving	14	0	0	0.674	0.527
C5	Competence	14	0	0	0.705	0.593
A7	Altruism	14	0	0	0.716	0.626
C10	Familiarity	14	0	0	0.688	0.571
C7	Self-discipline	15	0	0	0.775	0.629
C4	Prudence	15	0	0	0.770	0.629
R	Risk	16	0	0	0.803	0.583
C9	Confirmation	16	0	0	0.793	0.592
C	Cost	16	0	0	0.812	0.583
C17	Scenario Bias	16	0	0	0.803	0.600
C8	Availability	16	0	0	0.795	0.575
C14	Forward-Thinking	16	0	0	0.812	0.600
C2	Diligence	16	0	0	0.821	0.608
S	Scope	16	0	0	0.831	0.625
O3	Unconventionality	17	0	0	0.862	0.603
Q	Quality	17	0	0	0.835	0.551
A2	Gentleness	17	0	0	0.896	0.654
ST	Stakeholder Satisfaction	17	0	0	0.889	0.640
C12	Consistent	17	0	0	0.827	0.559
C16	Chain Processes	17	0	0	0.881	0.625
X5	Assertiveness	18	0	0	0.908	0.601
X9	Confidence	18	0	0	0.919	0.614

C1	Organization	18	0	0	0.908	0.608
A6	Morality	18	0	0	0.937	0.641
X8	Optimism	18	0	0	0.910	0.601
A3	Flexibility	18	0	0	0.890	0.575
C3	Perfectionism	18	0	0	0.915	0.608
X3	Sociability	19	0	0	0.950	0.585
T	Time	19	0	0	0.955	0.591
C11	Scale	19	0	0	0.979	0.626
X1	Expressiveness	20	0	0	1.000	0.584
H7	Hindsight	39	0.632	6.138	0.375	0.166
E12	Expected emotions	41	0.661	4.673	0.283	0.111
E5	Anger	48	0.679	12.392	0.494	0.169
E4	Sentimentality	48	0.667	12.762	0.605	0.224
E1	Fearfulness	51	0.673	17.572	0.612	0.222
E3	Dependence	55	0.718	19.812	0.507	0.153
E9	Vulnerability	55	0.718	21.910	0.515	0.144
E6	Depression	55	0.725	15.102	0.495	0.139
H5	Kindness	56	0.712	26.012	0.635	0.184
E11	Cognitive dissonance	57	0.705	27.417	0.748	0.234
E13	High Benefits	58	0.718	29.444	0.672	0.201
E2	Anxiety	60	0.740	29.553	0.616	0.163
E8	Impulse control	61	0.725	39.185	0.768	0.225
H4	Modesty	61	0.755	19.657	0.595	0.165
E10	Harm avoidance	66	0.787	43.164	0.559	0.145

H6	Amiability	68	0.804	34.146	0.644	0.151
H8	Competitive	70	0.813	37.222	0.676	0.160
H3	Greed Avoidance	70	0.804	32.734	0.755	0.176
H2	Fairness	73	0.831	40.337	0.721	0.162
H1	Sincerity	76	0.841	46.778	0.828	0.183
E7	Self-consciousness	77	0.860	40.990	0.793	0.167

Table 10.7: Centrality measures of risk propensity dependency network.

10.3.2 Traits influencing project managers' risky decisions related to project scope

The scope ego network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to scope than other traits. Moreover, the scope ego network shows the scope network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.8 displays the scope ego network.

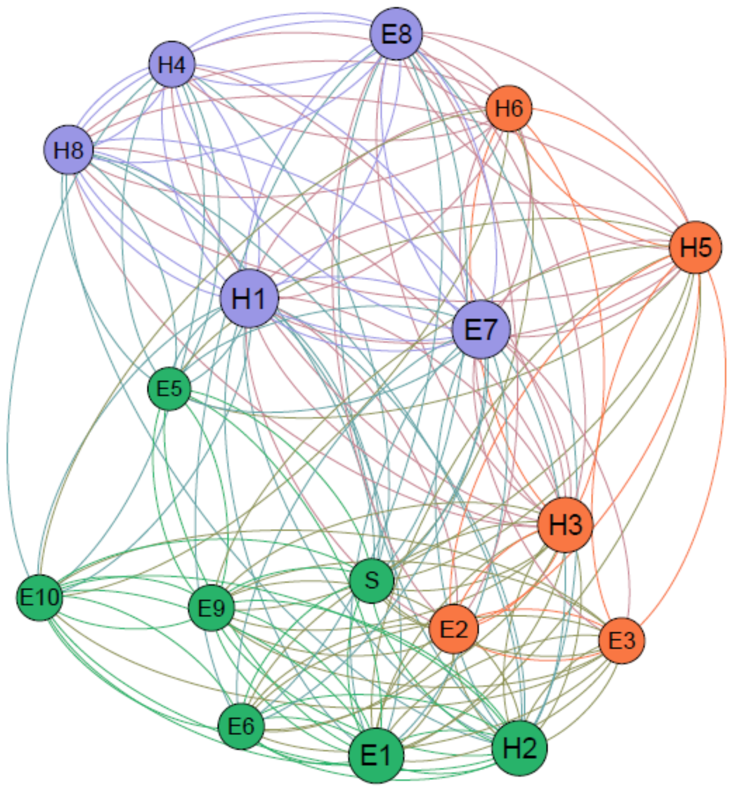


Figure 10.8: Scope ego network.

10.3.2.1 General characteristics

The topological characteristics of the scope ego network are shown in table 10.8 where it consists of 17 and 166 edges. The average degree of the scope network is 19.50 while the standard deviation was 3.18.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	19.529	0.700	5.294	0.625	0.625	
Standard Deviation	3.183	0.183	3.091	0.133	0.049	
Sum	332.000	11.903	90.000	10.624	10.620	
Variance	10.131	0.034	9.552	0.018	0.002	
Minimum	15.000	0.667	2.455	0.461	0.500	
Maximum	25.000	0.842	11.538	0.761	0.700	
Network Density						0.61

Table 10.8: General characteristics of the scope ego network.

10.3.2.2 Network density

The scope network density is 0.61 which suggests high level of interaction among the traits variables. Additionally, the scope ego network density visualize the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to scope (dependent variable).

10.3.2.3 Network clustering coefficient

The average clustering coefficient of the scope network was 0.625 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to scope. Figure. 10.9 shows how clustering coefficients of scope ego network nodes are inversely related to the risk nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project scope) and out-degree (which is the measure of the number of edges pointing from a node, which could be interpreted as the ability of scope node to influence project managers' risk propensity in other domains). The results imply that when clustering coefficient increasers the degree decreases. Similarly when the degrees increases the clustering coefficient decreases.

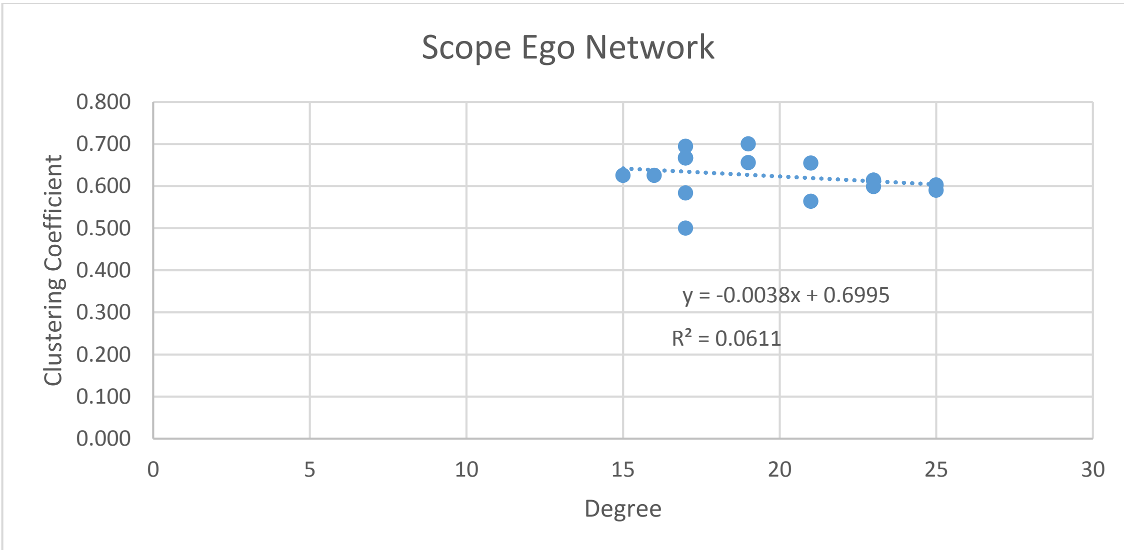


Figure 10.9: Clustering coefficients versus degree of scope ego network.

10.3.2.4 Network centrality measures

The scope ego network centrality measures the degree to which relationships within the scope network nodes are concentrated around the scope node. Table 10.9 displays the values of these centrality measures.

		Centrality Measures				
Label	Trait	Degree	Closeness	Betweeness	Eigenvector	Clustering coefficient
S	Scope	16	0.000	0.000	1.000	0.625
E5	Anger	15	0.667	2.852	0.461	0.625
H4	Modesty	17	0.696	3.105	0.515	0.667
E3	Dependence	17	0.696	2.586	0.508	0.667
H6	Amiability	17	0.696	2.455	0.530	0.694
E10	Harm avoidance	17	0.696	6.705	0.492	0.500
E9	Vulnerability	17	0.696	4.086	0.497	0.583
E6	Depression	17	0.696	2.574	0.530	0.667
H8	Competitive	19	0.727	3.033	0.594	0.700
E2	Anxiety	19	0.727	3.657	0.590	0.656
E8	Impulse control	21	0.762	5.502	0.656	0.655
H5	Kindness	21	0.762	8.321	0.628	0.564
H3	Greed Avoidance	23	0.800	8.974	0.709	0.598
H2	Fairness	23	0.800	7.545	0.705	0.614
E1	Fearfulness	23	0.800	7.593	0.690	0.614
E7	Self-consciousness	25	0.842	11.538	0.757	0.590
H1	Sincerity	25	0.842	9.474	0.761	0.603

Table 10.9: Centrality measures of the scope ego network.

It can be seen from the results above; that project managers' risky decisions related to scope are influenced by 16 personality traits. Seven of these personality traits belongs to the honesty/humility cluster (out of a total of 8 traits) and nine traits were within the emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the scope network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued that according to the views of the experts in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to scope. Below are plots of all possible combinations between the centrality measures of the scope network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

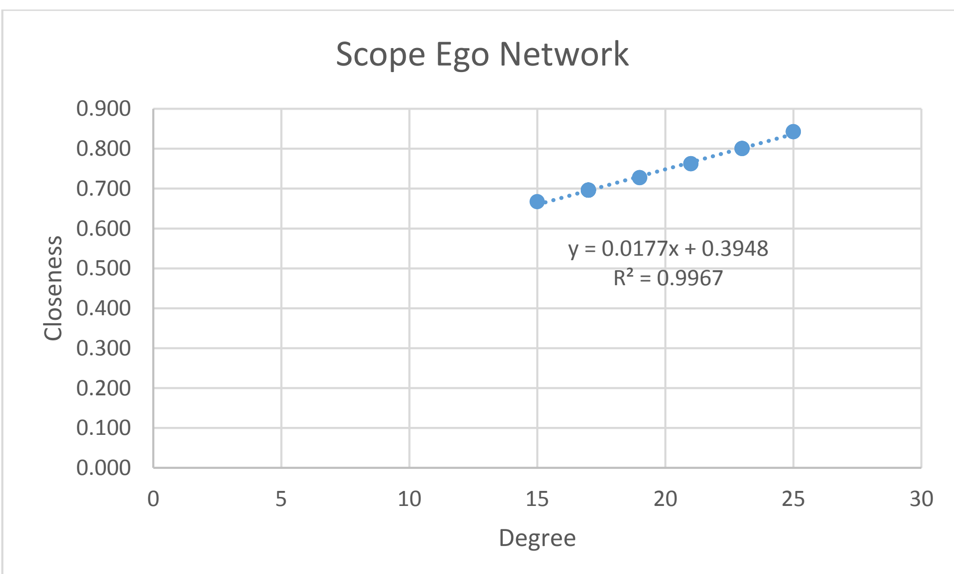


Figure 10.10: Degree versus closeness in the scope ego network.

Figure 10.10 shows how closeness centrality of personality traits in the scope network vary linearly with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the scope network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the scope ego network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.997 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep which may signify that the rate of change between these measurers is minimal. This means that traits closeness values do not increase much with an increase in their degree values.

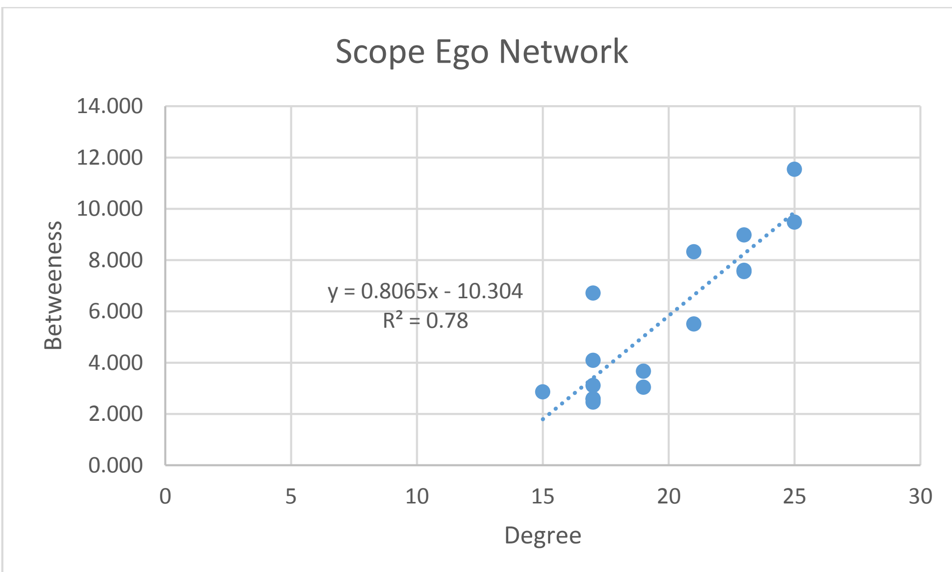


Figure 10.11: Degree versus betweeness in the scope ego network.

Figure 10.11 shows how betweeness centrality of personality traits in the scope network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the scope network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.78 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 80% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep which may signify that the rate of change between these measurers is great where changes in degree values of traits in the scope ego network lead to changes in their betweeness values.

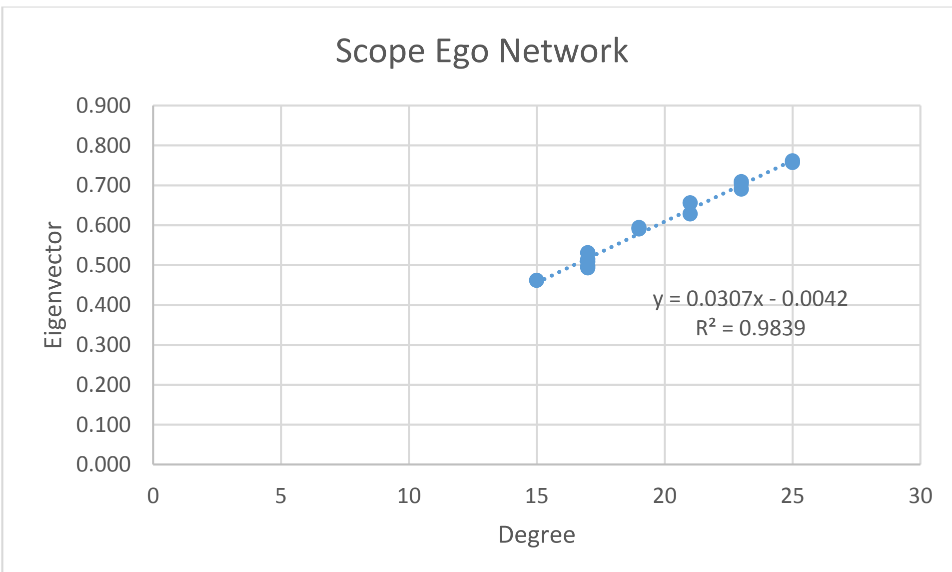


Figure 10.12: Degree versus eigenvector in the scope ego network.

Figure 10.12 shows how eigenvector centrality of personality traits in the scope network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the scope network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.984 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep which may signify that the rate of change between these measurers is minimal where changes in the degree values of the traits in the scope ego network do not necessarily lead to changes in their eigenvector values.

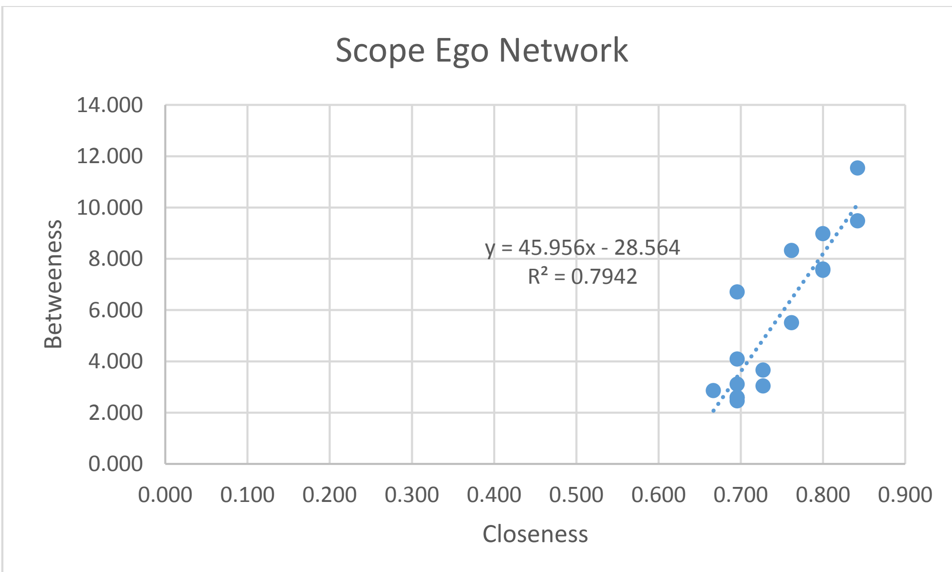


Figure 10.13: Closeness versus betweeness in the scope ego network.

Figure 10.13 shows how closeness centrality of personality traits in the scope ego network vary with its betweeness centrality measures. The relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.79 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 80% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that the rate of change between these measurers is very great where changes in the closeness values of traits in the scope ego network lead to changes in their betweeness values.

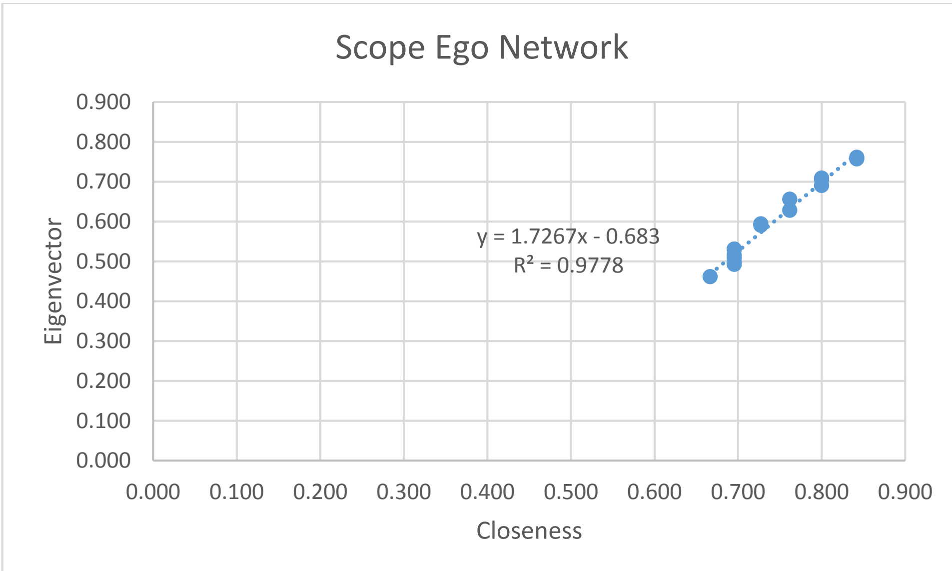


Figure 10.14: Closeness versus eigenvector in the scope ego network.

Figure 10.14 shows how closeness centrality of personality traits in the scope network vary with its eigenvector centrality measures. The relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.98 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and steep. This may signify that the rate of change between these measurers is great where changes in the closeness values of traits in the scope ego network lead to changes in their eigenvector values.

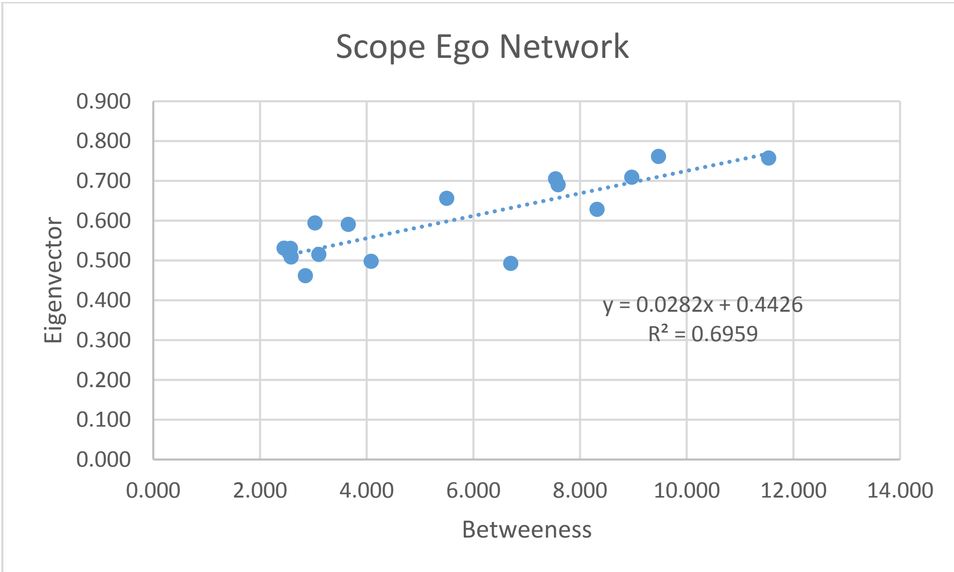


Figure 10.15: Betweeness versus eigenvector in the scope ego network.

Figure 10.15 shows how betweeness centrality of personality traits in the scope network vary with its eigenvector centrality measures. The relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.695 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 70% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that the rate of change between these measurers is minimal where changes in the betweeness values of traits in the scope ego network do not necessarily lead to changes in their eigenvector values

10.3.3 Traits influencing project managers’ risky decisions related to project time

The time ego network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers’ personality traits have more influence on their risky decisions related to time domain than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the time ego network shows the time network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.16 displays the time ego network.

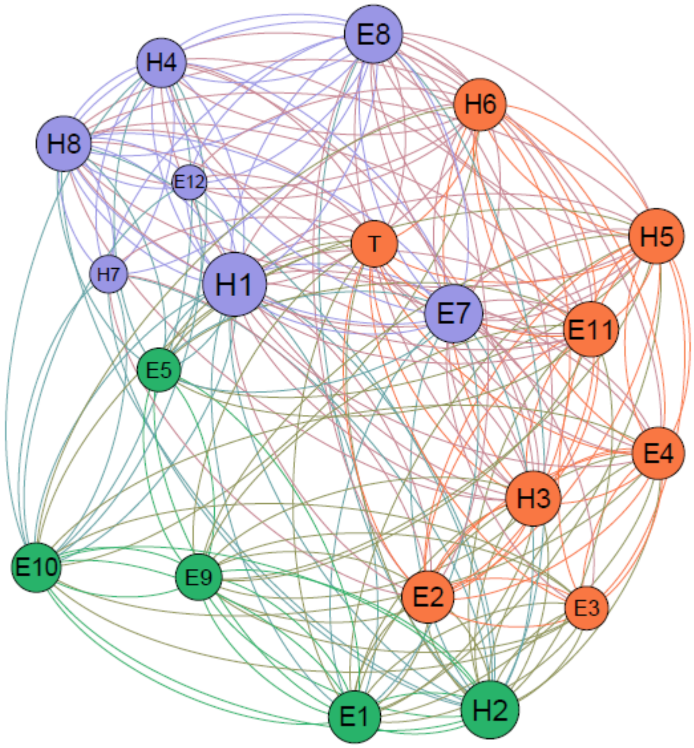


Figure 10.16: Time ego network.

10.3.3.1 General characteristics

The topological characteristics of the time network are shown in table 10.10 where there are 20 nodes and 221 edges. The average degree of the time network is 22.10 while the standard deviation was 4.84.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	22.100	0.690	7.000	0.609	0.624	
Standard Deviation	4.836	0.171	4.451	0.160	0.053	
Sum	442.000	13.805	140.000	12.180	12.480	
Variance	23.390	0.029	19.816	0.026	0.003	
Minimum	11.000	0.594	0.619	0.294	0.455	
Maximum	31.000	0.864	16.194	0.815	0.700	
Network Density						0.582

Table 10.10: General characteristics of the time ego network.

10.3.3.2 Network density

The time network density is high since its value is 0.582 which suggests high level of interaction among the traits variables. The time network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to time (dependent variable).

10.3.3.3 Network clustering coefficient

The average clustering coefficient of the time network was 0.624 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to time. Figure 10.17 shows how clustering coefficients of time ego network nodes are inversely related to the risk nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project time) and out-degree (which is the measure of the number of edges pointing from the time node, which could be interpreted as the ability of time node to influence project managers' risk propensity in other domains). The results imply that when clustering coefficient increasers the degree decreases. Similarly when the degrees increases the clustering coefficient decreases.

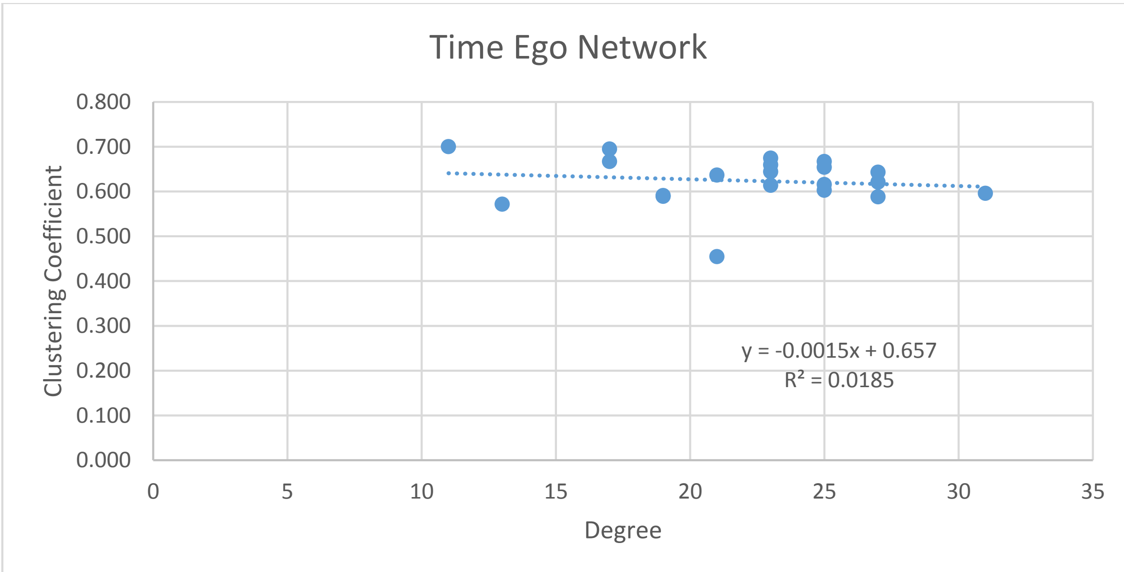


Figure 10.17: Clustering coefficients versus degree of time network.

10.3.3.4 Network centrality measures

The time network centrality measures the degree to which relationships within the time network nodes are concentrated around the time node. Table 10.11 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
T	Time	19	0.000	0.000	1.000	0.591
E12	Expected emotions	11	0.594	0.619	0.294	0.700
H7	Hindsight	13	0.613	1.840	0.333	0.571
E5	Anger	17	0.655	2.705	0.463	0.667
E3	Dependence	17	0.655	1.898	0.440	0.694
E9	Vulnerability	19	0.679	4.707	0.479	0.589
H4	Modesty	21	0.704	6.176	0.554	0.636
E10	Harm avoidance	21	0.704	15.288	0.490	0.455
E4	Sentimentality	23	0.731	4.820	0.633	0.674
H6	Amiability	23	0.731	6.179	0.619	0.659
E2	Anxiety	23	0.731	7.840	0.605	0.614
E1	Fearfulness	23	0.731	5.772	0.601	0.644
H8	Competitive	25	0.760	10.838	0.650	0.615
H5	Kindness	25	0.760	9.020	0.665	0.603
E11	Cognitive dissonance	25	0.760	6.448	0.688	0.667
H3	Greed Avoidance	25	0.760	6.834	0.696	0.654
E8	Impulse control	27	0.792	11.663	0.714	0.621
E7	Self-consciousness	27	0.792	9.529	0.736	0.643
H2	Fairness	27	0.792	11.629	0.705	0.588
H1	Sincerity	31	0.864	16.194	0.815	0.596

Table10.11: Centrality measures of the time ego network.

It can be seen from the results above; that project managers' risky decisions related to time are influenced by 19 personality traits. Eight of these personality traits belong to honesty/humility cluster (out of a total of 8 traits) and eleven traits belong to emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the time network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to the views of the experts of in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to time. Below are plots of all possible combinations between the centrality measures of the time network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

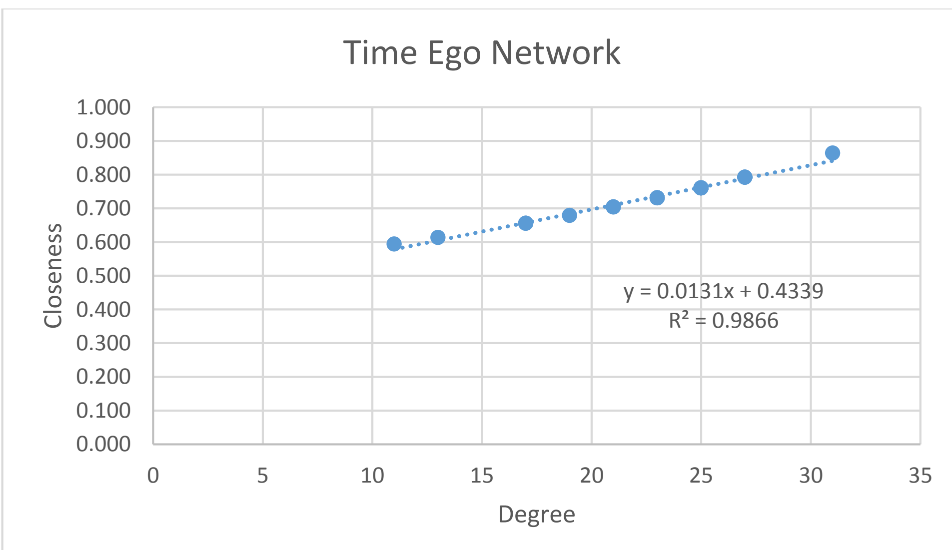


Figure 10.18: Degree versus closeness in the time ego network.

Figure 10.18 shows how closeness centrality of personality traits in the time network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the time network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the time network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.986 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 99% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that the rate of change between these measurers is minimal where high changes in the degree values of traits in the time ego network is not associated with high changes in their closeness values.

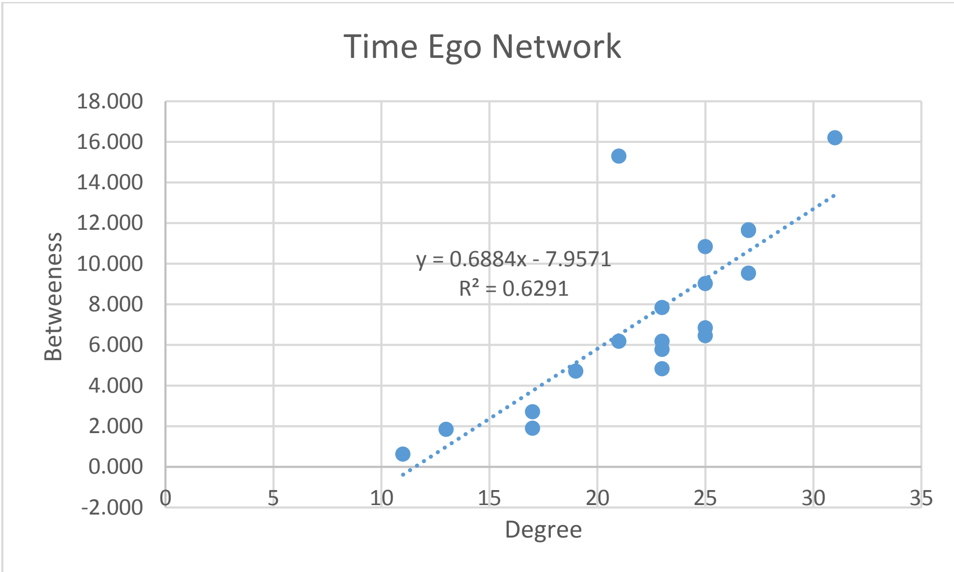


Figure 10.19: Degree versus betweeness in the time ego network.

Figure 10.19 shows how betweeness centrality of personality traits in the time network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the time network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.629 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 63% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that the rate of change between these measurers is great where high changes in the degree values of traits within the time ego network are associated with high changes in their betweeness values.

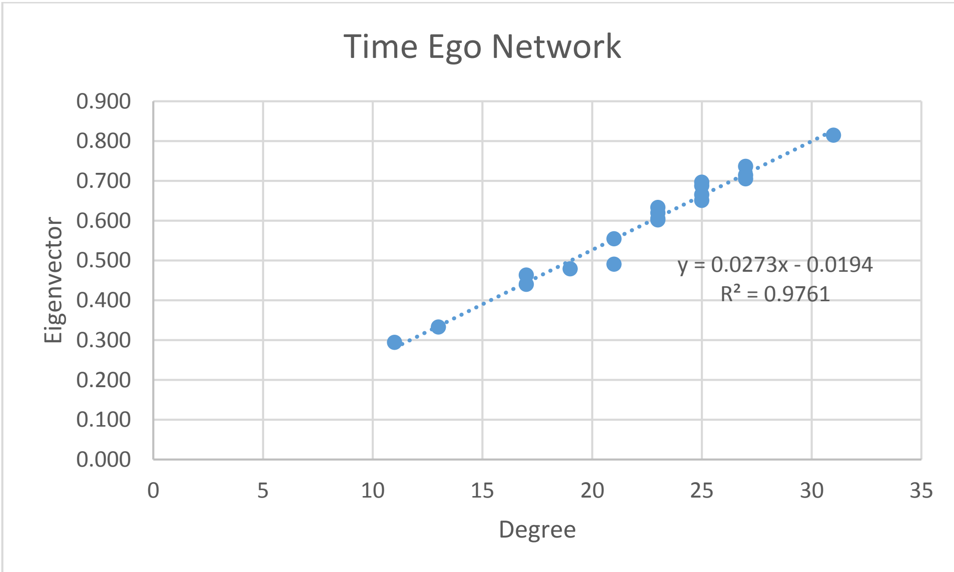


Figure 10.20: Degree versus eigenvector in the time ego network.

Figure 10.20 shows how eigenvector centrality of personality traits in the time network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the time network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.976 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 98% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that the rate of change between these measurers is minimal where changes in the degree values of traits in the time ego network do not cause high changes in their eigenvector values.

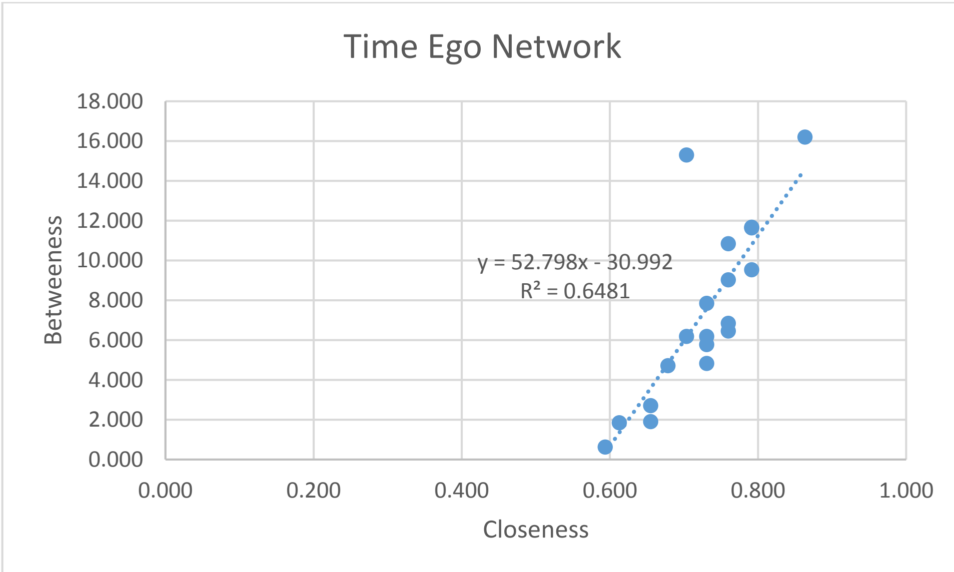


Figure 10.21: Closeness versus betweeness in the time ego network.

Figure 10.21 shows how closeness centrality of personality traits in the time network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.648 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 65% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that the rate of change between these measurers is great where changes in the closeness values of traits in the time ego network cause high changes in their betweeness values.

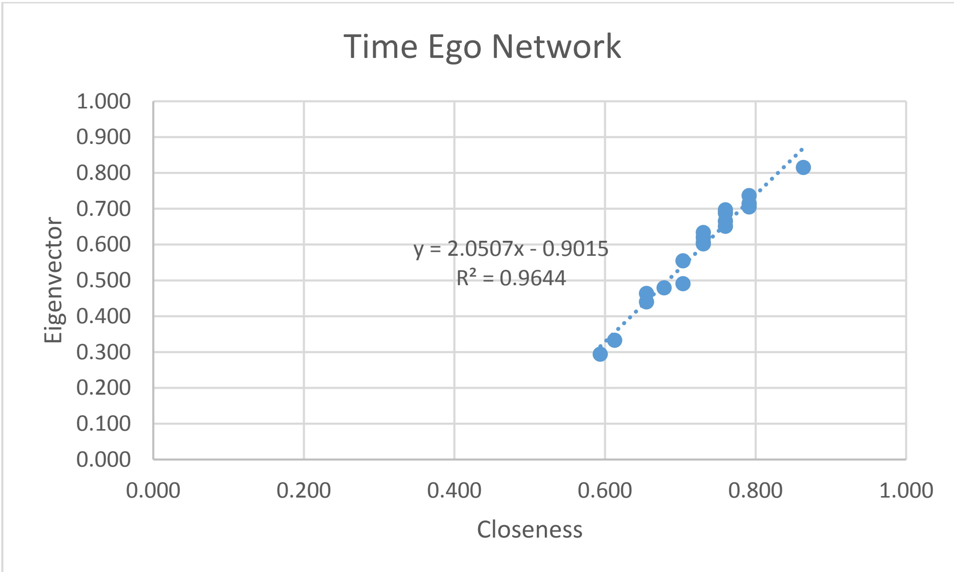


Figure 10.22: Closeness versus Eigenvector in the time ego network.

Figure 10.22 shows how closeness centrality of personality traits in the time network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.964 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and little steep. This may signify that the rate of change between these measurers is not great where changes in the closeness values of traits in the time ego network might not cause high changes in their eigenvector values.

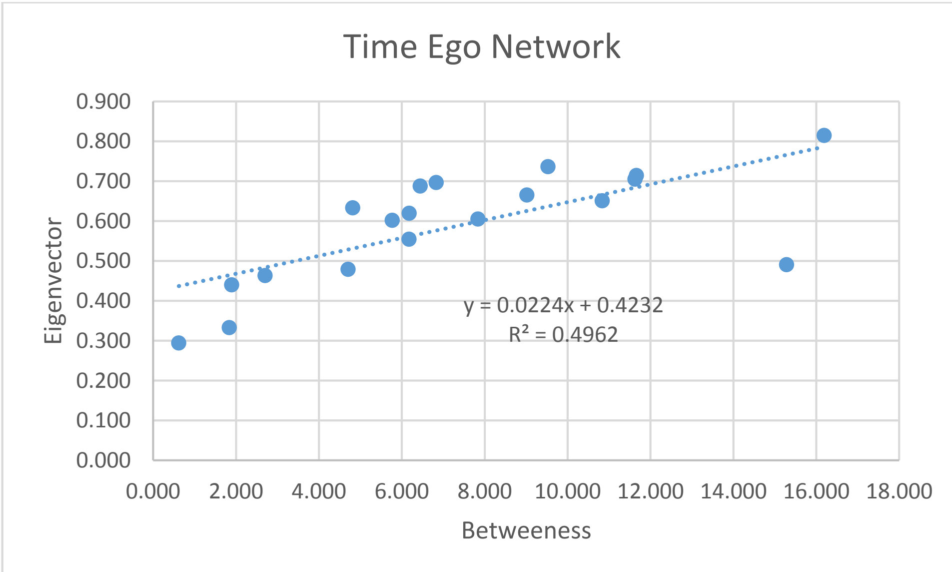


Figure 10.23: Betweeness versus eigenvector in the time ego network.

Figure 10.23 shows how betweeness centrality of personality traits in the time network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.496 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 50% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that the rate of change between these measurers is minimal where changes in the betweeness values of traits in the time ego network might not cause changes in their eigenvector values.

10.3.4 Traits influencing project managers' risky decisions related to project cost

The cost network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to cost domain than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the cost ego network shows the cost network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.24 displays the cost ego network.

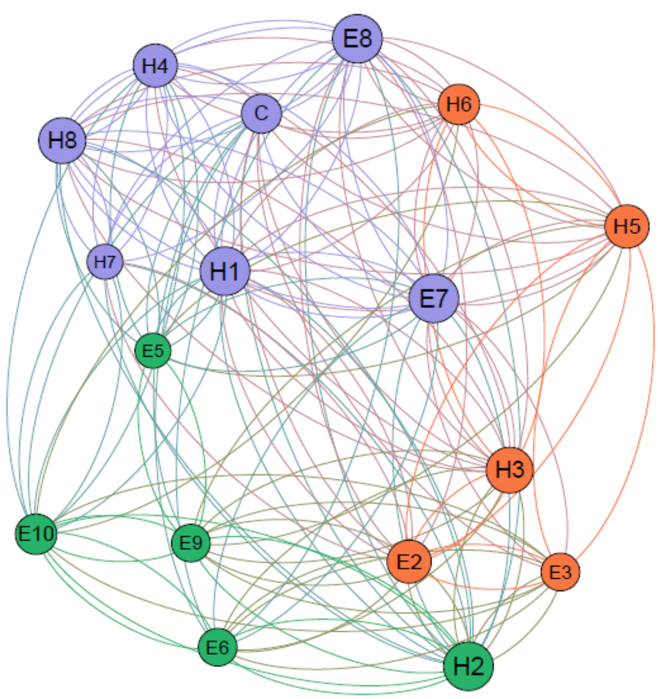


Figure 10.24: Cost ego network.

10.3.4.1 General characteristics

The topological characteristics of the cost ego network are shown in table 10.12 where it consists of 17 nodes and 156 edges. Furthermore, the average degree of the cost ego network is 18.40 while standard deviation was 3.45.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	18.353	0.681	5.882	0.594	0.580	
Standard Deviation	3.446	0.179	3.222	0.153	0.061	
Sum	312.000	11.577	100.000	10.097	9.866	
Variance	11.875	0.032	10.382	0.023	0.004	
Minimum	13.000	0.640	2.186	0.405	0.417	
Maximum	23.000	0.800	11.757	0.729	0.694	
Network Density						0.574

Table 10.12: General characteristics of the cost ego network.

10.3.4.2 Network density

The cost ego network density is high since its value is 0.574 which suggests high level of interaction among the traits variables. Additionally, the cost network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to scope (dependent variable).

10.3.4.3 Network clustering coefficient

The average clustering coefficient of the cost ego network was 0.580 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to cost. Figure 10.25 shows how clustering coefficients of cost ego network nodes vary with the nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project cost) and out-degree (which is the measure of the number of edges pointing from the cost node, which could be interpreted as the ability of cost node to influence project managers' risky decisions in other domains). The results imply the relationship between traits degree and clustering coefficients is almost a horizontal line with zero slope indicating the clustering coefficient is almost the same for traits within the cost ego network.

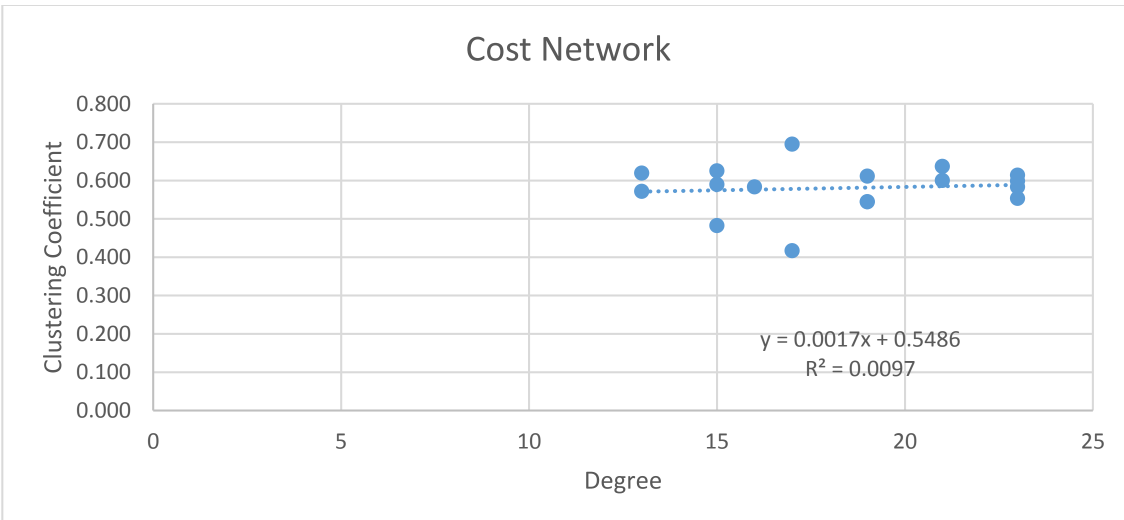


Figure 10.25: Clustering coefficients versus degree of cost network.

10.3.4.4 Network centrality measures

The cost network centrality measures the degree to which relationships within the cost network nodes are concentrated around the cost node. Table 10.13 displays these centrality measures values.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
C	Cost	16	0.000	0.000	1.000	0.583
H7	Hindsight	13	0.640	2.186	0.407	0.571
E5	Anger	13	0.640	2.233	0.405	0.619
E3	Dependence	15	0.667	3.038	0.430	0.589
E9	Vulnerability	15	0.667	5.038	0.420	0.482
E6	Depression	15	0.667	2.419	0.470	0.625
H6	Amiability	17	0.696	2.519	0.564	0.694
E10	Harm avoidance	17	0.696	8.752	0.473	0.417
H4	Modesty	19	0.727	6.000	0.588	0.611
H5	Kindness	19	0.727	7.786	0.574	0.544
E2	Anxiety	19	0.727	7.071	0.563	0.544
H8	Competitive	21	0.762	6.624	0.666	0.636
H3	Greed Avoidance	21	0.762	7.538	0.673	0.600
E8	Impulse control	23	0.800	8.376	0.728	0.614
E7	Self-consciousness	23	0.800	11.757	0.715	0.583
H1	Sincerity	23	0.800	8.410	0.729	0.598
H2	Fairness	23	0.800	10.252	0.690	0.553

Table10.13: Centrality measures of the cost network.

It can be seen from the results above; that project managers' risky decisions related to cost are influenced by 16 personality traits. Eight of these personality traits are within the honesty/humility cluster (out of a total of 8 traits) and eight traits were within the emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the cost network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to the views of the experts of in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to cost. Below are plots of all possible combinations between the centrality measures of the cost network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

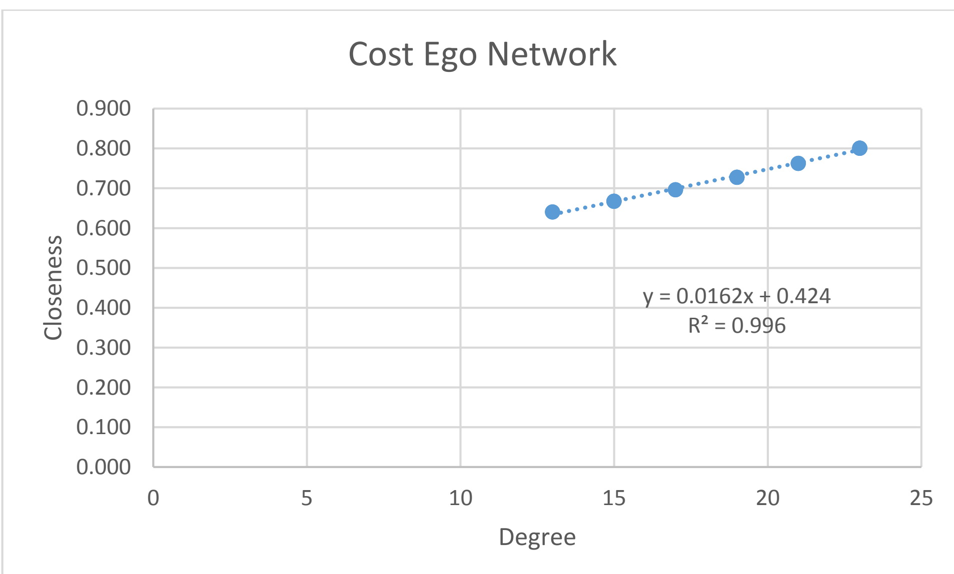


Figure 10.26: Degree versus closeness in the cost ego network.

Figure 10.26 shows how closeness centrality of personality traits in the cost network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the cost network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the cost network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.996 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that the rate of change between these measurers is minimal where changes in the degree values of traits in the cost ego network might not cause changes in their closeness values.

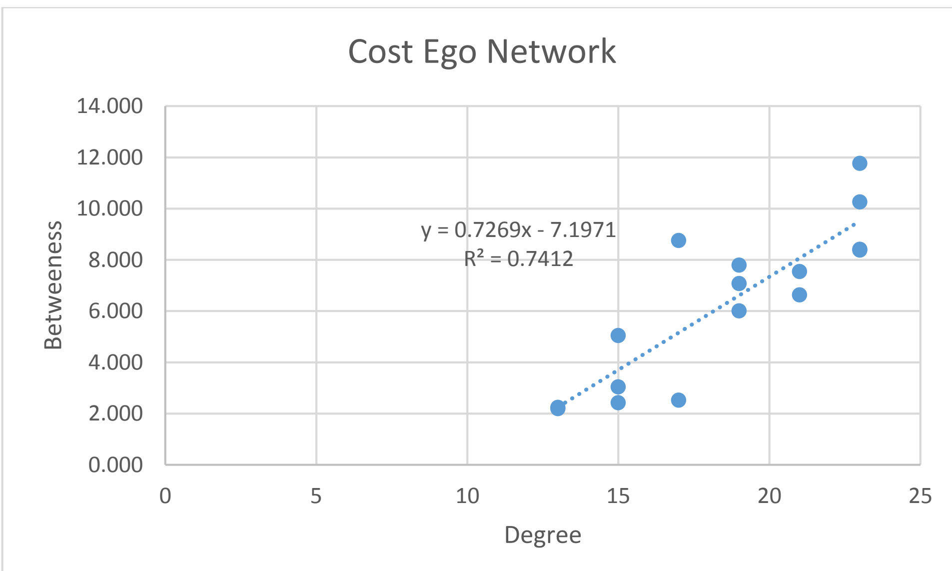


Figure 10.27: Degree versus betweeness in the cost ego network.

Figure 10.27 shows how betweeness centrality of personality traits in the cost network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the cost network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.741 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 74% of the variability of the response data around its mean. The graph indicate that the slope is positive and a little steep. This may signify that changes in the degree values of traits in the cost ego network might cause slight changes in their betweeness values.

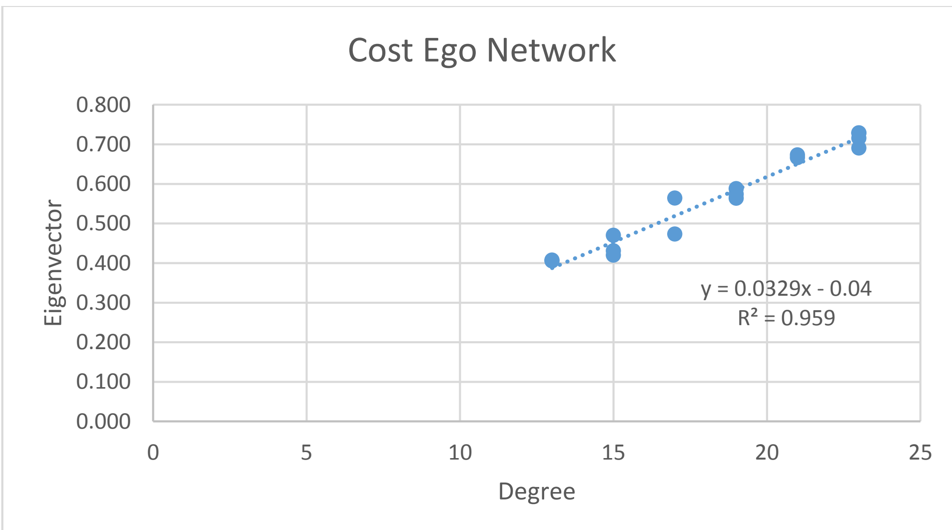


Figure 10.28: Degree versus eigenvector in the cost ego network.

Figure 10.28 shows how eigenvector centrality of personality traits in the cost network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the cost network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.959 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and a not steep. This may signify that changes in the degree values of traits in the cost ego network might not cause much changes in their eigenvector values.

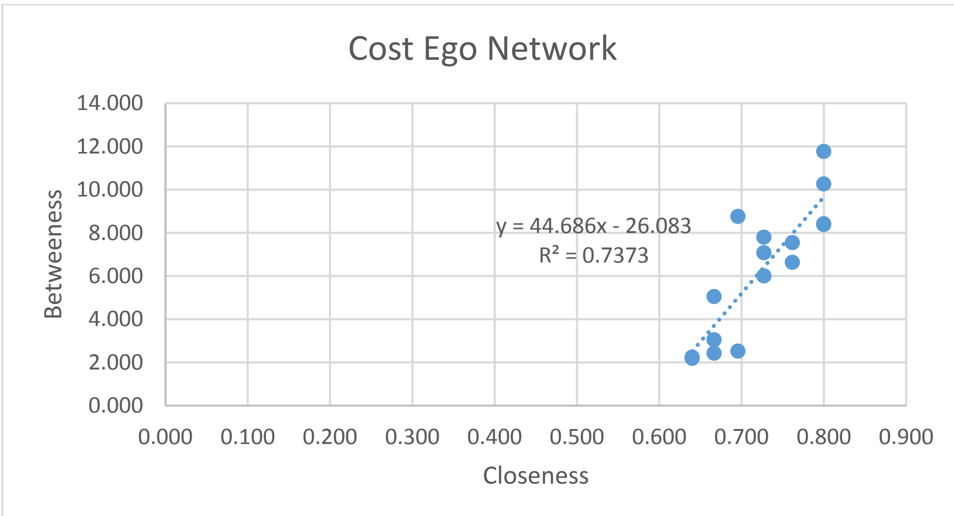


Figure 10.29: Closeness versus betweeness in the cost ego network.

Figure 10.29 shows how closeness centrality of personality traits in the cost network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.737 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 74% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the cost ego network might cause great changes in their betweeness values.

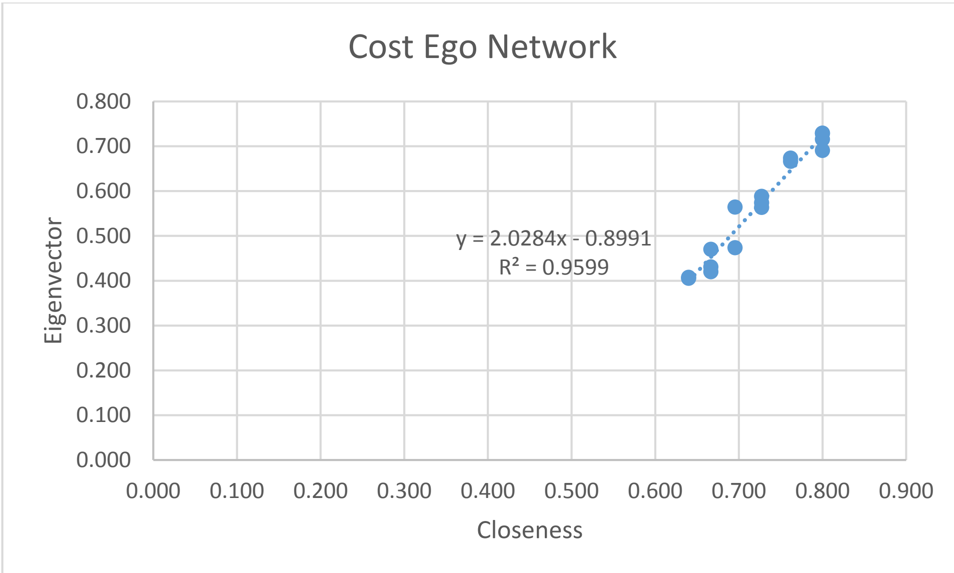


Figure 10.30: Closeness versus eigenvector in the cost ego network.

Figure 10.30 shows how closeness centrality of personality traits in the cost network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.959 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and a little steep. This may signify that changes in the closeness values of traits in the cost ego network might cause slight changes in their eigenvector values.

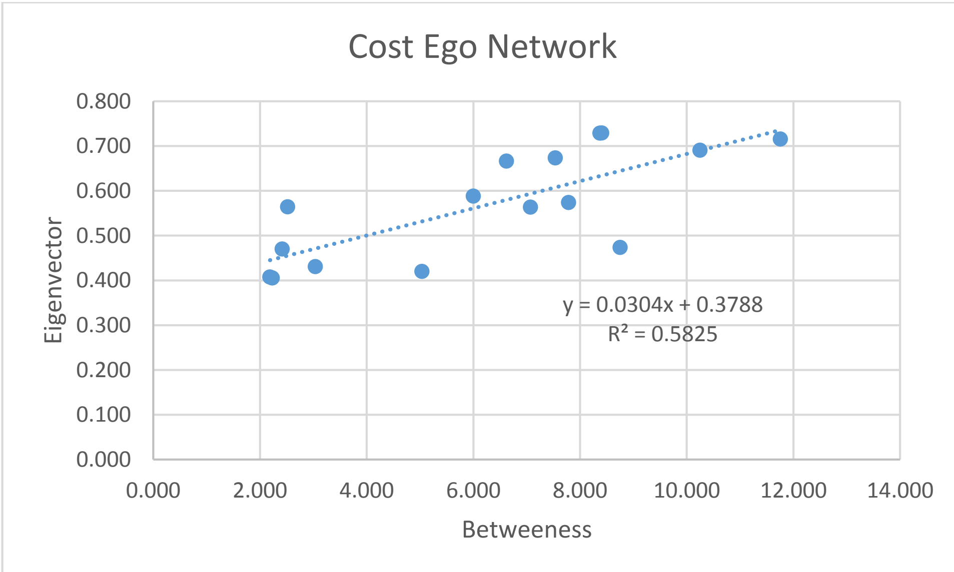


Figure 10.31: Betweeness versus eigenvector in the cost ego network.

Figure 10.31 shows how betweeness centrality of personality traits in the cost network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.582 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 58% of the variability of the response data around its mean. The graph indicate that the slope is positive and a not steep. This may signify that changes in the betweeness values of traits in the cost ego network might not cause much changes in their eigenvector values.

10.3.5 Traits influencing project managers' risky decisions related to project quality

The quality network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to quality domain than other traits. For example, the green and purple traits clusters are denser than the orange traits cluster. Moreover, the quality ego network shows the quality network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.32 displays the quality ego network.

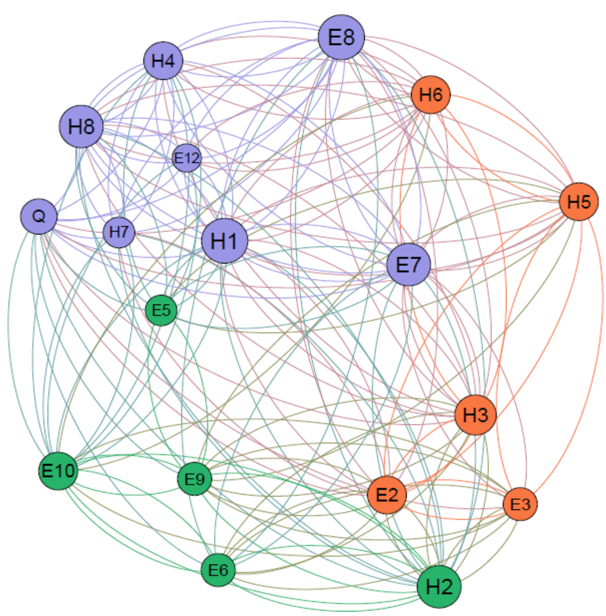


Figure 10.32: Quality ego network.

10.3.5.1 General characteristics

The topological characteristics of the quality network are shown in table 10.14 where it consists of 18 nodes and 167 edges. Furthermore, the average degree of the quality network is 18.56 while standard deviation was 4.14.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	18.556	0.669	6.778	0.572	0.574	
Standard Deviation	4.140	0.173	4.567	0.162	0.065	
Sum	334.000	12.046	122.000	10.302	10.331	
Variance	17.136	0.030	20.860	0.026	0.004	
Minimum	11.000	0.607	0.619	0.347	0.389	
Maximum	25.000	0.810	15.319	0.741	0.700	
Network Density						0.546

Table 10.14: General characteristics of the quality graph network.

10.3.5.2 Network density

The quality network density is high since its value is 0.546 which suggests high level of interaction among the traits variables. Additionally, the quality network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to quality (dependent variable).

10.3.5.3 Network clustering coefficient

The average clustering coefficient of the quality network was 0.574 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to quality. Figure 10.33 shows how clustering coefficients of quality ego network nodes are inversely related to the risk nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project quality) and out-degree (which is the measure of the number of edges pointing from the quality node, which could be interpreted as the ability of quality node to influence project managers' risk propensity in other domains). The results imply that when clustering coefficient increasers the degree decreases. Similarly when the degrees increases the clustering coefficient decreases.

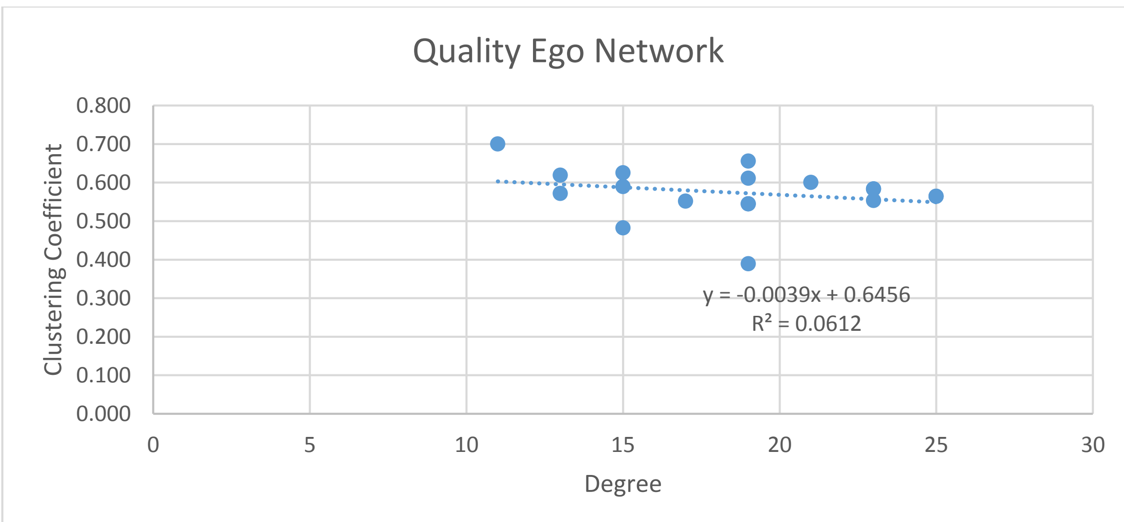


Figure 10.33: Clustering coefficients versus degree of quality ego network.

The quality network centrality measures the degree to which relationships within the quality network nodes are concentrated around the quality node. Table 10.15 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
Q	Quality	17	0.000	0.000	1.000	0.551
E12	Expected emotions	11	0.607	0.619	0.347	0.700
H7	Hindsight	13	0.630	2.071	0.396	0.571
E5	Anger	13	0.630	2.233	0.391	0.619
E3	Dependence	15	0.654	3.038	0.408	0.589
E9	Vulnerability	15	0.654	5.038	0.399	0.482
E6	Depression	15	0.654	2.371	0.450	0.625
H4	Modesty	19	0.708	5.886	0.575	0.611
H5	Kindness	19	0.708	7.786	0.556	0.544
H6	Amiability	19	0.708	4.305	0.586	0.656
E10	Harm avoidance	19	0.708	15.319	0.492	0.389
E2	Anxiety	19	0.708	7.071	0.538	0.544
H3	Greed Avoidance	21	0.739	7.538	0.650	0.600
H8	Competitive	23	0.773	10.690	0.679	0.583
E7	Self-consciousness	23	0.773	11.757	0.691	0.583
H2	Fairness	23	0.773	10.138	0.665	0.553
E8	Impulse control	25	0.810	13.443	0.738	0.564
H1	Sincerity	25	0.810	12.695	0.741	0.564

Table 10.15: Centrality measures of the quality ego network.

It can be seen from the results above; that project managers' risky decisions related to quality are influenced by 17 personality traits. Eight of these personality traits are within the honesty/humility cluster (out of a total of 8 traits) and nine traits were within the emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the quality network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to the views of the experts of in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to quality. Below are plots of all possible combinations between the centrality measures of the quality network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

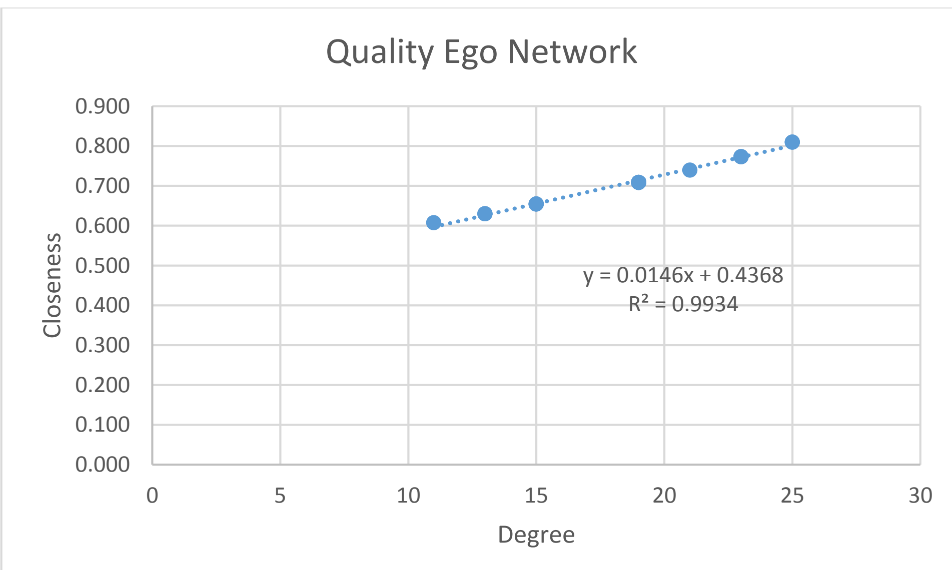


Figure 10.34: Degree versus closeness in the quality ego network.

Figure 10.34 shows how closeness centrality of personality traits in the quality ego network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the quality network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the quality network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.993 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and a not steep. This may signify that changes in the degree values of traits in the quality ego network might not cause much changes in their closeness values.

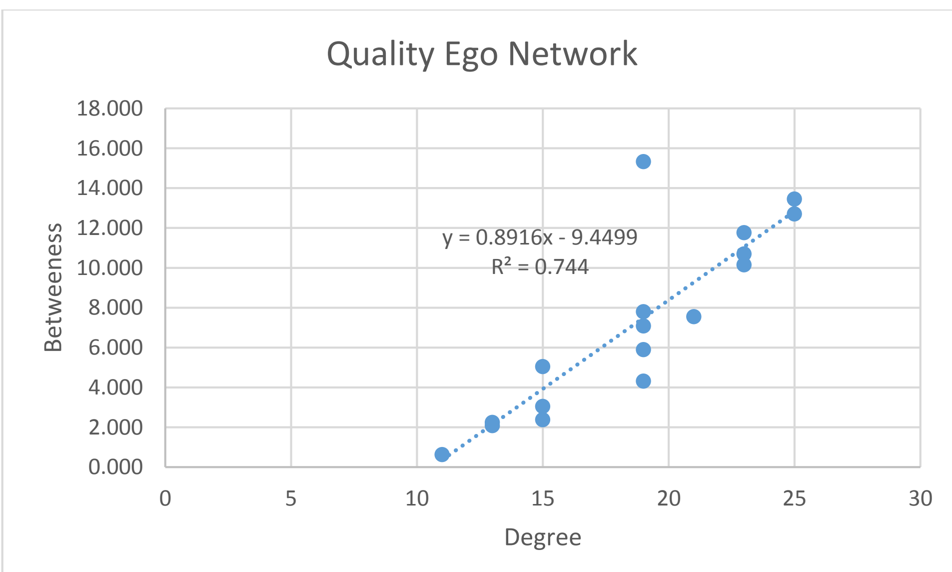


Figure 10.35: Degree versus betweeness in the quality ego network.

Figure 10.35 shows how betweeness centrality of personality traits in the quality network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the quality network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.744 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 74% of the variability of the response data around its mean. The graph indicate that the slope is positive and a little steep. This may signify that changes in the degree values of traits in the quality ego network might cause some changes in their betweeness values.

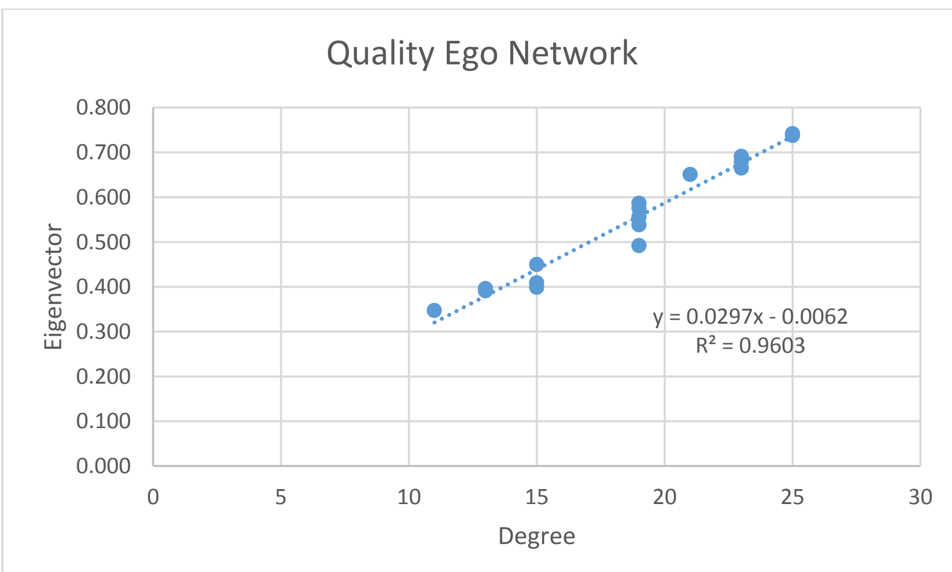


Figure 10.36: Degree versus eigenvector in the quality ego network.

Figure 10.36 shows how eigenvector centrality of personality traits in the quality network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the quality network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.96 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the quality ego network might not cause changes in their eigenvector values.

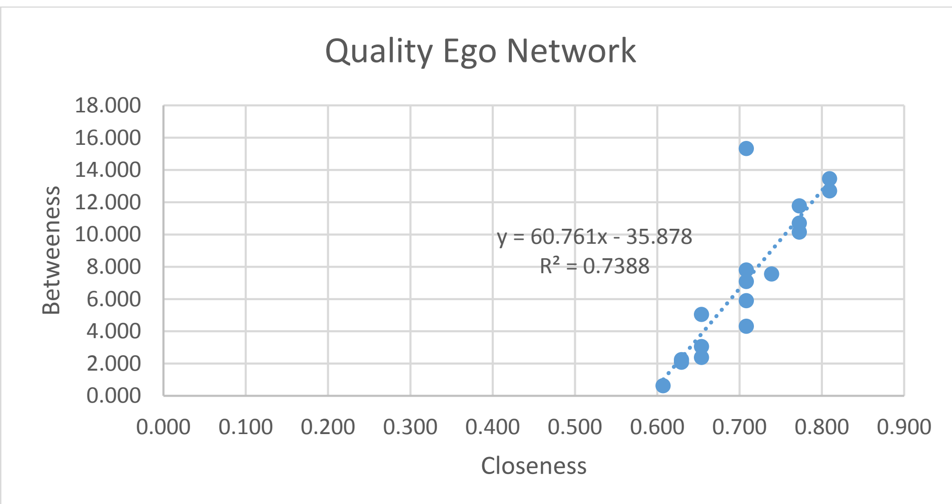


Figure 10.37: Closeness versus betweeness in the quality ego network.

Figure 10.37 shows how closeness centrality of personality traits in the quality network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.738 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 74% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the quality ego network might cause very great changes in their betweeness values.

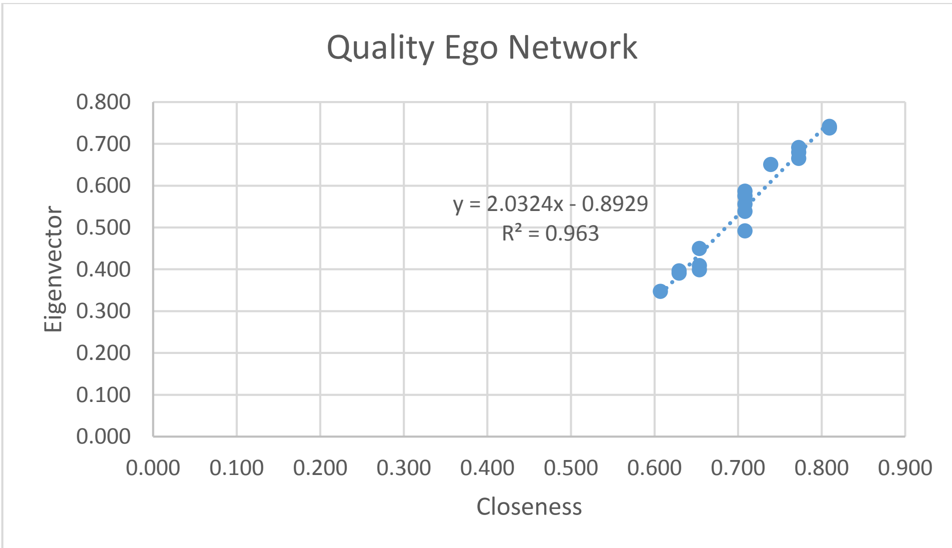


Figure 10.38: Closeness versus eigenvector in the quality ego network.

Figure 10.38 shows how closeness centrality of personality traits in the quality network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.963 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and a little steep. This may signify that changes in the closeness values of traits in the quality ego network might cause some changes in their eigenvector values.

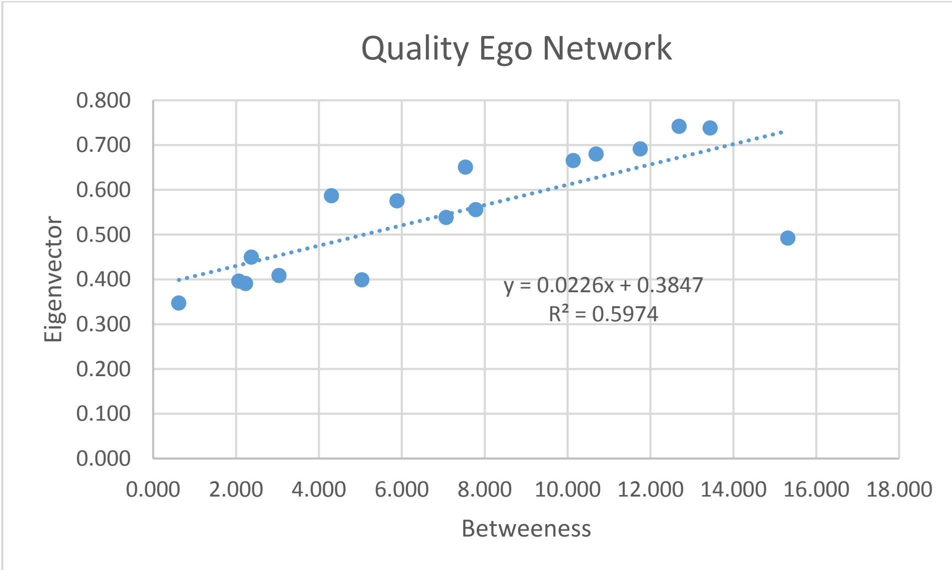


Figure 10.39: Betweeness versus eigenvector in the quality ego network.

Figure 10.39 shows how betweeness centrality of personality traits in the quality network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.597 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 58% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the betweeness values of traits in the quality ego network might not cause little changes in their eigenvector values.

10.3.6 Traits influencing project managers' risky decisions related to project risks

The risk ego network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to risk domain than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the risk ego network shows the risk network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.40 displays the risk ego network.

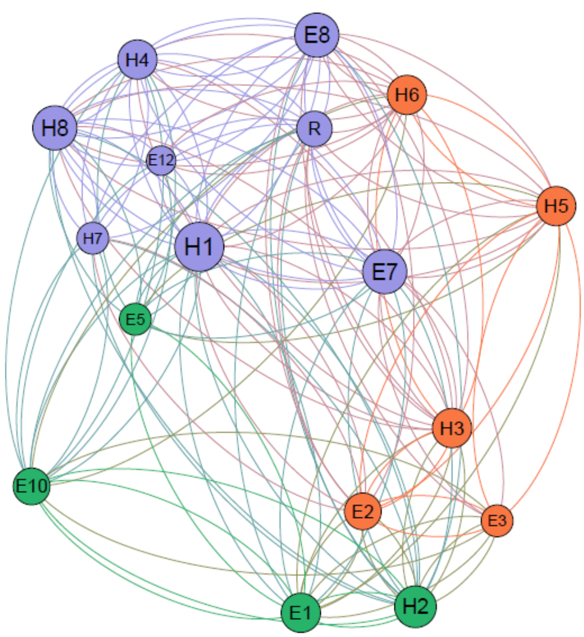


Figure 10.40: Risk ego network.

10.3.6.1 General characteristics

The topological characteristics of the risk ego network are shown in table 10.16 where it consists of 17 nodes and 156 edges. Furthermore, the average degree of the risk network is 18.35 while standard deviation was 4.18.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	18.353	0.683	5.882	0.602	0.605	
Standard Deviation	4.186	0.184	4.067	0.163	0.059	
Sum	312.000	11.614	100.000	10.227	10.281	
Variance	17.522	0.034	16.544	0.027	0.004	
Minimum	11.000	0.615	0.667	0.362	0.444	
Maximum	27.000	0.889	15.343	0.825	0.714	
Network Density						0.574

Table 10.16: General characteristics of the risk ego network.

10.3.6.2 Network density

The risk network density is high since its value is 0.574 which suggests high level of interaction among the traits variables. Additionally, the risk network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to risk (dependent variable).

10.3.6.3 Network clustering coefficient

The average clustering coefficient of the risk network was 0.605 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to risk. Figure 10.41 shows how clustering coefficients of risk ego network nodes are inversely related to the risk nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project risk) and out-degree (which is the measure of the number of edges pointing from the risk node, which could be interpreted as the ability of risk node to influence project managers' risk propensity in other domains). The results imply that when clustering coefficient increasers the degree decreases. Similarly when the degrees increases the clustering coefficient decreases.

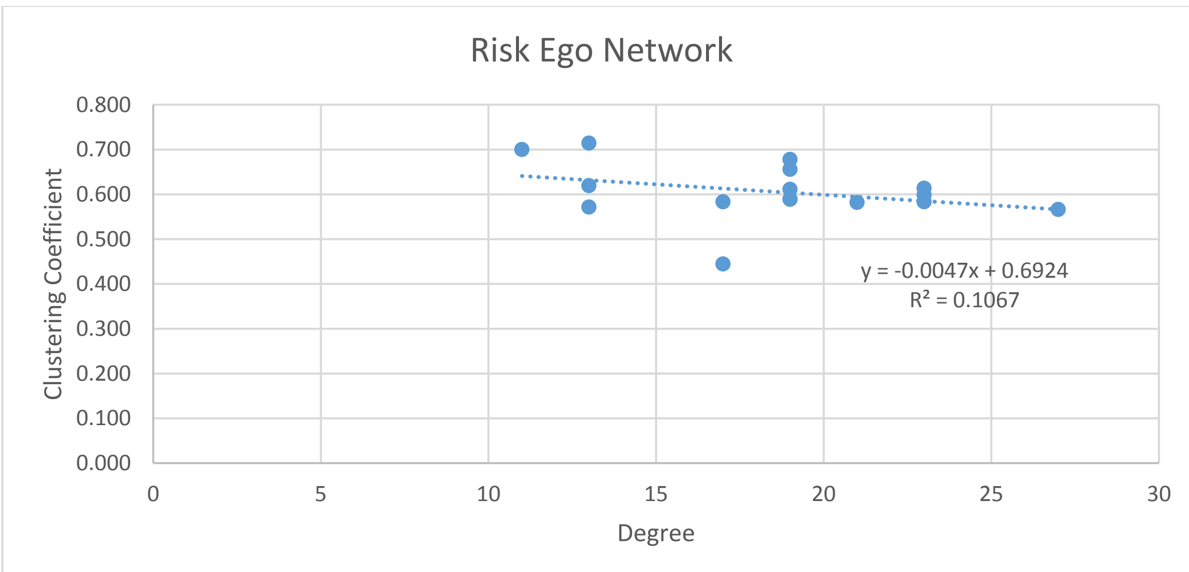


Figure 10.41: Clustering coefficients versus degree of risk ego network.

The risk ego network centrality measures the degree to which relationships within the risk network nodes are concentrated around the risk node. Table 10.17 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
R	Risk	16	0.000	0.000	1.000	0.583
E12	Expected emotions	11	0.615	0.667	0.362	0.700
H7	Hindsight	13	0.640	2.186	0.398	0.571
E5	Anger	13	0.640	1.067	0.436	0.714
E3	Dependence	13	0.640	1.805	0.384	0.619
E10	Harm avoidance	17	0.696	10.152	0.477	0.444
E2	Anxiety	17	0.696	4.971	0.518	0.583
H4	Modesty	19	0.727	6.000	0.600	0.611
H5	Kindness	19	0.727	6.486	0.596	0.589
H3	Greed Avoidance	19	0.727	3.705	0.642	0.678
H6	Amiability	19	0.727	4.419	0.612	0.656
E1	Fearfulness	19	0.727	6.224	0.570	0.589
H2	Fairness	21	0.762	7.652	0.647	0.582
E8	Impulse control	23	0.800	9.610	0.719	0.598
H8	Competitive	23	0.800	10.690	0.711	0.583
E7	Self-consciousness	23	0.800	9.024	0.730	0.614
H1	Sincerity	27	0.889	15.343	0.825	0.566

Table 10.17: Centrality measures of the risk ego network.

It can be seen from the results above; that project managers' risky decisions related to risk are influenced by 16 personality traits. Eight of these personality traits belongs to the honesty/humility cluster (out of a total of 8 traits) and eight traits belongs to the emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the risk network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to the views of the experts of in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to risk. Below are plots of all possible combinations between the centrality measures of the risk network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

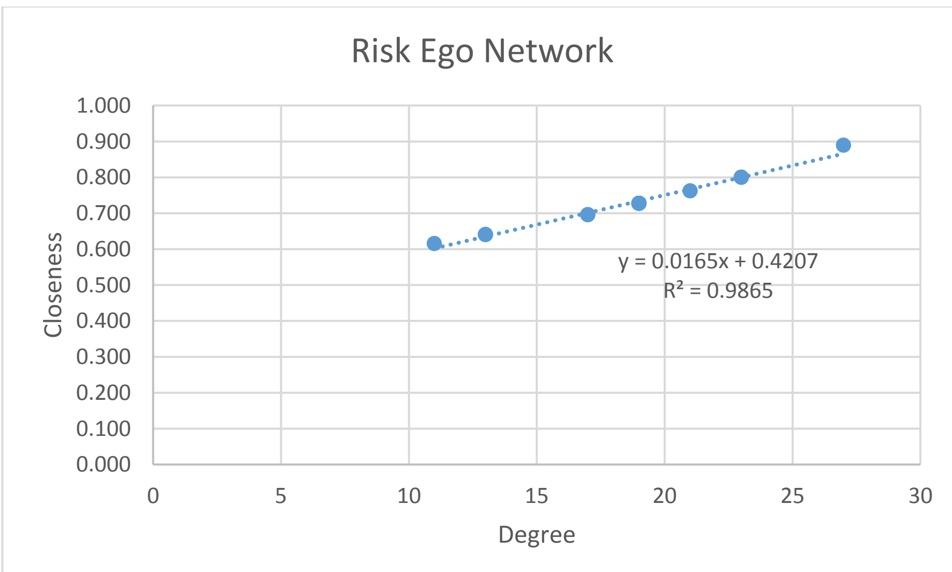


Figure 10.42: Degree versus closeness in the risk ego network.

Figure 10.42 shows how closeness centrality of personality traits in the risk network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the risk network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the risk network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.986 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 97% of the variability of the response data around its mean. The graph indicate that the slope is positive and a little steep. This may signify that changes in the degree values of traits in the risk ego network might cause little changes in their closeness values.

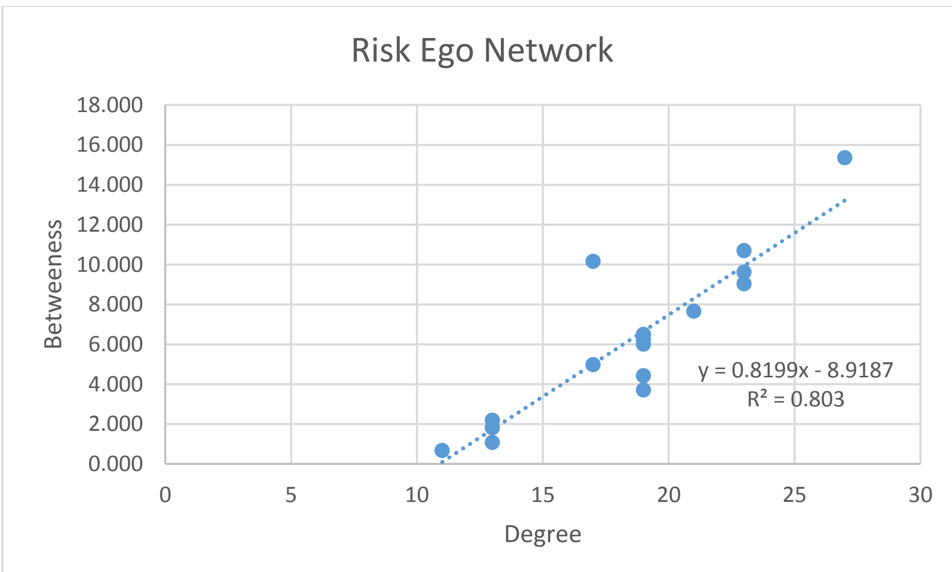


Figure 10.43: Degree versus betweeness in the risk ego network.

Figure 10.43 shows how betweeness centrality of personality traits in the risk network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the risk network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.803 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 80% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the degree values of traits in the risk ego network might cause very great changes in their betweeness values.

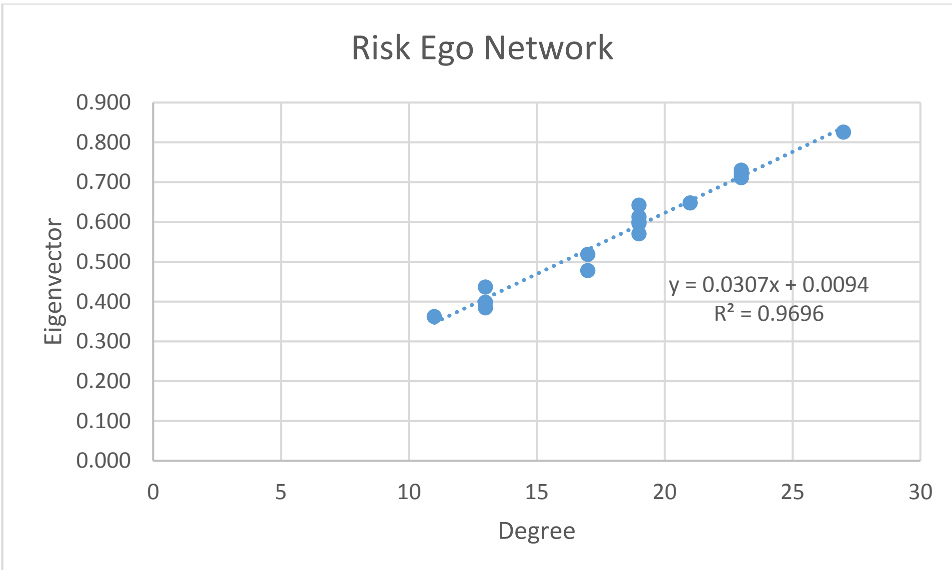


Figure 10.44: Degree versus eigenvector in the risk ego network.

Figure 10.44 shows how eigenvector centrality of personality traits in the risk network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the risk network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.969 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 97% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the risk ego network might not cause much changes in their eigenvector values.

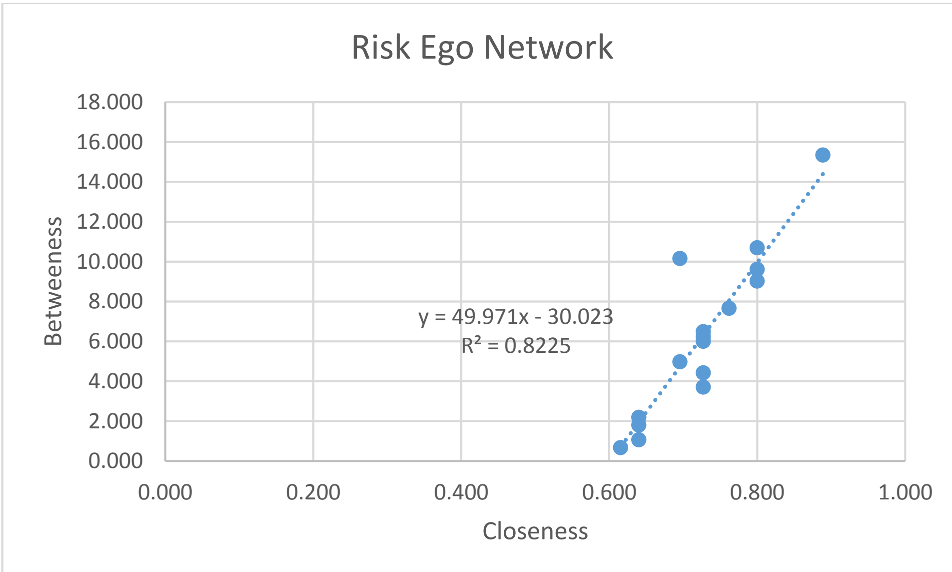


Figure 10.45: Closeness versus betweeness in the risk ego network.

Figure 10.45 shows how closeness centrality of personality traits in the risk network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.822 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 82% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the risk ego network might cause very great changes in their betweeness values.

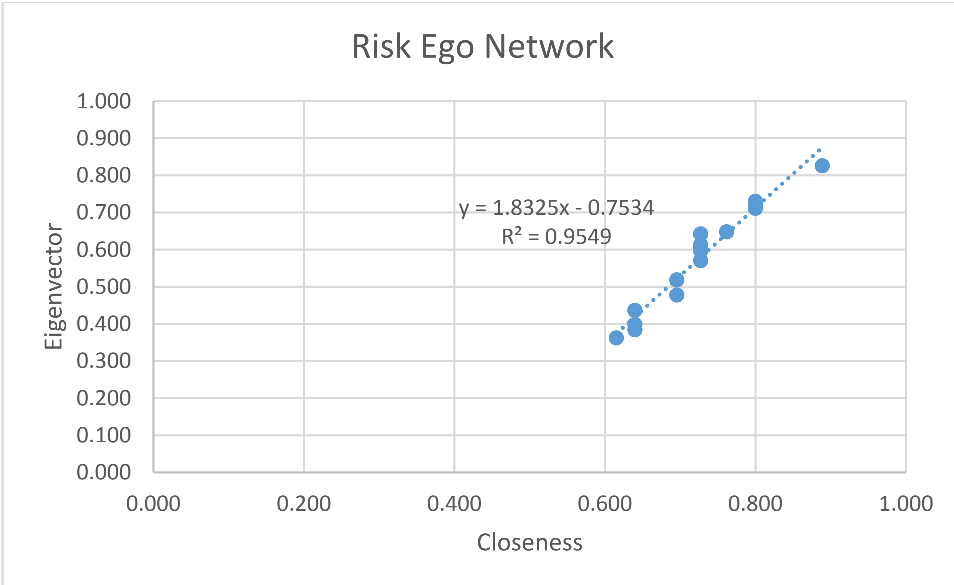


Figure 10.46: Closeness versus eigenvector in the risk ego network.

Figure 10.46 shows how closeness centrality of personality traits in the risk network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.954 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 95% of the variability of the response data around its mean. The graph indicate that the slope is positive and steep. This may signify that changes in the closeness values of traits in the risk ego network might cause changes in their eigenvector values.

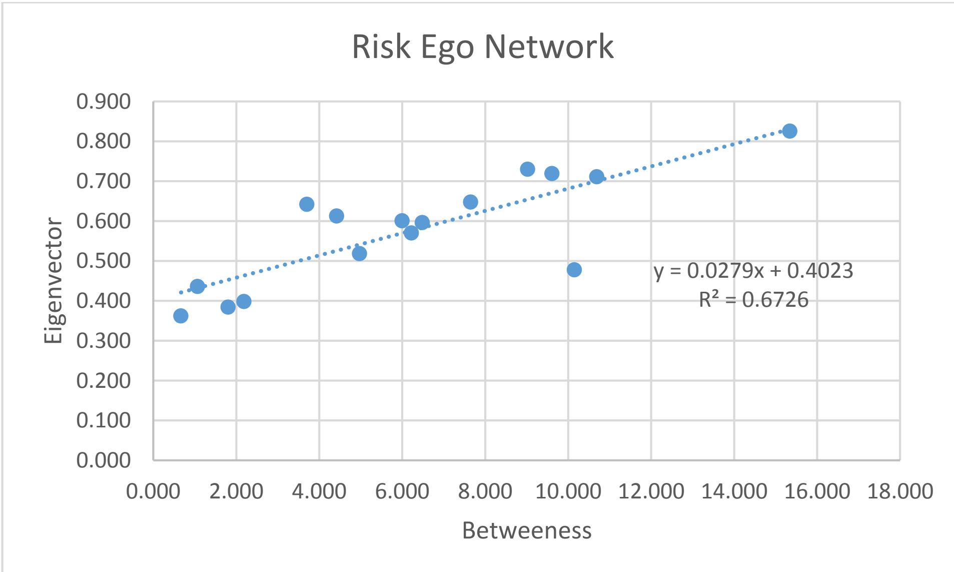


Figure 10.47: Betweeness versus eigenvector in the risk ego network.

Figure 10.47 shows how betweeness centrality of personality traits in the risk network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.673 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 67% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the betweeness values of traits in the risk ego network might cause little changes in their eigenvector values.

10.3.7 Traits influencing project managers' risky decisions related to project resources

The resources network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to resources domain than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the resources graph network shows the resources network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.48 displays the resources ego network.

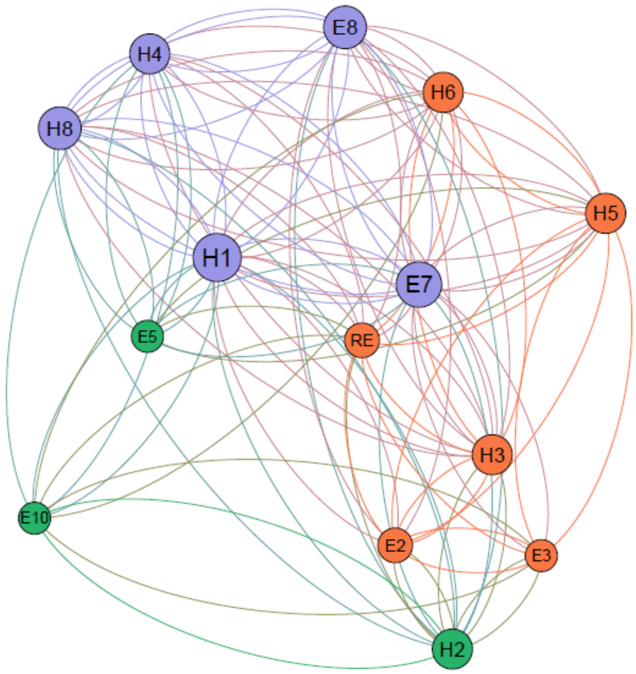


Figure 10.48: Resources ego network.

10.3.7.1 General characteristics

The topological characteristics of the resources ego network are shown in table 10.18 where it consists of 14 nodes and 113 edges. Furthermore, the average degree of the resources network is 16.14 while standard deviation is 3.68.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	16.143	0.706	4.000	0.652	0.635	
Standard Deviation	3.681	0.211	2.848	0.175	0.076	
Sum	226.000	9.878	56.000	9.124	8.893	
Variance	13.551	0.045	8.112	0.030	0.006	
Minimum	11.000	0.650	0.333	0.361	0.500	
Maximum	23.000	0.929	10.767	0.850	0.767	
Network Density						0.621

Table 10.18: General characteristics of the resources ego network.

10.3.7.2 Network density

The resources network density is high since its value is 0.621 which suggests high level of interaction among the traits variables. Additionally, the resources network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to resources domain (dependent variable).

10.3.7.3 Network clustering coefficient

The average clustering coefficient of the resources network was 0.635 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to resources. Figure 10.49 shows how clustering coefficients of resources ego network nodes vary with the nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related project resources) and out-degree (which is the measure of the number of edges pointing from the resources node, which could be interpreted as the ability of resources node to influence project managers' risk propensity in other domains). The results imply that changes in clustering coefficient do not cause much changes in degrees values.

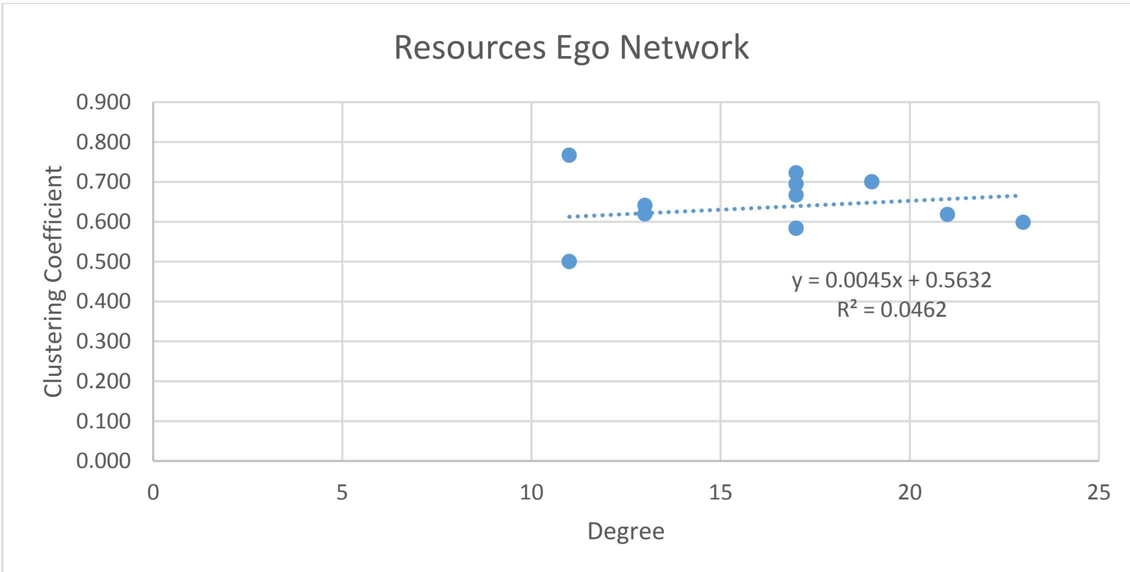


Figure 10.49: Clustering coefficients versus degree of resources ego network.

The resources network centrality measures the degree to which relationships within the resources network nodes are concentrated around the resources node. Table 10.19 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
RE	Resources	13	0.000	0.000	1.000	0.641
E5	Anger	11	0.650	0.333	0.453	0.767
E3	Dependence	11	0.650	2.400	0.361	0.500
E10	Harm avoidance	11	0.650	2.733	0.391	0.500
E2	Anxiety	13	0.684	2.233	0.482	0.619
H4	Modesty	17	0.765	4.200	0.659	0.667
H5	Kindness	17	0.765	6.267	0.631	0.583
H3	Greed Avoidance	17	0.765	2.567	0.688	0.722
H6	Amiability	17	0.765	3.233	0.679	0.694
H2	Fairness	17	0.765	5.533	0.625	0.583
E8	Impulse control	19	0.813	3.567	0.757	0.700
H8	Competitive	19	0.813	3.633	0.754	0.700
E7	Self-consciousness	21	0.867	8.533	0.794	0.618
H1	Sincerity	23	0.929	10.767	0.850	0.598

Table 10.19: Centrality measures of the resources ego network.

It can be seen from the results above; that project managers' risky decisions related to resources are influenced by 13 personality traits. Seven of these personality traits belongs to honesty/humility cluster (out of a total of 8 traits) and six traits belongs to emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the resources network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued according to the experts' opinions in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to project resources. Below are plots of all possible combinations between the centrality measures of the resource network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

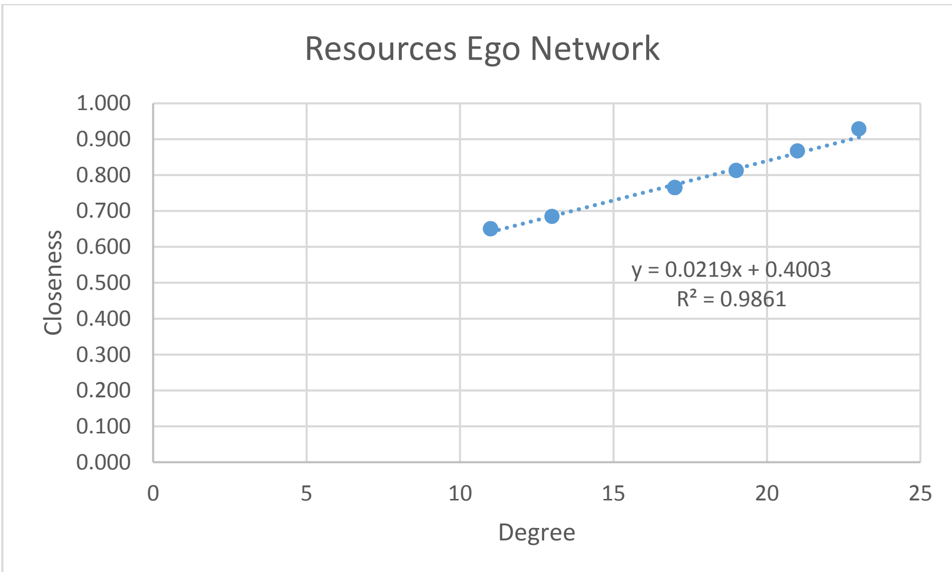


Figure 10.50: Degree versus closeness in the resources ego network.

Figure 10.50 shows how closeness centrality of personality traits in the resources network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the resources network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the resources network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.986 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 97% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the resources ego network might cause little changes in their closeness values.

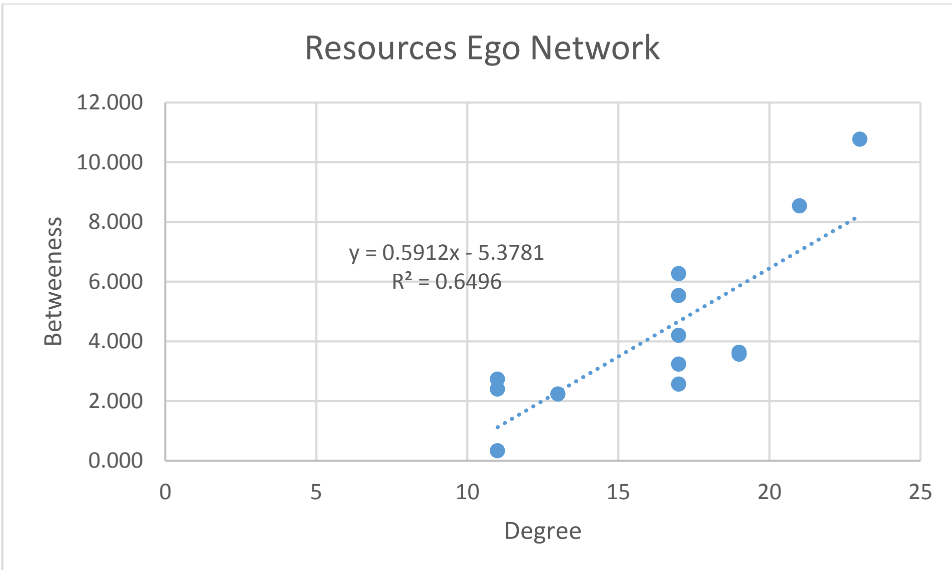


Figure 10.51: Degree versus betweeness in the resources ego network.

Figure 10.51 shows how betweeness centrality of personality traits in the resources network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the resources network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.649 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 65% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the degree values of traits in the resources ego network might cause great changes in their betweeness values.

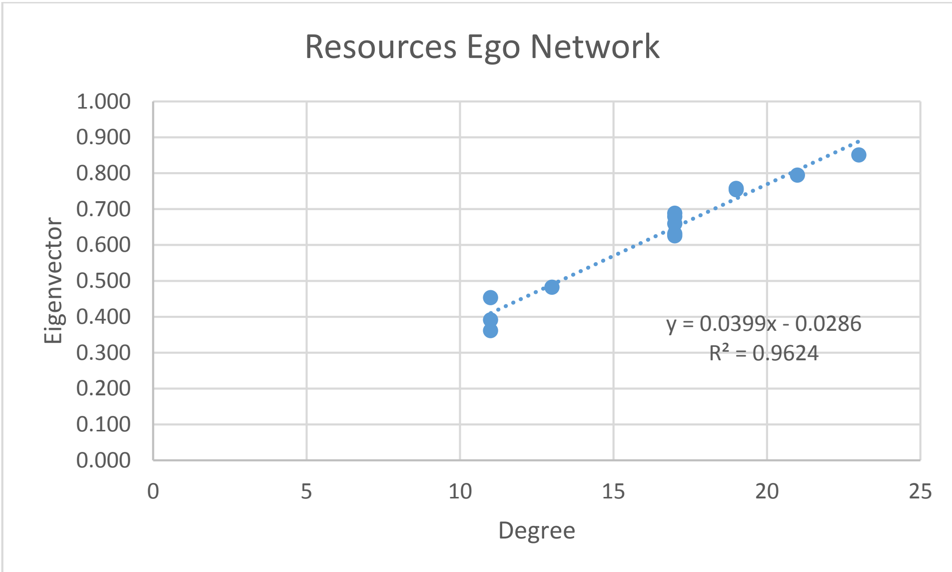


Figure 10.52: Degree versus eigenvector in the resources ego network.

Figure 10.52 shows how eigenvector centrality of personality traits in the resources network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the resources network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.962 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the resources ego network might cause very little changes in their eigenvector values.

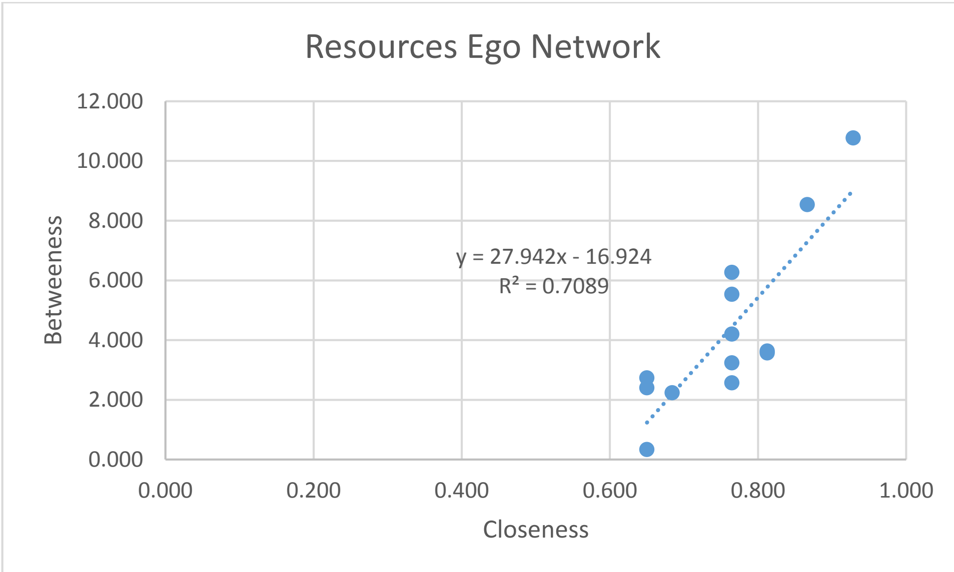


Figure 10.53: Closeness versus betweeness in the resources ego network.

Figure 10.53 shows how closeness centrality of personality traits in the resources network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.709 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 71% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the resources ego network might cause great changes in their betweeness values.

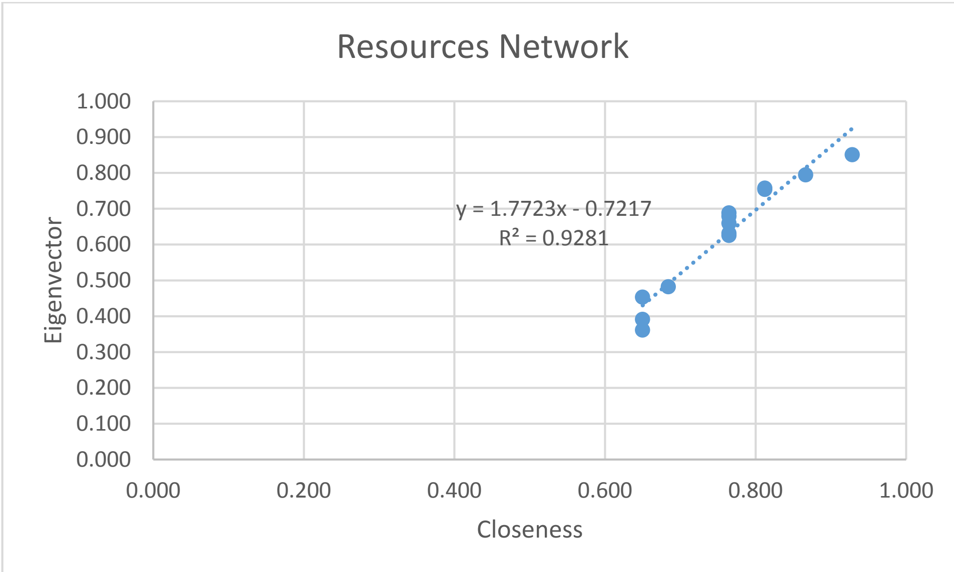


Figure 10.54: Closeness versus eigenvector in the resources network.

Figure 10.54 shows how closeness centrality of personality traits in the resources network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.928 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 93% of the variability of the response data around its mean. The graph indicate that the slope is positive and little steep. This may signify that changes in the degree values of traits in the resources ego network might cause little changes in their betweeness values.

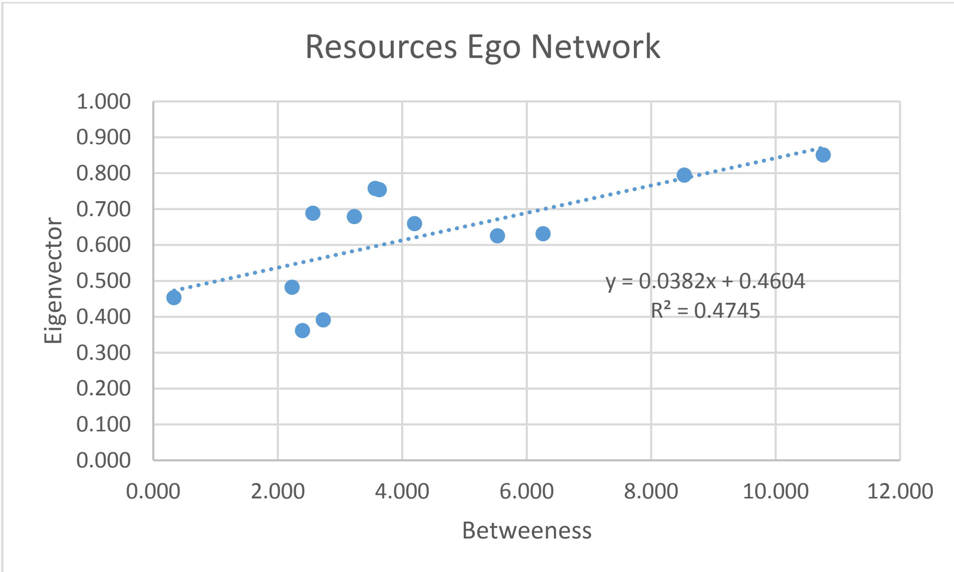


Figure 10.55: Betweeness versus eigenvector in the resources ego network.

Figure 10.55 shows how betweeness centrality of personality traits in the resources network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.475 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 48% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the resources ego network traits might cause very little changes in their betweeness values.

10.3.8 Traits influencing project managers' risky decisions related to stakeholders' satisfaction

The stakeholder satisfaction network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risky decisions related to stakeholder satisfaction than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the stakeholder satisfaction description graph network shows the stakeholder satisfaction description network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.56 displays the stakeholder satisfaction ego network.

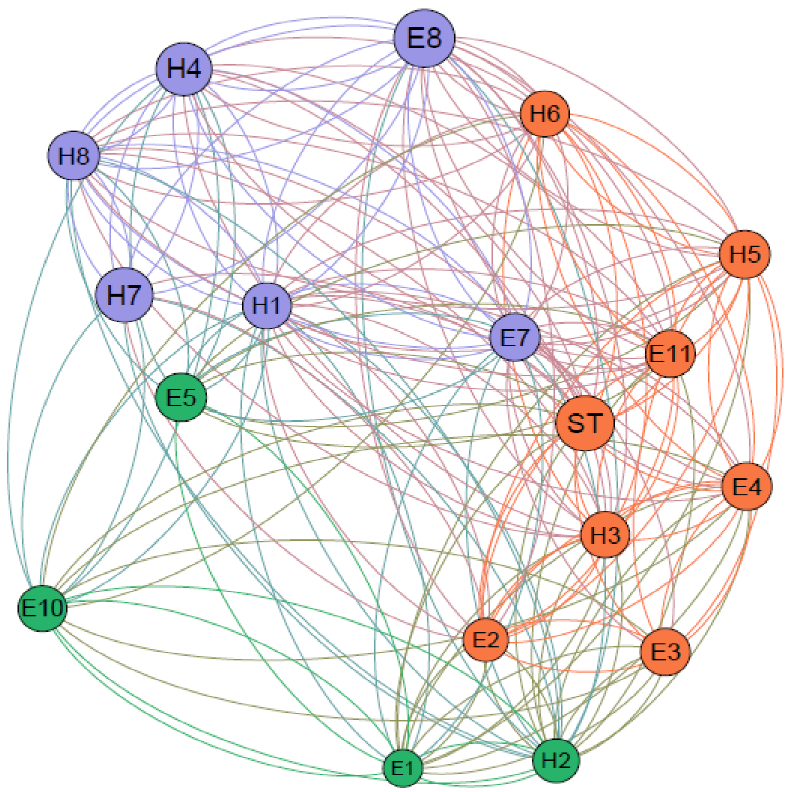


Figure 10.56: Stakeholder satisfaction ego network.

10.3.8.1 General characteristics

The topological characteristics of the stakeholder satisfaction network are shown in table 10.20 where it consists of 18 nodes and 191 edges. Furthermore, the average degree of the stakeholder satisfaction network is 21.22 while standard deviation is 4.21.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	21.222	0.711	5.444	0.648	0.651	
Standard Deviation	4.211	0.185	2.952	0.153	0.050	
Sum	382.000	12.801	98.000	11.662	11.717	
Variance	17.728	0.034	8.715	0.024	0.003	
Minimum	13.000	0.630	1.305	0.356	0.528	
Maximum	29.000	0.895	10.631	0.847	0.732	
Network Density						0.624

Table 10.20: General characteristics of the stakeholder satisfaction ego network.

10.3.8.2 Network density

The stakeholder satisfaction network density is very high since its value is 0.624 which suggests very high level of interaction among the traits variables. Additionally, the stakeholder satisfaction network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risky decisions related to stakeholders' satisfaction (dependent variable).

10.3.8.3 Network clustering coefficient

The average clustering coefficient of the stakeholder satisfaction network was 0.651 where it measures the degree to which personality traits interact with each other and influence project managers' risky decisions related to stakeholder satisfaction. Figure. 10.57 shows how clustering coefficients of stakeholders satisfaction ego network nodes vary with the nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risky decisions related to stakeholder satisfaction) and out-degree (which is the measure of the number of edges pointing from the stakeholder satisfaction node, which could be interpreted as the ability of stakeholder satisfaction node to influence project managers' risk propensity in other domains). The results imply that increases in stakeholder satisfaction degree values do not cause much changes in clustering coefficients.

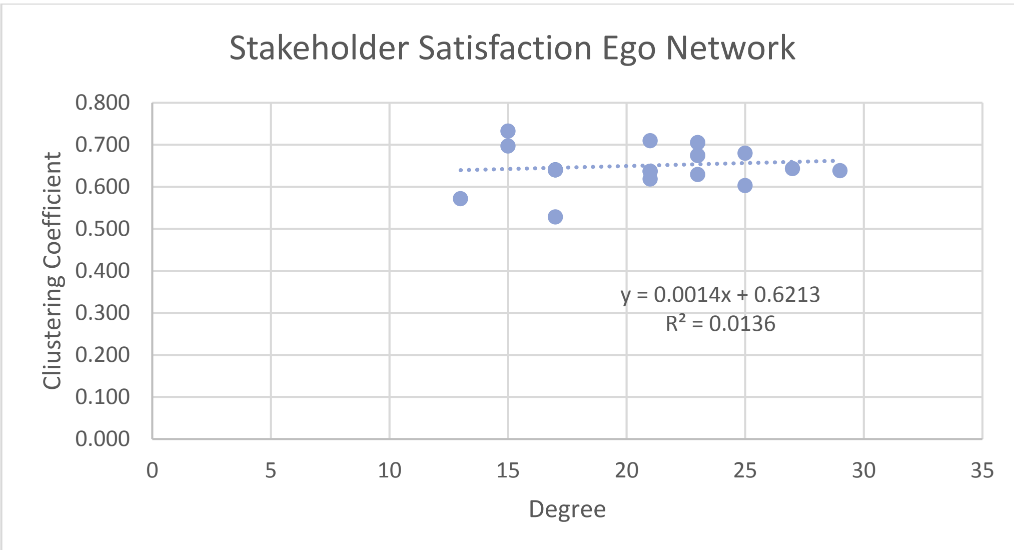


Figure 10.57: Clustering coefficients versus degree of stakeholder satisfaction ego network.

The stakeholder satisfaction network centrality measures the degree to which relationships within the stakeholder satisfaction network nodes are concentrated around the stakeholder satisfaction node. Table 10.21 displays the values these centrality measures.

Label	Trait	Degree	Closeness	Betweeness	Eigenvector	Clustering coefficient
ST	Stakeholder Satisfaction	17	0.000	0.000	1.000	0.640
H7	Hindsight	13	0.630	2.002	0.356	0.571
E3	Dependence	15	0.654	1.463	0.423	0.696
E5	Anger	15	0.654	1.305	0.457	0.732
E10	Harm avoidance	17	0.680	6.019	0.455	0.528
H4	Modesty	21	0.739	6.652	0.598	0.636
H6	Amiability	21	0.739	3.629	0.643	0.709
E2	Anxiety	21	0.739	6.485	0.603	0.618
E1	Fearfulness	21	0.739	5.771	0.595	0.636
H8	Competitive	23	0.773	6.430	0.677	0.674
H5	Kindness	23	0.773	7.301	0.671	0.629
E4	Sentimentality	23	0.773	5.140	0.675	0.674
E11	Cognitive dissonance	23	0.773	4.371	0.698	0.705
H3	Greed Avoidance	23	0.773	4.248	0.711	0.705
E8	Competitive	25	0.810	6.640	0.748	0.679
H2	Fairness	25	0.810	9.853	0.711	0.603
E7	Self-consciousness	27	0.850	10.056	0.792	0.643
H1	Sincerity	29	0.895	10.631	0.847	0.638

Table 10.21: Centrality measures of the stakeholder satisfaction network.

It can be seen from the results above; that project managers' risky decisions related to stakeholder satisfaction is influenced by 17 personality traits. Eight of these personality traits belong to honesty/humility cluster (out of a total of 8 traits) and nine traits belong to emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the resources network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to experts opinions that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to stakeholder satisfaction. Below are plots of all possible combinations between the centrality measures of the stakeholder satisfaction network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

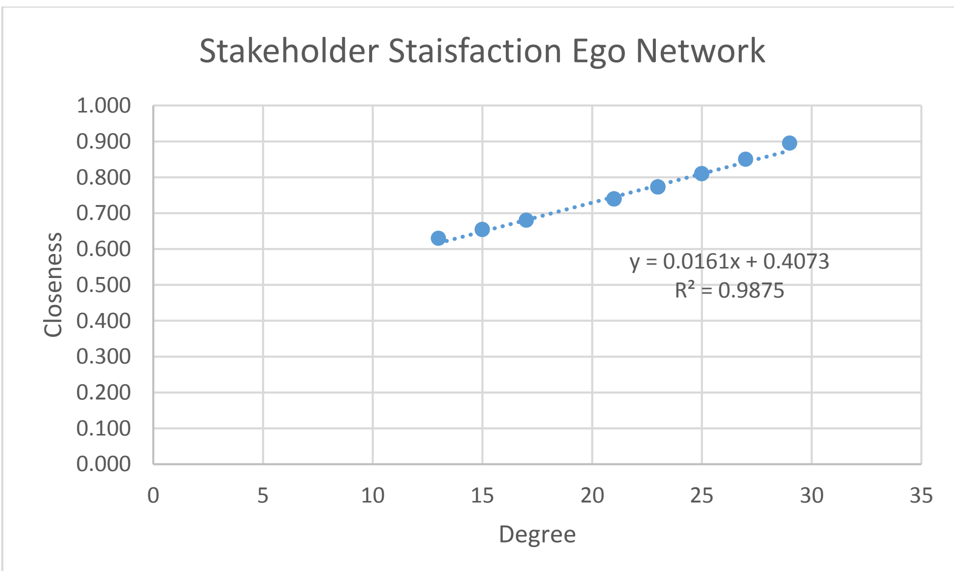


Figure 10.58: Degree versus closeness in the stakeholder satisfaction ego network.

Figure 10.58 shows how closeness centrality of personality traits in the stakeholder satisfaction network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the stakeholder satisfaction network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the stakeholder satisfaction network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.988 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 99% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the stakeholder satisfaction ego network might cause very little changes in their closeness values.

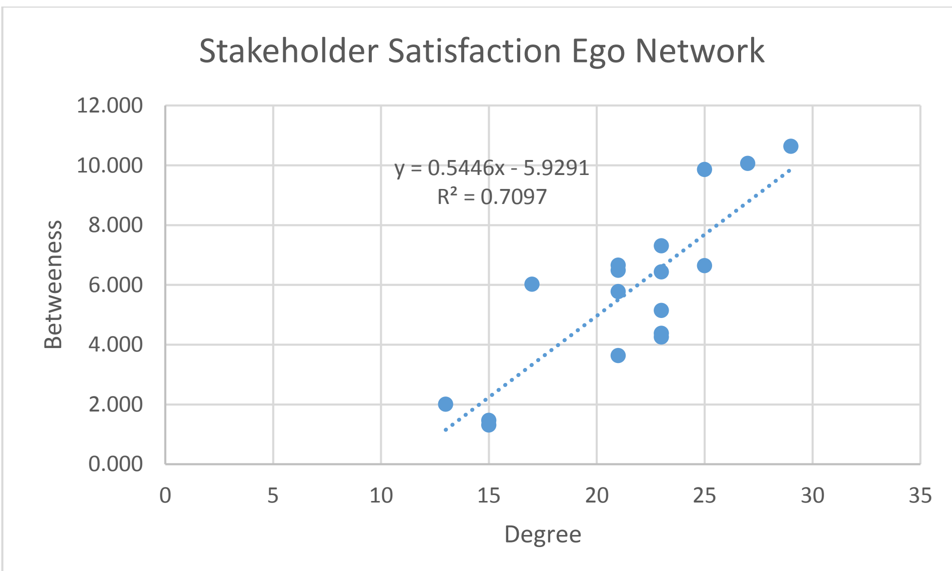


Figure 10.59: Degree versus betweeness in the stakeholder satisfaction ego network.

Figure 10.59 shows how betweeness centrality of personality traits in the stakeholder satisfaction network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the stakeholder satisfaction network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.708 indicating very high closeness of the data to the fitted regression line. Thus, the model equation explains almost 71% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the stakeholder satisfaction ego network might cause very little changes in their betweeness values.

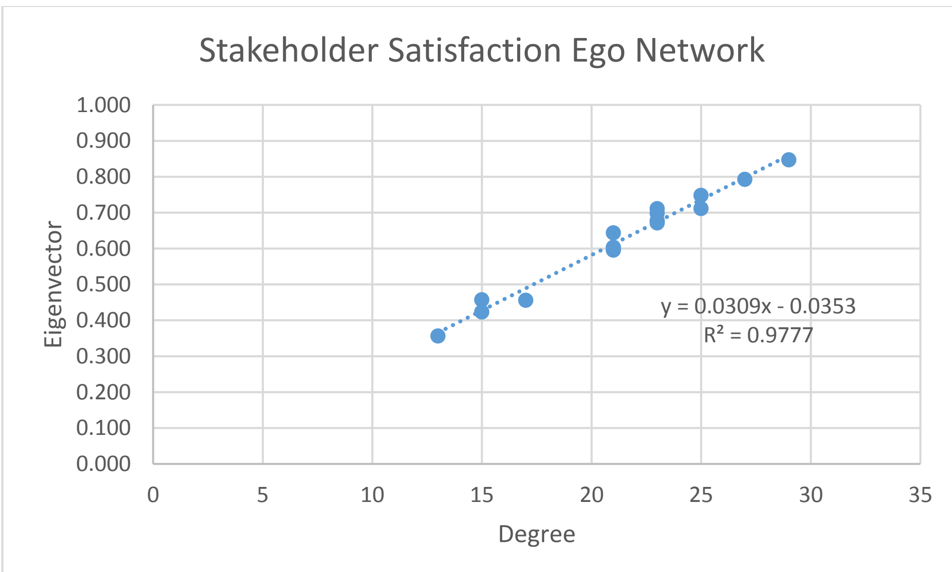


Figure 10.60: Degree versus eigenvector in the stakeholder satisfaction ego network.

Figure 10.60 shows how eigenvector centrality of personality traits in the stakeholder satisfaction network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the stakeholder satisfaction network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.978 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 98% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the stakeholder satisfaction ego network might cause very little changes in their eigenvector values.

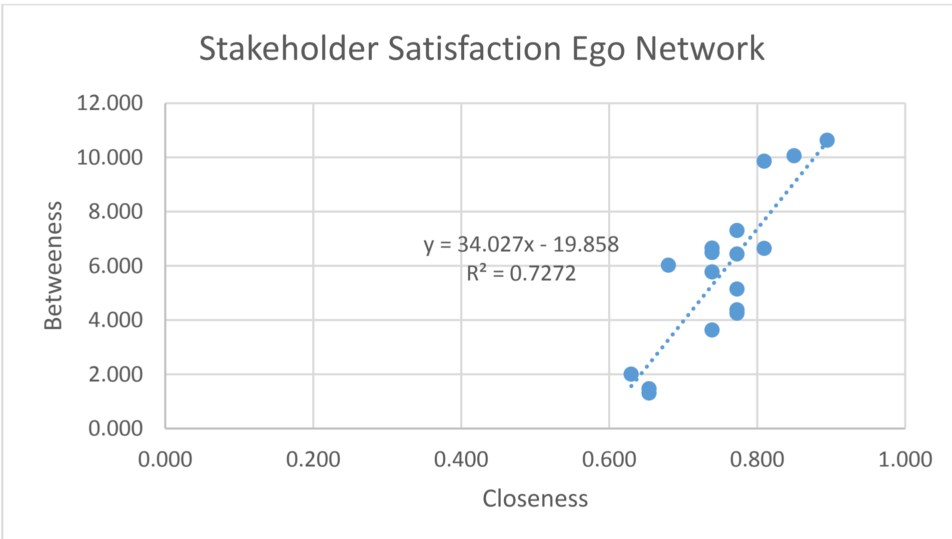


Figure 10.61: Closeness versus betweeness in the stakeholder satisfaction ego network.

Figure 10.61 shows how closeness centrality of personality traits in the stakeholder satisfaction network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.727 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 73% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the stakeholder satisfaction ego network might cause great changes in their betweeness values.

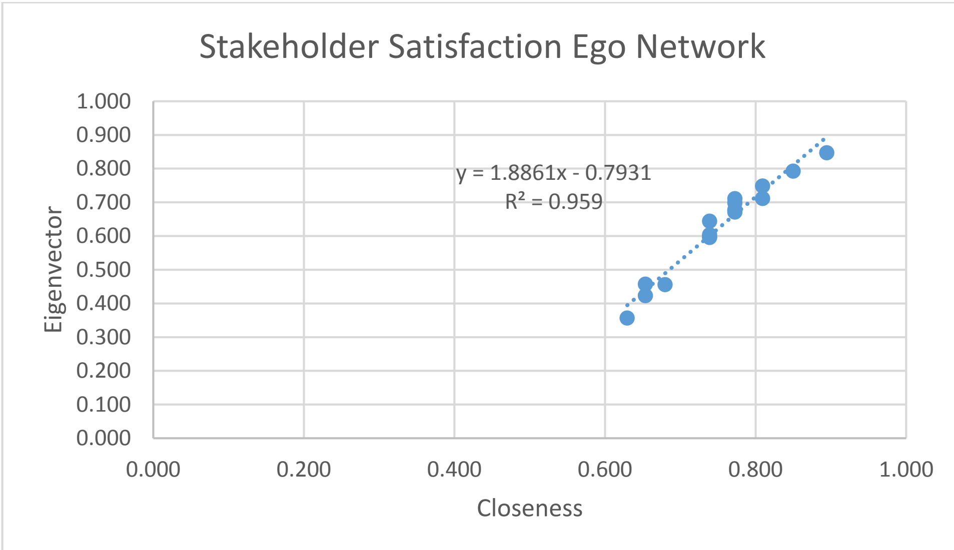


Figure 10.62: Closeness versus Eigenvector in the stakeholder satisfaction ego network.

Figure 10.62 shows how closeness centrality of personality traits in the stakeholder satisfaction network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.959 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 96% of the variability of the response data around its mean. The graph indicate that the slope is positive and steep. This may signify that changes in the closeness values of traits in the stakeholder satisfaction ego network might cause changes in their eigenvector values.

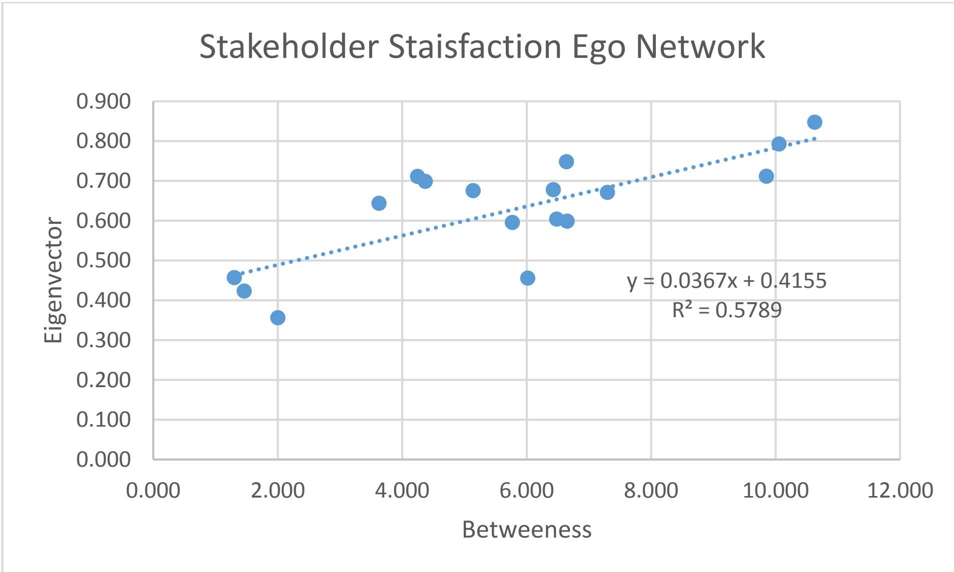


Figure 10.63: Betweeness versus eigenvector in the stakeholder satisfaction ego network.

Figure 10.63 shows how betweeness centrality of personality traits in the stakeholder satisfaction network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.579 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 58% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the betweeness values of traits in the stakeholder satisfaction ego network might cause very little changes in their eigenvector values.

10.3.9 Traits influencing project managers' general risk propensity

The risk propensity network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their general risk propensity than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the general risk propensity ego network shows the general risk propensity network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.64 displays the general risk propensity network.

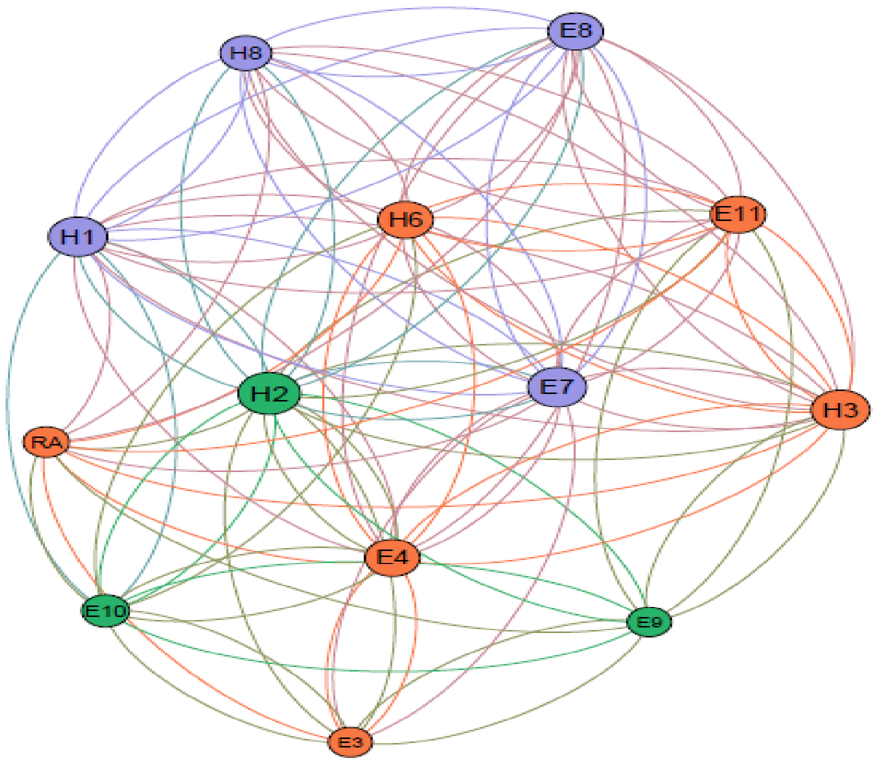


Figure 10.64: General Risk propensity ego network.

10.3.9.1 General characteristics

The topological characteristics of the general risk propensity ego network are shown in table 10.22 where it consists of 13 nodes and 104 edges. Furthermore, the average degree of the general risk propensity network is 16.00 while standard deviation is 3.19.

	Degree	Closeness	Betweeness	Eigenvector	Clustering Coefficient	
Mean	16.000	0.730	3.077	0.692	0.686	
Standard Deviation	3.187	0.223	2.331	0.167	0.078	
Sum	208.000	9.484	40.000	8.990	8.919	
Variance	10.154	0.050	5.434	0.028	0.006	
Minimum	11.000	0.667	0.250	0.398	0.567	
Maximum	21.000	0.923	9.300	0.810	0.839	
Network Density						0.667

Table 10.22: General characteristics of the general risk propensity ego network.

10.3.9.2 Network density

The risk propensity network density is high since its value is 0.667 which suggests high level of interaction among the traits variables. Additionally, the risk propensity network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' general risk propensity level (dependent variable).

10.3.9.3 Network clustering coefficient

The average clustering coefficient of the general risk propensity network was 0.686 where it measures the degree to which personality traits interact with each other and influence project managers' general risk propensity level. Figure 10.65 shows how clustering coefficients of general risk propensity ego network nodes vary with the nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' general risk propensity) and out-degree (which is the measure of the number of edges pointing from the general risk propensity node, which could be interpreted as the ability of general risk propensity node to influence project managers' risk propensity in other domains).

The results imply that changes in clustering coefficient might not cause much little changes in degrees values since the curve is almost flat.

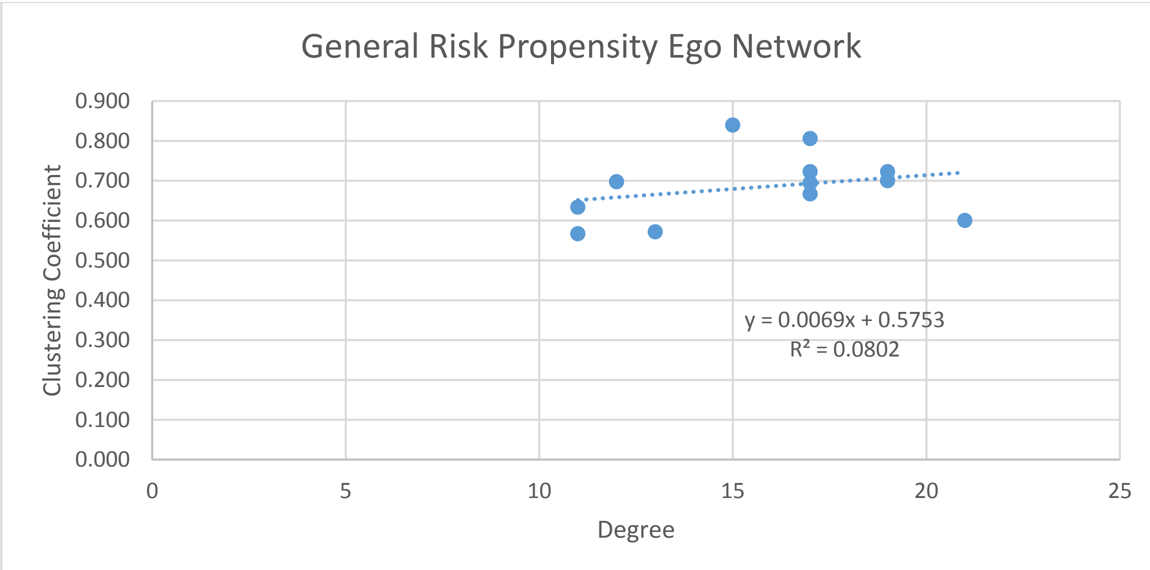


Figure 10.65: Clustering coefficients versus degree of general risk propensity ego network.

The general risk propensity network centrality measures the degree to which relationships within the risk propensity network nodes are concentrated around the risk propensity node. Table 10.23 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
RA	General Risk Propensity	12	0.000	0.000	1.000	0.697
E3	Dependence	11	0.667	1.400	0.398	0.633
E9	Vulnerability	11	0.667	2.067	0.400	0.567
E10	Harm avoidance	13	0.706	3.083	0.478	0.571
H8	Competitive	15	0.750	0.250	0.668	0.839
E8	Impulse control	17	0.800	0.917	0.745	0.806
E4	Sentimentality	17	0.800	3.883	0.690	0.667
E11	Cognitive dissonance	17	0.800	3.250	0.713	0.722
H6	Amiability	17	0.800	3.133	0.708	0.694
E7	Self-consciousness	19	0.857	4.917	0.790	0.700
H1	Sincerity	19	0.857	3.383	0.799	0.722
H3	Greed Avoidance	19	0.857	4.417	0.790	0.700
H2	Fairness	21	0.923	9.300	0.810	0.600

Table 10.23: Centrality measures of the general risk propensity ego network.

It can be seen from the results above; that project managers' general risk propensity level is influenced by 12 personality traits. Five of these personality traits belongs to honesty/humility cluster (out of a total of 8 traits) and seven traits belongs to emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the resources network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued according to experts' opinions in this study; that honesty/humility and emotionality traits have greater influence on project managers' risky decisions related to risk. Below are plots of all possible combinations between the centrality measures of the general risk propensity network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

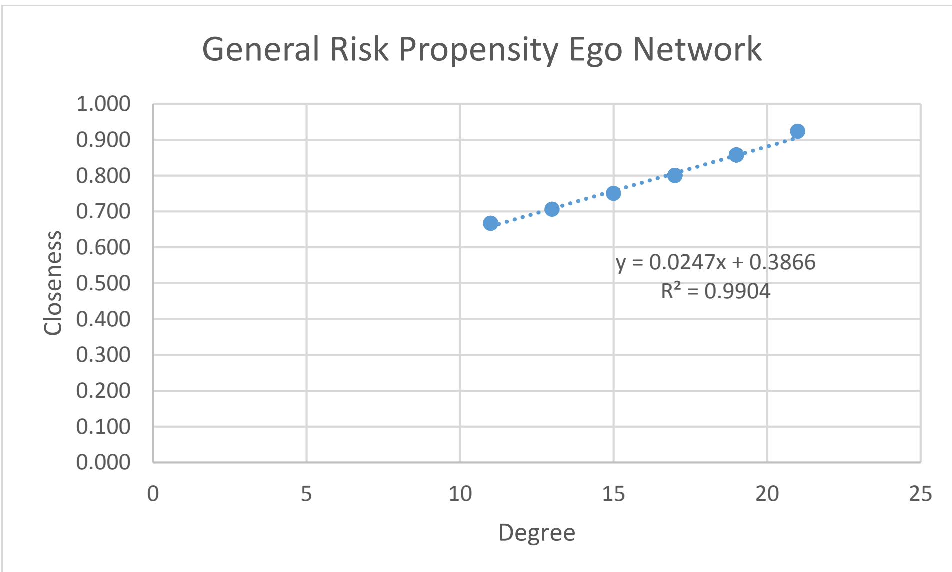


Figure 10.66: Degree versus closeness in the general risk propensity ego network.

Figure 10.66 shows how closeness centrality of personality traits in the general risk propensity network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the risk propensity network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the general risk propensity network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.99 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 99% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the general risk propensity ego network might cause very little changes in their closeness values.

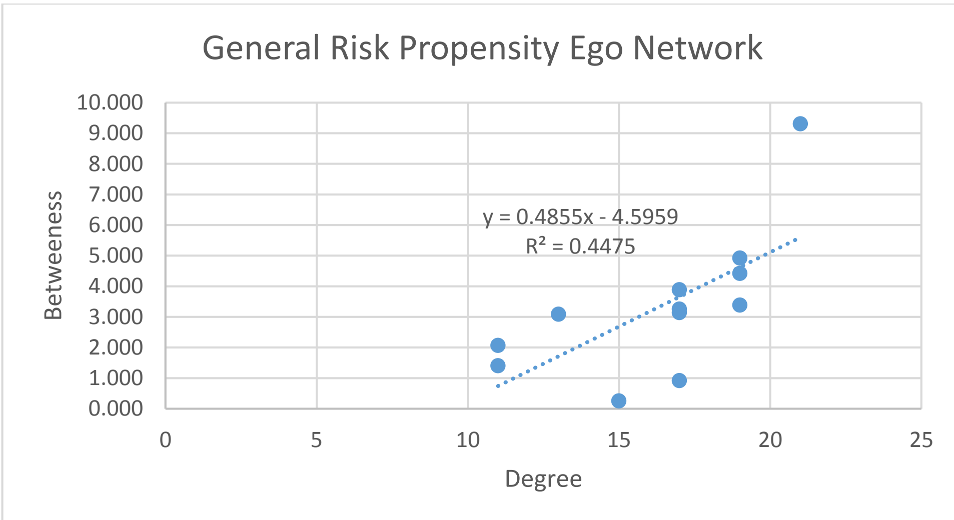


Figure 10.67: Degree versus betweeness in the general risk propensity ego network.

Figure 10.67 shows how betweeness centrality of personality traits in the general risk propensity network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the general risk propensity network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.448 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 45% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the general risk propensity ego network might cause very little changes in their betweeness values.

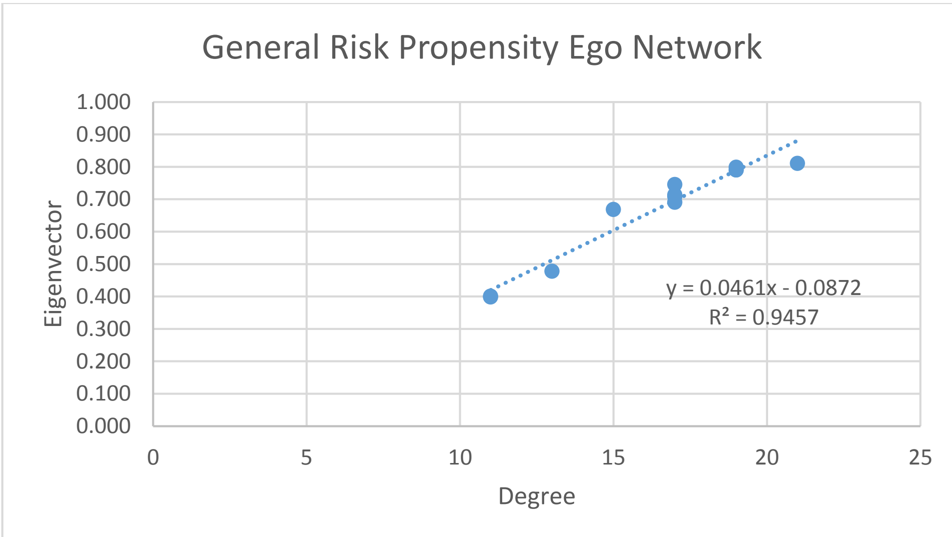


Figure 10.68: Degree versus eigenvector in the general risk propensity ego network.

Figure 10.68 shows how eigenvector centrality of personality traits in the general risk propensity network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the general risk propensity network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.946 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 95% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the general risk propensity ego network might cause very little changes in their eigenvector values.

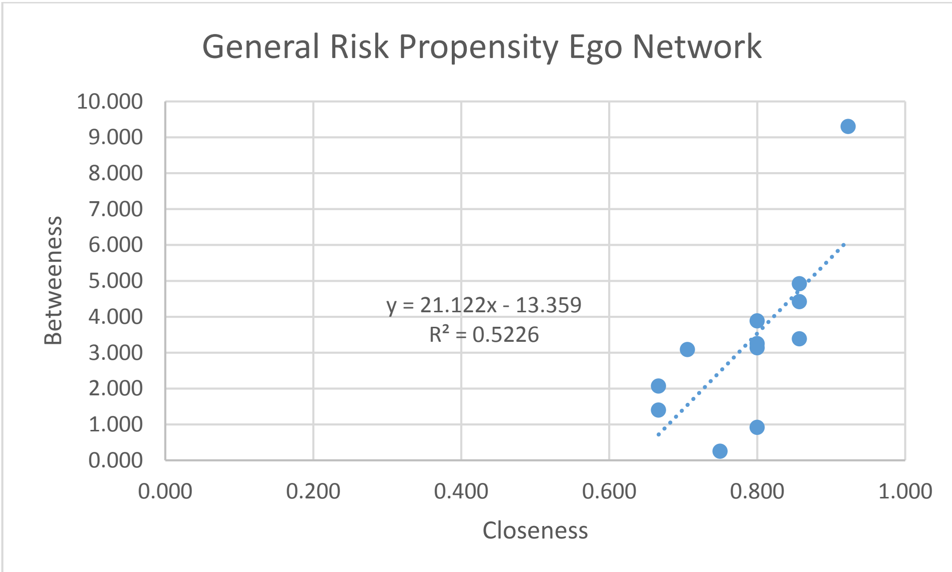


Figure 10.69: Closeness versus betweeness in the general risk propensity ego network.

Figure 10.69 shows how closeness centrality of personality traits in the general risk propensity network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.523 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 52% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the general risk propensity ego network might cause very great changes in their betweeness values.

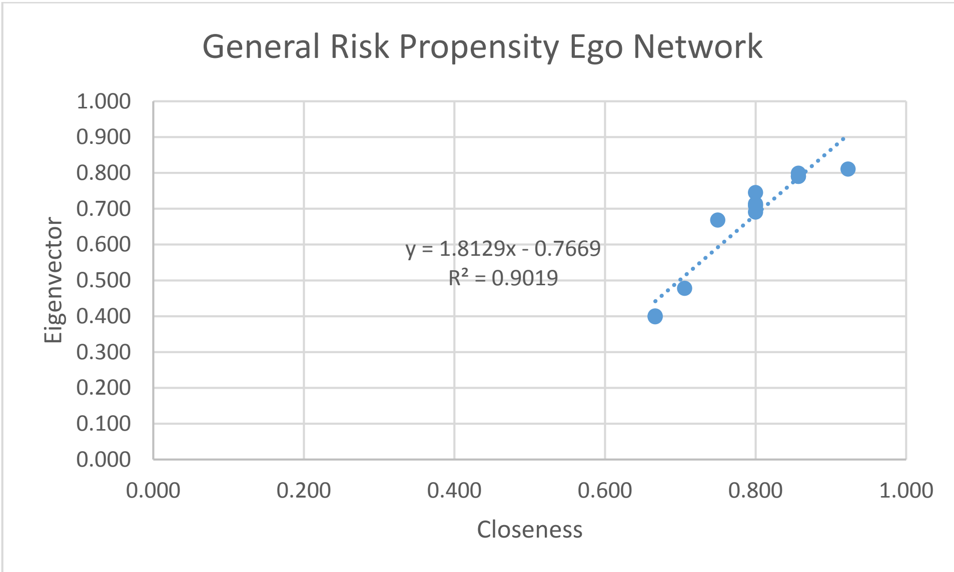


Figure 10.70: Closeness versus eigenvector in the general risk propensity ego network.

Figure 10.70 shows how closeness centrality of personality traits in the general risk propensity network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.902 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 90% of the variability of the response data around its mean. The graph indicate that the slope is positive and steep. This may signify that changes in the closeness values of traits in the general risk propensity ego network might cause changes in their eigenvector values.

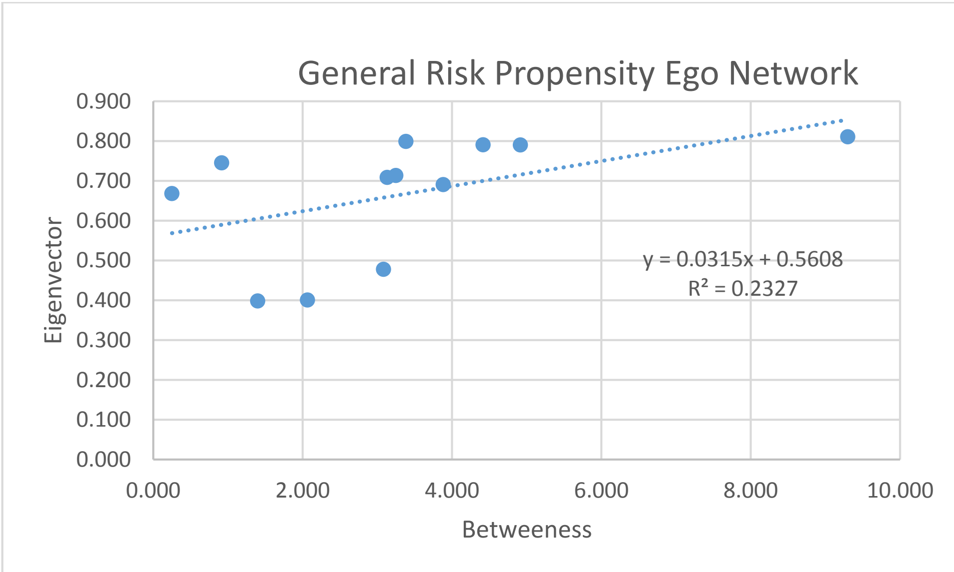


Figure 10.71: Betweeness versus eigenvector in the general risk propensity ego network.

Figure 10.71 shows how betweeness centrality of personality traits in the general risk propensity network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.232 indicating closeness of the data to the fitted regression line. Thus, the model equation explains almost 23% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the betweeness values of traits in the general risk propensity ego network might cause very little changes in their eigenvector values.

10.3.10 Traits influencing project managers' risk propensity description

The risk propensity description ego network is based on three modularity clusters (coloured as orange, purple and green). Additionally, some of the variables clusters are denser than others; which indicates that some project managers' personality traits have more influence on their risk propensity description than other traits. For example, the orange and purple traits clusters are denser than the green traits cluster. Moreover, the risk propensity description graph network shows the risk propensity description network degree centrality, i.e. the number of immediate neighbour connections each node has. Additionally, the size of the node indicates the level of total degrees of the nodes (the lines feeding into it as well as line coming out of it). Furthermore, there are certain nodes that have higher degree values than other nodes in the network. Figure 10.71 displays the risk propensity ego description network.

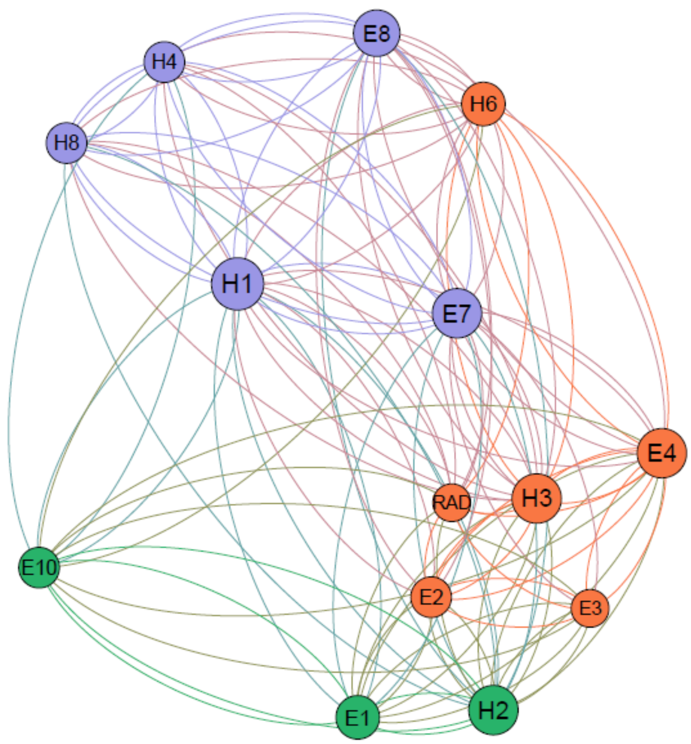


Figure 10.72: Risk propensity description ego network.

10.3.10.1 General characteristics

The topological characteristics of the risk propensity description network are shown in table 10.24 where it consists of 14 nodes and 123 edges. Furthermore, the average degree of the risk description network is 17.57 while standard deviation is 3.25.

	Degree	Closeness	Betweeneness	Eigenvector	Clustering Coefficient	
Mean	17.571	0.736	3.286	0.694	0.698	
Standard Deviation	3.245	0.217	2.280	0.139	0.049	
Sum	246.000	10.310	46.000	9.721	9.775	
Variance	10.531	0.047	5.199	0.019	0.002	
Minimum	13.000	0.684	0.619	0.469	0.589	
Maximum	23.000	0.929	6.919	0.849	0.804	
Network Density						0.676

Table 10.24: General characteristics of the risk description ego network.

10.3.10.2 Network density

The risk propensity description network density is high since its value is 0.676 which suggests very high level of interaction among the traits variables. Additionally, the risk propensity description network density describes the overall linkage between certain personality traits (independent variables) and their influence on project managers' risk propensity description (dependent variable).

10.3.10.3 Network clustering coefficient

The average clustering coefficient of the risk propensity description network was 0.698 where it measures the degree to which personality traits interact with each other and influence project managers' risk propensity description being careful or carefree person. Figure 10.73 shows how clustering coefficients of risk propensity description ego network nodes relates inversely with the nodes in-degree (measure of the number of edges pointing to a node, which could be interpreted as personality traits that influence project managers' risk propensity description) and out-degree (which is the measure of the number of edges pointing from the risk propensity description node, which could be interpreted as the ability of risk propensity description node to influence project managers' risk propensity in other domains). The results imply that increases in risk propensity description degree values cause decreases in clustering coefficients while decreases in risk propensity description degree values cause increases in clustering coefficients value.

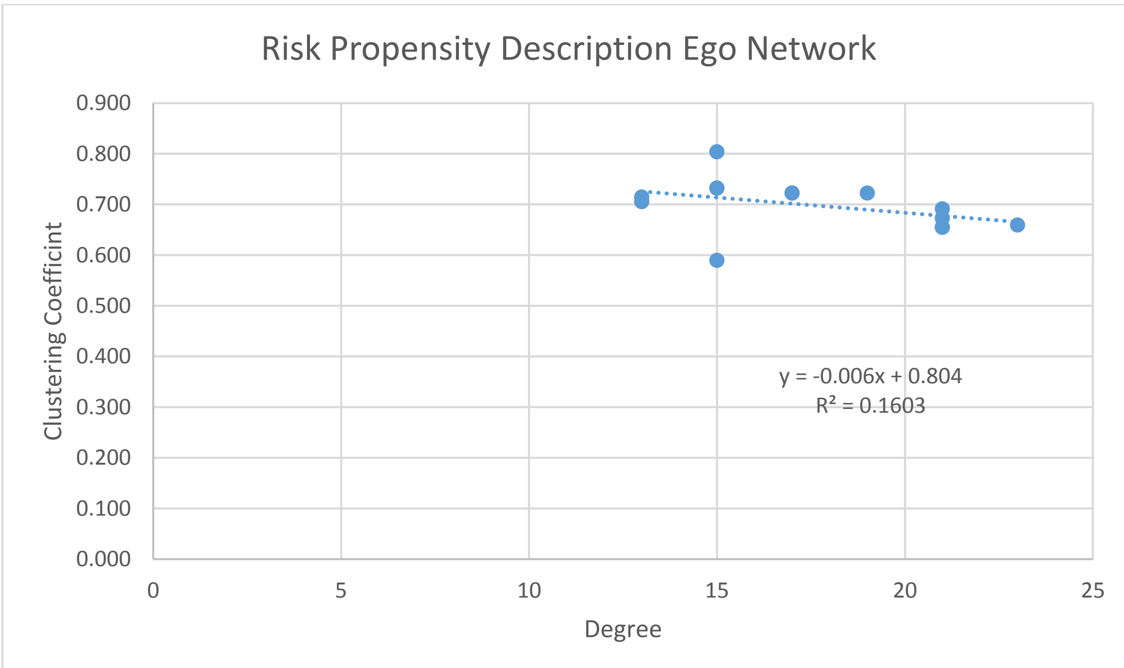


Figure 10.73: Clustering coefficients versus degree of risk propensity description ego network.

The risk propensity description ego network centrality measures the degree to which relationships within the risk propensity description network nodes are concentrated around the risk propensity description node. Table 10.25 displays the values of these centrality measures.

		Centrality Measures				
Label	**Trait**	**Degree**	**Closeness**	**Betweeness**	**Eigenvector**	**Clustering coefficient**
RAD	Risk Description	13	0.000	0.000	1.000	0.705
E3	Dependence	13	0.684	0.971	0.469	0.714
H4	Modesty	15	0.722	1.519	0.564	0.732
H8	Competitive	15	0.722	0.619	0.588	0.804
E10	Harm avoidance	15	0.722	3.852	0.541	0.589
E2	Anxiety	15	0.722	1.567	0.576	0.732
H6	Amiability	17	0.765	2.186	0.644	0.722
E1	Fearfulness	17	0.765	2.038	0.638	0.722
E8	Impulse control	19	0.813	3.238	0.727	0.722
E4	Sentimentality	21	0.867	5.124	0.779	0.673
E7	Self-consciousness	21	0.867	6.919	0.782	0.655
H3	Greed Avoidance	21	0.867	4.971	0.793	0.691
H2	Fairness	21	0.867	6.105	0.773	0.655
H1	Sincerity	23	0.929	6.890	0.849	0.659

Table 10.25: Centrality measures of the risk propensity description ego network.

It can be seen from the results above; that project managers' risk propensity description in being carefree or careful is influenced by 13 personality traits. Six of these personality traits belong to honesty/humility cluster (out of a total of 8 traits) and seven traits belong to emotionality traits cluster (out of a total of 13 traits). No traits from the other personality traits clusters appeared in the resources network; specifically: extraversion, agreeableness, conscientiousness and openness to experience. Hence, it can be argued and according to experts' opinions; that honesty/humility and emotionality traits have greater influence on project managers' risk propensity description. Below are plots of all possible combinations between the centrality measures of the risk propensity description network that will allow for understanding the general properties of the network and discovering any trends among all dependent variables networks.

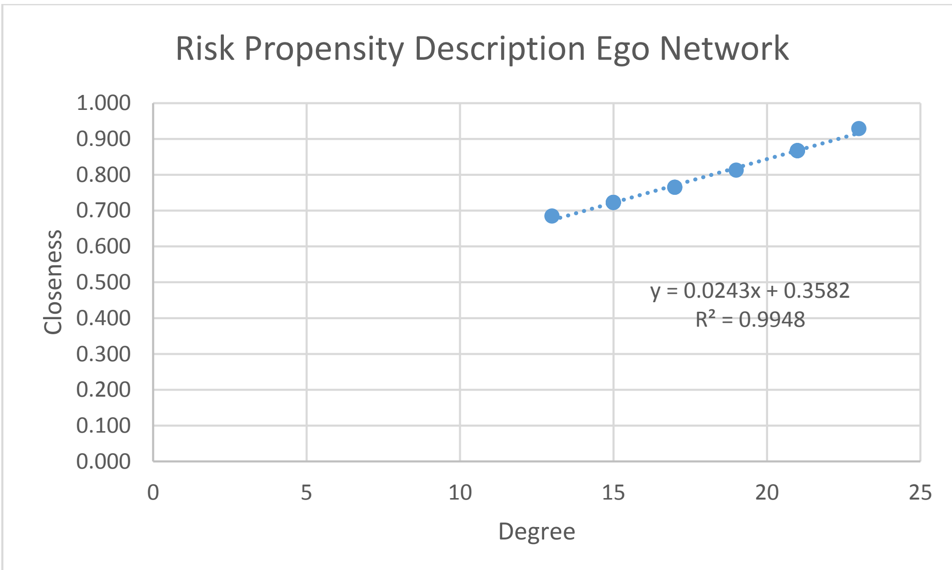


Figure 10.74: Degree versus closeness in the risk propensity description ego network.

Figure 10.74 shows how closeness centrality of personality traits in the risk propensity description network vary with personality traits degrees (which is the measure of the number of edges pointing to the trait; which could be interpreted as personality traits impact on this particular trait within the risk propensity description network). Additionally, closeness centrality of a certain personality trait is the number of other traits divided by the sum of all distances between this particular trait and all other traits in the risk propensity description network. Furthermore, as shown in the figure; the relationship between degree and closeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.995 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 100% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the risk propensity description ego network might cause very little changes in their closeness values.

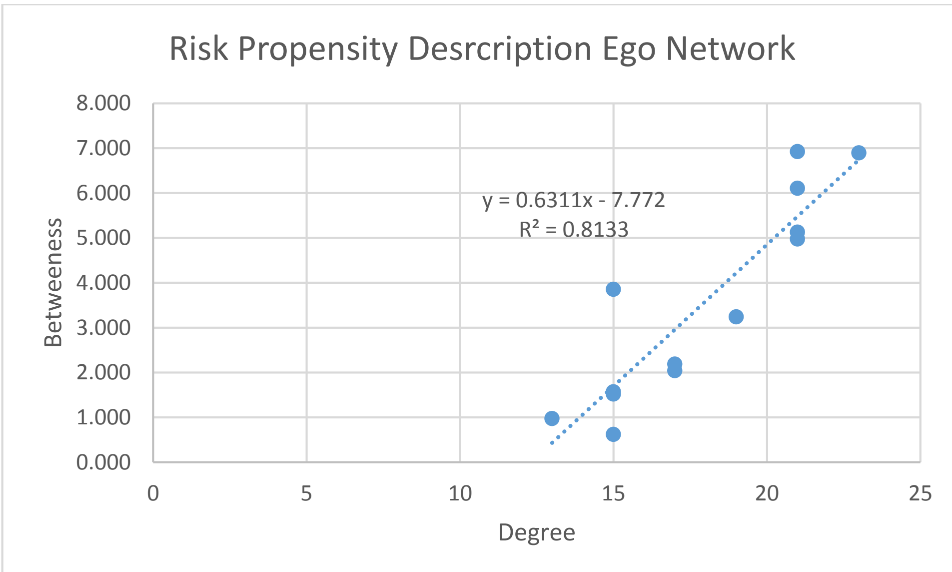


Figure 10.75: Degree versus betweeness in the risk propensity description ego network.

Figur10.75 shows how betweeness centrality of personality traits in the risk propensity description network vary with personality traits degrees. Additionally, betweeness centrality of a certain personality trait is the number of geodesic paths (shortest path between two traits) that pass through this particular trait within the risk propensity description network. Furthermore, as shown in the figure; the relationship between degree and betweeness centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.813 indicating very high closeness of the data to the fitted regression line. Thus, the model equation explains almost 81% of the variability of the response data around its mean. The graph indicate that the slope is positive and little steep. This may signify that changes in the degree values of traits in the risk propensity description ego network might cause little changes in their betweeness values.

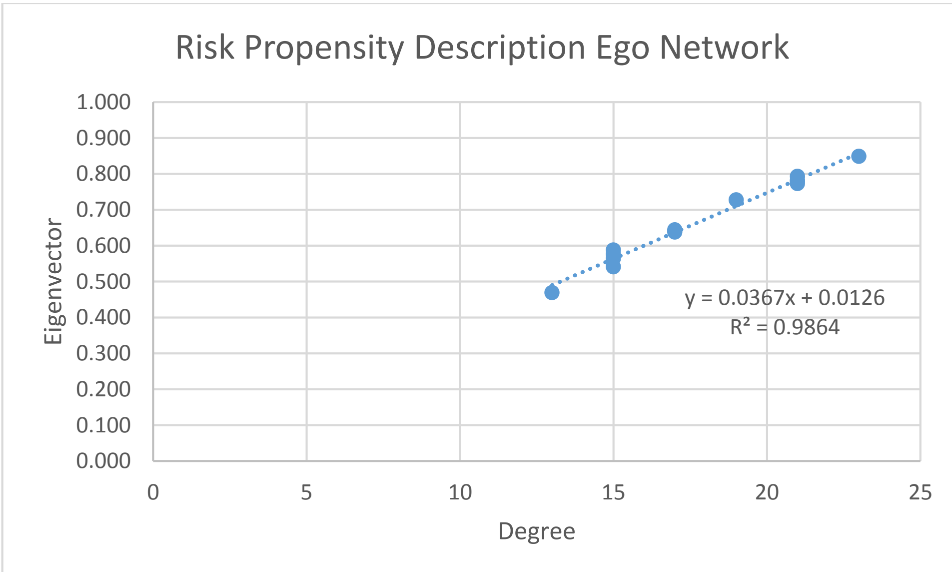


Figure 10.76: Degree versus eigenvector in the risk propensity description ego network.

Figure 10.76 shows how eigenvector centrality of personality traits in the risk propensity description network vary with personality traits degrees. Additionally, eigenvector of a certain personality trait is a measure of influence of this particular trait in the whole network; where it shows how well-connected this particular trait with other well-connected traits in the risk propensity description network. Furthermore, as shown in the figure; the relationship between degree and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.986 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 97% of the variability of the response data around its mean. The graph indicate that the slope is positive and not steep. This may signify that changes in the degree values of traits in the risk propensity description ego network might cause very little changes in their eigenvector values.

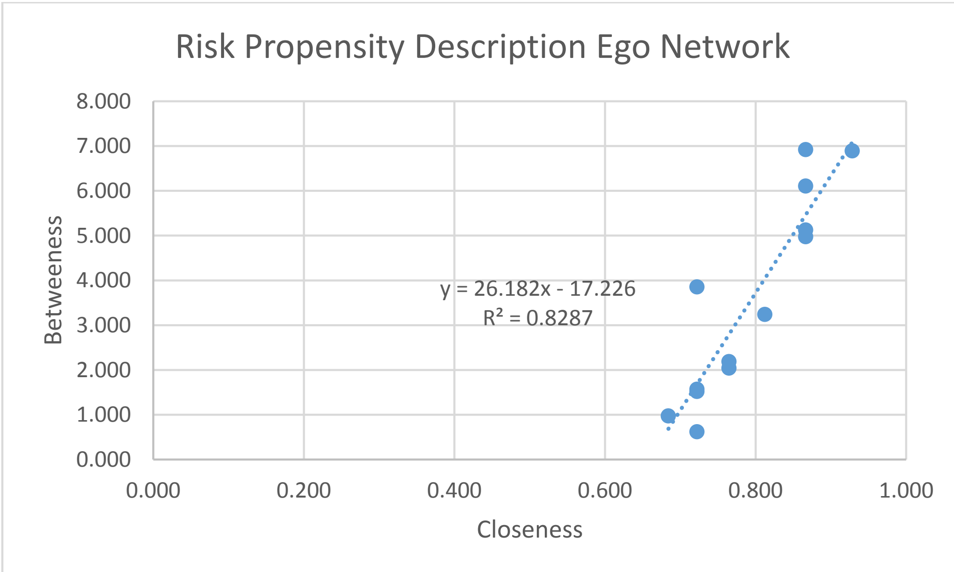


Figure 10.77: Closeness versus betweeness in the risk propensity description network.

Figure 10.77 shows how closeness centrality of personality traits in the risk propensity description network vary with its betweeness centrality measures. Furthermore, as shown in the figure; the relationship between closeness and betweeness centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.829 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 83% of the variability of the response data around its mean. The graph indicate that the slope is positive and very steep. This may signify that changes in the closeness values of traits in the risk propensity description ego network might cause great changes in their betweeness values.

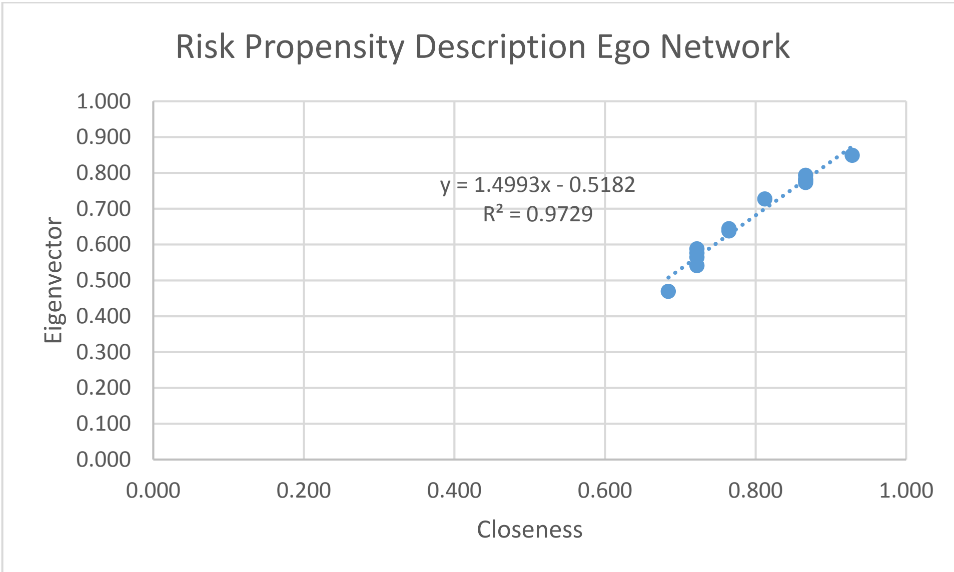


Figure 10.78: Closeness versus Eigenvector in the risk propensity description ego network.

Figure 10.78 shows how closeness centrality of personality traits in the risk propensity description network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between closeness and eigenvector centrality measures indicates a high positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.973 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 97% of the variability of the response data around its mean. The graph indicate that the slope is positive and steep. This may signify that changes in the closeness values of traits in the risk propensity description ego network might cause changes in their eigenvector values.

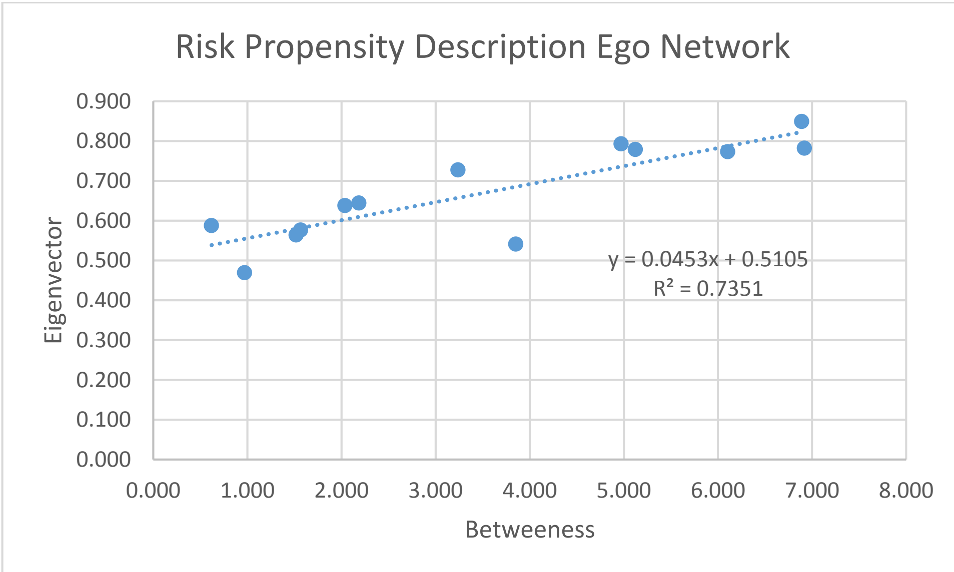


Figure 10.79: Betweeness versus eigenvector in the risk propensity description ego network.

Figure 10.79 shows how betweeness centrality of personality traits in the risk propensity description network vary with its eigenvector centrality measures. Furthermore, as shown in the figure; the relationship between betweeness and eigenvector centrality measures indicates a positive linear relationship where the equation coefficient of determination (referred to as R-squared) is 0.735 indicating high closeness of the data to the fitted regression line. Thus, the model equation explains almost 74% of the variability of the response data around its mean. The graph indicate that the slope is positive and little steep. This may signify that changes in the betweeness values of traits in the risk propensity description ego network might cause very little changes in their eigenvector values.

10.4 Summary

There were many key findings in this chapter. First, dependency structural techniques were introduced and its use was justified. Second, network nodes measures were described within the research topic field. Third, ego networks characteristics were presented in full details. Fourth, network centrality measures were used to investigate the influence of project managers' personality traits on their risk propensity in relation to project success criteria domains. Last, combined centrality measure plots were presented and analyzed for possible trends.

11 Chapter Eleven: Discussions

11.1 Introduction

This chapter presents discussions over key research questions and themes analyzed throughout the thesis. The first section presents a discussion on findings from the literature review. The subsequent sections present discussion on the findings from the survey and dependency structure matrices exercises. Specifically, the second section presents classification of personality traits and reliability of research questionnaire items. Third section discusses the findings from ranking analysis and hypothesis testing. Fourth section explains the results from multiple regression and correlation tests. Fourth and last section presents the results from the interdependency analysis. Throughout this chapter; implications of findings are discussed with respect to theory and practice.

11.2 Traits classification and reliability

What are the traits that may influence project managers' risk propensity?

It has always been challenging to discover personality traits where there is a need for having consensus on the basic personality traits that can be used to analyze personality influence and effect in different contexts. Nevertheless, a plethora of researchers investigated personality traits and agreed that it can be best summarized under five broad independent factors: extraversion, agreeableness, conscientiousness, neocriticism and intellect/imagination (Digman &Takemoto-Chock 1981; Tupes & Christal 1992; Goldberg 1993; Saucier & Goldberg 1996; Lee & Ashton 2009). However, many researchers based on empirical investigation and standard lexical studies of personality; rearranged the "Big Five" factors into its final shape through replacing “intellect/imagination” factor by “openness to experience” factor (Wiggins 1996). This research survey items were arranged based on the above five personality clusters and it also considered the most recent research in this field which was done by Lee & Ashton (2009). Furthermore, Lee & Ashton (2009) adjusted the above classification of human personality traits by adding a sixth cluster relating to honesty/humility traits which they found to be positively associated with human risky behaviours. Additionally, Blair (2007) mentioned that individuals’ with low honesty/humility tend to have high risk propensity level. Moreover, this new classification rearranged some of the traits between agreeableness cluster and honesty/humility cluster ending up in introducing personality traits under six major categories that can be summarized with the HEXACO acronym (honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience). However, Lee & Ashton (2009) introduced only four major traits under each of the six personality traits cluster; where only a total of twenty four traits were used to measure the human personality. Therefore, this research based the classification of personality traits influencing project managers’ risky decision on the HEXACO classification model introduced by Lee & Ashton (2009). Nevertheless, forty one more personality traits were added to the HEXACO traits making the total sixty five personality traits. These traits were added primarily from two sources. First, extensive literature review on personality traits that could influence individuals’ risk propensity and risky decisions. Second, the work done by Boussabaine (2014) who introduced twenty six personality traits and cognitive biases related to project managers’ risk propensity. Building on the extensive literature review – that were discussed in chapters 2 and 3- this research proposed sixty five project managers’ traits clustered around six personality clusters: honesty/humility, emotionality, extraversion, agreeableness, conscientiousness and openness to experience. These traits formed basis for developing research questionnaire which was used to seek project managers' opinions on the potential importance of these traits in relation to risky decisions. Additionally, reliability test between personality traits items was good where Cronbach's alpha was equal to .835 for all items under the personality traits scale indicating good consistency degree between personality traits scale items. Also, reliability test between risk propensity items was good where Cronbach's alpha was equal to .736 for all items under the risk propensity scale indicating good consistency degree between risk propensity scale items. Additionally, normality tests were performed to compare the shape of research sample distribution with shape of a normal curve where these normality tests assumes that if the research sample is normally shaped; then the population from which it was taken from is normally distributed and hence normality can be assumed. However, since the research sample size was larger than 30; then violation of normality assumption would not cause any major problems when analyzing the data (Ghasemi & Zahediasl 2012, Pallat 2016). Hence, parametric tests can be still used even if the data is not normally distributed where data distribution can be ignored with large sample sizes (Elliot & Woodward 2007; Altman & Bland 1995). Nevertheless, research data normality was assessed using the skewness and kurtosis values, where for sample size of less than 200 (in this research the sample size was 103); the z-values should be in the range of ±1.96 to establish data normality. Consequently, z-values for the personality traits clusters showed that data was normal where all z-values were within the acceptable range of ±1.96 as shown in chapter six figure .2. Also, there were no extreme data that could influence the mean where the 5% trimmed mean values were very close to the mean original values as shown in chapter six figure .3.

11.3 Ranking analysis and hypotheses testing

Is there a difference on project managers' mean ratings of personality traits in relation to their tendency of taking risky decisions? Would demographic factors influence project managers' mean ratings of personality traits in relation to their tendency of taking risky decisions?

The primary tool used to collect respondents' responses was a questionnaire designed by the researcher and distributed to targeted project practitioners who assume role of a project manager. Furthermore, the research questionnaire was distributed to targeted respondents through different channels; specifically through: direct email, email links, social media channels (LinkedIn, Facebook, WhatsApp, etc.) where targeted respondents were 525 covering almost 40 project designations and collected responses composed almost 19.6 % of the targeted sample size; which is considered an acceptable response rate (Akintoye 2000). Furthermore, collected responses were organized under certain groups to allow for statistical mean group comparisons and analysis of variance (ANOVA). The result of the responses grouping indicated two major categories that can be statistically analysed for mean comparisons. First, number of experience years in managing projects; where three groups were founded: Group 1: 0-7 years of experience, Group 2: 8-19 years of experience and Group 3: 20 years and above of experience. Second, current respondent position where three groups were founded: Group 1: project managers, Group 2: consultant/engineer and Group 3: functional manager/administrator. The above two groupings (experience level and position) were used to analyse project managers' perceived importance of personality traits in relation to their risk propensity where responses were ranked according to mean-weighted ratings. Also, severity indices were calculated to indicate the most highly ranked personality traits whereas coefficient of variation was calculated for comparison of responses relative variability. Below are the results of ranking analysis and hypotheses testing as per personality traits clusters.

11.3.1 Honesty/Humility cluster

Within honesty/humility traits cluster; H3-greed avoidance trait ranked as the 1st trait in terms of highest mean at all levels of experience and by positions of project manager and consultant/engineer. Whereas it ranked as the 5th trait within the overall 65 personality traits. Similarly, the results of the structure dependency network analysis emphasized the importance of H3-greed avoidance trait where it was ranked among the top five influential traits among all project success criteria (surprisingly it ranked fifth in almost all project success criteria similar to its rank based on survey responses!). Hence, H3-greed avoidance could be considered as an important personality trait that can influence project managers' risky decisions in projects where they will not take risky decisions for sake of impressing others or achieving personal goals. Moreover, project managers with high greed-avoidance will have higher tendency to avoid taking risky decisions in their projects that might impact one of the project success criteria. This finding is in line with the literature review in chapter 4 related to greed-avoidance; where Bulik et al. (1997) reported that greed-avoidance trait is associated with risk-averse individuals' due to their fear of experimenting new and uncertain things. Also, Cheung (2007) suggested that individuals' with high greed-avoidance trait tend to be suspicious and dreadful of risky decisions outcomes. Therefore, project managers' with high greed-avoidance trait tend to be have low risk propensity due to being afraid of accepting risks and those who have low greed-avoidance trait tend to have higher risk propensity where they enjoy exploring new and uncertain opportunities.

Therefore, project managers' with high greed-avoidance might be less inclined to take risky decisions related to project success (scope, time and cost) since they tend to thoroughly analyze decisions before finalizing them in order to avoid creating any controversies for them. Consequently, the above analysis can be used to support the test of hypothesis H1A where it was stated as follows: **H1A: there is no difference on rating honesty/humility traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H1A should be accepted where the ranking of honesty/humility traits was almost similar by all respondents as shown in chapter 6 figure .17. Also, H3-greed avoidance trait ranked as the 1st trait in terms of highest mean at all levels of experience and by all positions (with exception of functional manager/administrator group where it ranked 2nd).

One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to honesty/humility personality traits at significance level of $p < 0.05$ (with the exception of H1-sincerity and H2-fairness where there was medium actual difference between the position groups). This is in line with literature review in chapter 4; where MacCrimmon & Wehrung (1986) reported that executives with greater authority and closer to top management tend to have higher risk propensity and similarly Swalm (1966) reported that lower-level managers are usually associated with lower risk propensity levels. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to honesty/humility personality at significance level of $p < 0.05$.

Hence, these results can be used to support the test of hypothesis H2A where it was stated as follows:

H2A: demographic factors will influence respondents' mean rating of honesty/humility traits in relation to project success criteria risky decisions (scope, time and cost). Therefore, hypothesis H2A should be accepted for H1-sincerity and H2-fairness where there was statistically significant difference between respondents' opinions on H1-sincerity and H2-fairness influence on their risky decisions based on position. However, hypothesis H2A should be rejected for all remaining honesty/humility traits where there was no significant difference between respondents' opinions regarding all other honesty/humility traits influence on their risky decisions based on position or experience level. Table 11.1 summarizes ANOVA results for honesty/humility traits based on position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of honesty/humility traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on honesty/humility traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There were medium significant differences between respondents' opinions regarding traits: H1-sincerity and H2-fairness based on position. • There was no significant difference between respondents' opinions regarding all other honesty/humility traits based on position or experience level.
Researcher's observation	• The results demonstrated that project managers' group will not avoid taking risky decisions to please their stakeholders because of authority level whereas consultant/engineer group might avoid risky decisions to please stakeholders since they lack authorities. • The results demonstrated that project managers' group have higher tendency than functional managers'/administrators to follow company rules when taking risky decisions and breaching their tolerances. This is normal due to project manager accountability on achieving project objectives.
Conclusion	The null hypothesis was accepted for traits: H1-sincerity ($p<0.05$ where $p=0.025$) and H2-fairness ($p<0.05$ where $p = 0.005$). The null hypothesis was rejected for traits: H3, H4, H5, H6, H7 and H8.

Table 11.1: ANOVA for honesty/humility traits based on position and experience.

11.3.2 Emotionality cluster

Within the emotionality personality traits cluster; E7- self-consciousness ranked as the 1st trait in terms of highest mean at all experience and position levels. Whereas it ranked as the 2nd trait within the overall 65 personality traits. Similarly, the results of the structure dependency network analysis emphasized the importance of E7- self-consciousness trait where it was ranked among the top five influential traits among all project success criteria (surprisingly it ranked second in almost all project success criteria similar to its rank based on survey responses!). Hence, E7-self-consciousness is considered by the respondents' as an important personality trait that can influence project managers' risky decisions in projects. Moreover, project managers with low self-consciousness might have higher tendency to avoid taking risky decisions in their projects that might impact one of the project success criteria where they might be hesitant in taking risky decisions. This is in line with literature review in chapter 4; where Thompson (2008) argued that conscientiousness has to do with individuals' being thorough, cautious and think carefully before taking any risky decisions. Thus, project managers' who have low self-conscientiousness might be inclined to have low risk propensity where they are not confident about their ability to stand up and defend their risky decisions. However, project managers' with high conscientiousness might be more willing to adopt new methods that might impact the project success criteria (scope time and cost) where they tend to be more confident in exploring new such as: adopting new schedule compression methods, budget reduction techniques or processes that might impact project scope. Consequently, the above analysis can be used to support the test of hypothesis H1B where it was stated as follows: **H1B: there is no difference on rating emotionality traits by respondents' in relation to their tendency of taking risky decisions (risk propensity)**

influencing project success criteria (scope, time and cost). Therefore, hypothesis H1B should be accepted where the ranking of emotionality traits was almost similar by all respondents as shown in chapter 6 figure .19. Also, E7- self-consciousness trait ranked as the 1st trait in terms of highest mean at all levels of experience and by all positions.

One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to emotionality personality traits at significance level of $p < 0.05$. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to honesty/humility personality at significance level of $p < 0.05$ with exception of E9-vulnerability where there was a small actual difference between the experience groups. This is in line with literature review in chapter 4, where Ballesteros (2008) stated that vulnerable individuals' cannot stand adverse impacts and similarly project managers' with low project experience are more vulnerable where they can be easily overwhelmed by risk events when taking risky decisions due to their lack of experience. Hence, these results can be used to support the test of hypothesis H2B where it was stated as follows: **H2B: demographic factors will influence respondents' mean rating of emotionality traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H2B should be accepted for E9-vulnerability trait where there was statistically significant difference between respondents' opinions on E9-vulnerability influence on their risky decisions based on experience. However, hypothesis H2B should be rejected for all remaining emotionality traits where there was no significant difference between respondents' opinions regarding all other emotionality traits influence on their risky decisions based on position or experience level. Table 11.2 summarizes ANOVA results for emotionality traits based position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of emotionality traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on emotionality traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There was medium significant difference between respondents' opinions regarding E9-vulnerability trait based on experience level. • There was no significant differences between respondents' opinions regarding all other emotionality traits based on position or experience level.
Researcher's observation	• The results demonstrated that respondents'' with 8-19 years of project experience are more vulnerable than those with 20+ years of project experience where they can be easily overwhelmed by risk events when taking risky decisions due to their less experience.
Conclusion	The null hypothesis was accepted for trait: E9-vulnerability ($p<0.05$ where $p=0.045$). The null hypothesis was rejected for traits: E1, E2, E3, E4, E5, E6, E7, E8, E10, E11, E12 and E13.

Table 11.2: ANOVA for emotionality traits based on position and experience.

11.3.3 Extraversion cluster

Within the extraversion personality traits cluster; X5- assertiveness ranked as the 1st trait in terms of highest mean at all experience and position levels. Whereas it ranked as the 7th trait within the overall 65 personality traits. Hence, X5-assertiveness could be considered as an important personality trait that can influence project managers' risky decisions in projects where they try to take charge and lead others' into taking risky decisions. Moreover, project managers with high assertiveness will have higher tendency to take risky decisions in their projects that might impact one of the project success criteria. This is because assertive project managers' tend to be more comfortable and confidant when taking risky decisions where they are willing to accept the consequences of their risky decisions. Also, this finding is in line with literature review in chapter4; where Ashton et al. (2002) argued that assertive individuals tend to take risky decisions to attract attention and for the purpose of getting rewarded.

Consequently, the above analysis can be used to support the test of hypothesis H1C where it was stated as follows: **H1C: there is no difference on rating extraversion traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H1C should be accepted where the ranking of extraversion traits was almost similar by all respondents as shown in chapter 6 figure .21. Also, X5- assertiveness trait ranked as the 1st trait in terms of highest mean at all levels of experience and by all positions (with expectation of consultant/engineer group where it ranked 2nd).

One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to extraversion personality traits at significance level of $p < 0.05$ with exception of X1- expressiveness where there was a medium actual difference between the experience groups. It is normal for project managers to be more able to explain and express their risky decisions than functional managers where project manager role requires much communication with project stakeholders. According to Muller & Turner (2010), communication is an important leadership competency for project managers where majority of their time should be spent on communicating and expressing their views to stakeholders. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to honesty/humility personality at significance level of $p < 0.05$ with exception of X8-optimisim where there was a medium actual difference between the experience groups. This in line with literature review in chapter 4, where Bates & Timothy (2015) pointed out that individuals' with high optimism expects the best possible outcomes and belief future outcomes will be better. Similarly, project managers' with low experience expect the best possible outcomes of their risky decisions on project success criteria where O'Sullivan & Owen (2015) mentioned that optimism bias is common and relates to different demographic factors such as: age, race and gender. Hence, these results can be used to support the test of hypothesis H2C where it was stated as follows:

H2C: demographic factors will influence respondents' mean rating of extraversion traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost). Therefore, hypothesis H2C should be accepted for X1-expressiveness and X8-optimisim traits where there was statistically significant difference between respondents' opinions on X1-expressiveness trait influence on their risky decisions based on position and X8-optimisim trait influence on their risky decisions based on experience.

However, hypothesis H2C should be rejected for all remaining extraversion traits where there was no significant difference between respondents' opinions regarding all other extraversion traits influence on their risky decisions based on position or experience level. Table 11.3 summarizes ANOVA results for extraversion traits based position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of extraversion traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on extraversion traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There was medium significant difference between respondents' opinions regarding X1-expressiveness trait based on position and X8-optimisim based on experience level. • There was no significant differences between respondents' opinions regarding all other extraversion traits based on position or experience level.
Researcher's observation	• The results demonstrated that project managers group can easily explain their risky decisions more than functional manager/administrator group due to their experience in working in projects. • The results demonstrated that respondents'' with 0-7 years of project experience are more optimistic than those with 8-19 years of experience where they tend to look at the bright side of their suggested risky decisions due to lack of experience.
Conclusion	The null hypothesis was accepted for trait: X1-expressiveness ($p<0.05$ where $p=0.015$) and X8-optimisim ($p<0.05$ where $p=0.008$). The null hypothesis was rejected for traits: X2, X3, X4, X5, X6, X7, X9, X10 and X11.

Table 11.3: ANOVA for extraversion traits based on position and experience.

11.3.4 Agreeableness cluster

Within the agreeableness personality traits cluster; A6- morality ranked as the 1st trait in terms of highest mean at all experience and position levels. Whereas it ranked as the 14th trait within the overall 65 personality traits. Hence, A6-morality could be considered as an important personality trait that can influence project managers' risky decisions in projects where they tend to observe societal standards when taking risky decisions. Moreover, project managers with high morality will have higher tendency to avoid risky decisions in their projects that might impact one of the project success criteria. This is due to project managers' observing organizational and societal ethical standards in order to distinguish between proper and improper risky decisions. This is in line with the literature review in chapter 4, where Long & Sedley (1987) pointed out individuals' with high morality is capable of differentiating their decisions and actions of being proper or improper. Consequently, the above analysis can be used to support the test of hypothesis H1D where it was stated as follows: **H1D: there is no difference on rating agreeableness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H1D should be accepted where the ranking of agreeableness traits was almost similar by all respondents as shown in chapter 6 figure .23. Also, A6- morality trait ranked as the 1st trait in terms of highest mean at all levels of experience (with exception of group 0f of 0-7 years where it ranked 2nd) and by all positions.

Also, One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to agreeableness personality traits at significance level of $p < 0.05$. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to honesty/humility personality at significance level of $p < 0.05$. Hence, these results can be used to support the test of hypothesis H2D where it was stated as follows: **H2D: demographic factors will influence respondents' mean rating of agreeableness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H2D should be rejected for all agreeableness traits where there was no significant difference between respondents' opinions regarding all agreeableness traits influence on their risky decisions based on position or experience level. Table 11.4 summarizes ANOVA results for agreeableness traits based position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of agreeableness traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on agreeableness traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There was no significant differences between respondents' opinions regarding all agreeableness traits based on position or experience level.
Researcher's observation	• The results demonstrated that respondents' are all in agreement that agreeableness traits are important and can influence their risky decisions related to project success criteria regardless of position or project experience level.
Conclusion	The null hypothesis was rejected for all agreeableness traits: A1, A2, A3, A4, A5, A6, A7 and A8.

Table 11.4: ANOVA for agreeableness traits based on position and experience.

11.3.5 Conscientiousness cluster

Within the agreeableness personality traits cluster; C11- scale ranked as the 1st trait in terms of highest mean at all experience and position levels. Similarly, it ranked as the 1st trait within the overall 65 personality traits. Hence, C11- scale is considered by respondents' as an important personality trait that can influence project managers' risky decisions in projects. Moreover, project managers with high scale trait will have higher tendency to avoid risky decisions that might impact project success criteria where they consider risks impact and magnitude before taking risky decisions. This is consistent with the literature review in chapter 4, where Boussabaine (2014) pointed out that the size of risk associated to particular decision can affect project managers' risk propensity. Moreover, the following eight traits were ranked among the top 15 traits: C1- organization (8th rank), C2- diligence (9th rank), C3- perfectionism (11th rank), C4- prudence (3rd rank), C5 - competence (10th rank), C9 - confirmation (4th rank), C14- forward-thinking (12th rank) and C17- scenario bias (6th rank). All these traits are in line with the literature review in chapter 4. Additionally, Lee & Ashton (2004) mentioned that project managers' with high organization trait tend to prefer structured approach to taking risky decisions and avoid haphazard approaches. Also, project managers with high diligence tend to be more self-disciplined and exert themselves to achieve project objectives (Lee &Ashton 2004). Moreover, Stoeber et al. (2010) pointed out that perfectionism personality trait is the individuals' attempt for achieving high standards along with excessive self-criticism and caring too much for others' perception about them. Similarly, Frost et al. (1990) suggested that perfectionism trait is associated with being doubtful and avoiding mistakes. Thus, project managers' with high perfectionism tend to be more risk-averse since they do not accept risks until they thorough analyzed the events in order to avoid mistakes and being criticized. Consequently, project managers' with high perfectionism tend to over analyze their risky decisions that might negatively affect project success criteria (scope, time and cost). Furthermore, prudence trait is linked to perfectionism trait, where it relates to project managers carefully considering their options before taking risky decisions (Lee &Ashton 2004). Also, project managers with high competence rely on their knowledge and abilities to take the appropriate risky decisions. As for confirmation trait, it refers to project managers' pursuing supportive evidence for confirming their rationale and beliefs; and ignoring all evidence that contradicts their rationale (Boussabaine 2014). Similarly, Yudkowsky (2006) pointed out that "confirmation" is due to the tendency of pessimistic and skilled project managers' to apply their skills in a selective manner that allow them to select evidence that fit their risk appetite and risky decisions. Additionally, scenario bias and forward-thinking traits refers to project managers' ability to describe different future scenarios and anticipate their outcomes which can influence their risk propensities and risky decisions. Moreover, Boussbaine (2014) introduced "scenario bias" as a construct influencing risk propensity defining it as the use of hypothetical scenarios in describing a situation prior to risk occurrence and anticipating its outcomes. Consequently, the above analysis can be used to support the test of hypothesis H1E where it was stated as follows: **H1E: there is no difference on rating conscientiousness traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H1E should be rejected where the ranking of conscientiousness traits was not similar by all respondents as shown in chapter 6 figure .25. However, C11- scale ranked as the 1st trait in terms of highest mean at all experience and position levels.

One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to emotionality personality traits at significance level of $p < 0.05$ with exception of C1-organization and C9-confirmation where there was a medium actual difference between the experience groups. This is normal since functional managers/administrator group tend to be more organized and prefer structured approach for taking risky decisions than consultant/engineer group. On the other hand, consultant/engineer group are more thorough than functional managers/administrator group when taking risky decisions since they examine different sources of evidence when taking risky decisions due to their technical expertise and background. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to conscientiousness personality at significance level of $p < 0.05$. Hence, these results can be used to support the test of hypothesis H2E where it was stated as follows: **H2E: demographic factors will influence respondents' mean rating of conscientiousness traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H2E should be accepted for C1-organization and C9-confirmation traits where there was statistically significant difference between respondents' opinions on C1-organization and C9-confirmation traits influence on their risky decisions based on position. However, hypothesis H2E should be rejected for all remaining conscientiousness traits where there was no significant difference between respondents' opinions regarding all other conscientiousness traits influence on their risky decisions based on position or experience level. Table 11.5 summarizes ANOVA results for conscientiousness traits based position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of conscientiousness traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on conscientiousness traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There was medium significant difference between respondents' opinions regarding C1-organization and C9-confirmation based on position. • There was no significant differences between respondents' opinions regarding all remaining conscientiousness traits based on position or project experience level.
Researcher's observation	• The results demonstrated that functional managers/administrators group are more organized than consultants/engineer group when taking risky decisions where they prefer a structured approach for taking risky decisions due to having border lines of authorities within their organization. • The results demonstrated that consultants/engineer group are more thorough than functional managers/administrators group when taking risky decisions where they look at reasonable sources of evidence when taking risky decisions due to their technical expertise and background.
Conclusion	The null hypothesis was accepted for trait: C1-organization and ($p<0.05$ where $p=0.043$) and C9-confirmation ($p<0.05$ where $p=0.039$). The null hypothesis was rejected for all conscientiousness traits: C2, C3, C4, C5, C6, C7, C8, C10, C11, C12, C13, C14, C15, C15, C16 and C18.

Table 11.5: ANOVA for conscientiousness traits based on position and experience.

11.3.6 Openness to experience cluster

Within the openness to experience personality traits cluster; O1- inquisitiveness ranked as the 1st trait in terms of highest mean for the following groups: project manager position, functional manager/administrator position, and experience of 8-19 years group. Whereas, O2-creativity ranked as the 1st trait in terms of highest mean for the following groups: consultant/engineer position, experience of 0-7 years group and experience of 20+ years group. However, O1-inquisitiveness ranked as 13th among the overall 65 personality traits while O2-creativity ranked as 15th. Hence, O1- inquisitiveness and O2-creativity is considered by respondents' as important personality traits that can influence project managers' risky decisions in projects. Moreover, project managers with high inquisitiveness might have higher tendency to take risky decisions in their projects that might impact one of the project success criteria where they like to explore and challenge themselves. This is line with the literature review in chapter 4, where inquisitiveness was mentioned as a facet of novelty-seeking trait by DeFruyt et al. (2000) where project managers with high inquisitiveness trait tend to explore new ventures when taking risky decisions without worrying about the consequences. Also, project managers' with high creativity might have higher tendency to take risky decisions where they prefer to seek new solutions for problems to experiment new outcomes (Lee & Ashton 2004). Consequently, the above analysis can be used to support the test of hypothesis H1F where it was stated as follows: **H1F: there is no difference on rating openness to experience traits by respondents' in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H1F should be accepted where the ranking of openness to experience traits was almost similar by all respondents as shown in chapter 6 figure

.27. Also, O1- inquisitiveness and O2-creativity traits ranked as the 1st and 2nd traits in terms of highest mean by almost all levels of experience and positions groups.

One Way Analysis of Variance (ANOVA) results showed insignificant statistical difference between position groups and their mean scores in relation to emotionality personality traits at significance level of $p < 0.05$ with exception of O2-creativity where there was a medium actual difference between the experience groups. This is normal since functional managers/administrators group are inclined to look for creative risk response more than consultant/engineer group since due to their access to more resources and networking options within organization. Furthermore, ANOVA results showed insignificant difference between experience groups and their mean scores in relation to openness to experience personality at significance level of $p < 0.05$ with exception of O6-liberaism where there was a small actual difference between the experience groups. This is normal since project managers' with high years of project experience tend to be more liberal than project managers' with less project experience since they believe that there is no absolute right or wrong risky decisions. Hence, these results can be used to support the test of hypothesis H2F where it was stated as follows: **H2F: demographic factors will influence respondents' mean rating of openness to experience traits in relation to their tendency of taking risky decisions (risk propensity) influencing project success criteria (scope, time and cost).** Therefore, hypothesis H2F should be accepted for O2-creativity and O6-liberalism where there was statistically significant difference between respondents' opinions on O2-creativity and O6-liberalism traits influence on their risky decisions based on experience. However, hypothesis H2F should be rejected for all remaining openness to experience traits where there was no significant difference between respondents' opinions regarding all other openness to experience traits influence on their risky decisions based on position or experience level. Table 11.6 summarizes ANOVA results for openness to experience traits based position and project experience groups.

Research question	Is there a difference between respondents' opinions regarding the influence of openness to experience traits on their risky decisions based on "position" and their "experience level"?
Hypothesis	Null hypothesis: Ha_0 (at level of $p<0.05$): there is statistically significant difference between respondents' opinions on openness to experience traits influence on their risky decisions based on "position" and "experience level".
Results	The ANOVA results indicated that: • There was medium significant difference between respondents' opinions regarding O2-creativity based on position and O6-liberalism based on experience level. • There was no significant differences between respondents' opinions regarding all remaining openness to experience traits based on position or project experience level.
Researcher's observation	• The results demonstrated that functional managers/administrators group are more creative than consultants/engineers when taking risky decisions where they look for creative risk response strategies due to their access to more resources and networking options within organization. • The results demonstrated that respondents' with 8-19 years of project experience are more liberal than those with 0-7 years of project experience. This is normal as respondents' with higher project experience tend to believe that there is no absolute right or wrong risky decisions while those with less project experience are more inclined to look at risky decisions as being either right or wrong.
Conclusion	The null hypothesis was accepted for trait: O2-creativity and ($p<0.05$ where $p=0.032$) and O6-liberalism ($p<0.05$ where $p=0.039$). The null hypothesis was rejected for all openness to experience traits: O1, O3, O4, O5 and O7.

Table 11.6: ANOVA for openness to experience traits based on position and experience.

11.4 Correlation and regression analyses

What is the association between project managers' personality traits and risk propensity constructs?

Correlation tests were performed on the collected survey data to inspect the relationship strength and direction between project managers' personality traits and their general risk propensity as well as their risk propensity in relation to project success criteria (scope, time and cost). Furthermore, correlation results were used as basis for performing multiple and logistic regression tests to further explore the relationships between project managers' personality traits and their risk propensity. Specifically, regressions tests showed how project managers' personality traits can be used to predict their general risk propensity and that in relation to project success criteria; i.e. their tendency to take or avoid risky decisions in relation to project success criteria (scope, time and cost). Below are the discussions of the correlation and multiple regressions results as per personality traits clusters.

11.4.1 Honesty/humility cluster

Only two traits from the honesty/humility cluster had significant positive correlation with project managers' risk propensity. Specifically, H1-sincerity trait had small positive correlation with project managers' risk propensity related to general domain (at significance level of $p<.01$) and small positive correlation with project managers' risk propensity in relation to cost domain (at significance level of $p<.05$). This in line with literature review in chapter 4, where Ashton & Lee (2008) argued that sincerity trait -which is a facet of honesty/humility traits cluster- is positively associated with risky behaviours. Also, Blair (2007) reported that project managers' with low honesty/humility tend to adopt higher risk propensity level. Similarly, the results of the structure dependency network analysis emphasized the importance of H1-sincerity trait where it was ranked among the top five influential traits among all project success criteria (surprisingly it ranked first in almost all project success criteria).Thus, project managers' with high H1-sinceirty trait have general tendency to take risky decisions and specific tendency to take risky decisions related to project cost where they do not seek others' approval on their risky decisions. Furthermore, H6-amiability trait had a small positive correlation with project managers' risk propensity related to cost domain (at significance level of $p<.05$); in which project managers' with high levels of amiability have tendency to show friendless towards others' who might oppose their risky decisions related to cost domain. According to Thompson (2008), amiability is associated with agreeableness traits where individuals' with high amiability are cooperative and considerate to others. Thus, project managers' with high amiability might have low tendency to take risky decisions where they show friendliness and might back off if others' oppose their risky decisions without feeling offended. At the same time, high amiable project managers might be influenced by others and accept their risky decisions without opposing them. Additionally, multiple regression results showed that both H1-sincerity and H6-amibaility traits can be used to explain significant amount (almost 7% at significance level of $p<.01$) of the variance in project managers' risk propensity related to cost domain where regression model was: **Risk propensity related to cost domain = 1.65+0.213H1+0.303H6.** Moreover, H1-sincerity can be used to explain significant amount (almost 6% at significance level of $p<.01$) of the variance in project managers' general risk propensity where regression model was: **Risk propensity related to**

general domain = 3.31+0.219H1. Table 11.7 summarizes the multiple regression results for honesty/humility traits.

	Regression models (Risk propensity in relation to project success criteria domain)								
	Scope		**Time**		**Cost** $R^{2\ adjusted}$ =0.073 Sig. = 0.008		**General** $R^{2\ adjusted}$ =0.056 Sig. = 0.009		
Contributing honesty/humility traits to project managers' risky decisions.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	**Hypotheses support (yes, no, or partially)**
H1-sincerity					0.193	0.048	0.256	0.009	Yes, for risk propensity related to cost and general domains.
H2-fairness									No
H3-greed avoidance									No
H4-modesty									No
H5-kindness									No
H6-amiability					0.204	0.037			Yes, for risk propensity related to cost domain.
H7-hindsight									No
H8-competitve									No

Table 11.7: Regression for honesty/humility traits.

Consequently, the above analysis can be used to test hypothesis H3A where it was stated as follows: **H3A: honesty/humility traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and**

cost). Therefore, hypothesis H3A should be accepted for H1-sincerity trait in relation to cost and general domains and also for H6-amibaility trait in relation to cost domain. However, it should be rejected for all remaining honesty/humility traits in relation to all domains. Additionally, regression analyses showed that demographic variables did not affect the relationship between honesty/humility traits and project managers' risk propensity (results are provided in chapter 9; figures 1 and 2). Consequently, the above analysis can be used to test hypothesis H4A where it was stated as follows: **H4A: demographic factors will have an influence on the relationship between honesty/humility traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Thus, hypothesis H4A should be rejected for all demographic variables in all domains.

11.4.2 Emotionality cluster

Three emotionality traits (E2-anxiety, E3-dependence and E10-harm avoidance) had insignificant negative correlation with project managers' general risk propensity. Project managers' with low levels of anxiety might have high risk propensity where they tend to take risky decisions since they do not worry a lot about the consequences of their risky decisions. This is consistent with literature review in chapter 4, where Passer et al. (2009) mentioned that individuals' with low neuroticism and anxiety levels are more capable of taking risky decisions due to possessing the traits of calmness and steadiness. Also, project managers' with low level of dependence are more inclined to have higher risk propensity where they tend to take risky decisions due to their feeling of being independent and not needing emotional support from others when taking risky decisions. According to Lee & Ashton (2008), individuals' with low dependence trait feel more assured and able to deal with risks without the help of others.

Additionally, project managers' with low harm-avoidance might have high risk propensity since they do not try to avoid causes of harm to their project objectives or unpleasantness that might occur as result of their risky decisions. Furthermore, Cheung (2007) suggested that individuals' with low harm-avoidance are less suspicious and dreadful of their risky decisions outcomes. Furthermore, E3-dependence trait had a significant negative correlation with project managers' risk propensity related to time domain (at significance level of $p<.05$) and cost domain (at significance level of $p<.01$). Therefore, project managers' with high dependence level might have low risk propensity where they need emotional support from other project stakeholders when taking risky decisions that might impact project time and cost. Additionally, multiple regression results showed that E2-anxiety, E3-dependence and E10-harm avoidance traits can be used to explain significant amount (almost 8% at significance level of $p<.01$) of the variance in project managers' general risk propensity where regression model was: **Risk propensity related to general domain = 5.62-0.157E2-0.177E3-0.156E10.** Moreover, E3-dependence can be used to explain significant amount (almost 4% at significance level of $p<.01$) of the variance in project managers' risk propensity related to time domain where regression model was: **Risk propensity related to time domain = 4.57-0.25E3.** Also, E3-dependence can be used to explain significant amount (almost 12% at significance level of $p<.01$) of the variance in project managers' risk attitude related to cost domain where regression model was:

Risk propensity related to cost domain = 5.10-0.468E3. Table 11.8 summarizes the multiple regression results for emotionality traits.

	Regression models (Risk propensity in relation to project success criteria domain)								
	Scope		**Time** $R^{2\ \text{adjusted}}$ =0.03 Sig. = 0.043		**Cost** $R^{2\ \text{adjusted}}$ =0.116 Sig. = 0.000		**General** $R^{2\ \text{adjusted}}$ =0.082 Sig. = 0.009		
Contributing emotionality traits to project managers' risky decisions.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	**Hypotheses support (yes, no, or partially)**
E1-fearfulness									No
E2-anxiety							-.165	0.093	No
E3-dependence			-.200	0.043	-.353	0.00	-0.173	0.085	Yes, for risk propensity related to time and cost domains.
E4-sentimentality									No
E5-anger									No
E6-depression									No
E7-self-conscientiousness									No
E8-impluse control									No
E9-vulnreability									No
E10-harm avoidance							-0.171	0.081	No
E11-cognitive dissonance									No
E12-expetced emotions									No
E13-high benefits									No

Table 11.8: Regression for emotionality traits.

Consequently, the above analysis can be used to test hypothesis H3B where it was stated as follows: **H3B: emotionality traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and**

cost). Therefore, hypothesis H3B should be accepted for emotionality trait E3-dependence in relation to time and cost domains. However, it should be rejected for all remaining emotionality traits in relation to all domains. Additionally, regression analyses showed that demographic variables of age and organization size did affect the relationship between E3-dependence and project managers' risk propensity related to cost domain (results are provided in chapter 9; figures 3,4 and 5). Consequently, this finding can be used to test hypothesis H4B where it was stated as follows: **H4B: demographic factors will have an influence on the relationship between emotionality traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Thus, hypothesis H4B should be accepted for demographic variables of age and organization size in relation to cost domain and rejected for all remaining demographic variables in all domains.

11.4.3 Extraversion cluster

Four extraversion traits (X1-expressivness, X4-liveliness, X5-assertiveness and X7-cheerfulness) had significant positive correlation with project managers' risk propensity related to scope domain. Project managers' with high expressiveness trait level tend to be passionate and intense in communicating with others resulting in being comfortable when taking risky decisions related to project scope. This is due to seeking input from other project stakeholders and communicating effectively with them the consequences of risky decisions related to project scope. According to Muller & Turner (2010), project managers spend more time in communicating and expressing their views to project stakeholders. Also, project managers' with high liveliness level indicate having high energy and excitements about trying new ideas; hence they will be excited to see the outcomes of their risky decisions related to scope (Lee & Ashton 2008). Moreover, high level of assertiveness indicate having tendency to take risky decisions where project managers' with high assertiveness are inclined to be social forceful in their expressions and actions and might tend to force their risky decisions upon others. To emphasize, Ashton et al. (2002) argued that assertive individuals tend to take risky decisions to attract attention and for the purpose of getting rewarded. Similarly, project managers' with high cheerfulness level tend to experience positive emotions when thinking and taking risky decisions making them more of risk-seekers. Moreover, Isen (2000) pointed out the relationship between cheerfulness and productivity where cheerful individuals' expect positive outcomes from their decisions. Moreover, X1-expressivness and X2-social boldness had a significant positive correlation with project managers' general risk propensity (at both significance levels of $p<.05$ and $p<.01$). Project managers' with high expressiveness trait level tend to be passionate and intense in communicating with others resulting in being comfortable when making general risky decisions because they seek input from other project stakeholders and communicate effectively with them the consequences of their risky decisions. Also, project managers with high levels of social boldness tend to feel comfortable taking risky decisions in front of project stakeholders because of their high self-confidence in their abilities to make sound the right risky decisions. According to Regan (2005), high levels of boldness individuals' boldness implies willingness to get things done despite risks. Similarly, Lee & Ashton (2008) pointed out that individuals' with high social boldness are more willing to approach risks and take risky decisions. Additionally, multiple regression results showed that X1-expressiveness, X4-liveliness, X5-assertivenss, and X7-cheerfulness explain significant amount of the variance in risk propensity related to scope domain (almost 12% at significance level of $p<.01$) where regression model was: **Risk propensity related to scope**

domain = 0.154+0.218X1+0.147X4+0.351 X5+0.213 X7. Moreover, X1-expressivness and X2-social boldness can be used to explain significant amount (almost 4% at significance level of $p<.01$) of the variance in project managers' general risk propensity where regression model was: **Risk propensity related to general domain = 2.330+0.192X1+0.247X2**. Table 11.9 summarizes the multiple regression results for extraversion traits.

	Regression models (**Risk propensity in relation to project success criteria domain**)								
	Scope $R^{2\ adjusted}=0.115$ Sig. = 0.003		**Time**		**Cost**		**General** $R^{2\ adjusted}=0.073$ Sig. = 0.008		
Contributing extraversion traits to project managers' risky decisions.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	**Hypotheses support (yes, no, or partially)**
X1-expressivness	0.138	0.178					0.147	0.141	No
X2-social boldness							0.228	0.023	Yes, for risk propensity related to general domain.
X3-sociability									No
X4-liveliness	0.101	0.304							No
X5-assertivenss	0.205	0.044							Yes, for risk propensity related to scope domain.
X6-excitmenet seeking									No
X7-cheerfulness	0.158	0.099							No
X8-optimisim									No
X9-confidence									No
X10-halo effect									No
X11-framing									No

Table 11.9: Regression summary for extraversion traits.

Consequently, the above analysis can be used to test hypothesis H3C where it was stated as follows: **H3C: extraversion traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Therefore, hypothesis H3C should be accepted for X2-social boldness in general domain and X5-assertivenss in scope domain. However, it should be rejected for all remaining extraversion traits in relation to all domains. Additionally, regression analyses showed that demographic variables did not affect the relationship between extraversion traits and project managers' risk propensity (results are provided in chapter 9; figures 6 and 7). Consequently, this finding can be used to test hypothesis H4C where it was stated as follows: **H4C: demographic factors will have an influence on the relationship between extraversion traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Thus, hypothesis H4C should be rejected for demographic variables in all domains.

11.4.4 Agreeableness cluster

Correlation tests between agreeableness traits cluster and project managers' risk propensity showed no significant correlation at all significance levels (0.01 or 0.05). Hence, there was no multiple regression analyses done between agreeableness traits cluster and project managers' risk propensity since multiple regression was only performed based on significant correlation between project managers' personality traits and their risk propensity. Consequently, this finding can be used to test hypothesis H3D where it was stated as follows: **H3D: agreeableness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Therefore, hypothesis H3D should be rejected for all agreeableness traits. Also, this finding can be used to test hypothesis H4D where it was stated as follows: **H4D: demographic factors will have an influence on the relationship between agreeableness traits and project managers' tendency to take risky**

decisions (risk propensity) in relation to project success criteria (scope, time and cost). Thus, hypothesis H4D should be rejected for all demographic variables in all domains.

11.4.5 Conscientiousness cluster

Seven of the conscientiousness traits cluster had positive correlation with project managers' risk propensity related to scope domain (at both significance levels 0.05 and 0.01). Furthermore, there was medium positive correlation between C5-comptence and C18-redundant inputs with project managers' risk propensity related to scope. Whereas, there was small positive correlation between C4-prudence, C7-self-discipline, C9-confirmation, C14- forward-thinking and C16-chain processes traits. Project managers' with high level of competence tend to take risky decisions related to project scope where they depend on their knowledge and abilities to make appropriate risky decisions. According to Krueger et al. (1994), individuals' who perceive themselves as being competent at decision taking saw more opportunities in risky decisions and are willing to take more risks. Also, high levels of redundant inputs tend to be affiliated with higher level of taking risky decisions since project managers' with high level of redundant inputs will make sure to map their risk decisions consequences from several inputs before taking risky decisions that might affect project scope. According to Lioyd's (2010), individuals' can be easily convinced by redundant inputs variables, especially in cases where data trends signify certain risky decisions outcomes. Also, project managers' with high levels of prudence trait take risky decisions after considering their options carefully where they tend to be cautious and self-controlled when taking risky decisions related to project scope. (Lee & Ashton 2008). Similarly, project managers' with high self-discipline will go straight forward for discussing their risky decisions in relation to project scope without hesitation or wasting time. Furthermore, Fowers

(2008) pointed out that individuals' with high self-discipline determine the best course of action regardless of their personal desires. Also, project managers' with high confirmation trait will take risky decisions where they look at reasonable sources of evidence when taking risky decisions related to project scope. This aligns with literature review in chapter 2, where confirmation trait refers to individuals' pursuing supportive evidence for confirming their rationale and beliefs; and ignoring all evidence that contradicts their rationale (Boussabaine 2014). Moreover, Yudkowsky (2006) pointed out that individuals with confirmation trait apply their skills in a selective manner which allow them to select evidence that fit their risk appetite. Moreover, project managers' with high forward-thinking trait will take risky decisions related to project scope because it allow for achievement of long term objectives. Additionally, forward-thinking traits refers to project managers' ability to describe different future scenarios and anticipate their outcomes which can influence their risk propensity and risky decisions. Moreover, Boussabaine (2014) introduced scenario bias trait which relates to forward-thinking trait as a construct influencing risk propensity defining it as the use of hypothetical scenarios in describing a situation prior to risk occurrence and anticipating its outcomes. Also, project managers' with high chain processes trait might tend to take risky decisions related to project scope because they examine the interaction between all contextual variables before taking risky decisions. According to Boussabaine (2014), chain processes as a trait refers to individual's ability to recognize the interaction between all factors causing risks and affecting risky decisions. It is interesting that four of the conscientiousness traits that had positive correlation with project managers' risk propensity related to scope domain were also ranked by survey respondents' among the top 15 important traits that influence their risky decisions. The traits were: C4-

prudence (3rd rank), C5 - competence (10th rank), C9 - confirmation (4th rank), and C14- forward-thinking. Additionally, three conscientiousness traits (C8-avialibility, C14-forward-thinking and C18-redundant inputs) had positive correlation with project managers' general risk propensity (at significance level of 0.01). Therefore, project managers' with high level of availability trait tend to take risky decisions based on their past experiences. Also, high levels of redundant inputs tend to be affiliated with higher level of taking risky decisions since project managers' with high level of redundant inputs will make sure to map their risk decisions consequences from several inputs before taking risky decisions that might project outcomes. Moreover, project managers' with high forward-thinking trait will take risky decisions related to project success criteria because it allow for achievement of project long term objectives. Also, there was positive correlation between C4-prudence and project managers' propensity related to time domain where project managers' with high prudence tend to take risky decisions related to project time carefully after examining all their options. The cross referencing between these traits and literature review was done in the above paragraphs. Additionally, multiple regression results showed that C4-prudence, C5-comptence, C7-self-discpline, C9-confirmation, C14-forward-thinking , C16-chain processes and C18-redundant inputs explain significant amount of the variance in project managers' risk attitude related to scope domain where (almost 16% at significance level of $p<.01$) where regression model was: **Risk propensity related to scope domain = -0.949+0.143C4+0.409C5+0.098C7+140C9+0.177C14-0.099C16+0.368C18**. Moreover, C8-availaibilty and C14-forward-thinking and C18-redundant inputs explain significant amount of the variance in project managers' general risk attitude where regression model was: **Risk propensity related to general domain = 1.793+0.224C8+0.16C14+0.18C18.** Also, C4-prudence explains significant amount of the variance in project managers' risk attitude related to time domain (almost 4% at significance level of p<.05) where regression model was: **Risk propensity related to time domain = 2.391+0.319C4.** Table 11.10 summarizes the multiple regression results for conscientiousness traits.

	Regression models (Risk propensity in relation to project success criteria domain)								
	Scope $R^{2\ adjusted}$ =0.164 Sig. = 0.001		**Time** $R^{2\ adjusted}$ =0.034 Sig. = 0.035		**Cost**		**General** $R^{2\ adjusted}$ =0.066 Sig. = 0.020		
Contributing conscientiousness traits to project managers' risky decisions.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	**Hypotheses support (yes, no, or partially)**
C1-organization									No
C2-diligence									No
C3-perfectionsim									No
C4-prudence	0.094	0.476	0.208	0.035					Yes, for risk propensity related to time.
C5-comptence	0.251	0.025							Yes, for risk propensity related to scope.
C6-achivement striving									No
C7-self discipline	0.071	0.503							No
C8-availability							0.161	0.128	No
C9-confirmation	0.083	0.0504							Partially, for risk propensity related to scope.
C10-familiarity									No
C11-scale									No
C12-consistent									No

C13-representativeness									No
C14-forward thinking	0.103	0.319					0.113	0.289	No
C15-estimating probabilities									No
C16-chain processes	-0.065	0.596							No
C17-scenario bias									No
C18-redundant inputs	0.279	0.026					0.166	0.092	Yes, for risk propensity related to scope.

Table 11.10: Regression summary for conscientiousness traits.

Consequently, the above analysis can be used to test hypothesis H3E where it was stated as follows: **H3E: conscientiousness traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Therefore, hypothesis H3E should be accepted for C4-prudence trait in relation to time domain and C5-comptence trait in relation to scope domain. Also, it should be partially accepted for C9-confirmation trait in relation to scope domain and accepted for C18-redundant inputs trait in relation to scope domain. However, it should be rejected for all remaining conscientiousness traits in relation to all domains. Additionally, regression analyses showed that perceived benefits affected the relationship between conscientiousness traits and project managers' risk propensity related to scope and time domains (results are provided in chapter 9; figures 8 and 9). Consequently, this finding can be used to test hypothesis H4E where it was stated as follows: **H4E: demographic factors will have an influence on the relationship between conscientiousness traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Thus, hypothesis H4E should be accepted for perceived benefits in relation to scope and time domains and rejected for all remaining demographic variables in all domains.

11.4.6 Openness to experience cluster

Three openness to experience traits had positive correlation with project managers' risk propensity in relation to scope domain (at significance levels of 0.05 and 0.01). Specifically, O2-creativity has a small positive correlation with project managers' risk propensity related to scope domain while O3- unconventionality and O5-intellect had medium positive correlation with project managers' risk propensity related to scope domain. Project managers' with high levels of creativity tend to look for creative response strategies when taking risky decisions related to project scope. This in line with literature review in chapter 4, where Lee & Ashton (2008) reported that individuals' with high creativity trait actively seek new solutions for their problems; which can be achieved through taking risky decisions. Furthermore, high levels of unconventionality make project managers' receptive to ideas that might seem strange or radical and thus might take risky decisions related to project scope. Moreover, McRae (2004) mentioned that individuals' with high unconventionality trait tend seek new experiences and challenges through making risky decisions. Furthermore, project manager's with high levels of intellect tends to like making complex risky decisions that might assist them in achieving their project scope. Furthermore, individuals' form their intellect through experience where they become more capable of making appropriate risky decisions as they accumulate more experience (Colman 2008). Additionally, O5-intellect had a small positive correlation with project managers' risk propensity in relation to time domain where they are inclined to take complex risky decisions that might allow them to deliver their project deadlines. Furthermore, O5-intellect trait has a medium positive correlation with project managers' general risk propensity while O7-variety-seeking trait has a small positive correlation with project managers' general risk propensity. Project managers' with high levels of variety-seeking trait tend to seek adventure through exploring variety of solutions when taking risky decisions on their projects. This is in line with literature review in chapter 4, where Cloninger et al. (1993) pointed out that individuals' with variety/novelty seeking trait tend to be more impulsive and excited when taking risky decisions. Also Roberti (2004) stated that individuals' with high variety seeking trait are inclined to participate in high stimulus activities that might require taking risky decisions. Additionally, multiple regression results showed that O2-creativity, O3- unconventionality and O5-intellect explain significant amount of the variance in project managers' risk attitude related to scope domain (almost 21% at significance level of p<.05) where regression model was: **Risk propensity related to scope domain = 1.04+0.11O2+0.24O3+0.45O5**. Moreover, O5-intellect explains significant amount of the variance in risk propensity related to time domain (almost 6% at significance level of p<.01) where regression model was: **Risk propensity related to time domain = 2.792+0.309O5.** Furthermore, O5-intellect and O7-varity-seeking explain significant amount of the variance in project managers' general risk attitude (almost 16% at significance level of p<.01) where regression model was: **Risk propensity related to general domain = 2.517+0.366O5+0.124O7**. However, the analysis shows that only O5-intellect significantly predict values of project managers' general risk propensity while O7-varity-seeking did not significantly predict values of project managers' general risk propensity. Table 11.11 summarizes the multiple regression results for openness to experience traits.

	Regression models **(Risk propensity in relation to project success criteria domain)**								
	Scope $R^{2\ adjusted}$ =0.208 Sig. = 0.000		**Time** $R^{2\ adjusted}$ =0.056 Sig. = 0.009		**Cost**		**General** $R^{2\ adjusted}$ =0.161 Sig. = 0.000		
Contributing openness to experience traits to project managers' risky decisions.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	**Hypotheses support (yes, no, or partially)**
O1- inquisitiveness									No
O2-creativity	0.072	0.462							No
O3-unconventionality	0.173	0.085							No
O4-imagination									Yes, for risk propensity related to time domain.
O5-inltellect	0.372	0.000	0.256	0.009			0.370	0.00	Yes, for risk propensity related to scope domain.
O6-liberalism									No
O7-variety seeking							0.133	0.156	No

Table 11.11: Regression summary for openness to experience traits.

Consequently, the above analysis can be used to test hypothesis H3E it was stated as follows:

H3F: openness to experience traits are associated with project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost). Therefore, hypothesis H3E should be accepted for O3-unconventionality and O5-intellect traits in relation to scope domain. While it should be accepted for O4-imagination trait in relation to time domain and O5-intellect trait in relation to general domain. However, it should be rejected for all remaining openness to experience traits in relation to all domains.

Additionally, regression analyses showed that demographic variables did not affect the relationship between openness to experience traits and project managers' risk propensity (results are provided in chapter 9; figures 11, 12 and 13). Consequently, the above analysis can be used to test hypothesis H4F where it was stated as follows: **H4F: demographic factors will have an influence on the relationship between openness to experience traits and project managers' tendency to take risky decisions (risk propensity) in relation to project success criteria (scope, time and cost).** Thus, hypothesis H4F should be rejected for all demographic variables in all domains. In summary, based on multiple regressions tests; only fourteen traits were significantly associated with project managers' risk propensity in relation to project success criteria domains. Table 11.12 lists all these traits where interestingly O5-intellect trait was significantly associated with project managers' risk propensity in all project success criteria domains.

Project Success Criteria Domain			
Scope	**Time**	**Cost**	**General**
X5-assertivenss	E3-dependence	H1-sincerity	H1-sincerity
C5-comptence	C4-prudence	H6-amiability	X2-social boldness
C9-confirmation	O5-inltellect	E3-dependence	O5-inltellect
C18-redundant inputs			
O5-inltellect			

Table 11.12: Summary of significantly associated traits with risk propensity.

11.5 Logistic regression

Logistic regression was performed to assess how well personality traits (predictor variables) explain or predict project managers' risk propensity description (categorical dependent variable: being carefree or careful). Furthermore, the logistic regression models had a higher percentage accuracy classification (PAC) than the SPSS baseline with the exception of models related to extraversion and openness to experience clusters where the percentage accuracy classification (PAC) was same as predicted by SPSS. Moreover, the logistic regression results identified the following significant personality traits that might influence in project managers' being careful (low risk propensity) or carefree (high risk propensity): H3-greed-avoidance, E12-expected emotions, X6-excitement-seeking, X11-framing, A7-altruism, A8-sympathy, C15-estimating probabilities, C17-scenario bias, O2-creativity , O5-intellect. Interestingly, three of these personality traits (H3-greed-avoidance, C17-scenario bias and O2-creativity) were also significant in ranking analysis in which they were ranked by project managers' as the most important traits influencing their risky decisions in relation to project success criteria (scope, time and cost) and were ranked as the 1st trait within their clusters. Also, two of these personality traits (O2-creativity and O5-intellect) were significant in correlation tests where they influenced project managers' risk propensity in relation to scope and time domains as well as their general risk propensity. Moreover, the (B) coefficient values of all the above traits ranged from positive to negative which indicates the relationship direction between the personality trait and the risk propensity description. Specifically, traits E12-expected emotions, X6-excitement-seeking, A8-sympathy and O5-intellect had a negative (B) coefficient where an increase in these traits scores resulted in project managers' describing themselves as being carefree person with high risk propensity. Moreover, it can be seen that project managers' with high expected emotions tend to take risky decisions so that they can find out how their outcome would make them feel. Also, project managers' with high excitement-seeking can act reckless and wildly when taking risky decisions for the purpose of exciting themselves. Furthermore, project managers' with high level of sympathy might tend to be seeking risk where they sympathize with other stakeholders. Also, project managers' with high level of intellect tend to like taking complex risky decisions resulting in being carefree person with high risk propensity. On the other hand, personality traits H3-greed-avoidance, X11-framing, A7-altruism, C15-estimating probabilities, C17-scenario bias and O2-creativity all had positive Beta coefficients where an increase in these traits scores resulted in project managers' describing themselves as being careful person with low risk propensity. Additionally, project managers' with high greed-avoidance tend not to take risky decisions for personal gains or for sake of pleasing others resulting in being careful person with low risk propensity. Furthermore, project managers' with high framing trait tend to frame risk problems in a neutral way making them more of a careful person with low risk propensity. Also, project managers' with high levels of altruism trait are inclined to provide comfort and support to others when taking risky decisions; which make them careful person with low risk propensity. Moreover, project managers' with high estimating probabilities trait are inclined to be more careful people where they use simple experimental method in estimating risk probabilities when taking risky decisions resulting in low risk propensity. Also, project managers' with high levels of scenario bias trait tend to be more careful when taking risky decisions where they cover broad range of possibilities resulting in low risk propensity level. Nevertheless, project managers' with high level of creativity trait described themselves as careful person which is strange since creative project managers tend to look for creative response strategies when taking risky decisions as was shown in correlation and multiple regression analysis. However, due to the limited cases in one of the categorical predictors; only 11 project managers' choose to describe themselves as carefree person while 92 project managers described themselves as careful person; the logistic regression analysis cannot be generalized on all project managers. In summary, based on logistic regression tests; only ten traits were significantly associated with project managers' risk propensity description. Table 11.13 lists these traits as per their association with carefree person (low risk propensity) and careful person (high risk propensity).

Risk Propensity Description	
Carefree Person **(high risk propensity)**	**Careful Person** **(low risk propensity)**
E12-expected emotions	H3-greed-avoidance
X6-excitement-seeking	X11-framing
A8-sympathy	A7-altruism
O5-intellect	C15-estimating probabilities
	C17-scenario bias
	O2-creativity

Table 11.13: Summary of traits associated with risk propensity description.

Hence, personality traits listed in table 11.3 could be used to predict project managers' risk propensity description; i.e. carefree person (with high risk propensity) or careful person (with low risk propensity). Consequently, describing project managers' risk propensity and predicting their tendency in taking or avoiding risky decisions will lead to effective selection of project managers so that project teams can have balanced group risk propensities and not be biased towards low risk propensity or high risk propensity.

11.6 Interdependency between research constructs

Domain mapping or research constructs complexity interaction is an emerging field, aided by the availability of large data and computing power. Furthermore, one of the most widely utilized methods in mapping is the use of social network analysis. Moreover, network maps symbolize the dynamic interaction between any problem building blocks. Additionally, network map is made up of nodes and lines between these nodes to represent the landscape of the represented dynamic problem. In this study, personality traits and projects success criteria aggregated network presents a general view of the interaction or interdependence between project managers' personality traits when taking risky decisions in relation to projects key outcomes. Also, network centrality measurers were used to visualise and assess how personality traits interact. Thus, analyses of dependency structural networks enabled better understanding of project managers' personality traits influence on their risk propensity and risky decisions related to project success criteria. Additionally, the analysis covered nine project success criteria whereas the research questionnaire covered only five project success. Furthermore, the extended researched project success criteria/domains were: resources, risk, and quality and stakeholder satisfaction. Table 11.14 summarizes of the most important five personality traits (1 being the most important) related to each project success criteria and to risk propensity (based on centrality measures ranking; i.e. degree, betweeness, closeness and eigenvector values):

	Scope	Time	Cost	Quality	Risk	Resources	Stakeholder Satisfaction	General Risk Propensity	Risk Propensity Description
1	H1-Sincereity	H1-Sincerity	H2-Fairness	H1-Sincerity	H1-Sincerity	H1-Sincerity	H1-Sincerity	H2-Fairness	H1-Sincerity
2	E7-Self-Consciousness	H2-Fairness	H1-Sincerity	E8-Impulse control	E7-Self-consciousness	E7-Self-consciousness	E7-Self-consciousness	H3-Greed Avoidance	H2-Fairness
3	E1-Fearfulness	E7-Self-consciousness	E7-Self-consciousness	H1-Fairness	H8-Competitive	H8-Competitive	H2-Fairness	H1-Sincerity	H3-Greed Avoidance
4	H2-Fairness	E8-Impulse control	E8-Impulse control	E7-Self-consciousness	E8-Impulse control	E8-Impulse control	H8-Competitive	E7-Self-consciousness	E7-Self-consciousness
5	H3-Greed-Avoidance	H3-Greed Avoidance	H3-Greed Avoidance	H8-Competitive	H2-Fairness	H2-Fairness	H3-Greed Avoidance	H6-Amiability	E4-Sentimentality

Table 11.14: Most important personality traits in each project success criteria ego network.

It can be concluded that the top five personality traits which have highest influence on each of the researched project success criteria network are almost the same. Specifically, the following traits ranked the highest in terms of centrality measures, i.e. highest influence on project success criteria: sincerity and fairness which ranked the highest on all domains. Therefore, the above results can be used to answer the major research question listed earlier in introduction chapter as follows: **RQ: how do project managers' personality traits influence their tendency to take risky decisions (risk propensity) in relation to project success criteria?** The traits listed in table 11.14 summarizes the most important traits that influence project managers' tendency to take risky decisions (risk propensity) in relation to each of the project success criteria domains. Following, is discussion of the most influential traits in each project success criteria domain and how they interact to influence project manager' risk propensity.

11.6.1 Scope domain

Two traits had the highest centrality measures values of degree, closeness, betweeness and eigenvector: E7-self-conscientiousness (related to emotionality cluster) and H1-sincerity (related to honesty/humility cluster). Additionally, self-conscientiousness trait relates to project manager's tendency to be hesitant and socially anxious when making risky decisions where they might be inclined not to be able to defend their risky decisions related to project scope. Whereas, sincerity trait relates to project manager's tendency not to please others to get their project scope risky decisions approved. The high centrality measures of E7-self-conscientiousness and H1-sincerity traits indicates their high influence over other project managers' traits within the scope ego network where they are almost located in the centre of the network. Hence, these two traits have the highest relations with other traits within the scope ego network where they have potential control over other traits and their influence can quickly reach other traits within the network. Moreover, the relationship between these two traits can be interpreted as project managers' with high sincerity are associated with having high self-conscientiousness in which they become more anxious when making risky decisions related to scope because they want to be genuinely relating to others and not pleasing them when taking risky decisions related to project scope . Hence, the self-conscientiousness and sincerity traits are considered the most important influential nodes (in terms of centrality measures) in the scope ego network. Therefore, there is a strong influence of project managers' self-conscientiousness and sincerity traits on their risk propensity related to scope. Furthermore, it can be seen from the network graph; that both E7-self-conscientiousness and H1-sincerity traits are in the positioned in the middle of the network. Moreover, these two personality traits can be considered as having the most control over all other traits in the network where they have the highest betweeness centrality values. Also, these two traits have the highest closeness centrality values which indicates their ability to influence all other traits in the scope ego network where they are the closest traits to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, these two traits has the highest eigenvector values indicating that they are the most two traits well associated with other connected traits.

11.6.2 Time domain

The H1-sincerity trait (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, betweeness and eigenvector. Additionally, sincerity trait relates to project manager's ability to genuinely relate to others and not pleasing stakeholders to get time domain risky decisions approved. The other three traits that ranked high in terms of centrality measures after H1-sincerity were: E8-impulse control, E7-self-consciousness and H2-fairness. Project managers' with high sincerity tend to be confident in their ability to defend their risky decisions (self-conscientiousness) where they try to control their desire (impulse-control) when making risky decisions related to time domain and to avoid being dishonest about the consequences of these decisions on the project time (fairness). Hence, H1-sincerity trait is considered the most important node (in terms of centrality measures) in the time ego network. Therefore, there is a strong influence of project managers' sincerity trait on their risk propensity related to time decision making. Furthermore, it can be seen from the network; that H1-sincerity trait is positioned very close to time node in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value. Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the time network where they it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

11.6.3 Cost domain

Four traits had the highest centrality measures values of degree, closeness, betweeness and eigenvector: E8- Impulse control (related to emotionality), E7-self-conscientiousness (related to emotionality cluster), H1-sincerity (related to honesty/humility cluster) and H2-fairness (related to honesty/humility cluster). Additionally, impulse control trait relates to project managers' tendency to keep their emotions under control when taking risky decisions related to project cost while low self-conscientiousness trait relates to project manager's tendency to be hesitant, socially anxious and not being able to defend their risky decisions related to project cost. On the other hand, sincerity trait relates to project manager's ability to genuinely relate to project stakeholders and not pleasing them at the expense of not taking risky decisions related to project cost. Whereas, fairness trait relates to project managers' following company rules no matter what are the consequences on their project cost. However, the relationship between these four traits can be interpreted as project managers' try to be genuine (sincerity) and follow company rules (fairness) when making risky decisions related to project cost; and thus they think thoroughly (impulse-control) and become anxious (self-conscientiousness) to show their fairness and sincerity. Hence, these four traits are considered the most important nodes (in terms of centrality measures) in the cost network. Therefore, there is a strong influence of project managers' impulse control, self-conscientiousness, and sincerity and fairness traits on their risk propensity related to cost. Furthermore, it can be seen from the cost ego network; that these four traits are in the positioned in the middle of the network and has the most control over all other traits in the network where they have the highest betweeness centrality values. Also, these four traits have the highest closeness centrality values which indicates their ability to influence all other traits in the cost network where they are the closest traits to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, these four traits has the highest eigenvector values indicating that they are the most traits well associated with other connected traits.

11.6.4 Quality domain

Two traits had the highest centrality measures values of degree, closeness, Betweeness and eigenvector: E8-impulse control (related to emotionality cluster) and H1-sincerity (related to honesty/humility cluster). Additionally, impulse control trait relates to project manager's tendency to keep their emotions under control taking risky decisions related to project quality. Whereas, sincerity trait relates to project manager's ability to be frank with project stakeholders and not pleasing them at expense of project quality. However, the relationship between these two can be interpreted where project managers' try to be frank and honest to stakeholders by controlling their personal emotions when making risky decisions related to quality. Hence, E8-impulse control and H1-sincerity are considered the most important nodes (in terms of centrality measures) in the quality network. Therefore, there is a strong influence of project managers' impulse control and sincerity traits on their risk propensity related to quality. Furthermore, it can be seen from the ego network ; that both traits are positioned in the middle of the network and that they have the most control over all other traits in the network where they have the highest betweeness centrality values (with the exception of E10-harm avoidance where it had the highest betweeness centrality value of 15.32; indicating that project managers' harm-avoidance trait-avoiding any causes that could cause harm to project objective- has the shortest paths with all other quality network nodes). Also, these two traits have the highest closeness centrality values which indicates their ability to influence all other traits in the quality network where they are the closest traits to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, these two traits has the highest eigenvector values indicating that they are the most two traits well associated with other connected traits.

11.6.5 Risk domain

H1-sincerity (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, Betweeness and eigenvector. Additionally, sincerity trait relates to project manager's ability to be genuine through taking appropriate risky decisions related to project risks; and not trying to avoid or seek risky decisions for the purpose of pleasing their project stakeholders. The other three traits that ranked high in terms of centrality measures after H1-sincerity were: E8-impulse control, H8-competitive and E7-self-consciousness. The relationship between these traits can be interpreted where project managers' try to demonstrate their competitiveness with others by taking risky decisions while keeping their emotions under control (impulse-control); which might result in them being socially anxious and feeling not being able to defend their risky decisions in front of project stakeholders (self-conscientiousness). Hence, H1-sincerity trait is considered the most important node (in terms of centrality measures) in the risk network. Therefore, there is a strong influence of project managers' sincerity trait on their risk propensity related to risk domain. Furthermore, it can be seen from the network graph; that

H1-sincerity trait is positioned very close to risk node in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value. Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the risk network where they it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

11.6.6 Resources domain

H1-sincerity (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, betweeness and eigenvector. Additionally, sincerity trait relates to project manager's ability to take risky decisions related to project resources without having to please their stakeholders. The trait that ranked high in terms of centrality measures after H1-sincerity was E7-self-consciousness where it relates to project managers' ability to defend their risky decisions related to project resources. The relationship between sincerity and self-consciousness traits could be interpreted where project managers' get socially anxious (self-conscientiousness) in their efforts to convince stakeholders about their risky decisions related to resources without the need to please them. Hence, H1-sincerity trait is considered the most important node (in terms of centrality measures) in the resources network. Therefore, there is a strong influence of project managers' sincerity trait on their risk propensity related to resources domain. Furthermore, it can be seen from the network graph; that H1-sincerity trait is positioned very close to resource node in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value.

Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the resource network where they it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

11.6.7 Stakeholders' satisfaction domain

H1-sincerity (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, betweeness and eigenvector. Additionally, sincerity trait relates to project manager's ability to genuinely relate to stakeholders by being frank and honest with them in communicating the consequences of the risky decisions on project objectives. The trait that ranked high in terms of centrality measures after H1-sincerity was E7-self-consciosuness. The relationship between these traits is clear where project managers' get socially anxious (self-conscientiousness) in their attempt to genuinely relate to stakeholders when making risky decisions (sincerity). Hence, H1-sincerity trait is considered the most important node (in terms of centrality measures) in the stakeholder satisfaction network. Therefore, there is a strong influence of project managers' sincerity trait on their risky decisions related to stakeholder satisfaction. Furthermore, it can be seen from the network graph; that H1-sincerity trait is positioned very close to stakeholder satisfaction node in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value. Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the stakeholder satisfaction network where it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

11.6.8 General risk propensity

H2-fairness (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, betweeness and eigenvector. Additionally, fairness trait relates to project manager's tendency to follow company rules and risk management methodologies when taking risky decisions on their projects. The traits that ranked high in terms of centrality measures after H2-fariness was: E7-self-consciousness, H1-sincerity and H3-greed-avoidance. The relationship between these traits could be interpreted where project managers' tend to be socially anxious (self-consciousness) in their efforts to be genuine and honest when discussing risky decisions consequences (sincerity) while avoiding any personal desires (greed-avoidance). Hence, H2-fariness trait is considered the most important node (in terms of centrality measures) in the general risk propensity network. Therefore, there is a strong influence of project managers' sincerity trait on their general risk propensity level. Furthermore, it can be seen from the network graph; that H2-fariness trait is positioned very close to general risk propensity node (labelled as RA) in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value. Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the general risk propensity network where they it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

11.6.9 Risk propensity description

H1-sincerity (related to honesty/humility cluster) has the highest centrality measures values of degree, closeness, betweeness and eigenvector. Additionally, sincerity trait relates to project manager's ability to being honest and frank to stakeholders when taking risky decisions. The traits that ranked high in terms of centrality measures after H1-sincerity were: E4-sentimentality, E7-self-consciosuness, H3-greed-avoidance and H2-fairness. The relationship between these traits could be interpreted where project managers' get socially anxious and hesitant in defending their risky decisions (self-conscientiousness) due to feeling stakeholders emotions (sentimentality) where they tend to show no interest in achieving personal desires (greed-avoidance) and follow company rules regardless of the consequences (fairness).

Hence, H1-sincerity trait is considered the most important node (in terms of centrality measures) in the risk propensity description network. Therefore, there is a strong influence of project managers' sincerity trait on their risk propensity description in being careful or carefree when taking making risky decisions in their projects. Furthermore, it can be seen from the network graph; that H1-sincerity trait is positioned very close to risk propensity description node in the middle of the network. Moreover, this personality trait has the most control over all other traits in the network where it has the highest betweeness centrality value. Also, it has the highest closeness centrality value which indicates its ability to influence all other traits in the risk propensity description network where they it is the closest trait to all other traits and can quickly and directly influence them without going through many intermediary traits nodes. Additionally, this trait has the highest eigenvector values indicating that it is the most trait that is well associated with other connected traits.

Furthermore, below are summary tables of networks combination plots with suggested fitted equation/ model and R-square values.

Project Success Criteria	**Degree and Closeness Equation**	**Coefficient of Determination (R- Squared)**
Scope	y = 0.0177x + 0.3948	0.9967
Time	y = 0.0131x + 0.4339	0.9866
Cost	y = 0.0162x + 0.424	0.996
Quality	y = 0.0146x + 0.4368	0.9934
Risk	y = 0.0165x + 0.4207	0.9865
Resources	y = 0.0219x + 0.4003	0.9861
Risk Propensity	y = 0.0247x + 0.3866	0.9904
Risk Attitude Description	y = 0.0243x + 0.3582	0.9948
Stakeholder Satisfaction	y = 0.0161x + 0.4073	0.9875

Table 11.15: Trend of degree and closeness equations.

Results in table 11.15 show a trend in the degree and closeness plot across all project success criterial; where the fitted regression line equation is a linear model with an R-squared value of 0.98 or above. Hence, the suggested model explains almost 99% of the variability of the response data around its mean. Also, the equations showed the relationship between degree centrality and closeness centrality. The former shows the number of trait nodes that are connected to the ego network trait of interest, e.g., time ego network. The later measure the influence of a trait node on the entire ego network; this will demonstrate how each trait is close to other traits and the influence that a trait may put on the entire ego network of interest. Furthermore, the equations showed the association between degree and closeness centrality measures for each of the ego networks (using linear regression where other forms of relationship were experimented with but didn't yield good results). Additionally, results showed that all the network exhibit positive linear relationship; where if degree increases; then closeness increases proportionally. However, this increase is minimal as demonstrated by the beta coefficient size in each of the equations. Thus, the results demonstrate there is dynamic interaction ongoing between traits and tendency to take risky decisions in relation to the project success criteria. Thus, these network exhibit noteworthy characteristics, high coefficient of determination and low beta values.

Project Success Criteria	Degree and Betweeness Equation	Coefficient of Determination (R- Squared)
Scope	y = 0.8065x - 10.304	0.78
Time	y = 0.6884x - 7.9571	0.6291
Cost	y = 0.7269x - 7.1971	0.7412
Quality	y = 0.8916x - 9.4499	0.744
Risk	y = 0.8199x - 8.9187	0.803
Resources	y = 0.5912x - 5.3781	0.6496
Risk Propensity	y = 0.4855x - 4.5959	0.4475
Risk Attitude Description	y = 0.6311x - 7.772	0.8133
Stakeholder Satisfaction	y = 0.5446x - 5.9291	0.7097

Table 11.16: Trend of degree and betweeness equations.

Results in table 11.16 show a trend in the degree and betweeness plot across all project success criterial; where the fitted regression line equation is a linear model with an R-squared value of 0.65 or above (with exception of risk propensity domain). Hence, the suggested model explains almost 65% of the variability of the response data around its mean. Furthermore, betweeness centrality in this research reflects the bridge role that a trait plays in the ego network of project success criteria. Moreover, the larger the trait betweeness; the more influence that this trait has over the interaction between other disconnected personality traits. Also, results showed the association between degree and betweeness centrality measures for each of the ego networks (using linear regression where other forms of relationship were experimented with but didn't yield good results). Moreover, results showed that all the networks exhibited positive linear relationship where if the degree increases; then closeness increases proportionally. Also, results showed steep slope which indicates a great rate of change between these measures. That is to say a change in the degree of centrality of any of the project success criteria will be matched by a great change in the influence of traits among each other. Hence, the results demonstrates the existence of volatile interaction ongoing between traits and tendency to take risky decisions in relation to the project success criteria. Thus, these networks exhibit noteworthy characteristics, high to moderate coefficient of determination and high beta values.

Project Success Criteria	Closeness and Betweeness Equation	Coefficient of Determination (R- Squared)
Scope	y = 45.956x - 28.564	0.7942
Time	y = 52.798x - 30.992	0.6481
Cost	y = 44.686x - 26.083	0.7373
Quality	y = 60.761x - 35.878	0.7388
Risk	y = 49.971x - 30.023	0.8225
Resources	y = 27.942x - 16.924	0.7089
Risk Propensity	y = 21.122x - 13.359	0.5226
Risk Attitude Description	y = 26.182x - 17.226	0.8287
Stakeholder Satisfaction	y = 34.027x - 19.858	0.7272

Table 11.17: Trend of closeness and betweeness equations.

Results in table 11.17 show a trend in the closeness and betweeness plot across all project success criterial; where the fitted regression line equation is a linear model with an R-squared value of 0.75 or above (with exception of risk propensity domain). Hence, the suggested model explains almost 98% of the variability of the response data around its mean.

Also, results showed the association between betweeness and closeness centrality measures for each of the ego networks (using linear regression where other forms of relationship were experimented with but didn't yield good results). Furthermore, results showed that all networks exhibited positive linear relationship where if the betweeness increases; then closeness increases proportionally. However, it is noticeable that intercept of the relationship was negative. Thus, these networks exhibited noteworthy characteristics, high to moderate coefficient of determination, high beta values and negative intercept.

11.7 Summary

There were many key findings in this chapter. First, research questions and relevant hypotheses were discussed in relation to analysis findings. Second, results of personality traits classifications and reliability showed that scales of personality traits and risk propensity had good degree of reliability between their items. Third, results of ranking analysis and hypotheses testing showed insignificant difference of project managers' mean ratings of personality traits in relation to their risk propensity and demographic factors. Fourth, results of multiple and logistic regressions were showed significant association between certain traits and project managers' risk propensity. Last, results from the interdependency analysis showed that certain traits are more influential (in terms of centrality measures) than others in specific project success criteria domains.

12 Chapter Twelve: Conclusions and Further Recommendations

12.1 Introduction

This chapter presents the conclusions drawn out from the research analysis and findings discussions in five parts. First, the robustness of the adopted research methodology will be presented. Second, the study objectives will be reviewed and linked to findings. Third, study limitations will be listed. Fourth, the study contribution to knowledge will be presented. Fifth, research ideas for future research in the field will be suggested.

12.2 Robustness of the research methodology

The researcher took into consideration the importance of selecting a suitable research and data collection methods and followed a formal research strategy as presented in chapter five. The study methodology was based on extensive literature review and survey. Furthermore, literature review was used to synthesize existing knowledge in order to identify gaps of knowledge in the proposed research area and to confirm research questions and objectives. Moreover, the material for the survey was compiled from literature review. Moreover, an on-line survey methodology was developed and administered to address the research questions and collect primary data on the influence of project managers' personality traits on their risk propensity in relation to project success criteria and domains. The collected data were checked for errors, completeness and consistency. Also, several robust statistical methods were used to prudently analyze and statistically test the research hypotheses. There were a number of strengths in the research methodology such as: selection and classification of personality traits, selection of survey respondents and methods used to analyze the data. In order to reduce any motivational or cognitive biases; the research questions and items were validated by academics and senior project experts to solicit their professional feedback. The feedback collected from academics and project experts during the pilot testing was used to refine the survey questions making it clearer and easy to understand by respondents. Finally, several statistical tools were deployed to analyze the survey results such as: descriptive statics, one way analysis of variance, correlation, multiple and logistic regression and dependency structural modeling. In conclusion, the research methodology strengths could be summarized in the following:

- The theoretical background of this research was developed on an extensive and systematic literature review. Also, the study combined traits from several personality models and other cognitive decision theories. However, there is no consensus in the literature to what exactly influence the personality of managers when taking risky decisions.
- The existing literature on personality traits neglected several cognitive traits related to risk propensity. It only considered generic traits that are related to human behaviour and emotions in general life context. However, trait theory states that traits as habitual patterns in relation to behaviour, emotion and cognitive thinking. Hence, this study added seventeen new cognitive traits and examined their influence on project managers' risk propensity in relation to different project domains.
- This study has expanded the exiting literature by incorporating a total of 30 new personality (that covers all three aspects of trait: behaviour, emotion and cognitive thinking) organized as below:

- Honesty/humility traits: kindness, amiability, hindsight and competitiveness.
- Emotionality: harm-avoidance, cognitive dissonance, expected emotions and high-benefits.
- Extraversion: cheerfulness, optimism, confidence, halo effect and framing.
- Agreeableness: morality and sympathy.
- Conscientiousness: availability, confirmation, familiarity, scale, consistent, representativeness, forward-thinking, estimating probabilities, chain-processes, scenario-bias and redundant-inputs.
- Openness to experience: imagination, intellect, liberalism and variety-seeking.

12.3 Accomplishing the research objectives

A. To investigate project management success criteria that can be influenced by project managers' risk propensity and risky decisions:

Project success criteria differs from one project to another because of the difference in project stakeholders expectations. Also, the study reaffirmed that the way project success is defined and the parties involved in evaluating project success will impact the final decision of whether to consider the project a success or a failure. Also, project success is dependent on the stakeholders' perspective and perception. Furthermore, the study underpinned the notion that there is no "absolute" project success but only what stakeholders perceive as project success. Additionally, this study confirmed that project success cannot be measured as a unidimensional variable but rather as a multidimensional variable whose definition is limited to a specific environment. Hence, this study reinforce the view that in order to examine how project managers' risk propensity influences their risky decisions related to project success; there is a need to identify project success areas or domains that are impacted mostly by project managers' risky decisions. The research observed that both objective and subjective criteria were used to measure project success. The study has also reaffirmed that objective criteria relates to hard and tangible measures that include: time, cost, health and safety and profitability. Similarly, subjective criteria can be referred to as soft and intangible measures which include: quality, technical performance, satisfaction, productivity and environmental sustainability. Moreover, the study selected the success criteria that have relevance to project managers' risky decisions. This criteria were used to study the influence of project managers' personality traits on their risk propensity in relation to different success criteria or project domains. Also, the research provided an in-depth analysis of personality traits and individual characteristics that influence project managers' risk propensity in relation to project success criteria. The results of the research contribute to our understanding in the following areas:

- Scope domain: the study established the traits influencing project managers' risk propensity in relation to scope domain are: assertiveness, competence, confirmation, redundant-inputs and intellect.
- Time domain: the analysis confirmed that traits influencing project managers' risk propensity in relation to time domain are: dependence, prudence and intellect.
- Cost domain: the study showed that traits influencing project managers' risk propensity in relation to cost domain are: sincerity, amiability and dependence.
- General domain: the analysis confirmed that traits influencing project managers' general risk propensity are: sincerity, social boldness and intellect.

The results confirmed that project managers' risk propensity is not stable across all project domains. Moreover, project managers' risk propensity vary depending on the project success criteria/domain that will be impacted by the project manager risky decision. Additionally, since the personality traits that influence project managers risk propensity are different in different project domains; then risk propensity will also be different. Hence, project domain may affect project managers risk propensity making it higher or lower.

B. To investigate the influence of project managers' personality traits on their risk propensity and risky decisions in relation to project success criteria:

Most researchers investigated individuals' risk propensity based on objective criteria related to expected-utility, perceived risk and perceived benefits. However, risk propensity is also influenced by the person's individual traits and characteristics. Many researchers emphasized the need for investigating the impact of individuals' personality traits on their risk propensity. However, it has always been challenging to discover the human personality structure and traits where there is still a need for having consensus on the basic personality traits that can be used to analyze personality influence and effect in different contexts. Also, risk propensity has been traditionally looked at as a one dimensional and stable variable across different contexts. Nevertheless, recent research in decision-making theories indicates that risk propensity could be considered as a domain-specific variable. It is almost impossible for project managers to collect all needed information that allow for taking the appropriate risky decisions related to project success criteria. Hence, project managers' will take their risky decisions based on available information and on their tendency to take risks, i.e. risk propensity. The research discussed in-depth the most common personality traits structures and presented comparison between the prospect and dispositional theories related to tendency to take risky decisions; i.e. risk propensity. Moreover, the dispositional theory emphasize the issue of risk propensity stability across various domains while the prospect theory emphasize the issue of risk propensity variability in different domains. In conclusion, this objective was achieved where research analyses showed clear influence of personality traits on project managers' risk propensity. The results derived from analysis of data expanded our understanding in relation to the following:

- Some personality traits will influence project managers risk propensity regardless of the project domain.
- The analysis established that the most influential traits on project managers' risk propensity in all project domains are: sincerity, fairness, impulse-control, greed-avoidance and self-conscientiousness.
- The study confirmed that the traits of sincerity, fairness and self-conscientiousness will influence project managers' risk propensity in relation to the following domains: scope, time, cost, quality, risk, resources, stakeholders' satisfaction, general risk propensity and risk propensity description.
- The study demonstrated that the trait of impulse-control will influence project managers' risk propensity in relation to the following domains: time, cost, quality, risk and resources.
- The research demonstrated that the trait of greed-avoidance will influence project managers' risk propensity in relation to the following domains: scope, time, cost, stakeholders' satisfaction, and general risk propensity and risk propensity description.

- The results are consistent with the dispositional trait theory mentioned in chapter two; that project managers' risk propensity might be stable across all project domains where project managers' might have the tendency to display consistent risk propensity levels across all project success criteria/domains. Additionally, since the top five personality traits that influence project managers risk propensity are the same across all investigated project domains; then project managers' risk propensity level might also be the same across all project domains.
- The findings of the dependency structural modelling suggest that project domain might not have large effect on project managers risk propensity levels.

C. To investigate the influence of project managers' demographic and individual characteristics on their risk propensity and risky decisions in relation to project success criteria:

The research demonstrated that risk propensity vary for persons with different socioeconomic individualities. Hence, the study investigated the impact of different individual and demographic factors that can act as moderator variables between project managers' personality traits and their risk propensity and risky decisions related to project success criteria. Furthermore, these variables were grouped as follows: demographic (such as: age, gender, education, nationality and dependents), work-related (seniority and managerial level) and organizational (such as: industry nature, government control, organizational size, organizational risk). Moreover, the research included the analysis of descriptive statistics related to the investigated individual characteristics as well as the data ranking of examined personality traits according to project managers' experience and position within their organization. Also, the study examined differences between respondents' mean answers according to their demographic and individual characteristics. Additionally, the research analyzed the individual characteristics that influence project managers' risk propensity and risky decisions in relation to project success criteria. In conclusion, this objective was achieved where research analyses showed that demographic and individual characteristics do not have large influence on project managers' risk propensity. Furthermore, the results of the study expanded our understanding of the association between the studied sample demographics and their traits and their risk propensities. The study confirmed the following:

- Age is associated with risk propensity in relation to scope and cost domains. The results confirmed that higher ages increase project managers' risk propensity in relation to scope and cost domains.
- Education is associated with general risk propensity. The results demonstrated that higher education increase project managers' general risk propensity where they feel more competent when taking risky decisions.
- Organization size is associated with risk propensity in relation to scope and cost domains. The results confirmed that project managers' risk propensity increase when they are working for small organizations and vice versa.
- The results demonstrated that all other demographics are not associated with project managers' risk propensity; such as: gender, dependents, nationality, project experience, and position and organization type.

- The results confirmed that project managers' position within their organization have small influence on the following traits: sincerity, fairness, expressiveness, organization, confirmation and creativity.
- The results showed that project managers' level of experience in managing projects have small influence on the following traits: vulnerability, optimism and liberalism.

12.4 Research limitations

The research was conducted within a specific time duration and within resources constraints. Hence, several limitations has been identified:

- Difficulty of accurately measuring certain personality traits related to project managers' risk propensity where some traits are related to cognitive biases.
- Generalizability issue as the study sample was based on selected number of individuals within specific industries. Hence, the study results cannot be generalized on all project managers' working in different industries. Although the number of respondents were comparable to other studies, it is not possible to claim that the findings represent the views of the majority of project managers' worldwide.
- The difficulty of extracting personality traits that only relates to risk propensity and risky decisions due to lack of research in this area of study.
- The proposed personality traits and risk propensity framework has been tested and presented to limited number of project managers' to validate. The robustness of the proposed framework could have been demonstrated through case studies related to

project managers’ risky decisions and their outcomes. However, the validation of the proposed framework can be considered for further research recommendation.

12.5 Knowledge contribution

This research has contributed to the existing body of knowledge in the following areas:

- A comprehensive literature review to identify project success criteria that could be influenced by project managers’ risk propensity and risky decisions. Additionally, most previous studies explored the topic of the individual’s risk propensity related to general domains such as: health, career, financial, safety and social. Nevertheless, there was no research that was conducted specifically on project managers’ risk propensity related to specific project domains. Hence, this research added to the existing knowledge by investigating project domain-specific risk propensity. Moreover, the research examined the influence of project managers’ risk propensity in relation to seven project domains: scope, time, cost, quality, risk, resources stakeholders’ satisfaction. It also investigated the influence of traits on project managers’ general risk propensity as well as on their risk propensity description; i.e. being carefree or careful project manager.
- A comprehensive literature review to identify personality traits that could influence project managers’ risk propensity and risky decisions. Hence, this research expanded existing knowledge by introducing thirty new personality traits related to project managers’ risk propensity where these traits were not investigated in previous

research and are not part of existing personality models. Out of the thirty new traits; there were seventeen traits related to cognitive biases and thinking.

- This study discovered a new way of clustering personality traits and cognitive biases that influence project managers' risk propensity and risky decisions.
- The study added to the existing literature by developing an integrated personality traits-risk propensity framework.
- The research suggested development of an assessment tool that could assess project managers' risk propensity -tendency to take or avoid risky decisions- based on their personality traits. Hence, the research outcomes can be used to design a self-assessment psychometric tool that can be used by practitioners in assessment and development centers to assess project managers' domain specific risk propensity. Therefore, coaching plans can be drafted for project managers to assist them in understanding and modifying their risk propensity levels according to project needs. Finally, the research outcomes can assist organizations in having a better match and fit between project managers' and their assigned projects based on their risk propensity levels; where project managers' risk propensity can be assessed against stakeholders' risk tolerance during risk planning phase.
- New analyses were used in investigating the influence of project managers' personality traits on project success criteria. Specifically, dependency structural modelling and network analysis were used for the first time in analyzing the most significant and important personality traits and their influence on project success criteria. Also, the dependency structural network analyses revealed certain network

patterns and trends between project managers' personality traits centrality measures and project domains. Moreover, these trends and patterns can repeat itself used in future research related to traits and risk propensity.

- The research addressed the issue of project managers' risk propensity stability and whether project managers' demonstrate consistent risk propensity when taking decisions related to different project domains. Hence, this research revealed that project managers' risk propensity cannot be claimed to be stable and consistent across all project domains. However, there are certain traits that are consistently appear to influence project managers' risk propensity across all project domains.
- The research investigated the interaction between various personal and situational factors as predictors of project managers' risk propensity. Consequently, the description of project managers' risk propensity and predicting how they might respond to project risks will lead to effective selection of project team members' so that project teams can have balanced group risk propensity and not be biased towards having either low or high risk propensity.

12.6 Recommendations for future research

The original contribution to knowledge listed above serves as a solid foundation on which to build further research in the area. Thus, this thesis has identified a number of areas that would benefit from further research:

- Further research needs to be done to refine the extracted project managers' personality traits that influence their risk propensity and risky decisions related to project success criteria. New identified personality traits and project success criteria can be added and analyzed.
- Further research needs to be done to test the proposed framework on cases studies. Although this might be difficult to achieve because of the confidentiality nature of project managers' risky decisions and its outcomes.
- Further research required to verify the correlation between project managers' personality traits and their risk propensity in relation to project success criteria.
- Further investigation is required to demonstrate the implementation and use of the proposed risk propensity tool and gather feedback from users for further improvements.
- Further research to verify how the proposed framework could be extended to include other factors and variables that could influence project managers' risk propensity in relation to project success criteria. Thus, future research is recommended in different industries and nations; on the influence of different human factors on risk propensity and considering other factors such as: group, organizational and situational factors.

13 References

Ashton, M. C., & Lee, K. (2008). The prediction of Honesty-Humility-related criteria by the HEXACO and Five-Factor Models of personality. *Journal of Research in Personality*, vol. 42, pp. 1216–1228.

Arks, H., Guilmette, T., Faust, D., Hart, K. (1988). Eliminating the hindsight bias. *Journal of Applied Psychology*, vol. 73 (2), pp. 305-307.

Acar, E. & Goc, Y. (2011). Prediction of risk perception by owners' psychological traits in small building contractors. *Construction Management and Economics*, vol. 29, pp. 841-852.

Ahmed, P.K. (1998). Culture and climate for innovation. *European Journal of Innovation Management*, vol. 1 (1), pp. 30–43.

Ajzen, I. & Madden, T.J. (1986). Prediction of goal-directed behaviour: attitudes, intentions, and perceived behavioural control. *J Exp. Soc. Psychol.*, vol. 22, pp. 453–74.

Ajzen, I. (1991). The theory of planned behaviour. *Organisational Behaviour and Human Decision Processes*, vol. 50, pp. 179–211.

Ajzen, I. (2002). Theory of Planned Behaviour. Retrieved from http:// www-unix.oit.umass.edu/_aizen/ on 20 November 2015.

Akintoye, A. (1994). Design and build: A survey of construction contractors' views. *Construction Management Economics*, vol.12 (2), pp. 155-163.

Alderman, N., & Ivory, C. (2011). Translation and convergence in projects: An organizational perspective on project success. *Project Management Journal*, vol.42 (5), pp. 17–30.

Allais, M. (1953). Rational human behaviour regarding risk: A critique of axioms of the American school. *Econometrica*, vol. 21, pp. 503-546.

Al-Meshekeh, H. S., & Langford, D. A. (1999). Conflict management and construction project effectiveness: A review of the literature and development of a theoretical framework. *Journal of Construction Procurement.*, vol.5 (1), pp. 58-75.

Anderson, C. & Galinsky, A. (2006). Power, optimism, and risk-taking. *European Journal of Social Psychology*, vol. 36, pp. 511–536.

Armitage, C.J. & Conner, M. (2001). Efficacy and the theory of planned behaviour: a meta analytic review. *British Journal of Social Psychology*, vol. 40, pp. 471–499.

Athanassoulis, N. & Ross, A. (2010). A virtue ethical account of making decisions about risk**.** *Journal of Risk Research***,** vol. 13 (2), pp. 217–230.

Atkinson, J.W. (1964). An introduction to motivation. New York: Van Nostrand.

Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, it is time to accept other success criteria. *International Journal of Project Management*, vol. 17 (6), pp. 337-342.

Aron, E., Aron, A. & Jagiellowicz, J. (2012). Sensory processing sensitivity: A review in the light of the evolution of biological responsivity. *Personality and Social Psychology Review,* vol. 16 (3), pp. 262–282.

Anderson, T.W. (2003). *An Introduction to Multivariate Statistical Analysis.* New York: John Wiley.

Anderson, D.R., Sweeney, D.J. & Williams, T.A. (1999). *Statistics for Business and Economics.* 7th edn. Cincinnati, OH: South-Western College Publishing.

Akintola, A. (2010). Analysis of factors influencing project cost estimating practice. *Construction Management and Economics,* vol. 18 (1), pp. 77-89.

Bryman, A. & Bell, E. (2015). *Business Research Methods. 4th edn*. UK: Oxford University Press.

Barratt, E. (1959). Anxiety and Impulsiveness Related to Psychomotor Efficiency. *Perceptual and Motor Skill*s, vol. 9 (3), pp. 191–198.

Bulik, C. M. (1997). Eating disorders and antecedent anxiety disorders: a controlled study. *Acta Psychiatrica Scandinavica*, vol. 96 (2), pp. 101–107.

Begley, T.M. & Boyd, D.P. (1986). Executive and corporate correlates of financial performance in smaller business firms. *Journal of Small Business Management*, vol. 24, pp. 8-15.

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology,* vol. 34 (10), pp. 2045–2068.

Baccarini, D. (1999). The logical framework method for defining project success. *Project Management Journal,* vol. 30 (4), pp. 25-32.

Bryman, A. (2012). *Social Research Methods*.4th edn. New York: Oxford University Press.

Burrell, G. and Morgan, G. (1982) *Sociological Paradigms and Organisational Analysis*. London: Heinemann.

Blair, R. J. R. (2007). The amygdala and ventromedial prefrontal cortex and morality and psychopathy. *TRENDS in Cognitive Sciences*, vol. 11, pp. 387–392.

Baird, I. S., & Thomas, H. (1985). Toward a contingency model of strategic risk taking. *Academy of Management Review,* vol. 10, pp. 230–243.

Baker, B. N., Murphy, D. C. & Fisher, D. (1983). *Factors affecting project success, in project management handbook*. NY: Van Nostrand.

Bandura, A. (1986). *Social foundations of thought and action*. NJ: Prentice-Hall.

Bannerman, P. L. (2008). Defining project success: A multilevel framework. In *Proceedings of the PMI research conference* (pp. 1–14). Newtown Square: Project Management Institute.

Barbosa, S. (2007). The role of cognitive style and risk preference on entrepreneurial self-efficacy and entrepreneurial intentions, *Journal of Leadership and Organizational Studies,* vol.13 (4).

Barrett, H. C., & Fiddick, L. (1999). Evolution and risky decisions. *Trends in Cognitive Sciences*, vol. 4, pp. 251-252.

Bass, B.M & Burger, P.C (1979). *Assessment of managers: An international comparison.* New York: Free Press.

Bednekoff, P. A. (1996). Risk-sensitive foraging, fitness, and life histories: Where does reproduction fit into the big picture? *American Zoologist*, vol. 36, pp. 471-483.

Berg, N., & Gigerenzer, G. (2010). As-if behavioural economics: Neoclassical economics in disguise? *History of Economic Ideas*, vol. 18, pp. 133-166.

Bernoulli, D. (1738). Exposition of a new theory on the measurement of risk. *Econometrica*, vol. 22, pp. 23-36.

Blais, A.-R., & Weber, E. U. (2006). A domain-specific risk-taking (DOSPERT) scale for adult populations. *Judgment and Decision Making*, vol.1, pp. 33–47.

Blaszczynski, A., Steel, Z., & McConaghy, N. (1997). Impulsivity in pathological gambling: The antisocial impulsivist. *Addiction*, vol. 92, pp. 75-87.

Boussabaine, H. (2014). *Risk Pricing Strategies for Public-Private Partnership Projects,* 1st Ed. Wiley: Blackwell.

Brandstatter, E. & Gussmack, M. (2013). The cognitive processes underlying risky choices. *Journal of Behavioural Decision Making,* vol. 26, pp. 185–197.

Brinkmann, J. (2013). Combining Risk and Responsibility Perspectives: First Steps.

Brockhaus, R. H. (1980). Risk-taking propensity of entrepreneurs. *Academy of Management Journal*, vol. *23*, pp. 509–520.

Brockman, B.K., Jones M.A. & Becherer, R.C. (2012). Customer orientation and performance in small firms: examining the moderating influence of risk-taking, innovativeness, and opportunity focus. *Journal of Small Business Management*, vol.50, pp. 429–446.

Bromiley, P. & Curley, S. P. (1992). *Individual differences in risk takin*g.New York: John Wiley.
Brooks, F. P., Jr. (1987). No silver bullet: Essence and accidents of software engineering. *Computer*, vol. 20 (4), pp. 10–19.

Bryde, D.J. & Volm, J.M. (2009). Perceptions of owners in German construction projects: congruence with project risk theory. *Construction Management and Economics* vol.27, pp. 1059–1071.

Bubshait, A. A. & Almohawis, S. A. (1994). Evaluating the general conditions of a construction contract. *International Journal of Project Management*, vol.12 (3), pp. 133-135.

Buchan, H. (2005). Ethical Decision-making in the Public Accounting Profession: An Extension of Ajzen's Theory of Planned Behaviour'. *Journal of Business Ethics*, vol. 61 (2), pp. 165-181.

Buss, D. M. (1995). Evolutionary psychology: A new paradigm for psychological science. *Psychological Inquiry*, vol. 6, pp. 1-49.

Buss, D. M. (2009). How can evolutionary psychology successfully explain personality and individual differences? *Perspectives on Psychological Science*, vol. 4, pp.359-366.

Buss, D. M., & Greiling, H. (1999). Adaptive individual differences. *Journal of Personality*, vol. 67, pp. 209-243.

Butler, G. & Matthews, A. (1987). Anticipatory anxiety and risk perception. *Cognitive Therapy and Research*, vol.11, pp. 551–565.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, vol. 125, pp. 367-383.

Bromiley, P. & Curley, S.P. (1992). *Individual differences in risk-taking.* UK: Wiley.

Bell, J. (2005). *Doing Your Research Project.* 4th edn.. Buckingham: Open University Press.

Berman Brown, R. and Saunders, M. (2008). *Dealing with statistics: What You Need to Know.* Maidenhead: McGraw-Hill Open University Press.

Blumberg, B., Cooper, D.R. & Schindler, D.S. (2008). *Business Research Methods.* Maidenhead: McGraw-Hill.

Blumberg, B., Cooper, D.R. & Schindler, D.S. (2008). *Business Research Methods.* Maidenhead: McGraw-Hill.

Bourque, L.B. & Clark, V.A. (1994). *Processing data: the survey example.* London: Sage.

Ballesteros, L. (2008). *What determines a disaster?* Pesos.

Bates, T.C. (2015). The glass is half full and half empty: A population-representative twin study testing if optimism and pessimism are distinct systems. *The journal of positive psychology*, vol. 10 (6), pp. 533-542.

Browning, T. R. (2001). Applying the Design Structure Matrix to System Decomposition and Integration Problems: A Review and New Directions. *IEEE Transactions on Engineering Management,* vol. 48, pp. 292-306.

Charlesraj, V., Maheswari, J., Kalidindi, S. &Varghese, K. (2004) Knowledge management for planning construction projects using dependency structure matrix. *Association of Researchers in Construction Management*, vol. 2, pp. 831-838.

Clark, K. & Clark, M. (1990). *Measures of leadership.* West Orange: NJ.

Colman, A. (2008). *A dictionary of psychology.4th edn.* Oxford: Oxford University Press.

Cohn, R.A., Lewellen, W.G., Lease, R.C. & Schlarbaum, G.G. (1975). Indiviudal investor risk aversion and investment portfolio composition. *Journal of Finance,* vol. 30, pp. 605-620.

Campbell, A. (1995). A few good men: Evolutionary psychology and female adolescent aggression. *Ethology and Sociobiology*, vol. 16, pp. 99-123.

Cao, Q., & Hoffman, J. J. (2011). A case study approach for developing a project performance evaluation system. *International Journal of Project Management,* vol.29 (2), pp.155–164.

Carpenter, T. & Reimers, J. (2005). Unethical and Fraudulent Financial Reporting: Applying the Theory of Planned Behaviour. *Journal of Business Ethics*, vol. 60 (2), pp. 115-129.

Chan, A., Scott, D. & Lam, E. (2002). Framework of success criteria for design/build projects. *Journal of Management in Engineering*, vol.18 (3), pp.120-128.

Chapman, C., Ward, S. & Harwood, I. (2006). Minimizing the effects of dysfunctional corporate culture in estimation and evaluation processes: A constructively simple approach. *International Journal of Project Management,* vol. 24 (2), pp. 106-115.

Churchill, G.A. Jr. (1979). A Paradigm for Developing Better Measures of Marketing Constructs. *Journal of Marketing Research,* vol.16, pp.64-73.

Collins, A. & Baccarini, D. (2004). Project Success: A Survey. *Journal of Construction Research*, vol.5 (2), pp. 211-231.

Conner, M. & Sparks, P. (2005).Theory of planned behaviour and health behaviour. Mainhead: Open University Press.

Carr, W. (2006).Philosophy, methodology and action. *Journal of Philosophy of Education*, vol. 40 (4), pp. 421-434.

Cook, M., Young, A., Taylor, D. & Bedford, A. P. (1998). Personality correlates of alcohol consumption. *Personality and Individual Differences,* vol.24, pp. 641–647.

Cooper, M. L. (2010). Toward a Person X Situation Model of Sexual Risk-Taking Behaviour: Illuminating the Conditional Effects of Traits Across Sexual Situations and Relationship Contexts. *Journal of Personality and Social Psychology*, vol. 98 (2), pp. 319–341.

Corsini, R. J., & Osaki, B. D. (1984). *Encyclopedia of psychology*. New York: Wiley.

Crawford, L., Pollack, J. & England, D. (2006). Uncovering the trends in project management: journal emphases over the last 10 years. *International Journal of Project Management, vol.* 24, pp. 175–84.

Cubitt, R., Starmer, C., & Sugden, R. (2001). Discovered preferences and the experimental evidence of violations of expected utility theory. *Journal of Economic Methodology*, vol. 8, pp. 385-414.

Cummings, L.L., Harnett, D.L. & Stevens, O.J. (1977). Risk, fate, conciliation, and trust: An international study of attitudinal differences among executives. *Academy of Management Journal*, vol. 14, pp. 285-304.

Costa, P. T. & McCrae, R. R. (1992). *NEO personality Inventory professional manual*. FL: Psychological Assessment Resources.

Cattell, H. & Mead, A. (2008).*The Sixteen Personality Factor Questionnaire (16PF).* The SAGE Handbook of Personality Theory and Assessment.

Collis, J. & Hussey, R. (2003). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*. Hampshire: Palgrave Macmillan.

Cloninger, C.R., Svrakic, D.M. & Przybeck, T.R. (1993). A psychobiological model of temperament and character. *General Psychiatry,* vol. 50 (12), pp. 975–90.

Costa, P. T., McCrae, R. R. (1976). Age differences in personality structure: A cluster analytic approach. *Journal of gerontology,* vol. 31 (5), pp. 564–570.

Cheung, G (Aug 2007). Stability of the harm avoidance personality trait in late-life depression. *International Psychogeriatr*, vol. 19 (4), pp. 778–80.

Cooper, D.R. & Schindler, P.S. (2008). *Business Research Methods*.10th edn.. IL: McGraw-Hill.

Corbetta, P. (2003). *Social Research: Theory, Methods and Techniques.* London: Sage.

De Fruyt, F., Van De Wiele, L. & Van Heeringen, C. (2000). Cloninger's Psychobiological Model of Temperament and Character and the Five-Factor Model of Personality. *Personality and Individual Differences,* vol. 29, pp. 441-452.

Dall, S. R. X., Gosling, S. D., Brown, G. D., Dingemanse, N., Erev, I., Kocher, M. & Wolf, M. (2012). Variation in decision making. MA: MIT Press.

Dillman, D.A. (2007). *Mail and Internet Surveys: The Tailored Design Method.* 2nd edn. NJ: Wiley.

Daly, M., & Wilson, M. (2001). Risk taking, intrasexual competition, and homicide. *Nebraska Symposium on Motivation*, vol. 47, pp. 1-36.

Daly, M., Wilson, M., & Vasdev, S. (2001). Income inequality and homicide rates in Canada and the United States. *Canadian Journal of Criminology,* vol. 43, pp. 219-236.

Davies, A., Brady, T. & Hobday, M. (2006). Charting a path toward integrated solutions. *MIT Sloan Management Review*, vol. 3 (47), pp. 39–48.

Daw, C. (1999). Risk training: the neglected part of project management. *The Training Report*. Crownhill Publishing. Available from www.trainingreport. Ca

De Grada, E., Kruglanski, A. W., Mannetti, L., & Pierro, A. (1999). Motivated cognition and group interaction: Need for closure affects the contents and processes of collective negotiations. *Journal of Experimental Social Psychology,* vol. 35 (4), pp. 346–365.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. & Wagner, G. (2011). Individual risk attitudes: measurement, determinants, and behavioural consequences. *Journal of the European Economic Association,* vol. 9 (3), pp. 522-550.

Deditius-Island, H. K., Szalda-Petree, A. D., & Kucera, S. C. (2007). Sex differences in risk sensitivity under positive and negative budgets and predictors of choice. *The Journal of General Psychology*, vol. 134, pp. 435-452.

DeVinne, P. B. (1985). *The American Heritage dictionary* (2nd college ed.). Boston: Houghton Mifflin.

Devonish, D., Alleyne, P., Charles-Soverall, W., Young-Marshall, A. & Pounder, P. (2010). Explaining Entrepreneurial Intentions in the Caribbean'. *International Journal of Entrepreneurial Behaviour & Research*, vol. 16 (2), pp. 149-171.

DeYoung, CG. , Peterson JB. & Higgins DM. (2005). Sources of openness/intellect: cognitive and neuropsychological correlates of the fifth factor of personality. *Journal of Personality,* vol.73 (4), pp. 825 858.

Dhar, R. (2000). Consumer choice between hedonic and utilitarian goods. *Journal of marketing research,*vol. 33, pp. 497-529.

Digman, J. M. & Takemoto-Chock, N. K. (1981). Factors in the natural language of personality: Re-analysis, comparison, and interpretation of six major studies. *Multivariate Behavioural Research*, vol. 1*6*, pp. 149-170.

Douglas, M. & Wildavsky, A. (1982). *Risk and culture.* Berkeley: University of California Press.

Dowie, J. (1999). Against risk. *Risk Decision and Policy*, vol. 4 (1), pp. 57–73.

Dancey, C.P. & Reidy, J. (2008). *Statistics Without Maths for Psychology: Using SPSS for Windows.* 4th edn. Harlow: Prentice Hall.

Dillman, D.A. (2007). *Mail and Internet Surveys: The Tailored Design Method.* 2nd edn. Hoboken, NJ: Wiley.

Danilovic, M. & Browning, T. (2007). Managing Complex Product Development Projects with Design Structure Matrices and Domain Mapping Matrices. *International Journal of Management*, vol. 25, pp. 300-314.

Dong, Q. (1999). Representing Information Flow and Knowledge Management in Product Design Using the Design Structure Matrix. Cambridge: MA.

De Nooy, W., Andrej M. & Vladimir B. (2005). *Exploratory social network analysis with Pajek*. New York: Cambridge Univ. Press.

Economic and Social Research Council (ESRC). (2016). *Question Bank* [online]. [Accessed June 2016]. Available at: http://www.researchcatalogue.esrc.ac.uk/grants/RES-162-25-1001/read.

Eppinger S. & Browning, T. (2012). Design structure matrix methods and applications. MIT press.

Ellsburg, D. (1961). Risk, ambiguity, and the Savage axioms. Quarterly Journal of Economics, vol. 75, pp. 643-669.

Endriulaitienė1, E. & Martišius, V. (2010). Personal and Situational Factors as the Predictors of Risk-Taking Propensity in the Sample of Lithuanian Students. International Journal of Psychology, vol.5, pp. 75–98.

Easterby-Smith, Thorpe, R., & Jackson, P. (2012). Management Research (4th ed.). London: Sage.

Ermer, E., Cosmides, L., & Tooby, J. (2008). Relative status regulates risky decision-making about resources in men: Evidence for the co-evolution of motivation and cognition. *Evolution and Human Behaviour,* vol. 29, pp. 106-118.

Eysenck, S. B. & Eysenck, H. J. (1977). The place of impulsiveness in a dimensional system of personality description. *British Journal of Social & Clinical Psychology*, vol.16, pp. 57–68.

Eysenck, H.J. (1973). *Eysenck on Extraversion.* New York: Wiley.

Eysenck, H.J. (1992). A reply to Costa and McCrae. P or A and C: The role of theory. Personality and Individual Differences,vol.13, pp. 867–868.

Engel, S., Corneliussen, S., Wonderlich, S., Crosby, R., Le Grange, D., Crow, S., Klein, M. & Bardone-Cone, A. (2005). Impulsivity and compulsivity in bulimia nervosa. *International Journal of Eating Disorders,* vol. 38 (3), pp. 244–51.

Eysenck, S., Pearson, P.R., Easting, G. & Allsopp, J.F. (1985). Age norms for impulsiveness, venturesomeness and empathy in adults. *Personality and Individual Differences,* vol. 6 (5), pp. 613–619.

Fabricius, G. & Buttgen, M. (2015). Project managers' overconfidence: how is risk reflected in anticipated project success?. *Business Research,* vol.8, pp. 239-263.

Farmer, R.N. & Richman, B.M. (1965). *Comparative management and economic progress.* Irving: Homewood.

Fessler, D., Eng, S., Navarette, D. (2005). Elevated disgust sensitivity in the first trimester of pregnancy. Evidence supporting the compensatory prophylaxis hypothesis. *Evolution and Human Behaviour,* vol. 26, pp. 344-351.

Frost, R. O.; Heimburg, R. G.; Holt, C. S.; Mattia, J. I. & Neubauer, A. A. (1993). A comparison of two measures of perfectionism. *Personality and Individual Differences,* vol. 14, pp. 469–489.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behaviour: An Introduction to Theory and Research.* MA: Addison-Wesley.

Festinger, L. (1957). *A theory of cognitive dissonance*. IL: Row and Peterson.

Fincham, R. (2002).Narratives of success and failure in systems development. *British Journal of Management,* vol. 13, pp. 1–14.

Finuncane, M. L., Slovic, P., Mertz, C. K., Flynn, J. & Satterfield, T. A. (2000). Gender, Race and Perceived Risk: The "White Male" Effect. *Health, Risk & Society*, vol. 2 (2), pp. 159–172.

Fischhoff, B. (1985). Managing risk perceptions. *Issues in Science and Technology*, vol. 2, pp. 83-96.

Fischhoff, B. (1992). *Risk taking: a developmental perspective.* UK: Wiley.

Friedman, M., & Savage, L. J. (1948). The utility analysis of choice involving risk. *Journal of Political Economy,* vol. 56, pp. 279-304.

Friedman, M., & Savage, L. J. (1952). The expected utility hypothesis and the measurability of utility. *Journal of Political Economy*, vol. 60, pp. 463-474.

Friend, JK. & Hickling, A. (1997). *Planning under pressure: the strategic choice approach.* 2nd ed. UK: Butterworth-Heineman.

Fink, A. (2003). *How to Ask Survey Questions.* 2nd edn.. Thousand Oaks, CA: Sage.

Fowers, B. (2008). From Continence to Virtue: Recovering Goodness, Character Unity, and Character Types for Positive Psychology. *Theory and Psychology,* vol. 18, pp. 629–653.

Gough, H.G. (1990). Testing for leadership with the California Psychological Inventory.

Gibbons, F. X., Gerrard, M. & Lune, L. S. V. (2004). Context and Cognitions: Environmental Risk, Social Influence, and Adolescent Substance Use. *Personality and Social Psychology Bulletin*, vol. 30 (8), pp. 1048–1061.

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision-making. *Annual Review of Psychology*, vol. 62, pp. 451-482.

Godin, G. & Kok, G. (1996). The theory of planned behaviour: a review of its applications to health related behaviours. *American Journal of Health Promotion*, vol. 11, pp. 87–98.

Godin, G., Valois, P., Lepage, L. & Desharnais, R. (1992). Predictors of Smoking Behaviour: An Application of Ajzen's Theory of Planned Behaviour. *British Journal of Addiction*, vol. 87 (9), pp. 1335-1343.

Gold, R., Kennedy, B., Connell, F., & Kawachi, I. (2002). Teen births, income inequality, and social capital: Developing an understanding of the causal pathway. *Health & Place*, vol. 8*, pp.* 77-83.

Gill, J., & Johnson, P. (2010). *Research Methods for Managers*. 4th edn. London: SAGE Publications.

Guba, E. & Lincoln, Y. (1994). *Competing paradigms in qualitative research.* London: Sage Publications.

Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology*, vol. 59, pp. 1216-1229.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, vol. 48, pp. 26-34.

Goodwin, P. (2010). *Why Hindsight Can Damage Foresight.* International Institute of Forecasters.

Gosling, S. D., & John, O. P. (1999). Personality dimensions in nonhuman animals: A cross-species review. *Current Directions in Psychological Science*, vol. 8, pp. 69-75.

Green, D. (2001). Towards an integrated script for risk and value management. *Project management*, vol.7 (1), pp. 52–8.

Griskevicius, V., Tybur, J. M., Delton, A. W., & Robertson, T. E. (2011). The influence of mortality and socioeconomic status on risk and delay rewards: A life history theory approach. *Journal of Personality and Social Psychology*, vol. 100, pp.1015-1026.

García, L., Aluja, A., García, Ó. & Cuevas, L. (2005). Is Openness to Experience an Independent Personality Dimension?". *Journal of Individual Differences*, vol. 26 (3), pp. 132–138.

Goldberg, L. R. (1981). *Language and individual differences: The search for universals in personality lexicons.* CA: Sage.

Goldberg, L.R., Johnson, J.A. & Eber, H.W (2006). The international personality item pool and the future of public-domain personality measures. *Journal of Research in Personality*, vol. 40 (1), pp. 84–96.

Graziano, W.G., & Eisenberg, N. (1997). *Agreeableness; A dimension of person*ality.CA: Academic Press.

Ghauri, P.& Grønhaug, K. (2005). *Research Methods in Business Studies: A Practical Guide.* 3rd edn. Harlow: Financial Times Prentice Hall.

Halmi K. (2001). Perfectionism in anorexia nervosa: variation by clinical subtype, obsessionality, and pathological eating behaviour. *American Journal Psychiatry*, vol. 157 (11), pp. 1799-805.

Hamachek, D. E. (1978). Psychodynamics of normal and neurotic perfectionism. *Psychology*, vol. 15, pp. 27-33.

Hair, J.F. Jr., Anderson, R.E., Tatham, R.L., & Black, W.C. (1995). *Multivariate Data Analysis, 4th Ed.*NJ: Prentice Hall.

Han, S. & Lerner, J. S. (2009). *Decision Making*. New York: Oxford University Press.

Hanoch, Y., Johnson, J. G. &Wilke, A. (2006). Domain specificity in experimental measures and participant recruitment. *Psychological Science*, vol.17, pp. 300–304.

Harris (2012). Feelings of dread and intertemporal choice. *Journal of Behavioural Decision Making*, vol. 25, pp. 13–28.

Hewson, C., Yule, P., Laurent, D. and Vogel, C. (2003) *Internet Research Methods: A Practical Guide for the Social and Behavioural Sciences*. London: Sage.

Hillson, D. (2009). *Managing Risks in Projects.* England: Gower Publishing Limited.

Harris, G. T., Rice, M. E., & Lalumière, M. L. (2001). Criminal violence: The roles of neurodevelopmental insults, psychopathy, and antisocial parenting. *Criminal Justice and Behaviour*, vol. 28, pp. 402-426.

Hassan, L. & Shiu, E. (2007). Gender differences in low-risk single-occasion drinking: an application of the theory of planned behaviour. *International Journal of Consumer Studies*, vol. 31, pp. 317–325.

Hatush, Z. & Skitmore, M. (1997). Criteria for contractor selection. *Construction of Management Economy*, vol.15 (1), pp. 19–38.

Hayward, M.L.A., Shepherd, D.A. & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, vol. 52, pp.160–172.

Hayword, A. L. & Sparkes, J. J. (1990). *The Concise English Dictionary*. USA: New Orchard.
Head GL. (1967). An alternative to defining risk as uncertainty. *Journal Risk Insurance*, vol. 2 (34), pp.205–214.

Henderson, L. S. (2004). Encoding and decoding communication competencies in project management: An exploratory study. *International Journal of Project Management*, vol. 22, pp. 469–476.

Hertwig, R., Barron, G., Weber, E. U., & Erev, I. (2004). Decisions from experience and the effect of rare events in risky choice. *Psychological Science*, vol. 15, pp. 534-539.

Higgins, E. T., & Bryant, S. L. (1982). Consensus information and the fundamental attribution error - The role of development and in-group versus out-group knowledge. *Journal of Personality and Social Psychology,* vol. 43 (5), pp. 889–900.

Hopkins, M.E., Lo, L., Peterson, R.E. & Seo, K.K. (1977). Japanese and American managers. *The Journal of Psychology,* vol. 96, pp.71–72.

Huff, R. & Prybutok, V. (2008). Information Systems Project Management Decision Making: The Influence of Experience and Risk Propensity. *Project Management Journal*, vol. 39 (2), pp. 34-47.

Huff, R.A., Keil, M., Kappelman, L. & Prybutok, V. (1997). Validation of the Sitkin-Weingart business risk propensity scale. *Management Research News,* vol. 20 (12), pp.39-48.

Hurly, T. A. (2003). The twin threshold model: Risk-intermediate foraging by rufous hummingbirds, *Selasphorus rufus. Animal Behaviour*, vol. 66, pp. 751-761.

Hussein, B. & Klakegg, O. (2014). Measuring the impact of risk factors associated with project success criteria in early phase. *Social and Behavioural Sciences,* vol. 119, pp. 711-718.

Hogan, J., & Ones, D.S. (1997). *Conscientiousness and integrity at work*. London: Academic Press.

Higbee, K.L., & Laffterty, T. (1972). Relationship among preferences, importance and control. The Journal of Psychology, vol. 81, pp. 105-106.

Harnett, D.L. & Cummings, L.L. (1980). *Bargaining behaviour: An international study*. Houston: Dame.

Ika, L. A. (2009). Project success as a topic in project management journals. *Project Management Journal,* vol.40 (4), pp. 6–19.

International personality item pool (IPIP). (2016). *A Scientific Collaboratory for the Development of Advanced Measures of Personality and Other Individual Differences.* [Accessed April 2015]. Available at: http://ipip.ori.org/.

Isen, A. (2000). *Positive Affect and Decision-making*. New York: Guilford Press.

Jung, C. G. (1921). *Psychologische Typen*. Zurich: Rascher Verlag.

Jaafari, A. (2001). Management of risks, uncertainties and opportunities on projects: time for a fundamental shift. *International Journal of Project Management*, vol. 19 (2), pp. 81-101.

Jacelon C.S. (2007). Theoretical perspectives of perceived control in older adults: a selective review of the literature. *Journal of Advanced Nursing,* vol. 59 (1), pp. 1–10.

Jones, T. M. (1991). Ethical decision making by individuals in organizations. An issue contingent model. *Academy of Management Review*, vol. 16, pp. 366–395.

Johnson, P. & Clark, M. (2006). *Mapping the terrain: an overview of business and management research methodologies.* London: Sage.

Jankowicz, A.D. (2005). *Business Research Projects.* 4th edn. London: Thomson Learning.

Knight, A., & Turnbull, N. (2008). *Epistemology*. West-Sussex: Blackwell Publishing.

Kahneman, D. & Lovallo, D. (1993). Timid choices and bold forecasts: a cognitive perspective on risk taking. *Management Science,* vol. 39 (1), pp. 17–31.

Kahneman, D. & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica,* vol. 47 (2), pp. 263-291.

Kaplan, H., & Gangestad, S. (2005). Life history theory and evolutionary psychology. NJ: John Wiley.

Kaplan, S. & Garrick, J. (1981). On The Quantitative Definition of Risk. *Risk Analysis,* vol.1 *(1).*

Karlsen, J.T., Andersen, J.,Birkel, L. S.,& Odegard, E. (2005). What characterizes successful IT projects. *International Journal of Information Technology & Decision Making,* vol.4 (4), pp. 525–540.

Keil, M., Wallace, L., Turk, D., Dixon-Randall, G. & Nulden, U. (2000). An investigation of risk perception and risk propensity on the decision to continue a software development project. *Journal of Systems and Software*, vol. 53 (2), pp. 145–157.

Kendler, K. S., Neale, M. C., Sullivan, P., Corey, L. A., Gardner, C. O. & Prescott, C. A. (1999). A population-based twin study in women of smoking initiation and nicotine dependence. *Psychological Medicine*, vol.29, pp. 299–308.

Kenrick, D. T., Griskevicius, V., Neuberg, S. L., & Schaller, M. (2010). Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations. *Perspectives on Psychological Science*, vol. 5, pp. 292-314.

Kenrick, D. T., Griskevicius, V., Sundie, J. M., Li, N. P., Li, Y. J., & Neuberg, S. L. (2009). Deep rationality: The evolutionary economics of decision-making. *Social Cognition*, vol. 27, pp. 764-785.

Kerzner, H. (1987). In search of excellence in project management. *Journal of Systems Management*, pp. 30-39.

Khang, D. B., & Moe, T. L. (2008). Success criteria and factors for international development projects: A life-cycle based framework. *Project Management Journal*, vol. 39 (1), pp. 72–84.

King, J. & Slovic, P. (2014). The affect heuristic in early judgments of product innovations. *Journal of Consumer Behaviour*, vol. 13, pp. 411– 428.

Knight, FH. (1964). *Risk, uncertainty and profit.* New York: Augustus M. Kelley.

Kobbeltvedt, *T. &* Wolff, K. (2009).The Risk-as-feelings hypothesis in a Theory-of-planned-behaviour perspective. *Judgment and Decision Making*, vol. 4 (7), pp. 567–586.

Kogan, N. & Wallach, M. A. (1964). *Risk taking: A study in cognition and personality*. New York: Holt.

Krueger, J. I., & Funder, D. C. (2004). Towards a balanced social psychology: Causes, consequences, and cures for the problem seeking approach to social behaviour and cognition. *Behavioural and Brain Sciences*, vol. 27, pp. 313-376.

Kwak, Y. & LaPlace, K. (2005). Examining risk tolerance in project-driven organization. *Technovation*, vol. 25, pp. 691-695.

Klein, W.M., & Kunda, Z. (1994). Exaggerated self-assessments and the preference for controllable risks. *Organizational Behaviour and Human Decision Processes*, vol. 59, pp. 410-417.

Kanji, G.K. (2006). *100 Statistical Tests.* 3rd edn. London: Sage.

Kendall, M. (1938). A New Measure of Rank Correlation, *Biometrika*, vol. 30 (1), pp. 81–89.

Lally, M. (2015). *Highly sensitive people: a condition rarely understood.* UK: The Telegraph.

Lee, K., & Ashton, M. C. (2006). Further assessment of the HEXACO Personality Inventory: Two new facet scales and an observer report form. *Psychological Assessment*, vol. 18 (2), pp. 182–191.

Langewisch, M. W. J., & Frisch, G. R. (1998). Gambling behaviour and pathology in relation to impulsivity, sensation seeking, and risky behaviour in male college students. *Journal of Gambling Studies*, vol. 14, pp. 245-262.

Lanzara, G. F. (1999). Between transient constructs and persistent structures: Designing systems in action. *Journal of Strategic Information Systems*, vol.8 (4), pp. 331–349.

Lavagnon, I.. (2009). Project success as a topic in project management journals. *Project Management Journal*, vol. 40, pp. 6-19.

Lee, K. & Ashton, M. (2004). Psychometric Properties of the HEXACO Personality Inventory. *Multivariate Behavioural Rese*arch, vol. 39 (2), pp. 329-358.

Lee, K., Ogunfowora, B., & Ashton, M. C. (2005). Personality traits beyond the Big Five: Are they within the HEXACO space? *Journal of Personality*, vol.73, pp. 1437–1463.

Legoherel, P., Callot, P., Gallopel, K. & Peters, M. (2004). Personality characteristics, attitude toward risk, and decisional orientation of the small business entrepreneur: a study of hospitality managers. *Journal of Hospitality and Tourism Research*, vol. 28 (1), pp. 109–120.

Lerner, S. & Tiedens, Z. (2002). Emerging perspectives in judgment and decision making. Cambridge: Cambridge University Press.

Li, J. & Tang, Y. (2010). CEO hubris and firm risk taking in China: the moderating role of managerial discretion. *Academy of Management Journal*, vol. 53, pp.45–68.

Lim C., & Mohamed, Z. (1999). Criteria of project success: an exploratory re-examination. *International Journal of Project Management*, vol. 17, pp. 243-248.

Lin, T. C., M. H. Hsu, F. Y. Kuo & P. C. Sun (1999). An Intention Model-Based Study of Software Piracy. *Proceedings of the 32nd Hawaii International Conference on System Sciences.*
Lloyd's (2010). *Behaviour, bear, bull or lemming.* London.

Loewenstein, G., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, vol. 127 (2), pp. 267–286.

Lorenzi P., Sims HP. & Slocum JW. (1981). Perceived environmental uncertainty: an individual or environmental attribute? Journal of Management, vol. 7, pp. 27–41.

Laughhunn, D.J., Payne, J.W. & Crum, R. (1980). Managerial risk preferences for below target returns. *Management Science*, vol. 26, pp. 1238-1249.

Lloyd's. (2010). *Behaviour, bear, bull or lemming*: *Lloyd's emerging risks report*. London.

Long, A. & Sedley, D. N. (1987). *The Hellenistic Philosophers: Translations of the Principal Sources with Philosophical Commentary*. Cambridge: Cambridge University Press.

McRae, T. (2004). *Openness to Experience.* Encyclopedia of Applied Psychology. Elsevier.

Müller, R. & Turner, R. (2010). Leadership competency profiles of successful project managers. *International journal of project management*, vol. 28 (5), pp. 437-448.

Mashek, D. & Aron, A. (2004). *Handbook of Closeness and Intimacy*. Psychology Press.

Matsumoto, D., & Juang, L. (2012). *Culture and Psychology: 5th Edition*. CA: Wadsworth-Cengage Learning.

McCloskey, M., New, A., Siever, L., Goodman, M., Koenigsberg, H., Flory, J. & Coccaro, E. (2009). Evaluation of behavioural impulsivity and aggression tasks as endophenotypes for borderline personality disorder. *Journal of Psychiatric Research*, vol. 43 (12), pp. 1036–1048.

MacCrimmon, K.R. & Wehrung, D.A. (1986). *Taking risks: The management of uncertainty*. New York: Free Press.

Maehr, M. L. & Videbeck, R. (1968). Predisposition to risk and persistence under varying reinforcement success schedules. *Journal of Personality and Social Psychology*, vol. 9, pp. 96 - 100.

MacDonald, A.P. (1970). Revised scale for ambiguity tolerance: reliability and validity. *Psychological Reports*, vol. 26 (3), pp. 791–8.

Maloney, W. F. (1990). Framework for analysis of performance. *Journal Construction Engineering Management*, vol.116 (3), pp. 399-415.

March, J.G. & Shapira, Z. (1987). Managerial perspectives on risk and risk taking. *Management Science*, vol. 33 (11), pp. 1404–1418.

McClelland, D.C. (1961). *The Achieving Society*. New York: The Free Press.

McCrae, R. R. & Costa, P. T., Jr. (1992). Discriminant validity of NEO-PIR facet scales. *Educational and Psychological Measurement*, vol.52, pp. 229–237.

McCrae, R. R. & Costa, P. T. (1997). *Conceptions and correlates of openness to experience.* London: Academic Press.

McCrae, R. R. & John, O. P. (1992). An introduction to the Five-Factor Model and its applications. *Journal of Personality*, vol.60 (2), pp.175–215.

McDermott, R., Fowler, J. H., & Smirnov, O. (2008). On the evolutionary origin of prospect theory preferences. *The Journal of Politics*, vol. 70, pp. 335-350.

McLain, D.L. (1993). The MSTAT-I: a new measure of an individual's tolerance for ambiguity. *Educational and Psychological Measurement*, vol. 53, pp. 183–92.

Mcleod, L., Doolin, B. & MacDonell, S. (2012). Understanding of project success. *Project Management Journal*, vol. 43 (5), pp. 68-86.

Mellers, B. A., Schwartz, A. &Weber, E. U. (1997). *Do risk attitudes reflect in the eye of the beholder?* NJ: Lawrence Erlbaum.

Mishra P., Dangayach, G. S., Mittal, M. L. (2011). An Empirical Study on Identification Of Critical Success Factors In Project Based Organizations. *Global Business and Management Research: An International Journal*, vol. 3, pp. 356 – 368.

Mishra S. (2014). Decision-Making under Risk: Integrating Perspectives from Biology, Economics, and Psychology. *Personality and Social Psychology Review*, vol. 18 (3), p. 307.

Mishra, S., & Fiddick, L. (2012). Beyond gains and losses: The effect of need on risky choice in framed decisions. *Journal of Personality and Social Psychology*, vol. 102, pp. 1136-1147.

Mishra, S., & Lalumière, M. L. (2008). Risk taking, antisocial behaviour, and life histories. NY: Oxford University Press.

Mishra, S., & Lalumière, M. L. (2009). Is the crime drop of the 1990s in Canada and the USA associated with a general decline in risky and health-related behaviours? *Social Science & Medicine*, vol. *68*, pp. 39-48.

Mishra, S., & Lalumière, M. L. (2010). You can’t always get what you want: The motivational effect of need on risk-sensitive decision-making. *Journal of Experimental Social Psychology*, vol. 46, pp. 605-611.

Mishra, S., Barclay, P., & Lalumière, M. L. (2014). Competitive disadvantage facilitates risk-taking. *Evolution and Human Behaviour*, vol. 35, pp. 126-132.

Mishra, S., Gregson, M., & Lalumière, M. L. (2012). Framing effects and risk-sensitive decision-making. *British Journal of Psychology*, vol. 103, pp. 83-97.

Mishra, S., Logue, D. M., Abiola, I., & Cade, W. H. (2011). Developmental environment affects risk-acceptance in the hissing cockroach, *Gromphadorhina portentosa*. *Journal of Comparative Psychology*, vol. 125, pp. 40-47.

Molenaar, K. R., & Songer, A. D. (1998). Model for public sector design-build project selection. *Journal of Construction Engineering Management*, vol.124 (6), pp. 467–479.

Molenaar, K. R., Songer, A. D. & Barash, M. (1999). Public-sector design/build evolution and performance. *Journal of Management Engineering*, vol.15 (2), pp. 54–62.

Moore, D.A. & Healy, P.J. (2008). The trouble with overconfidence. *Psychological Review,* vol. 115, pp. 502–517.

Morenoff, J. D., Sampson, R. J., & Raudenbush, S. W. (2001). Neighborhood inequality, collective efficacy, and the spatial dynamics of urban violence. *Criminology*, vol. 39, pp. 517-558.

Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International Journal of Project Management, 14*, 81–87.

McInish, T.H. (1982). Individual investors and risk-taking. Journal of Economic Psychology, vol. 2, pp. 125-136.

Mitchell, V. (1996). Assessing the reliability and validity of questionnaires: an empirical example. *Journal of Applied Management Studies*, vol. 5 (2), pp. 199–207.

Morris, C. (2003). *Quantitative Approaches in Business Studies.* 6th edn. Harlow: Financial Times Prentice Hall.

Naoum, S. G. (1994). Critical analysis of time and cost of management and traditional contracts. *Journal of Construction Engineering Management.*, vol.120 (4), pp. 687-705.

Neuberg, S. L., Kenrick, D. T., Maner, J., & Schaller, M. (2004). From evolved motives to everyday mentation: Evolution, goals, and cognition. UK: Cambridge University Press.

Neverauskas, B., Bakinaite, L. & Meiliene, E. (2013). Contemporary approach to the possibility of project's success increase. *Economics and Management*, vol. 18 (4), pp. 829-836.

Newby-Clark, I.R., Ross, M., Buehler, R., Koehler, D.J. & Griffin, D. (2000). People focus on optimistic scenarios and disregard pessimistic scenarios while predicting task completion times. *Journal of Experimental Psychology*: Applied 6, pp. 171–182.

Nicholson, N., Soane, E., Fenton-O'Creevy, M. & Willman, P. (2005). Personality and domain specific risk taking, *Journal of Risk Research*, vol.8, pp. 157–176.

Nikander, IO. & Eloranta, E. (1997). Preliminary signs and early warnings in industrial investment projects. International Journal of Project Management, vol.15 (6), pp. 371–376.

Nosic, A. & Weber, M. (2010). How riskily do I invest? The role of risk attitudes, risk perception, and overconfidence. *Decision Analysis,* vol. 7, pp. 282–301.

Nowotny, H., Scott, P. & Gibbons, M. (2001). *Re-thinking science: knowledge and the public in an age of uncertainty*. MA: Blackwell Publishers Ltd.

Nunnally, J.C. (1967). *Psychometric Theory*. NY: McGraw-Hill Book.

Neuman, L. (2011). *Social Research Methods - Qualitative and Quantitative Approaches. 7th edn.* Boston: Pearson Education.

Norris, K. & Dickson, P. (1994). How believing in ourselves increases risk taking: perceived self-efficacy and opportunity recognition. *Decision Sciences,* vol. 25 (3), pp. 385-400.

Oxford Dictionary Thesaurus. (2001). *Oxford Dictionary Thesaurus & Word power Guide.* New York: Oxford University Press.

Oehmen, J., Olechowski, A., Kenley, R. & Ben-Daya, M. (2014). Analysis of the effect of risk management practices on the performance of new product development programs. *Technovation,* vol. 34, pp. 441– 453.

Office of Government Commerce (2001). *A8: Managing Risk*. Crown. Available from www.ogc.gov.uk

Oppenheim, A.N. (2000). *Questionnaire Design, Interviewing and Attitude Measurement.* London: Continuum International.

O'Sullivan, O. (2015). The neural basis of always looking on the bright side. *Dialogues in Philosophy, Mental and Neuro Sciences*, vol. 8 (1), pp.11-15.

Peterson, C. & Seligman, M.E. (2004). *Character strengths and virtues: A handbook and classification*. Oxford University Press.

Pimmler, T.U. & Eppinger, S.D. (1994). Integration analysis of product decompositions, *ASME Design Theory and Methodology Conference,* Minneapolis, MN.

Pachur, T., Hertwig, R. & Steinmann, F. (2012). How do people judge risks: availability heuristic, affect heuristic, or both?. *Journal of Experimental Psychology Applied,* vol.18, pp. 314–330.

Parfitt, M. K., & Sanvido, V. E. (1993). Checklist of critical success factors for building projects. *Journal of Management Engineering,*vol.(9) 3, pp.243-249.

Paunonen, S. & Jackson, D. (1996). The Jackson Personality Inventory and the Five-Factor Model of Personality. *Journal of Research in Personality*, vol.30, pp. 42–59.

Perminova, O., Gustafsson, M. & Wikstrom, K. (2008). Defining uncertainty in projects – a new perspective. *International Journal of Project Management*, vol. 26, pp. 73–79.

Peters, E. & Slovic, P. (1996). The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. *Journal of Applied Social Psychology*, vol.26, pp. 1427–1453.

Pavic, I. & Vojinic, P. (2012). The Influence of Demographical and Professional Characteristics on Managers' Risk Taking Propensity. *Advances in Management and Applied Economics,* vol. 2 (4), p.171.

Petrakis, P. (2005). Risk perception, risk propensity and entrepreneurial behaviour: the Greek case. *Journal of American Academy of Business*, vol. 7(1), pp. 233–242.

Pich, M.T., Loch, C.H. & De Meyer A. (2002). On uncertainty, ambiguity, and complexity in project management. *Management Science,* vol. 48, pp. 1008–1023.

Pinto, J. K. & Slevin, D. P. (1987). Balancing strategy and tactics in project implementation. *Sloan Management Review*, pp.33-41.

Pinto, J. K., & Slevin, D. P. (1988a). Project success: Definitions and measurement techniques. *Project Management Journal*, vol. 19 (1), pp. 67–72.

Pinto, J. K., & Slevin, D. P. (1988b). Critical success factors across the project life cycle. *Project Management Journal*, vol. 19 (3), pp. 67–74.

PMI. (2009). A guide to the project management body of knowledge, 5th (edn). Newtown Square: Project Management Institute.

Psychology.about (2015) http://psychology.about.com/od/cognitivepsychology/f/dissonance.htm

Passer, M. & Smith, R. (2009). *Psychology: the science of mind and behaviour*. McGraw-Hill: Higher Education.

Patton, J., Stanford, M. & Barratt, E. (1995). Factor structure of the Barratt impulsiveness scale. *Journal of Clinical Psychology,* vol. 51 (6), pp. 768–774.

Peskine A., Picq, C. & Pradat-Diehl, P. (2004). Cerebral anoxia and disability. *Brain Injury,* vol. 18 (12), pp. 1243–1254.

Rachlin, H. (2000). Self-Control as an Abstraction of Environmental Feedback. Cambridge: Harvard University Press.

Randy O., Frost, P., Cathleen L. & Robin, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, vol. 14 (5), pp 449-468.

Rankin, KP. (2004). Right and left medial orbitofrontal volumes show an opposite relationship to agreeableness in FTD. *Dement Geriatr Cogn Disord*, vol.17 (4), pp. 328-332.

Rice, K., Leever, B., Noggle, C. & Lapsley, D. (2007). Perfectionism and depressive symptoms in early adolescence. *Psychology in the Schools,* vol. 44 (2), pp. 139–156.

Robson, C. (2002). *Real World Research. A Resource for Social Scientists and Practitioner-Researchers (Second Edition).* Malden: Blackwell.

Rawlings, D. & Rohrmann, B. (2003). Personality Correlates of Attitudes Toward Risk- Taking. *Australian Journal of Psychology, pp.* 205–206.

Raz, T., Shenhar, A.J. & Dvir, D. (2002). Risk management, project success, and technological uncertainty. *R&D Management*, vol. 32, pp. 101–109.

Real, L., & Caraco, T. (1986). Risk and foraging in stochastic environments. *Annual Review of Ecology and Systematics*, vol. 17, pp. 371-390.

Reid, A. (2007). *Managing teams*, 4th edn. Aldershot, UK: Gower.

Rescher, N. (1983). *Risk: A philosophical introduction.* Lanham: University Press.

Richards, R. M., Prybutok,V. R. , & Kappelman, L. A. (1996). Influence of computer user training on decision making risk preferences. *Management Research News*, vol. 19 (11), pp. 26-41.

Risk Propensity Scale. *Management Research News*, vol. 20 (12), pp. 39-48.

Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin*, vol. 126, pp. 3-25.

Rode, C., & Wang, X. T. (2000). Risk-sensitive decision-making examined within an evolutionary framework. *American Behavioural Scientist*, vol. 43, pp. 926-939.

Ronen, S. (1986). *Comparative and multinational management.* New York: Wiley.

Room, R. (2005). Stigma, social inequality and alcohol and drug use. *Drug and Alcohol Review*, vol. 24, pp. 143-155.

Rosenau, M. D. Jr. (1984). *Project Management for Engineers.* NY: Van Nostrand.

Ross, S.A. (1981). Some stronger measures of risk aversion in the small and in the large with applications. *Econometrica*, vol. 49, pp. 621–638.

Rubin, P. H., & Paul, C. W. (1979). An evolutionary model of taste for risk. *Economic Inquiry*, vol. 17, pp. 585-596.

Ryan, R. M., Huta, V., & Deci, E. L. (2008). Living well: A self-determination theory perspective on eudaimonia. *Journal of Happiness Studies*, vol. 9 (1), pp. 139–170.

Remenyi, D., Williams, B., Money, A. & Swartz, E. (1998). *Doing Research in Business and*

Robson, C. (2002). *Real World Research.* 2nd edn. Oxford: Blackwell.

Regan, R.J., (2005). *The Cardinal Virtues: Prudence, Justice, Fortitude, and Temperance*. Hackett Publishing.

Roberti, J. (2004). A Review of Behavioural and Biological Correlates Of Sensation Seeking. *Journal of Research in Personality*, vol. 38(3), pp. 256-279.

Saunders, M., Lewis, P. & Thornhill, A. (2016). *Research methods for business students.7th edn.* UK: Pearson Education Limited.

Sandberg, T. & Conner, M. (2008). Anticipated regret as an additional predictor in the theory of planned behaviour: a metaanalysis. *Br J Soc Psychol*, vol. 47, pp. 589–606.

Saucier, G. & Goldberg, L. R. (1996). Evidence for the Big Five in analyses of familiar English personality adjectives. *European Journal of Personality*, vol. 10, pp. 61-77.

Schmitt, D. P. (2004). The Big Five related to risky sexual behaviour across 10 world regions: Differential personality associations of sexual promiscuity and relationship infidelity. *European Journal of Personality*, vol.18, pp. 301–319.

Schoemaker, P. J. H. (1990). Are risk-attitudes related across domains and response modes? *Management Science*, vol.36, pp.1451–1463.

Schewer, R.K. & Yucelt, U. (1984). A study of risk-taking propensities among small business entrepreneurs and managers: an empirical evaluation. *American Journal of Small Business*, vol. 8 (3), pp. 31-40.

Schwarz, N., Bless, H., Strack, F., Klumpp, G., Rittenauer-Schatka, H. & Simons, A. (1991). Ease of retrieval as information: another look at the availability heuristic. *Journal of Personality and Social Psychology*, vol. 61, pp. 195–202.

Schwer, R. & Yucelt, U. (1984). A Study of Risk-Taking Propensities among Small Business Entrepreneurs and Managers: an Empirical Evaluation. *American Journal of Small Business,* vol. 8 (3), pp. 31- 40.

Shenhar, A. J., & Dvir, D. (2007). *Reinventing project management: The diamond approach to successful growth and innovation*. Boston: Harvard Business School Press.

Shepherd, D.A. & Cardon, M.S. (2009). Negative emotional reactions to project failure and the self-compassion to learn from the experience. *Journal of Management Studies*, vol. 46, pp. 923–949.

Simpson, J. A., Griskevicius, V., Kuo, S. I., Sung, S., & Collins, W. A. (2012). Evolution, stress, and sensitive periods: The influence of unpredictability in early versus late childhood on sex and risky behaviour. *Developmental Psychology*, vol. 48, pp. 674-686.

Sitkin, S. B., & Pablo, A. L. (1992). Reconceptualizing the determinants of risk behaviour. *Academy of Management Review,* vol. 17 (1), pp. 9–39.

Sitkin, S. B., & Weingart, L. R. (1995). Determinants of risky decision-making behaviour: A test of the mediating role of risk perceptions and propensity. *Academy of Management Journal,* vol. 38, pp. 1573–1592.

Sitkin, S.B. & Pablo, A.L. (1992). Reconceptualizing the determinants of risk behaviour. *Academy of Management Review*, vol. 17, pp. 9-38.

Schwer, R.K. & Yucelt, U. (1984). A study of risk-taking propensities among small business entrepreneurs and managers: an empirical evaluation. *American Journal of Small Business,* vol. *8* (3), pp.31-40.

Stewin, L. (1983). The concept of rigidity: an enigma. *International Journal for the Advancement of Counselling*, vol. 6 (3), pp. 227–232.

Sjo¨berg, L., Moen, B.-E. & Rundmo, T. (2004). Explaining Risk Perception: An Evaluation of the Psychometric Paradigm in Risk Perception Research. *Rotunde Publication* No. (84), Trondheim, Norway.

Skitch, S., & Hodgins, D. (2004). Impulsivity, compulsivity and pathological gambling: An exploratory study of pathological gambling as an impulsivity-compulsivity spectrum disorder. *International Gambling Studies*, vol. *4*, pp. 175-188.

Slovic, P. (1964). Assessment of risk taking behaviour. *Psychological Bulletin,* vol.61, pp. 220 233.

Slovic, P. (1972). Information processing, situation specificity and the generality of risk–taking behaviour. *Journal of Personality and social Psychology*, vol. 22, pp. 128-134.

Smithson, S. & Hirschheim, R. (1998). Analyzing information systems evaluation: Another look at an old problem. *European Journal of Information Systems*, vol. 7 (3), pp. 158-174.

Soane, E., & Chmiel, N. (2005). Are risk preferences consistent? The influence of decision domain and personality on decision making. *Personality and Individual Differences*, vol.38, pp. 1781-1791.

Starmer, C. (2000). Developments in non-expected utility theory: The hunt for a descriptive theory of choice under risk. *Journal of Economic Literature*, vol. 38, pp. 332-382.

Stearns, S. C., Allal, N., & Mace, R. (2008). Life history theory and human development. NY: Lawrence Erlbaum Associates.

Stephens, D. W., & Krebs, J. R. (1986). *Foraging theory*. NJ: Princeton University Press.

Stern, j. (2012). Dreaded risks and the control of biological weapons, *International Security*, vol. 27 (3), pp. 89–123.

Stevens, J. D. (1996). Blueprint for measuring project quality. *Journal of Management Engineering*,vol.12 (2), pp. 34-39.

Stober, J. (1997). Trait anxiety and pessimistic appraisal of risk and chance. *Personality and Individual Differences*, vol.22, pp. 465–476.

Sutton, S. (1998). Explaining and predicting intentions and behaviour: how well are we doing? *Journal of Applied Social Psychology*, vol. 28, pp. 1318–1339.

Smolewska, K., McCabe, S. &Woody, E. (2006). A psychometric evaluation of the Highly Sensitive Person Scale: The components of sensory-processing sensitivity and their relation to the BIS/BAS and "Big Five"". *Personality and Individual Differences,* vol. 40 (6), pp. 1269–1279.

Stoeber, J. & Childs, J. (2010). The Assessment of Self-Oriented and Socially Prescribed Perfectionism: Subscales Make a Difference. *Journal of Personality Assessment*, vol. 92 (6), pp. 577–585.

Stoeber, J. & Otto, K. (2006). Positive Conceptions of Perfectionism: Approaches, Evidence, Challenges. *Personality and Social Psychology Review,* vol. 10 (4), pp. 295–319.

Stanovich, K.E., & West, R.F. (1998). Individual differences in framing and conjunction effects. *Thinking and Reasoning*, vol. 4, pp. 289–317.

Swalm, R.O. (1966). Utility theory: Insights into risk taking. *Harvard Business Review*, vol. 44, pp. 123-136.

Schein, E.H. (1985). *Organizational culture and leadership.* San Francisco: Jossey Bass.

Scheier, M., Carver, C. & Bridges, M. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *Journal of personality and social psychology*, vol. 67 (6), p.1063.

Scott, J. (2011). Social network analysis: developments, advances, and prospects. *Social Network Analysis and Mining*, vol. 1 (1), pp. 21-26.

The MIT Design Structure Matrix. (2016). *DSM*- [online]. [Accessed October 2016]. Available at: http://www.dsmweb.org.

The Office of Government Commerce (OCG). (2016). *Best Management Practice Portfolio*- [online]. [Accessed October 2016]. Available at: http://ogc.gov.uk/.

Thompson, E.R. (2008). Development and Validation of an International English Big-Five Mini-Markers. *Personality and Individual Differences*, vol. 45 (6), pp. 542–548.

Taylor, R. N. & Dunnette, M.D. (1974). Influence of dogmatism, risk-taking propensity, and intelligence on decision-making strategies for a sample of industrial managers. *Journal of Applied Psychology*, vol. 59, pp. 420-423.

Tellegen, A. (1985). *Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report*. NJ: Erlbaum.

Teller, J., Kock, A. & Gemunden, H.G. (2014). Risk management in project portfolios is more than managing project risks: a contingency perspective on risk management. *Project Management Journal*, vol. 45, pp. 67–80.

Terracciano, A., & Costa, P. T., Jr. (2004). Smoking and the Five-Factor Model of personality. *Addiction*, vol.99, pp. 472–481.

Terracciano, A., Lo¨ckenhoff, C. E., Crum, R. M., Bienvenu, O. J. & Costa, P. T., Jr. (2008). Five-Factor Model personality profiles of drug users. *BMC Psychiatry,* vol.8, Article ID# 22.

Thayer, R. H., Pyster, A. B., & Wood, R. C. (1981). Major issues in software engineering project management. *IEEE Transactions on Software Engineering,* vol. 7, pp. 333–342.

Thomas, G., & Fernandez,W. (2008). Success in IT projects: A matter of definition? *International Journal of Project Management,* vol.26 (7), pp. 733–742.

Tinbergen, N. (1963). On aims and methods in ethology. *Zeitschrift für Tierpsychologie,* vol. 20, pp. 410-433.

Todd, P. M., & Gigerenzer, G. (2012). *Ecological rationality: Intelligence in the world*. UK: Oxford University Press.

Tashakkori, A. & Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches*. CA: Sage.

Toor, S.-U.-R., & Ogunlana, S. O. (2010). Beyond the 'iron triangle': Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects. *International Journal of Project Management,* vol.28 (3), pp. 228–236.

Torbica, Z. M. & Stroh, R. C. (2001). Customer satisfaction in home building. *Journal of Construction and Engineering Management,* vol.127 (1), pp. 82-86.

Trivers, R. (1972). Parental investment and sexual selection. IL: Aldine.

Trobst, K., Wiggins, J. S., Costa, P. T Jr., Herbst, J. H., McCrae, R. R., & Masters, H. L., III. (2000). Personality psychology and problem behaviours: HIV risk and the Five-Factor Model. *Journal of Personality*, vol.68, pp.1234–1252.

Tupes, E. C. & Christal, R. E. (1992). Recurrent personality factors based on trait ratings. *Journal of Personality*, vol. 60, pp. 225-251.

Turner, J. R. (2009). *The handbook of project-based management: Leading strategic change in* organizations 3rd edn. UK: McGraw-Hill.

Turner, J. R., Huemann, M., & Keegan, A. E. (2008). *Human resource management in the project-oriented organization.* Newtown Square: Project Management Institute.

Turner, R. & Zolin, R. (2012). Forecasting success on large projects: developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal*, vol. 43 (5), pp. 87-99.

Tversky, A. & Kahneman, D. (1992). Advances in prospect theory: cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, vol. 5, pp. 297–323.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, vol. 185, pp. 1124-1131.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, vol. 211, pp. 453-458.

Tukey, J.W. (1977). *Exploratory Data Analysis.* Reading. MA: Addison-Wesley.

van Dam, C., Janssens, J. M. A. M. & De Bruyn, E. E. J. (2005). PEN, Big Five, juvenile delinquency and criminal recidivism. *Personality and Individual Differences*, vol.3.

Van Zant, A.B. & Moore, D.A. (2013). Avoiding the pitfalls of overconfidence while benefiting from the advantages of confidence. *California Management Review*, vol. 55 (2), pp. 5–23.

Vollrath, M., Knoch, D., & Cassano, L. (1999). Personality, risky health behaviour, and perceived susceptibility to health risks. *European Journal of Personality,* vol.13, pp. 39–50.

Vasvári, T. (2015). Risk, Risk Perception, Risk Management: a Review of the Literature. *Focus Risk Management,* vol. 1.

Von Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behaviour*. NJ: Princeton University Press.

Ward, S. & Chapman, C. (2003). Transforming project risk management into project uncertainty management. *International Journal of Project Management,* vol. 21, pp. 97-105.

Wateridge, J. (1998). How can IS/IT projects be measured for success? *International Journal of Project Management,* vol. *16,* pp. 59–63.

Watson, D., Clark, L. A., Wegner, D. & Pennebaker, J. (1993). *Behavioural disinhibition versus constraint: A dispositional perspective.* US: Prentice-Hall.

Weber, E. U. & Milliman, R. A. (1997). Perceived risk attitudes: Relating risk perception to risky choice. *Management Science*, vol. 43 (2), pp. 123-144.

Weber, E. U., Blais, A.R. & Betz, E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviours. *Journal of Behavioural Decision Making,* vol.15, pp. 263-290.

Wegner, & J.W. Pennebaker (Eds.). *Handbook of mental control. Century psychology series*. NJ: Prentice-Hall.

Weick, K. (1977). Entactment processes in organizations. Chicago: St. Clair.

Weinstein, E. & Martin, J. (1969). Generality of willingness to take risks, *Psychological Reports,* vol. 24, pp. 499-501.

Weller, J. & Tikir, A. (2011). Predicting Domain-Specific Risk Taking with the HEAXCO Personality Structure. *Journal of Behavioural Decision-Making,* vol. 24, pp. 180-201.

Westerveld, E. (2003). The project excellence model: Linking success criteria and critical success factors. *International Journal of Project Management,* vol. 21, pp. 411–418.

Westhuizen, D., Fitzgerald, E. P. (2005). Defining and Measuring Project Success. *European Conference on IS Management, Leadership and Governance.*

Wiggins, J. S. (1996). *The five-factor model of personality: Theoretical perspectives.* New York: The Guilford Press.

Wikipedia (2015), optimism, http://en.wikipedia.org/wiki/Optimism

Wilemon, D.L. & Cicero, J.P. (1970). The project manager: anomalies and ambiguities. *The Academy of Management Journal,* vol.13 (3), pp. 269–282.

Wilke, A., Hutchinson, J. M. C., Todd, P. M., & Czienskowski, U. (2009). Fishing for the right words: Decision rules for human foraging behaviour in internal search tasks. *Cognitive Science*, vol. 37 (1), p. 60.

Wilkinson, R. G., & Pickett, K. E. (2009). *The spirit level: Why more equal societies almost always do better*. England: Penguin.

Williams S. & Narendran S. (1999). Determinants of managerial risks: exploring personality and cultural influences. The Journal of Social Psychology, vol. 139 (1), pp. 102-125.

Williams, G. C. (1966). *Adaptation and natural selection*. NJ: Princeton University Press.

Wilson, M., & Daly, M. (1985). Competitiveness, risk taking, and violence: The young male syndrome. *Ethology and Sociobiology*, vol. 6, pp. 59-73.

Wilson, M., & Daly, M. (1997). Life expectancy, economic inequality, homicide and reproductive timing in Chicago neighborhoods. *British Medical Journal*, vol. 314, pp.1271-1274.

Winterhalder, B., Lu, F., & Tucker, B. (1999). Risk-sensitive adaptive tactics: Models and evidence from subsistence studies in biology and anthropology. *Journal of Archaeological Research*, vol. 7, pp. 301-347.

Wohl, M. J. A., Branscombe, N. R., & Lister, J. J. (2014). When the going gets tough: Economic threat increases financial risk-taking in games of chance. *Social Psychological and Personality Science*, vol. 5, pp. 211-217.

Wolman, B. B. (1989). *Dictionary of behavioural science.* CA: Academic Press.

West, R. & Hall, J. (1997). The role of personality and attitudes in traffic accident risk. *Applied Psychology: An International Review,* vol. 46, pp. 253-264.

Wang, W.; Zhao, J.; Zhang, W. & Wang, Y. (2015). Conceptual framework for risk propensity, risk perception, and risk behaviour of construction project managers. *Proceedings 31st Annual ARCOM Conference,* Lincoln, UK, Association of Researchers in Construction Management, pp. 165-174.

Wang, C.; Xu, B; Zhang, S.; Chen; Y. (2016). Influence of personality and risk propensity on risk perception of Chinese construction project managers. *International Journal of Project Management,* vol. 34, pp. 1294-1304.

Yates, J.F. & Stone, E.R. (1992). The risk construct. UK: Wiley.

Yoon, C. (2011). Theory of Planned Behaviour and Ethics Theory in Digital Piracy: An Integrated Model. *Journal of Business Ethics*, vol. 100, pp. 405–417.

Young, R. R. (2006). Project requirements: a guide to best practices. Vienna: Management Concepts.

Yudkowsky, E. (2006). Cognitive biases potentially affecting judgment of global risk. *Machine Intelligence Research Institute*, *pp.91-119.*

Yassine, A., Falkenburg, D. & Chelst, K. (1999). Engineering design management: An information structure approach. *International Journal of Production Research*, vol. 37(13), pp. 2957-2975.

Zuckerman, M. & Kuhlman, D. M. (2000). Personality and Risk-Taking: Common Biosocial Factors. *Journal of Personality*, vol. 68, pp. 999–1029.

Zuckerman, M. (2007). *Sensation seeking and risky behaviour*. DC: American Psychological Association.

14 Appendix

14.1 Appendix I: Questionnaire validation.

List of the researchers/academics that were contacted for validating the questionnaire.

1. Weller, J. & Tikir, A. (2011). Predicting Domain-Specific Risk Taking with the HEAXCO Personality Structure. *Journal of Behavioural Decision-Making*, vol. 24, pp. 180-201.
2. Endriulaitienė1, E. & Martišius, V. (2010). Personal and Situational Factors as the Predictors of Risk-Taking Propensity in the Sample of Lithuanian Students. *International Journal of Psychology*, vol.5, pp. 75–98.
3. Acar, E. & Goc, Y. (2011). Prediction of risk perception by owners' psychological traits in small building contractors. *Construction Management and Economics*, vol. 29, pp. 841-852.
4. Nicholson, N., Soane, E., Fenton-O'Creevy, M. & Willman, P. (2005). Personality and domain specific risk taking, *Journal of Risk Research*, vol.8, pp. 157–176.
5. Pavic, I. & Vojinic, P. (2012). The Influence of Demographical and Professional Characteristics on Managers' Risk Taking Propensity. *Advances in Management and Applied Economics*, vol. 2 (4), p.171.
6. Ashton, M. C., Lee, K., & de Vries, R. E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality Factors: A review of research and theory. Personality and Social Psychology Review, 18, 139-152.
7. Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies*, vol. 4, pp. 465-505.

14.2 Appendix II: Research invitation letter.

Dear Participant,

Project managers' tendency to take or avoid risky decisions (risk propensity) can have a major impact on their risky decisions related to project success criteria. Thus, it is imperative to investigate the interaction between various personal and situational factors as predictors of project managers' risk propensity. Hence, the primary aims of the research is to investigate project managers' personality traits and its influence on their risk propensity in relation to project success criteria. Also, the research addresses the issue of risk propensity stability and whether project managers' demonstrate consistent risk propensity when taking risky decisions related to different project domains.

Your input will help us to understand the influence of project managers' personality traits on their risk propensity in relation to project success. We estimate it will take you approximately 15-20 minutes to complete the questionnaire. All individual responses will remain confidential and study data will be amalgamated and analyzed as a whole where results will be reported in summary form to protect confidentiality. However, if you have any questions or concerns about the questionnaire or about participating in this research, you may contact me on (2014232175@student.buid.ac.ae). Alternatively, you may communicate with my Director of Studies, Prof. H. Boussabaine on 04-2791437 (halim@buid.ac.ae).

Thank you for your time and support and I look forward to sharing the outcomes of this survey with all of the participants.

Yours faithfully,

Ahmad Rashid

PhD Candidate

British University in Dubai (BUiD)

Mobile: 00971-50 2461629

Email: 2014232175@student.buid.ac.ae

The Research directed by:

Prof. Halim Boussabaine

British University in Dubai (BUiD)

Tel.: 00971-4 2791437

Email: halim@buid.ac.ae

14.3 Appendix III: Research questionnaire.

Risk Attitude Survey

1. Risk Attitude Statements

1. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I would not please others to get my risky decisions approved.					
I follow company rules no matter what are the consequences.					
I feel fear when thinking about the consequences of my risky decisions.					
I get upset by unpleasant thoughts that come into my mind when thinking about my risky decisions.					
I consider risks impact and magnitude when taking risky decisions.					
I tend to have a consistent approach for taking risky decisions across the project time frame.					
I would not take risky decisions for the sake of impressing others.					
I often think that my risky decisions are better than others' risky decisions.					
I feel I need reassurance from others when taking risky decisions.					
I tend to feel others' emotions when taking risky decisions.					

1

Risk Attitude Survey

2. Risk Attitude Statements - Continued

2. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I tend to be kind to others even if they are not kind to me.	○	○	○	○	○
I would not get offended if others opposed my risky decisions.	○	○	○	○	○
I easily get angry if others opposed my risky decisions.	○	○	○	○	○
I feel down when thinking about the consequences of my risky decisions.	○	○	○	○	○
I am inclined to see the risk event as having been predictable after its occurrence.	○	○	○	○	○
I enjoy competing with others when taking risky decisions.	○	○	○	○	○
I feel I am able to stand up for myself and defend my risky decisions.	○	○	○	○	○
I keep my emotions under control when taking risky decisions.	○	○	○	○	○
I cover broad range of possibilities when taking risky decisions.	○	○	○	○	○
I map risk causes to outcomes when taking risky decisions.	○	○	○	○	○

Risk Attitude Survey

3. Risk Attitude Statements - Continued

3. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I can easily express myself using different words when explaining my risky decisions.	◯	◯	◯	◯	◯
I feel comfortable taking risky decisions in a group.	◯	◯	◯	◯	◯
I can easily become overwhelmed by risk events when taking risky decisions.	◯	◯	◯	◯	◯
I would avoid taking risky decisions that might possibly harm project success.	◯	◯	◯	◯	◯
I draw conclusions based on small number of past experiences when taking risky decisions.	◯	◯	◯	◯	◯
I take risky decisions that allow for the achievement of long term objectives.	◯	◯	◯	◯	◯
I enjoy debating my risky decisions with others.	◯	◯	◯	◯	◯
I tire out quickly when discussing my risky decisions.	◯	◯	◯	◯	◯
I tend to encounter conflicting beliefs, values and emotional reactions when taking risky decisions.	◯	◯	◯	◯	◯

3

Risk Attitude Survey

4. Risk Attitude Statements - Continued

4. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I would take risky decisions so that I can find out how their outcome will make me feel.	○	○	○	○	○
I would take risky decisions based on my perceptions that high project benefits could be achieved.	○	○	○	○	○
I look at reasonable sources of evidence when taking risky decisions.	○	○	○	○	○
I take risky decisions based on previous familiar situations.	○	○	○	○	○
I take charge and try leading others when taking risky decisions.	○	○	○	○	○
I can be reckless and act wildly when taking risky decisions.	○	○	○	○	○
I am inclined to forgive and forget those who oppose my risky decisions.	○	○	○	○	○
I avoid criticizing others' shortcomings when taking risky decisions.	○	○	○	○	○
I try to radiate joy among others when discussing risky decisions.	○	○	○	○	○

4

Risk Attitude Survey

5. Risk Attitude Statements - Continued

5. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I look at the bright side of suggested risky decisions.	◯	◯	◯	◯	◯
I can adjust my risky decisions based on others' feedback.	◯	◯	◯	◯	◯
I am usually a patient person when taking risky decisions.	◯	◯	◯	◯	◯
I tend to be confident about my risky decisions outcomes.	◯	◯	◯	◯	◯
I tend to enlarge the consequences of my risky decisions.	◯	◯	◯	◯	◯
I trust others and believe in their good intentions when taking risky decisions.	◯	◯	◯	◯	◯
I observe societal ethical standards when taking risky decisions.	◯	◯	◯	◯	◯
I frame risk problems in a neutral way.	◯	◯	◯	◯	◯
I provide comfort and support to others when taking risky decisions.	◯	◯	◯	◯	◯

5

Risk Attitude Survey

6. Risk Attitude Statements - Continued

6. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I sympathize with others who oppose my risky decisions.	◯	◯	◯	◯	◯
I prefer a structured approach for taking risky decisions.	◯	◯	◯	◯	◯
I tend to push myself very hard to succeed in taking the right risky decisions.	◯	◯	◯	◯	◯
I can read challenging material if it is relevant to my risky decisions.	◯	◯	◯	◯	◯
I look for creative response strategies when taking risky decisions.	◯	◯	◯	◯	◯
I thoroughly check all details before taking risky decisions.	◯	◯	◯	◯	◯
I consider my options carefully and tend to be cautious and self-controlled when taking risky decisions.	◯	◯	◯	◯	◯
I am receptive to ideas that might seem strange or radical when taking risky decisions.	◯	◯	◯	◯	◯
I enjoy daydreaming about the consequences of my risky decisions.	◯	◯	◯	◯	◯

6

Risk Attitude Survey

7. Risk Attitude Statements - Continued

7. Assume you are a project manager taking risky decisions related to project success criteria (scope, time and cost) during the execution phase. Please rate your agreement level with the following statements.

	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5
I rely on my knowledge and abilities to make appropriate risky decisions.	◯	◯	◯	◯	◯
I try to turn risky decisions into actions.	◯	◯	◯	◯	◯
I like making complex risky decisions.	◯	◯	◯	◯	◯
I tend to believe that there is no absolute right or wrong risky decisions.	◯	◯	◯	◯	◯
I go straight for discussing risky decisions goals without wasting time.	◯	◯	◯	◯	◯
I depend on my past experiences when taking risky decisions.	◯	◯	◯	◯	◯
I seek adventure through exploring variety of solutions when taking risky decisions.	◯	◯	◯	◯	◯
I use simple experimental methods in estimating risk probabilities when taking risky decisions.	◯	◯	◯	◯	◯
I examine the interaction between all contextual variables when taking risky decisions.	◯	◯	◯	◯	◯

Risk Attitude Survey

8. Risk Attitude Information

8. As the manager of a major project, you face a decision during execution phase that affects one or more of the project success criteria (scope, time and cost). Please answer the below three questions.

	Extremely less than others 1	Much less than others 2	A little less than others 3	A little more than others 4	Much more than others 5	Extremely more than others 6
1. ....your tendency to choose more or less risky decisions that could have a major impact on the project scope?	◯	◯	◯	◯	◯	◯
2. ....your tendency to choose more or less risky decisions that could have a major impact on the project time?	◯	◯	◯	◯	◯	◯
3. ....your tendency to choose more or less risky decisions that could have a major impact on the project cost?	◯	◯	◯	◯	◯	◯

9. Please rate your tendency towards taking risky decisions.

Avoiding Risky Decisions 1	2	3	4	5	Taking Risky Decisions 6
◯	◯	◯	◯	◯	◯

10. How do you describe yourself?

◯ Carefree person

◯ Careful person

11. When taking risky decisions, I feel more accountable to my:

◯ Boss

◯ Ethical standards

◯ Country laws

◯ Company rules

◯ God

◯ Other (please specify)

8

12. Please indicate the most important benefit you may obtain from taking risky decisions in your projects.

- ◯ Promotion
- ◯ Bonus
- ◯ Reputation
- ◯ Empowerment
- ◯ Creativity
- ◯ Positive project outcomes

Risk Attitude Survey

9. General Information

13. Age:

- Less than 25
- 25 - 35
- 36 - 46
- 47 - 57
- 58 or more

14. Gender:

- Male
- Female

15. What is the highest level of education you have completed?

- High school
- College
- Bachelor
- Post graduate

16. Number of dependents:

- 0
- 1
- 2
- 3
- 4 or more

17. Which race/ethnicity best describes you?

- ◯ Arab
- ◯ Asian
- ◯ African
- ◯ Caucasian
- ◯ Other (please specify):

18. Professional certifications:

- ☐ Project Management Professional (PMP)
- ☐ Projects in Controlled Environment (PRINCE2)
- ☐ Risk Management Professional (RMP)
- ☐ Management of Risk (MoR)
- ☐ Other (please specify)

Risk Attitude Survey

10. General Information - Continued

19. Years of experience in managing projects:

- ◯ One year or less
- ◯ 2 - 7
- ◯ 8 - 13
- ◯ 14 - 19
- ◯ 20 years or more

20. Current position:

- ◯ Project manager
- ◯ Engineer
- ◯ Functional manager
- ◯ Consultant
- ◯ Administrator
- ◯ Other (please specify)

21. Nature of industry:

- ◯ Manufacturing
- ◯ Information technology
- ◯ Transportation
- ◯ Constrcution
- ◯ Hospitality
- ◯ Commercial retail
- ◯ Financial and banking
- ◯ Consulting
- ◯ Advertising
- ◯ Other (please specify)

12

22. Organization type:

- ◯ Government
- ◯ Semi-government
- ◯ Private
- ◯ Not-for-profit

23. Organization size: total number of employees:

- ◯ 99 or less
- ◯ 100 - 499
- ◯ 500 - 999
- ◯ 1,000 - 4,999
- ◯ 5,000 or more

14.4 Appendix VI: Mapping matrices.

Indicate the strength of relationship betweem the horizental and vertical statements by choosing a number from 0-1.0.	I would not please others to get my risky decisions approved.	I follow company rules no matter what are the consequences.	I would not take risky decisions for the sake of impressing others.	I often think that my risky decisions are better than others' risky decisions .	I tend to be kind to others' even if they are not kind to me.	I would not get offended if others' opposed my risky decisions.	I am inclined to see the risk event as having been predictable after its occurrence.	I enjoy competing with others when taking risky decisions.	I feel fear when thinking about the consequences of my risky decisions.	I get upset by unpleasant thoughts that come into my mind when thinking about my risky decisions.	I feel I need reassurance from others' when taking risky decisions.	I tend to feel others' emotions when taking risky decisions.	I easily get angry if others' opposed my risky decisions .	I feel down when thinking about the consequences of my risky decisions.	I feel I am able to stand up for myself and defend my risky decisions.	I keep my emotions under control when taking risky decisions.	I can easily become overwhelmed by risk events when taking risky decisions.	I would avoid taking risky decisions that might possibly harm project success.	I tend to encounter conflicting beliefs, values and emotional reactions when taking risky decisions.	I would take risky decisions so that I can find out how their outcome will make me feel.	I would take risky decisions based on my perceptions that high project benefits could be achieved.	I can easily express myself using different words when explaining my risky decisions.	I feel comfortable taking risky decisions in a group.	I enjoy debating my risky decisions with others.	I tire out quickly when discussing my risky decisions.	I take charge and try leading others' when taking risky decisions.	I can be reckless and act wildly when taking risky decisions.	I try to radiate joy among others' when discussing risky decisions.	I look at the bright side of suggested risky decisions .	I tend to be confident about my risky decisions outcomes.	I tend to enlarge the consequences of my risky decisions.	I frame risk problems in a neutral way.	I am inclined to forgive and forget those who oppose my risky decisions.	I avoid criticizing others' shortcomings when taking risky decisions.	I can adjust my risky decisions based on others' feedback.	I am usually a patient person when taking risky decisions.	I trust others' and beileve in their good intentions when taking risky decisions.	I observe societal ethical standards when taking risky decisions.	I provide comfort and support to others' when taking risky decisions.	I sympathize with others' who oppose my risky decisions.	I prefer a structured approach for taking risky decisions.	I tend to push myself very hard to succeed in taking the right risky decisions.	I thoroughly check all details before taking risky decisions.	I consider my options carefully and tend to be cautious and self-controlled when taking risky decisions.	I rely on my knoweldge and abilities to make appropriate risky decisions.	I try to turn risky decisions into actions.	I go straight for discussing risky decisions goals without wasting time.	I depend on my past experiences when taking risky decisions.	I look at reasonable sources of evidence when taking risky decisions.	I take risky decisions based on previous familiar situations.	I consider risks impact and magnitude when taking risky decisions.	I tend to have a consistent approach for taking risky decisions across the project time frame.	I draw conclusions based on small number of past expereinces when taking risky decisions.	I take risky decisions that allow for the achievement of long term objectives.	I use simple experimental methods in estimating risk probabilities when taking risky decisions.	I examine the interaction between all contextual variables when taking risky decisions.	I cover broad range of possibilities when taking risky decisions.	I map risk causes to outcomes when taking risky decisions.	I can read challenging material if it is relevant to my risky decisions.	I look for creative response strategies when taking risky decisions.	I am receptive to ideas that might seem strange or radical when taking risky decisions.	I enjoy daydreaming about the consequences of my risky decisions.	I like making complex risky decisions.	I tend to believe that there is no absolute right or wrong risky decisions.	I seek adventure through exploring variety of solutions when taking risky decisions.	I tend to avoid taking risky decisions.	I tend to be careful when taking risky decisions.	I aim to obtain the most important benefit for me when taking risky decisions.	**scope**	**Time**	**Cost**	**Resources**	**Quality**	**Risk**	**Stakeholders' Satisfaction**
I would not please others to get my risky decisions approved.	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1
I follow company rules no matter what are the consequences.	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1
I would not take risky decisions for the sake of impressing others.	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1
I often think that my risky decisions are better than others' risky decisions .	1	0	1	1	0	1	1	1	0	0	0	0	1	0	1	1	0	1	1	0	1	1	1	1	0	1	0	1	1	1	0	0	0	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1
I tend to be kind to others' even if they are not kind to me.	1	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	0	0	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1
I would not get offended if others' opposed my risky decisions.	1	0	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
I am inclined to see the risk event as having been predictable after its occurrence.	0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0	1	1	1	0	1	1	1	1	0	0	1	0	1	1	0	0	0	0	1	1	0	1	1	1
I enjoy competing with others when taking risky decisions.	1	1	1	1	1	1	1	1	0	0	0	0	1	0	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	0	1	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
I feel fear when thinking about the consequences of my risky decisions.	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	0	1	1	0	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	1	1	0	0	0	1	1
I get upset by unpleasant thoughts that come into my mind when thinking about my risky decisions.	1	1	1	0	1	0	1	0	1	1	1	1	0	1	0	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1
I feel I need reassurance from others' when taking risky decisions.	0	1	0	0	1	0	0	0	1	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	0	1	0	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	1	1	1
I tend to feel others' emotions when taking risky decisions.	1	1	1	0	1	1	0	0	1	1	1	1	0	0	1	1	0	1	0	0	0	1	0	1	0	1	0	0	1	1	1	0	0	1	0	1	1	1	1	1	0	0	1	0	0	1	1	0	1	0	1	1	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	1	0	0	0	0	1
I easily get angry if others' opposed my risky decisions .	1	0	0	1	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	1	1	0	1	1	1	0	0	0	1	1	1	0	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	1	0	1	0	1	1	0	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1
I feel down when thinking about the consequences of my risky decisions.	0	1	1	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	1	0	0	1	0	1	1	1	0	1	1	1	1	1	0	1	1	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	0	1	0	1	0	0
I feel I am able to stand up for myself and defend my risky decisions.	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
I keep my emotions under control when taking risky decisions.	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1
I can easily become overwhelmed by risk events when taking risky decisions.	0	1	1	0	1	0	0	0	1	1	1	0	1	0	0	0	1	1	1	0	1	1	0	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0	1	1	0	1	0	0	0
I would avoid taking risky decisions that might possibly harm project success.	1	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	1	1	0	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1
I tend to encounter conflicting beliefs, values and emotional reactions when taking risky decisions.	1	1	1	1	1	1	0	1	0	1	0	0	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	0	0	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	1
I would take risky decisions so that I can find out how their outcome will make me feel.	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1	1	0	1	0	0	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0
I would take risky decisions based on my perceptions that high project benefits could be achieved.	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1
I can easily express myself using different words when explaining my risky decisions.	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	1	0	1	1	0	1	0	1	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1
I feel comfortable taking risky decisions in a group.	1	1	1	1	1	1	0	1	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0
I enjoy debating my risky decisions with others.	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	0	1	0	0	1	0	1
I tire out quickly when discussing my risky decisions.	1	1	0	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	1	0	0	0	0	1	0	1	0	1	1	1	0	0	0	1	0	0	1	1	0	0	0	1	0	1	1	1	1	0	1	1	0	0	0	1	1	0	1	1	0	0
I take charge and try leading others' when taking risky decisions.	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	1	0	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
I can be reckless and act wildly when taking risky decisions.	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0
I try to radiate joy among others' when discussing risky decisions.	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	1	0	1	0	1
I look at the bright side of suggested risky decisions .	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	1	0	1	1	1	0	0	0	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	0	1	1
I tend to be confident about my risky decisions outcomes.	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1
I tend to enlarge the consequences of my risky decisions.	0	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	1
I frame risk problems in a neutral way.	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	1	1	0	1	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1	1	0	1	0	1	1	1	1	1	1	1
I am inclined to forgive and forget those who oppose my risky decisions.	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0
I avoid criticizing others' shortcomings when taking risky decisions.	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1	1	1	0	0	0	1	0	1
I can adjust my risky decisions based on others' feedback.	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	0	1	1	0	0
I am usually a patient person when taking risky decisions.	0	1	1	0	1	1	0	0	0	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	1	0	0	1	0	0	0	1	1	1	1	0	1	1	0	0	0	0	1	0	0	1	0	0	1	0	1
I trust others' and beileve in their good intentions when taking risky decisions.	0	1	1	0	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	0	0	0	0	0	1
I observe societal ethical standards when taking risky decisions.	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	0	1	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	1
I provide comfort and support to others' when taking risky decisions.	0	1	1	0	1	1	0	0	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
I sympathize with others' who oppose my risky decisions.	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	0	1	1	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	1
I prefer a structured approach for taking risky decisions.	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1
I tend to push myself very hard to succeed in taking the right risky decisions.	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1
I thoroughly check all details before taking risky decisions.	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1
I consider my options carefully and tend to be cautious and self-controlled when taking risky decisions.	1	1	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
I rely on my knoweldge and abilities to make appropriate risky decisions.	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	1	0	1	0	0	1	0	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
I try to turn risky decisions into actions.	1	0	0	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	0	0	1	1	0
I go straight for discussing risky decisions goals without wasting time.	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	0	0	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	0	1	0
I depend on my past experiences when taking risky decisions.	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	1	0	1	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
I look at reasonable sources of evidence when taking risky decisions.	1	1	1	1	0	1	1	0	0	1	1	1	0	1	1	1	1	1	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	1	0	1	1	0
I take risky decisions based on previous familiar situations.	1	1	1	0	0	1	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
I consider risks impact and magnitude when taking risky decisions.	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	1	0	1	1	1
I tend to have a consistent approach for taking risky decisions across the project time frame.	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0	1	1	1
I draw conclusions based on small number of past expereinces when taking risky decisions.	1	1	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	1	0	1	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
I take risky decisions that allow for the achievement of long term objectives.	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	0	0	0	1	0	0	1	0	1	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	0
I use simple experimental methods in estimating risk probabilities when taking risky decisions.	0	1	1	0	0	0	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	1	1	0	1	1	0
I examine the interaction between all contextual variables when taking risky decisions.	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	0
I cover broad range of possibilities when taking risky decisions.	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	0	1	0	1	1	0	0	0	1	1	1	0	0	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	0
I map risk causes to outcomes when taking risky decisions.	1	1	0	1	0	1	1	1	1	1	0	0	0	1	1	0	1	1	0	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	1	1	0
I can read challenging material if it is relevant to my risky decisions.	0	0	0	1	0	1	1	1	1	1	0	0	1	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	0	0	1	0
I look for creative response strategies when taking risky decisions.	0	0	0	1	0	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	0
I am receptive to ideas that might seem strange or radical when taking risky decisions.	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0
I enjoy daydreaming about the consequences of my risky decisions.	1	0	0	1	0	0	1	0	0	0	0	0	1	1	1	0	1	1	0	1	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	1	1	0	0	0	0	1	1	0	0	1	0
I like making complex risky decisions.	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0
I tend to believe that there is no absolute right or wrong risky decisions.	1	1	1	0	1	1	1	1	0	1	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	0	1	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	1	1	0	1	1	0	1	0	1	1	0	0	1	0	1
I seek adventure through exploring variety of solutions when taking risky decisions.	1	1	0	1	1	1	1	1	0	1	0	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	1	0	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	0
I tend to avoid taking risky decisions.	1	1	1	0	0	1	0	1	0	0	1	1	0	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1
I tend to be careful when taking risky decisions.	1	1	1	1	0	1	0	1	1	1	1	1	0	0	1	1	0	1	0	0	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1
I aim to obtain the most important benefit for me when taking risky decisions.	1	0	1	1	0	1	0	1	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	1	0	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Scope	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	1	0	0	1	1	0	0	1	0	1	1	1	1	0	1	0	1	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1	1	1	1	0	0	0	1	0	0
Time	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	0	1	0	0
Cost	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	0
Resources	1	1	1	1	1	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	1	1	1	0	1	1	0	1	1	1	0	1	0	0	1	0	0	1	0	0	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0
Quality	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0
Risk	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	0	1	1	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	1	0
Stakeholders' Satisfaction	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1

	H1	H2	H3	H4	H5	H6	H7	H8	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	A1	A2	A3	A4	A5	A6
H1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1
H2	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1
H3	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	1	1
H4	1	0	1	1	0	1	1	1	0	0	0	0	1	0	1	1	0	1	1	0	1	1	1	1	0	1	0	1	1	1	0	0	0	1	0	0	0	1
H5	1	0	0	0	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	0	0	1	1	1	1	1	0	1	1	1	0	0	1	1	1	1	1	1
H6	1	0	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1
H7	0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0	0
H8	1	1	1	1	1	1	1	1	0	0	0	0	1	0	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	0	0	1
E1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	0	1
E2	1	1	1	0	1	0	1	0	1	1	1	1	0	1	0	1	1	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	1
E3	0	1	0	0	1	0	0	0	1	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	0	1	0	0	1	1	1	0	1	1	1	1	1	1
E4	1	1	1	0	1	1	0	0	1	1	1	1	0	0	1	1	0	1	0	0	0	1	0	1	0	1	0	0	1	1	1	0	0	1	0	1	1	1
E5	1	0	0	1	1	0	0	1	1	0	0	0	1	0	1	0	1	0	1	0	1	1	0	1	1	1	0	0	0	1	1	1	0	1	1	0	0	0
E6	0	1	1	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	1	0	0	1	0	1	1	1	0	1	1	1	1	1	0	1	1	0	0	1
E7	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	1	0	1	1	1	0	1	0	1	1	0	1	1
E8	1	1	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	1	1	1	1	1	0	1	0	0	1	1	0	0	0	1	0	1	0	1
E9	0	1	1	0	1	0	0	0	1	1	1	0	1	0	0	0	1	1	1	0	1	1	0	1	1	0	1	0	1	1	1	1	0	1	1	0	0	0
E10	1	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	1	1	0	1	1	1	0	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1
E11	1	1	1	1	1	1	0	1	0	1	0	0	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1
E12	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	1	0	1	1	1	0	1	0	0	1	1	1	0	0	0	1	0	0	1
E13	1	0	1	1	0	1	1	1	0	0	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1
X1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	1	0	1
X2	1	1	1	1	1	1	0	1	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1	1	0	1	0	1	1	1	1	0	0	1	1	1	1	1
X3	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	0	1	1	1	1	1
X4	1	1	0	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	1	0	0	0	0
X5	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	1	0	1	1
X6	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
X7	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1
X8	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	0	0	0	0
X9	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	0	1	0	0	1
X10	0	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	1	0	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0	0	0	0
X11	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	0	0	1	0	1	0	1	0	1	0	1	1	1	0	0
A1	0	0	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1
A2	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1
A3	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1
A4	0	1	1	0	1	1	0	0	0	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	1	1
A5	0	1	1	0	1	1	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	0	1	1	1	1	1	1
A6	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	0	1	0	1	0	1	0	0	1	1	1	1	1	1
A7	0	1	1	0	1	1	0	0	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1
A8	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	0	1	1	0	1	0	0
C1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	1	0	1	0	1	0
C2	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	1	0	0	0	1	0	1	0	1	0	1
C3	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	0	0	1	1	0	1
C4	1	1	1	1	0	0	0	0	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	1	0	1	0	1	1	1	0	1
C5	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	1	0	1	0	0	1	0	1	0	0	1
C6	1	0	0	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	0	1	1	1	1	1	0	1	1	1	1	0
C7	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	0	0	0	1	0	1	0
C8	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	0	1	0	1	1	0	1	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0
C9	1	1	1	1	0	1	1	0	0	1	1	1	0	1	1	1	1	1	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	0
C10	1	1	1	0	0	1	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1	0	1	0	0	1	1	0	1	1	1	1	0	1	1	0	0	0
C11	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1
C12	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	0	1	1	0	1	0	1	1	1	0	1
C13	1	1	1	1	1	0	1	1	1	0	1	0	0	0	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1	1	0	1	0	0	0	0	1	0
C14	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	0	0	0	1	0	0	1	0	1	0	1	1	1	0	1	0
C15	0	1	1	0	0	0	0	0	1	1	0	0	0	1	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
C16	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	1	1	0	1
C17	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1	1	0	0	1	0	1	0	1	1	0	0	0	1	1	1	0	0	1	1	0	1
C18	1	1	0	1	0	1	1	1	1	1	0	0	0	1	1	0	1	1	0	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0
O1	0	0	0	1	0	1	1	1	1	1	0	0	1	1	1	0	1	1	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	1	1	0	0
O2	0	0	0	1	0	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
O3	1	1	0	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	0
O4	1	0	0	1	0	0	1	0	0	0	0	0	1	1	1	0	1	1	0	1	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	1	0	0
O5	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
O6	1	1	1	0	1	1	1	1	0	1	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	0	1	0
O7	1	1	0	1	1	1	1	1	0	1	0	1	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	1	0
RA	1	1	1	0	0	1	0	1	0	0	1	1	0	0	1	1	1	1	1	0	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	1	1
RAD	1	1	1	1	0	1	0	1	1	1	1	1	0	0	1	1	0	1	0	0	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	0	1
BE	1	0	1	1	0	1	0	1	0	0	0	0	1	0	1	1	0	1	0	0	1	1	0	1	0	1	0	0	0	1	0	0	0	1	0	0	1	1
S	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	1	0	0	1	1
T	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	0	0
C	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0
RE	1	1	1	1	1	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	1	1	1	0	1	1	0	1	1	1	0	1	0	0	1	0	0	1
Q	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1
R	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	0	1	1	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0
ST	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	1	1	0	1	0	1	0	1	1	1	1	1	0	1	0	1	1	1

	A7	A8	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	O1	O2	O3	O4	O5	O6	O7	RA	RAD	BE	S	T	C	RE	Q	R	ST
H1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
H2	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	1	1	1	0	1	1	1	1	1	1	1
H3	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	1	1	1
H4	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1
H5	1	1	0	1	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	1	1	1	1	1	1	1
H6	1	1	1	1	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1
H7	0	0	1	0	0	0	0	1	0	1	1	1	0	1	1	1	0	1	1	1	1	0	0	1	0	1	1	0	0	0	0	1	1	0	1	1	1
H8	0	0	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
E1	1	0	1	1	1	1	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	0	1	1	0	0	0	1	1
E2	0	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1
E3	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	1	1	1
E4	1	1	0	0	1	0	0	1	1	0	1	0	1	1	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	1	0	0	0	0	1
E5	0	0	1	0	1	1	1	1	0	0	0	0	0	1	0	1	0	1	1	0	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1
E6	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	0	1	0	1	0	0
E7	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1
E8	1	0	1	0	1	1	0	1	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1
E9	0	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0	0	1	1	0	0	1	1	1	0	1	0	0
E10	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1
E11	1	1	1	1	1	1	0	0	1	0	0	0	1	0	0	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	1
E12	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0
E13	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1
X1	1	0	1	0	1	1	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	1	0	1	0	0	1
X2	1	1	1	0	1	1	0	0	0	1	0	1	0	1	1	0	1	1	1	0	0	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	0
X3	1	1	1	0	1	0	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	1	1	0	1	0	0	1	0	1
X4	1	0	1	0	1	1	1	0	0	0	1	0	0	1	1	0	0	0	1	0	1	1	1	1	0	1	1	0	0	0	1	1	0	1	1	0	0
X5	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
X6	0	0	1	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0
X7	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	1	0	1	1	0	1
X8	1	0	0	0	0	0	0	1	1	0	0	1	0	1	1	1	0	0	0	0	0	1	1	0	0	1	1	1	1	0	0	1	0	1	0	0	1
X9	0	0	1	0	1	1	1	1	1	1	0	1	0	1	1	0	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1
X10	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	1	0	0	1	1	0	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	1
X11	1	0	1	1	1	1	0	1	0	0	0	1	1	1	1	0	0	1	1	1	0	0	0	0	0	1	1	0	1	0	1	1	1	1	1	1	1
A1	1	1	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0
A2	1	1	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1	1	1	0	0	0	1	0	1
A3	1	0	1	0	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	0	1	1	0	0
A4	1	1	0	1	1	1	0	1	0	0	1	0	0	1	0	0	0	1	1	1	1	0	1	1	0	0	0	0	1	0	0	1	0	0	1	0	1
A5	1	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	0	0	0	0	0	1
A6	1	0	0	1	1	1	1	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	0	1
A7	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1
A8	1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	1
C1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1
C2	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	1	1
C3	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1
C4	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
C5	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
C6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	1	1	0	0	1	1	0
C7	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	1	1	0	0	1	1	0	0	1	0
C8	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
C9	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	1	0	1	1	0
C10	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
C11	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	0	0	1	1	0	1	1	1
C12	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0	1	1	1
C13	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1
C14	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	1	0	1	1	0
C15	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	0	0	1	1	0	1	1	0
C16	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1	0
C17	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	1	1	1	1	1	1	1	0
C18	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	1	1	0
O1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	1	0	0	1	0
O2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1	0
O3	1	1	1	1	1	0	1	1	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0
O4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	1	0	0	1	0
O5	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0
O6	1	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	0	0	1	0	1	1	0	1	1	0	1	0	1	1	0	0	1	0	1
O7	1	0	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	1	0	0
RA	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1
RAD	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	1	1	0	1	0	1	1	1	1	1	1	1
BE	0	0	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	1	0	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
S	0	0	1	0	1	1	1	1	0	1	0	1	0	0	1	0	0	0	1	0	1	0	1	0	1	1	0	1	1	1	1	0	0	0	1	0	0
T	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	1	0	0
C	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	1	0	0	0	0
RE	0	0	1	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	0	0
Q	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0	1	0	1	1	1	1	1	1	1	1	0	1	1	0	0
R	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	1	0
ST	1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	0	1