Decision support framework for resources allocation to corporate social responsibility (CSR) programmes

Jolanta Poplawska

A thesis submitted in partial fulfilment of the requirement for the award of the degree of

Doctor of Philosophy (PhD)

Director of studies: Prof. Ashraf Labib

February 2014
Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

Signature ................................

Date ...........................................
Acknowledgements

First and foremost, I would like to express my sincere gratitude and thanks to my supervision team, in particular Prof. Ashraf Labib and Dr. Debbie Reed for their guidance, assistance, encouragement and continuous support.

Secondly, I would like to thank the academic and administrative staff at the University of Portsmouth, who has provided kindly support during the duration of my PhD. I am also thankful to all key experts who have given me suggestions with their professional knowledge and experience.

Last but not least, I would like to express special thanks to my family and friends for the entire support along my PhD journey and motivation to complete this PhD thesis.
Abstract

Academia and business could benefit significantly from a framework allocating scarce resources to corporate social responsibility (CSR) programmes while considering the stakeholders’ importance. Methodologies that are capable of integrating CSR into business models in an operational way could be of great use.

This thesis makes a contribution to knowledge by the development of a decision support methodology to allocate resources to CSR programmes. The research introduces the concepts of CSR and decision analysis, while identifying a hybrid integrated framework combining several decision analysis techniques allowing elimination of the deficiencies of mono-methodologies and facilitating resources allocation to CSR projects.

Despite the high levels of awareness, the process of implementing CSR at the project level is difficult, as implementation of CSR at the design stage requires effective allocation of scarce resources in addition to considering diverging objectives of stakeholders, multiple criteria and uncertainty throughout the decision-making process.

A three phase research programme involving a pilot study, framework building, framework testing and validation is conducted to understand the principles of CSR practices and related implementation issues. The research explores and identifies methodologies of decision analysis that can be applied in an integrated manner to address problems in CSR.

The result is a sequential and iterative methodology that fills the gap identified through a literature review and practitioner survey. The documented framework, derived from the structured development and test programme, has shown to be feasible. It makes a significant contribution to knowledge, attained through the provisions of procedural fairness. The key stakeholders are fully engaged in the process of framework building as well as throughout the entire decision-making process.

The research provides a framework to allocate resources to CSR programmes in an efficient manner by considering the stakeholders’ diverging objectives, companies’ competitive advantage, interdependent criteria, and limited resources.
# Table of Contents

Table of Contents .................................................................................................................. iii

List of Tables .......................................................................................................................... ix

List of Figures .......................................................................................................................... xi

List of Boxes ........................................................................................................................... xiii

Glossary of Abbreviations ........................................................................................................ xiv

Part I: Introduction and Literature Review .............................................................................. 1

1 Chapter One - Introduction ................................................................................................. 2

1.1 Research background ........................................................................................................... 1

1.2 Problem statement ............................................................................................................... 9

1.2.1 The Process and Structure of Resource Allocation to Corporate Social Responsibility Programmes .................................................................................................................. 10

1.2.2 The Research ................................................................................................................... 13

1.2.3 Concepts Definition ......................................................................................................... 14

1.3 Research aims and objectives ............................................................................................ 17

1.4 Research questions .............................................................................................................. 19

1.5 Overview of research methods ............................................................................................ 19

1.6 Overview of the research contribution ................................................................................. 22

1.7 Thesis structure .................................................................................................................. 24

2 Chapter Two - Corporate Social Responsibility: Doing Well by Doing Good .................. 27
2.1 Introduction ................................................................................................................. 29
2.2 Background and context ............................................................................................. 30
2.3 Defining Corporate Social Responsibility ................................................................. 34
2.4 Corporate Social Responsibility Theories ................................................................. 37
2.5 Dynamic map of Corporate Social Responsibility theories ...................................... 54
2.6 Stakeholders salience assessment .............................................................................. 60
2.7 Sustainability and fairness ......................................................................................... 68
2.8 Resources allocation to Corporate Social Responsibility programmes .................... 72
2.9 Gaps identified in the literature ............................................................................... 74
2.10 Conclusions drawn from the overview of literature ............................................... 76
2.11 Chapter Summary .................................................................................................... 77

3 Chapter Three - Decision Analysis Methods ................................................................. 79

3.1 Introduction ................................................................................................................ 81
3.2 Tools and techniques identified for Corporate Social Responsibility integration .... 81
3.3 Multiple criteria decision analysis methods ............................................................... 87

3.3.1. Problem structuring ............................................................................................ 89
3.3.2. Cognitive mapping ............................................................................................. 92
3.3.3. Analytic Hierarchy Process .............................................................................. 97
3.3.4. Analytic Network Process methodology .......................................................... 107
3.4 Fuzzy Systems ........................................................................................................... 112
3.4.1. Fuzzy logic ........................................................................................................114
3.5 The Knapsack approach ..........................................................................................119
3.6 Conclusions drawn from the overview of the literature........................................122
3.7 Chapter summary....................................................................................................126

Part II: Top-Down: Application of a decision-making framework to allocate resources to
Corporate Social Responsibility programmes ..................................................................128

4 Chapter Four - Methodology .........................................................................................129
4.1 Introduction: Linking research objective and methodology .....................................130
4.2 Philosophical Stance ...............................................................................................134
4.3 The research process: an iterative approach ...........................................................140
4.4 Research Design .....................................................................................................146
4.5 Research Ethics .......................................................................................................156
4.6 Data collection methods ..........................................................................................158
4.7 Presentation of Survey Results ................................................................................172
4.8 Research Evaluation ...............................................................................................180
4.9 Validation ................................................................................................................184
  4.9.1. Validation of Methodology ...............................................................................185
  4.9.2. Validation of the Framework ...........................................................................189
  4.9.1. Framework validation strategies .......................................................................192
4.10 Chapter summary ....................................................................................................194
Chapter Five - A dynamic theory of stakeholder identification and salience using Fuzzy Logic and the Analytic Hierarchy Process methodology in Corporate Social Responsibility

5.1 Introduction .................................................................................................................................................. 197
5.2 Method and data ............................................................................................................................................ 198
5.3 Fuzzy logic framework for stakeholder salience assessment ................................................................. 200
5.4 Analytic Hierarchy Process framework for stakeholder salience assessment ........................................ 223
5.5 Conclusions ................................................................................................................................................ 227
5.6 Chapter summary ....................................................................................................................................... 229

Chapter Six - A hybrid framework for resources allocation to Corporate Social Responsibility programmes ................................................................................................................................. 230

6.1 Introduction .................................................................................................................................................. 231
6.2 Decision support framework ...................................................................................................................... 235
6.3 Data Analysis and Results .......................................................................................................................... 240
6.4 Distinctive features of the synthesis ......................................................................................................... 267
6.5 Conclusions ................................................................................................................................................ 268
6.6 Chapter summary ....................................................................................................................................... 268

Part III: Bottom-up: Framework Consistency Check ..................................................................................... 269

Chapter Seven – Consistency Assessment of the Hybrid Decision Support Framework

7.1 The hybrid integrated framework overview ............................................................................................... 272
7.2 Framework consistency assessment adopted in this research...............................272

7.2.1. The consistency assessment questionnaire and its development ..............274

7.2.2. Panel of professionals ..................................................................................275

7.2.3. Participants’ response ..................................................................................276

7.2.4. Findings .......................................................................................................282

7.3 Chapter summary ..............................................................................................283

Part IV: Conclusions ..............................................................................................284

8 Chapter Eight - Conclusions ...........................................................................285

8.1 Main findings and implications .......................................................................287

8.1.1. Corporate Social Responsibility practices .................................................287

8.1.2. Decision Analysis tools to integrate Corporate Social Responsibility into corporate business models .................................................................291

8.1.3. Assessing Stakeholders’ Salience using the Dynamic Methodology ..........295

8.1.4. Integrated decision-making framework .....................................................299

8.1.5. Consistency check of the decision-making framework ..............................302

8.2 Summary guidance on using multiple tools approach to conduct CSR ..........302

8.3 Limitations and Future Research ..................................................................304

8.4 Reflection on the research process .................................................................309

8.5 Concluding remarks ..........................................................................................311

References .............................................................................................................312

9 Appendices .........................................................................................................330
9.1 Appendix A: Deduction vs. Induction ................................................................. 331
9.2 Appendix B: Focus groups conducted for the purpose of this research ....... 332
9.3 Appendix C: PBS Ethics Review document .................................................... 333
9.4 Appendix D: Researcher skills and expertise in facilitating focus groups .... 341
9.5 Appendix E: Conferences, seminars and workshops attended .................... 342
9.6 Appendix F: Non-Probability Sampling Techniques ....................................... 344
9.7 Appendix G: Questionnaire ............................................................................ 345
9.8 Appendix H: Strategic Cognitive Map ............................................................ 367
9.9 Appendix I: Benefits Opportunities Costs Risks (BOCR) network ............ 369
9.10 Appendix J: Validation Questionnaire ............................................................ 373
9.11 Appendix K: List of articles submitted for publication ............................. 382
9.12 Appendix L: Research Ethics Review Checklist ............................................ 383
List of Tables

Table 2.1 The CSR theories classification.................................................................54
Table 2.2 Classification of stakeholders according to three attributes of power, legitimacy, and urgency (Y=yes, N=No).............................................................................................65
Table 2.3 The fairness framework .................................................................................70
Table 3.1 Methods and the CSR business areas they address......................................82
Table 3.2 AHP measurement scale of preference between two elements (Saaty, 1980)......98
Table 3.3 Average random index RI values for different matrix sizes .........................100
Table 4.1 The worldview used in the research...............................................................137
Table 4.2 The pragmatic worldview implications for practice .....................................138
Table 4.3 Design research overview .............................................................................141
Table 4.4 Design research characteristics.................................................................142
Table 4.5 Summary of data sources/instruments used in the framework development. ...148
Table 4.6 Limitations of the main data collection methods used in this study ..............160
Table 4.7 Framework consistency assessment techniques (Sargent, 2009) ..................193
Table 5.1 Respondents’ answers in respect to legitimacy, power and urgency of each of eight types of stakeholders in the context of resources allocation to CSR programmes (Scale 0-3: none=0, low=1, medium=2, high=3) .................................................................................................202
Table 5.2 Fuzzy stakeholder attributes importance ratings ..........................................206
Table 5.3 Fuzzy stakeholder salience score ................................................................208
Table 5.4 Stakeholder salience crisp score and ranking .............................................209
Table 5.5 The linguistic criteria importance scale .....................................................211
Table 5.6 The linguistic value scale of stakeholders’ importance ..............................213
List of Figures

Figure 1.1 Overview of the research phases ................................................................. 20
Figure 1.2 Thesis structure .......................................................................................... 26
Figure 2.1 Chapter two within this thesis .................................................................... 29
Figure 2.2 CSR timeline ............................................................................................. 33
Figure 2.3 The Pyramid of Corporate Social Responsibility (Carroll, 1999) ................. 59
Figure 2.4 Stakeholder typology by Mitchell et al. (1997) ........................................... 65
Figure 3.1 Chapter three within this thesis ................................................................. 80
Figure 3.2 Decision analysis methods taxonomy. Source: Zhou et al. (2006) .......... 85
Figure 3.3 Fuzzy inference process ............................................................................. 117
Figure 3.4 Decision analysis methods and their applications in the CSR context ....... 123
Figure 4.1 Chapter four in this thesis ........................................................................ 130
Figure 4.2 The Iterative Process Diagram. Source: Deming (1982) ....................... 144
Figure 4.3 Three phased iterative research design ..................................................... 152
Figure 4.4 Brief overview of the iterative research design employed in this work ....... 153
Figure 4.5 Photographs taken during the initial focus group session ......................... 171
Figure 4.6 Stakeholder groups .................................................................................. 174
Figure 4.7 Organisation type ..................................................................................... 175
Figure 4.8 Organisation ownership .......................................................................... 175
Figure 4.9 Organisation size ..................................................................................... 176
Figure 4.10 Age of organisation .............................................................................. 178
Figure 4.11 Annual turnover .................................................................................... 179
Figure 4.12 Resources allocation to CSR.................................................................180
Figure 5.1 Chapter five in the thesis ..................................................................197
Figure 5.2 (a) and (b) The membership functions of the linguistic importance weight of criteria ..................................................................................................................212
Figure 5.3 The membership functions of the linguistic importance weight of stakeholders 213
Figure 5.4 Fuzzy logic decision surface for the relationship between urgency and power ..217
Figure 5.5 The fuzzy decision surface for the relationship between power and legitimacy .219
Figure 5.6 The three level hierarchy for the stakeholder prioritisation problem ..........224
Figure 5.7 AHP synthesis with respect to goal, which also provides weightings calculation and the rate of inconsistency ..........................................................................................................................225
Figure 5.8 The 2-D plot ..........................................................................................226
Figure 6.1 Chapter six within the thesis .................................................................231
Figure 6.2 The contribution of the methods in the synthesis .................................237
Figure 6.3 A view of the part of the strategic cognitive map .................................241
Figure 6.4 The partial view of a strategic cognitive map ......................................243
Figure 6.5 The ANP decision framework ...............................................................253
Figure 7.1 Chapter seven within this thesis ..........................................................271
Figure 8.1 Chapter eight in the thesis ..................................................................287
Figure 8.2 Kolb management teaching cycle .........................................................310
List of Boxes

Box 2.1 Selected definitions of CSR ................................................................. 34
Box 2.2 Key elements of CSR process ....................................................... 35
Box 4.1 Research questions revisited (from the introductory chapter) .... 131
Box 4.2 A brief outline of the PhD ethical research policy ......................... 151
Box 4.3 Outline of data collection methods employed in this research .......... 153
Glossary of Abbreviations

ABC  Activity-Based Costing
AHP  Analytic Hierarchy Process
AI   Artificial Intelligence
AIJ  Aggregation of Individual Judgements
AIP  Aggregation of Individual Priorities
APS  AccountAbility Principles
AS   Assurance
BOCR Benefits Opportunities Costs Risks
CATWOE Customers, Actors, Transformation, Worldview, Owners and Environment
CAUSE Criteria, Alternatives, Uncertainties, Stakeholders, Environmental factors and constraints
CM   Cognitive Mapping
CR   Consistency Ratio
CSP-FP Corporate Social Performance-Financial Performance
CSR  Corporate Social Responsibility
DEMATEL Decision Making Trail and Evaluation Laboratory method
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMUU</td>
<td>Decision-making Under Uncertainty</td>
</tr>
<tr>
<td>DSS</td>
<td>Decision Support Systems</td>
</tr>
<tr>
<td>ELECTRE</td>
<td>Elimination and Choice Translating Reality Methods</td>
</tr>
<tr>
<td>GP</td>
<td>Global Reporting Initiative</td>
</tr>
<tr>
<td>ICMM</td>
<td>International Council for Mining and Metals</td>
</tr>
<tr>
<td>ISO</td>
<td>International Standard Organisation</td>
</tr>
<tr>
<td>MAUT</td>
<td>Multiple-Attribute Utility Theory</td>
</tr>
<tr>
<td>MAVT</td>
<td>Multi-Attributive Value Theory</td>
</tr>
<tr>
<td>MCDA</td>
<td>Multiple-Criteria Decision Analysis</td>
</tr>
<tr>
<td>MCDM</td>
<td>Multiple-Criteria Decision-Making</td>
</tr>
<tr>
<td>MNCs</td>
<td>Multi National Corporations</td>
</tr>
<tr>
<td>MODM</td>
<td>Multiple-Objective Decision-Making</td>
</tr>
<tr>
<td>MOLP</td>
<td>Multiple-Objective Linear Programming</td>
</tr>
<tr>
<td>NCP</td>
<td>National Contact Point</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Governmental Organisation</td>
</tr>
<tr>
<td>NPV</td>
<td>Net Present Value</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OR</td>
<td>Operational Research</td>
</tr>
</tbody>
</table>
PDCA  Plan Do Check Act

PROMETHEE  Preference Ranking Organisation Methods for Enrichment Evaluation

SES  Stakeholder Engagement

SODA  Strategic Options Development and Analysis

SODM  Single Objective Decision-making methods

UNGC  The United Nations Global Compact

ZOGP  Zero-one Goal Programming
Part I: Introduction and Literature Review

This part of the thesis covers the background, motivation, approach to the study, and outlines the contribution of this work. The literature review presents different areas of corporate social responsibility (CSR). The current literature points out the need for systematic methods for CSR integration into business strategy, methods for consistent decision-making, innovative ways to manage stakeholders’ objectives, and to allocate resources in an efficient manner.
Chapter One - Introduction
Chapter 1

This chapter presents the rationale behind this research (section 1.1 and section 1.2). Then, it defines the research problem and the key concepts involved in the decision-making process (section 1.3), followed by an overview of the research aims and objectives (section 1.4), research questions (section 1.5) and an overview of the research methods (section 1.6). Subsequently, an outline of the contribution of this work is offered (section 1.7). The structure and composition of the thesis is discussed in the final section of this chapter (section 1.8).

1.1 Research background

One of the key issues nowadays that the business world is facing is the transition to sustainability. The broad and complex context of sustainability has at its core meeting the needs of global population, reducing poverty, preserving human well-being along with preserving and maintaining the environment and its natural resource base. By integrating the sustainability concept into their business models, companies aim at reaching the goal of sustainable human consumption patterns (Kates, 2000). To justify sustainability strategies within organisations, the notion of ‘business case’ has been applied (Carroll & Shabana, 2010). This research is based on the premise that to ensure sustainability, the sustainability practices have to be integrated within the organisational use (Slack, 2012). Therefore, this research proposes a set of methodologies based on decision analysis techniques to assist the iterated processes of resource allocation to CSR programmes. These decision analysis techniques help in modelling business sustainability in terms of goals, stakeholders, alternatives and different criteria (Tsai & Hsu, 2008). The techniques chosen in this study are intended to support the decision-making process in terms of resource allocation, prioritisation of options, feedback on consistency, rules evaluation, and sensitivity analysis.
Chapter 1

This multiple modelling approach in an integrated manner helps to view the same problems from different perspectives, and in a complementary manner. The robustness of these methodologies as well as their suitability to the organisational use of CSR integration is assessed in this work and illustrated through the application in the extractive industry.

As awareness of potential negative impacts of many corporate operations has grown, efforts have been made to avoid these effects and to work towards their mitigation (Jenkins, 2004). There is common agreement that certain initiatives are required to make operations of companies more sustainable (Jenkins & Yakovleva, 2006). The shift towards the sustainable movement depends on the awareness, knowledge and understanding of the multi-faceted impacts of corporate operations as well as the adoption of appropriate strategies enabling better integration of CSR into business strategy. Therefore, effective approaches enabling integration of CSR practices into business strategy have high potential to contribute towards sustainable development.

The sustainability of projects depends to a large extent on the recognition and integration of the needs of stakeholders such as the local community, government, employees, environmental groups, NGO’s, and suppliers, who may have different or even conflicting objectives (Merad, Dechy, Serir, Grabisch, & Marcel, 2013; Sperry & Jetter, 2012). What is more, an investment process such as CSR requires consideration of many qualitative variables.

Allocation of resources to CSR programmes would be considered as one of the critical issues for a company wishing to develop a CSR strategy. According to Noda and Bower (1996) strategy making is an iterative process of resource allocation. Nevertheless, a lack of structural approach regarding the problem of resources allocation in CSR remains. Thus,
Multiple-Criteria Decision Analysis (MCDA) has been proposed in this study as an effective way (Montibeller & Franco, 2010; Montibeller, Franco, Lord, & Iglesias, 2009) to deal with the aforementioned challenges and for solving the problem.

Nowadays execution of CSR practices is an initiative demonstrating the promotion of sustainable development. Therefore, it is appropriate to consider the CSR concept as the business level equivalent to sustainable development (Guenther, Hoppe, & Poser, 2007).

The sustainability concept is popular but hard to define. Sustainability discourse started with the publication of the Brundtland Report in 1987, where the term was defined as ‘meeting the needs of the present without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987, p. 43). Environmental issues were particularly stressed in the report. Therefore, the report resulted in the Earth Summit Convention in 1992, then the adoption of Agenda 21 and the Rio Declaration. The Intergovernmental Panel on Climate Change and Copenhagen Climate Conference was also originated thanks to the Brundtland Report. It is not, however, solely the environmental aspect that is included within the report but also the developmental issues. At its heart is finding a balance between diverging objectives of multiple stakeholders and different courses of action.

The expectations and requirements of various company stakeholders along with the preservation of the environment can be met with the CSR comprehensive business model. Integration of CSR into the strategy can be recognised as a way of managing the company by harmonising profitability with social and environmental actions (Vintro & Comajuncosa, 2010). Hence, the key areas that projects can impact upon and hamper sustainable
development are environmental, social, economic, and political to an extent (Zald, 2002).
Similarly, these factors can in turn influence sustainability of projects.

**Extensive effects upon the natural environment**

The operations of many industries may have a direct severe physical impact upon the natural environment. For instance, in the case of oil, gas and mining industries, whatever natural resources are extracted, quarried or mined requires landscape alteration and disturbance of flora and fauna. Environmental impacts of corporate operations include destruction of natural habitat, changes in river regime and ecology, land degradation and instability. The extent of environmental impacts can never be predicted with certainty (UNEP, 2000) and too much change in an eco-system means upsetting its ability to redevelop and adapt. In addition, severe water, air and land pollution impacts are often associated with many sectors’ activities.

**Ensure social progress**

Major issues related to operations of corporations are concerned with cultural diversity and decision-making processes. Socially-deficient industries’ operations can hinder free participation of people in the cultural life of the community and can result in the devastation of traditional means of livelihood (Frynas, 2008). Health, culture, and tradition of local communities and their relationship with the national government are normally affected areas. Corporations can, however, ensure social progress, as social protection measures provided by the state are very limited in some areas. Corporate engagement can make a difference (Matten & Moon, 2008), for instance, by funding secondary and professional education. Funded by the state in most European countries, it is missing in
most liberal market economies. In addition, apart from financing education, donations are made to schools and universities, constructing hospitals, transport systems, and various public facilities to increase the quality of life.

*Uphold steady economic growth and provide employment*

Many corporations play a crucial role in the economic landscapes of several developing countries, for instance, in Nigeria or Azerbaijan (Wise & Shtylla, 2007). Revenues from corporate operations take the form of income taxes, royalties, and other profit arrangements. For instance, Shell contributed US$18 billion in taxes in the countries of its operations, in 2005 (Wise & Shtylla, 2007). The consistent and direct effect on economic growth in developing countries cannot, however, be always guaranteed due to the problems with governance, transparency and accountability in the allocation of funds in many governments. Local economies are significantly affected by operations of companies through provision of employment, social and community investments, product distribution and sales, and procurement of goods and services (Wise & Shtylla, 2007). Corporate activities in developing countries are often viewed by the local communities as an economic engine and even a way of life (Vintro & Comajuncosa, 2010). Among the responsibilities of progressive companies may be necessary staff training to ensure employment. Apart from employment and training, it is a company responsibility to deal with issues related with workers’ safety, ethics, job security and professional careers.

These sustainability factors will be extended further and incorporated in the subsequent part of the thesis. Many corporations have to face future challenges, among which sustainable development plays an important role. Responsibilities in local and national development along with satisfying societal needs require various strategies to be developed.
and integrated in corporate business models. These strategies have to take into account the interests of multiple parties, the government, and society, while upholding the development of the company and maintaining its reputation (Fombrun & Shanley, 1990). Therefore, to ensure socially responsible business, several CSR frameworks have been developed. These tools were developed to aid in design, implementation, monitoring and evaluation of corporate CSR strategies and programmes. They mostly consist of a set of principles and policy guidance. Some are in-depth management frameworks and guidance notes, while others cover issue-specific guidance. The summary of some of these developments is presented below ("CSR Frameworks Review for Extractive Industry," 2009).

(i) The United Nations Global Compact (UNGC) - considered to be the most recognisable CSR framework in the world. The United Nations in 2000 released a broad set of principles that apply to any industry. It is a strategic policy initiative to ensure business operations and strategies follow ten universal principles in the areas of human rights, labour, environment and anti-corruption.

(ii) OECD Guidelines for Multinational Enterprises – is a high-level policy and management guidance. The Organisation for Economic Co-operation and Development (OECD) guidelines were initially developed in 1976 following the Universal Declaration of Human Rights. Subject to several revisions they were finalised in 2000. Companies exploring or operating under OECD guidelines are encouraged to follow its recommendations. The guidelines aim at ensuring consistency in codes of conduct across member nations as well as providing recommendations on responsible business conduct to multinational corporations.
The National Contact Point (NCP) in any member country is required to inform and explain to both business and non-business communities the nature of the guidelines, promote them, and deal with any enquiries. Taxation, competition, employment and industrial relations, combating bribery, environment, consumer interest, science and technology are the areas targeted by the policy recommendations.

(iii) ISO 26000: 2010 – an international standard, which is a part of one of the most well-known set of management systems in the world. It provides guidelines on CSR concepts, definitions, methods of evaluation specifically linked to identification and engagement of stakeholders, social responsibility reporting, operationalising social responsibility. The key components of the document are eight principles of social responsibility that refer to seven social responsibility core themes. These themes are organisational governance, human rights, labour practices, the environment, fairness of practices\(^1\), consumer related issues, and community engagement and development. At the heart of the ISO standards are elements essential for incorporation of social responsibility within organisation business models.

(iv) Global Reporting Initiative (GRI) – is a global standard for CSR reporting developed in 2006. It is governed by a number of bodies to ensure its continuous improvement. The framework’s focus is on economic, environmental, and social performance of a company, including labour practices and work environment, human rights, and product responsibility. GRI and the International Council for Mining and Metals

\(^1\) Fairness is discussed in section 2.7
(ICMM) extended the framework in 2005 by adding recommendations for the mining and metals sector.

(v) AA 1000 Series – addresses CSR area of materiality\(^2\) and complements the GRI. Thanks to an extensive world-wide multi-stakeholder consultation it was developed by AccountAbility in the UK. It consists of three standards set out in 2003, 2005, and 2008 which are Assurance (AS), Stakeholder Engagement (SES), and the AccountAbility Principles (APS). At their heart is measurement and reporting of business ethical behaviour. The first standard AS deals with an organisation’s disclosure and associated performance, the second SES tackles design, implementation, assessment, communication, and the assurance of the quality of stakeholder involvement. The last one, namely APS, provides principles of responsiveness, materiality, and inclusivity.

(vi) IFC Performance Standards on Social and Environmental Sustainability - was launched in 2006 to ensure companies can manage environmental and social risks associated with their operations. Its attention is focused on the community support and informed consultation about projects and their impacts. The framework consists of eight standards and associated guidelines on how to implement them. The emphasis is put on social and environmental review procedure and disclosure policy.

\(^2\) The UK’s Accounting Standards Board, for example, states that: “information is material if it could influence users’ decisions taken on the basis of the financial statements.” Company Law Review Team Consultative Committee Meeting 27\(^{th}\) June 2000 Note for the record, cited in Zadek and Merme (2003). The US’s Securities and Exchange Commission (SEC), similarly, states that: “materiality concerns the significance of an item to users of a registrants financial statements. Canada - Treasury Board Accounting Standard 2.2 – Materiality, cited in Zadek and Merme (2003)
It may seem that these efforts are sufficient to achieve sustainable development and companies have an appropriate regulation which would allow for integrating CSR within their business models. However, as awareness of the importance of the issue has increased, so have the regulative initiatives at the global level. The stage is therefore set for greater conflict in the future as the challenges for the industries, according to Echavarria (2000), Roessler (2000), Sweeting (2000), and Slack (2012), are numerous and varied, unless decision-making frameworks at a micro level can be agreed between all concerned stakeholders and companies to allow the implementation of strategies at the project stage.

1.2 Problem statement

Notable progress in embracing sustainable development has been made throughout the last 10 years. A number of initiatives to reach sustainable development have been undertaken. Many CSR frameworks taking a general approach to CSR, in-depth management frameworks, and guidance notes providing prescriptive and demonstrational direction on CSR implementation have been developed. Both environmental and social policies, combined with management systems that necessitate regular audits and public reporting, have been put into practice by many companies. Numerous MNCs mention that the Board of Directors supervise their social and environmental performance. Many firms state in their codes of conduct that reaching sustainable development is their ultimate objective. Increasingly recognised are the benefits of integrating environmental, social and economic features into decision-making processes together with stakeholder engagement. Despite the high levels of awareness, the process of implementing CSR at the project level is not an easy task to accomplish. The global CSR initiatives, guidelines, strategies and frameworks concentrate on strategic objectives; however, they fail reasonably in addressing
sustainability implementation in decision-making processes. Along with the general principles and guidelines to assist companies in developing their CSR strategies, more in-depth approaches are required on how to put CSR into action. The real challenge remains in implementing CSR at the project level. Hence, an important task in the implementation of CSR at the design stage is an effective allocation of scarce resources while considering salience of stakeholders and fairness throughout the decision-making process.

1.2.1. The Process and Structure of Resource Allocation to Corporate Social Responsibility Programmes

Not all CSR programmes are claimed to create value for the firm; some are accused of raising costs because of ineffective allocation of scarce resources which may result in companies putting profits first (Husted and Allen, 2007; Tsai, Hsu, Chen, Lin, & Chen, 2010). Resources can differ from one company to another and are project specific. This can be time, personnel or money. Therefore, it is important that CSR is implemented into business strategy. Disconnection of CSR from business strategy may mean many failed opportunities for companies to benefit society (Porter & Kramer, 2006).

Selecting a portfolio of CSR programmes for implementation is far from being a straightforward task. It is an important subject which involves a number of stakeholders, with often conflicting objectives, and multiple criteria. This task requires managers to face multiple challenges according Phillips and Costa (2007, p.2) such as:

(i) limited resources and a large number of projects,

(ii) multiple and often conflicting objectives,

(iii) lack of understanding of projects’ consequences,
(iv) the allocation of resources to individual projects may not result in total efficient collective allocation of resources,

(v) resource allocation process requires appropriate management otherwise it may lead to investments in projects which do not meet the strategic objectives of the company.

Therefore, the problem can be formulated as a multiple-criteria decision analysis (MCDA) problem. MCDA is a methodology that aids decision-making processes characterised by multiple, often conflicting, criteria and a selection of a number of alternatives or courses of action. MCDA has not been extensively applied to decision-making problems tackling implementation of CSR. Growing concern over the multi-dimensional aspect of firms’ operations eliminates application of single objective evaluation methods. The complexity of the relationship between the environment and companies’ operations requires the application of more advanced techniques.

It is not solely the environmental, socio-political, and economic factors but also incompleteness of information, often qualitative and very detailed in nature, which can hamper sustainable development and even further usefulness in policy making (Phillis & Andriantiatsoaholinina, 2001). Hence, systemic methods based on a reliable methodology such as MCDA are required to assess the multidimensional nature of the problem as well as to include uncertainty.

Existing evaluation problems or studies have applied the Analytic Hierarchy Process (AHP) which is an MCDA technique to reach sustainable development objectives in mining (Ostrega, 2010; Uberman & Ostrega, 2005). AHP has also been used to aid resources allocation problems (Brice & Wegner, 1989). Kouikoglou and Phillis (2011) applied a fuzzy
hierarchical model to the assessment of corporate social and environmental sustainability in
two multinational cement companies. Tsai et al. (2010) used hierarchical structures to
model CSR in the hotel industry. An integrated approach combining such techniques as
Decision Making Trail and Evaluation Laboratory method (DEMATEL)³, ANP/AHP, Zero-one
Goal Programming (ZOGP)⁴, and Activity-Based Costing (ABC)⁵ is used in their study to select
CSR programmes and evaluate costs in the hotel industry. An analytic structure was created
for CSR programme selection which helped to identify costs and benefits criteria as well as
relevant stakeholders. DEMATEL was applied to uncover the relationships and construct a
network structure among costs and benefits criteria. ANP/AHP and ZOGP methods were
employed to select CSR programmes under limited resources and constrained situations.
Costs evaluations were undertaken with the ABC method. Similarly, Tsai and Hsu (2008)
offer a hybrid model of CSR programmes choice and costs assessment in the airline industry.
Tsai and Chou (2009) demonstrate a hybrid model for selection of management systems
under resource constraints.

Decision support tools to assist the resource allocation to CSR investments, however, have
still not been extensively researched. More research is needed in terms of how to address
the imprecision and vagueness of information in the CSR context, how to deal with the
interdependence between decision elements to ensure rational, consistent decision-making

³ The Decision Making Trail and Evaluation Laboratory method (DEMATEL) is an approach used to construct a
network structure with interdependent relationships. It is possible to extract the mutual relationships of
interdependencies among various criteria and the strength of interdependence by using this method (Fontela
& Gabus, 1976).
⁴ Goal Programming (GP) is a multi-objective programming technique. The ethos of goal programming lies in
the concept of satisfying of objectives. It is an optimisation programme. It can be thought of as an extension or
generalisation of linear programming to handle multiple, normally conflicting, objective measures. Each of
these measures is given a goal or target value to be achieved (Tamiz et al., 2008).
⁵ Activity-Based Costing (ABC) focuses on accurate cost assignment of overheads to products. ABC occurs in
two stages: cost objects consume activities and activities consume resource costs. This means that resource
costs are assigned to various activity centres by using resource drivers in the first stage. At the next stage, each
activity cost is distributed to cost objects by a suitable activity driver. Total cost is calculated by adding various
activities costs to a specific programme (Cooper & Kaplan, 1992).
practices. Therefore, a gap exists with respect to practical ways of integrating CSR into business strategy. In order to bridge this gap, an integrated approach using a selection of MCDA techniques, problem structuring methods and fuzzy logic is proposed to a problem knapsack\(^6\). Unlike mono methodology, hybrid methodology does not suffer from the shortcomings of single decision analysis methods. The hybrid approach takes in the concept of acquiring societal benefit and obtaining competitive advantage for business, as previously advocated by Tsai et al. (2010).

1.2.2. The Research

This research studied a strategic approach to CSR integration to ensure sustainability. It specifically focused on the decision-making to allocate scarce resources to CSR programmes. For this purpose decision analysis methods that found an application to resource allocation problems have been examined. A fuzzy MCDA-based framework, integrating stakeholder objectives and considering multiple attributes to allocate limited resources to CSR programmes while ensuring fairness throughout all stages of the process, was developed in this study. It was necessary to apply a combination of techniques capable of embracing environmental protection in a broader sense, thereby meeting sustainability objectives. The developed decision-making framework copes with multiple criteria, constraints on resources, and demonstrates how to select a portfolio of CSR programmes for implementation. The study was iterative in design as the process and structure of resource allocation is iterative over time (Noda & Bower, 1996), simultaneous across levels, involves

---

\(^6\)The knapsack problem is a problem in combinatorial optimization. The multiple knapsack problem is the problem of assigning a subset of \(n\) items to \(m\) distinct knapsacks, such that the total profit sum of the selected items is maximized, without exceeding the capacity of each of the knapsacks (e.g. Sinha & Zoltners, 1979; Boryczka, 2007). The name comes from the problem faced by someone who is constrained by a fixed-size knapsack and must fill it with the most useful items. It often arises in resource allocation with financial constraints. A similar problem also appears in combinatorics, complexity theory, cryptography and applied mathematics.
multiple participants and multiple influences (Bower, Doz, & Gilbert, 2006). The main steps of the investigation undertaken in this study are summarised below.

In order to develop the framework, a widespread literature review was carried out to identify relevant stakeholders, criteria, and alternatives. The multiple-criteria framework was developed using the data gathered through the literature search. The framework was then refined in the course of the study a number of times as the resource allocation process and its structure is iterative over time. Focus groups were then used to verify the framework’s validity and robustness.

A survey was carried out among practitioners from different industries using a questionnaire. An attempt has been made in this research to develop the framework applicable across different industries. The questionnaire was used to gather the data required to populate the hybrid framework.

The challenge of sustainable development was addressed in this work through a novel framework to allocate resources by prioritising CSR programmes. This research approached the resource allocation problem via prioritisation. CSR programme evaluation was a first step to arrive at an overall ordering of several options, and to the construction of a portfolio of options to find a combination giving maximum utility. The relevant concepts involved in the decision-making process are presented in the following section.

1.2.3. Concepts Definition

Decision-making

Decision-making is at the heart of management activity. Management is accountable for making decisions, organisation, and development of decision-making capabilities in any
organisation. Thus, any organisational actions necessitate management’s decision-making (Jennings & Wattam, 1998). Often the decision-making process is complex and involves a high degree of uncertainty. On many occasions decision-makers are faced with multiple stakeholders involved who may have a number of conflicting objectives and a range of alternatives to choose from. External factors can also easily influence the decision-making process.

**Group decision-making**

Many decision problems are complex in nature and so require collaboration of experts from different fields and departments, for instance, marketing or finance. The group decision-making process often appears to be affected by a number of issues. Multiple participants in a group can bring certain advantages to the decision-making process in terms of generating more ideas and bringing more knowledge about certain relationships and facts. However, a number of participants can also bring adverse effects as some specific aspects may interfere with the decision-making process. For instance, particularly significant are the cohesion of the group, differences in power and status among group members, as well as conflicts of interests among the group members (Eisenfuhr, Weber, & Langer, 2010). The transparency of the decision-making process can be significantly improved by the higher level of procedural rationality.

**Rational decision-making**

Rationality of individuals is limited by a number of constraints, that is information, the cognitive limitations of their minds, and the finite amount of time to make a decision (Simon, 1957, 1991). A model of bounded rationality to overcome some of the limitations of
the rational-agent models in economic literature was proposed by Kahneman (2002). Rubinstein (1998) argues that the decision makers have to make decisions about how and when to decide and suggests modelling of bounded rationality by explicitly specifying decision-making procedures. This puts the research of decision procedures on the agenda.

Rational decision-making can provide good decision outcomes. The rationality definition concept can be evaluated by the decision outcome. Rationality, however, cannot guarantee decision-making success. Increased rationality can enhance the likelihood of more successful decisions and improve transparency of the decision-making process, according to Eisenfuhr et al. (2010). The rationale of consistent decision-making can be ensured through the application of decision analysis tools.

**Stakeholder definition**

In the academic debate there is some disagreement about the key features of the theory including the precise description of who the stakeholders are (Krishnan, 2009). The definition of a stakeholder by Freeman (1984, p. 46) is *any person, group, organisation, or system which affects or can be affected by an organisation's actions*. The important part of the stakeholder theory is to recognise the existence of stakeholders in the first place. The fact that stakeholders can both be affected by, as well as affect, an organisation shows an important aspect of bi-directionality of stakeholders. Their range and complexity is dependent upon a firm’s size and activities.

**Stakeholder salience**

In most of the research, stakeholders are defined based on the single attribute (Henriques & Sadorsky, 1999). The seminal framework by Mitchell, Agle, and Wood (1997), however,
identifies stakeholders and assesses their salience in terms of attributes of power, legitimacy and urgency. The most salient stakeholders according to their study possess all the three attributes. Salience refers to the extent to which management of a company gives priority to competing stakeholder claims. The Mitchell et al. (1997) framework offers a possibility for management to evaluate the importance of stakeholders and it is further explored in this work (chapter 2 and chapter 5).

**Multiple-criteria decision analysis (MCDA)**

Multiple-criteria decision analysis (MCDA) is also termed multiple criteria decision aid, or multiple-criteria decision-making (MCDM). It refers to the range of tools and approaches that aid decision makers in reaching consensus with diverging objectives and interests. MCDM tools and techniques assist in selecting or ranking alternatives with respect to several criteria. MCDM methods help users to arrive at a decision based on trade-offs or compromises among a number of certain conflicting criteria. The application of MCDM tools and techniques can ensure transparency of the decision-making process and provide a support for decision-makers in proper articulation of their preferences. The next section presents aims and objectives of this research.

**1.3 Research aims and objectives**

This research project strives to add evidence to the stream of research that deals with the application of decision analysis tools and techniques for the allocation of resources to CSR programmes. The decision-making involved in allocation of scarce resources to CSR programmes to create sustainable competitive advantage is an important topic, which can be formulated as a multi-criteria decision-making (MCDM) problem. The decision analysis framework proposed in this work will aid managerial decision-making through the
application of a technique taking account of stakeholders, diverging objectives, companies’ competitive advantage, interdependent criteria, and limited resources. This study seeks to determine the extent to which the application of sophisticated decision analysis tools can be relied upon to deliver governance to stakeholders. Furthermore, it seeks to gain empirical knowledge of the key stakeholders as well as to uncover the internal stakeholders’ reasoning behind resource allocation. It will focus on stakeholder preferences, decision criteria, perceived costs, benefits, and risks in natural resource management as well as the wider structural and policy context governing individuals’ economic behaviour.

Thus, the specific objectives of this study are to:

i. Establish whether or not the importance of stakeholders in the CSR environment is affected by political, social, environmental and economic conditions.

ii. Enable organisations to derive priorities of alternative decisions in order to facilitate organisations to optimally allocate resources to CSR programmes.

iii. Explore through a questionnaire survey and focus groups the extent of corporate CSR practices and resource allocation assessment tools enabling implementation of sustainability into their decision-making processes.

iv. Develop a multi-criteria decision-making framework for resources allocation to CSR investments.

v. Test the effectiveness and usefulness of the decision-making framework.

The extensive literature review served as a means to provide a theoretical foundation for the research and a basis for establishing research aims and objectives. The review revealed the knowledge gaps in the field that require addressing. The information was collected using a number of sources, to include academic publications, university databases, the Internet,
workshops, relevant seminars and courses, as well as conferences attended. The next section will address the research questions.

**1.4 Research questions**

Therefore, this research aims to address the following specific questions:

i. What are the CSR paradigms that are capable of facilitating sustainability implementation?

ii. What are the factors influencing corporate decision-making processes in resources allocation to CSR investments?

iii. What are the decision-making tools to aid allocation of resources to CSR programmes?

iv. How can the process of resources allocation to CSR programmes be improved?

v. How can managers identify and prioritise important stakeholders with often diverging objectives?

vi. What should be the decision-making framework aiding evaluation and selection of a portfolio of CSR programmes for implementation?

vii. How to validate the credibility and robustness of the proposed framework?

By answering these questions this work will test the usefulness of the hybrid methodology based on decision analysis techniques to allocate resources to CSR programmes. The research methods applied to carry out this work are briefly summarised below.

**1.5 Overview of research methods**

The research aims and objectives identified in section 1.4 lead to a three phase research programme which is summarised in Figure 1.1.
The main criterion of good quality research is explicitness of method (Ferlie, 2001b, pp. 28-29). Therefore, an attempt is made in this study to clearly distinguish the methodology and the methods used. Methodology relates to the research design and methods to the data collection techniques. There are various research strategies in accordance with Saunders, Lewis, and Thornhill (2007, p. 135)\(^7\). To achieve the objectives of this research and address the gaps in previous work an iterative design to the study was employed. A predominantly qualitative approach to a mixed method design was adopted in this research to address the

\(^7\) Saunders *et al.* (2007) identifies such research strategies as case-study, survey, experiment, action research, grounded theory, ethnography, and archival research.
gap in previous work, identified in chapters 2 and 3. The qualitative component is privileged in this framework, with quantitative methods playing an auxiliary role in this approach. This research design covered a cross-national perspective and assumed an involvement of a number of stakeholder groups.

A number of data collection methods have been employed in this work. A literature search reviewing current corporate CSR practices has been completed. It was followed by an extensive literature review on decision analysis techniques, stakeholder management approaches, and resources allocation techniques. The initial framework for CSR resources allocation was built after the literature review. Then, the framework was refined after the pilot study and after the survey. The framework’s validity was verified using two sessions with focus groups in the final phase of the research.

Data was collected with the help of a Bloomberg database\(^8\), an online questionnaire survey, a postal questionnaire survey, focus groups, discussions and using personal networking. The questionnaire survey was employed to investigate the CSR practices of companies, identify CSR programmes they employ, explore relevant sustainability criteria and to discover the stakeholders involved. As the extractive sector was used to illustrate the applicability of the framework, the practitioners’ opinions about sustainability implementation in the extractive industry were used to populate the framework. The framework, however, proved itself to be transferable across industries. The iterative data analysis approach in this work employed a set of multi criteria decision analysis techniques in developing the framework to enable effective resources allocation to CSR programmes.

\(^8\) Bloomberg offers the largest database available to the market with information for more than six million instruments, sophisticated analytical functionality and the ability to calculate custom returns based on client-specific inputs (Bloomberg, 2013).
Chapter 1

Empirical sources

Empirical data for this thesis have been collected via focus groups and questionnaire survey with 61 professionals from various industries such as defence, telecommunications, software-IT, transport, Rescue and Fire Service, education and extractives.

Criteria for selecting empirical sources

To collect high quality of data for the analysis, the search for empirical data was approached with rigor. Before selecting and contacting participants a couple of criteria that would guide the search for data were defined. (1) Respondents with rich professional experience from diverse range of industries were selected. (2) Participants should preferably have knowledge of decision analysis tools and CSR. The next section will address the importance and contribution of this research.

1.6 Overview of the research contribution

This study proposes a hybrid MCDA based methodology integrating various stakeholders’ objectives to allocate limited resources to CSR programmes. Unlike a mono methodology, the hybrid methodology does not suffer from the shortcomings of single decision analysis methods. The hybrid framework does not have limitations imposed by using mono models. The drawbacks that exist in different mono models are diminished as they complement each other in the hybrid framework. Due to the specific nature of the CSR resource allocation problem, a necessity arises to apply a combination of techniques that would be capable of addressing the environmental aspect arising from companies’ operations.
This work presents a novel integrated framework that could cope with various diverging criteria as well as constraints on resources, and to demonstrate how to select CSR programmes for implementation achieving the maximum benefit for the company.

Therefore, the main contribution of this work is to improve the company’s capacity to address the challenge of sustainable development more effectively through a novel framework by prioritising CSR programmes. Most of the approaches proposed for resource allocation are actually models for establishing priorities. This work aims to approach the resource allocation problem via prioritisation. CSR programme evaluation will be a first step of this work to arrive at an overall ordering of several options. Then, portfolio construction will lead to the appraisal of the options available and the best combination of them for a given level of resource. By incorporating diverging stakeholders’ interests, this work will also contribute to the stream of research on fairness in decision-making and trust.

Furthermore, this study’s contribution will be the practical application of this hybrid methodology. The robustness of the methodology as well as its suitability to the organisational use of CSR integration will be assessed.

A generic framework for implementing corporate social responsibility

Despite the abundance of theories and models surrounding the stakeholder management and CSR, the operational implementation of CSR is still at an embryonic stage. As there is still lack of generic CSR framework/standard widely accepted among organisations (Brennan, Binney, & McCrohan, 2012; Castka, Bamber, Bamber, & Sharp, 2004), the contribution of this work is a generic framework applicable across organisations and sectors. The focus of this empirical work is being ‘illustrative’ of the extractive industry; however, the
Chapter 1

Scope of this study covers a wider range of sectors, including the public and/or third sectors. The framework for CSR implementation in an operational way is generic in nature and is applicable to organisations irrespective of type and size - from public to private, from small-to-medium enterprises to multinational enterprises, from manufacturing to service organisations. It can help managers run organisations profitably in a socially and environmentally responsible way. The following section comments upon the thesis structure.

1.7 Thesis structure

The present work is organised in eight chapters. Figure 1.2 illustrates the thesis structure. Section 1 of this chapter briefly introduced the problem of resources allocation to CSR programmes, and explained why it is an important subject. The next sections focused on aims and objectives of the study, research questions and research methods in brief.

Chapter 2 Describes the debate on CSR. It discusses CSR theories and identifies the significant sustainability criteria as pointed out in the literature. Additionally, it examines the significance of sustainable development practices and highlights the difficulties in practical implementation of CSR and its integration into business strategy of companies. The debate presented in this chapter emphasises the need for the application of operational research tools capable of bridging this gap, and provides a background for further investigation of literature on multiple-criteria decision analysis techniques.

Chapter 3 Concentrates on methods capable of integrating sustainability into business strategy. It investigates strategies that can help to reduce the negative impacts of corporate operations and meet objectives of sustainable
development. Therefore, it reviews the literature on decision analysis methods. It describes in detail methods applied in this study to allocate resources to CSR programmes. Among them are cognitive mapping (CM), analytic hierarchy process (AHP), analytic network process (ANP), fuzzy logic, and the knapsack approach to resource allocation.

Chapter 4  Following the literature review presented in chapters 2 and 3, the philosophy of this research is presented in chapter 4. It outlines the iterative methodology adopted in this work and the data collection approaches employed.

Chapter 5  Comparison of two decision analysis techniques, AHP and fuzzy logic, and initial research findings concerning the capability of these tools to prioritise stakeholder objectives and assess their salience is presented in chapter 5.

Chapter 6  The conceptual knapsack framework for resources allocation to CSR programmes is discussed in chapter 6.

Chapter 7  Verifies and validates the developed framework, it presents in detail the validation procedure and its rationale.

Chapter 8  Research summary and conclusions are highlighted in chapter 8. The last section of this chapter is devoted to the limitations of this research and provides recommendations for future work.
This chapter has introduced the background to the research interest and offered an overview of research aims and objectives, and research questions. The methods undertaken in this work to attain the aims and objectives are also illustrated. Finally, an overview of the research contribution is presented and the thesis structure provided.
Chapter Two - Corporate Social Responsibility: Doing Well by Doing Good
This chapter provides an overview of the development of the ideas behind corporate social responsibility (CSR) within the literature, presents the key points of the debate surrounding this area, the different definitions of CSR, and discusses its contested nature (section 2.3). It examines these issues through the lens of theory, showing how different theories can help to explain the involvement of business in CSR actions (section 2.4). The concept of a dynamic analysis of CSR theories is proposed (section 2.5). In line with the objectives of the thesis, this chapter sheds light on practical considerations which have not been accorded attention in the CSR literature. These considerations pertain to the lack of practical, systematic methods to integrate CSR into business models in an operational way. The challenges faced in precise stakeholders’ needs assessment and prioritisation (section 2.6) while ensuring social fairness and sustainability (section 2.7), and resources allocation to CSR programmes (section 2.8) are highlighted in this chapter. Finally, the gaps identified in the literature (section 2.9) and conclusions that can be drawn from this literature review are presented (section 2.10).

This overview of the literature will illustrate that there is a requirement for a decision support framework which can facilitate practical implementation of CSR, while integrating multiple, often conflicting, objectives of stakeholders. Figure 2.1 illustrates chapter 3 within this thesis.
2.1 Introduction

The link between the corporation and broader society, termed as corporate social responsibility (CSR), which at its heart has the relations between the board, the top management and the broader range of corporate stakeholders along with preserving the environment, has been investigated in this research.

Addressing CSR is in the interests of companies as the strategic approach is increasingly important to gain competitiveness. Adopting a strategic CSR approach can benefit the company in terms of cost savings, access to capital, risk management, innovation capacity, human resource management, and customer relationships (European Union, 2011). CSR can help shape positive relations between the company and its stakeholders, create a basis for sustainable business models, and build trust leading to an environment in which firms can innovate and grow. There is a growing need to adopt socially responsible business practices in the light of a number of corporate scandals; the economic crisis and its social consequences have extensively damaged consumer confidence and trust in business. Efforts
to adopt CSR can create conditions for sustainable growth, responsible corporate behaviour and employment generation in the long term (European Union, 2011).

### 2.2 Background and context

The principle of CSR is closely related with ensuring that the operations of a firm are “sustainable”, which refers not only to taking account of financial and economic aspects in decision making, but also the environmental and wider social consequences.

The study of the CSR concept and its strategic integration is still at an early stage (McWilliams & Siegel, 2006). Such issues as concept measurement and elaboration of a widely accepted theoretical framework need to be determined. Finding and adopting a generally accepted evaluation methodology for projects and policies, according to Lee (2006), is hindered by the complex nature of sustainability and its measurement. Prior literature has considered empirical research across a broad set of organisations to document relations between stakeholders and the company, and to emphasise the strategic benefits of stakeholder management with a broader view of firm performance (Berman, Wicks, Kotha, & Jones, 1999; Griffin & Mahon, 1997; Harrison & Caron, 1996; Harrison & Freeman, 1999; McGuire, Sundgren, & Schneeweis, 1988; Mitchell et al., 1997; W. G. Simpson & Kohers, 2002). It has been debated whether shareholder value, social and environmental goals are in line with each other, whether there is a “business case for CSR” or whether adhering to social and environmental standards may harm a firm’s competitive position. The debate surrounded the issue of a causal link between environmental/social performance and financial performance. It has been emphasised in the literature that the link between CSR and a firm’s financial performance is negative, neutral or positive. A rich
body of evidence already exists on the topic (Carroll, 2000a; Frooman, 1997; Griffin, 2000; Griffin & Mahon, 1997; McWilliams & Siegel, 2000; Roman, Hayibor, & Agle, 1999; Rowley & Berman, 2000; Swanson, 1999). Griffin and Mahon (1997) examined the link over a twenty-five year span from 1972-1997. Their study was conducted on large corporations from a single industry using data from multiple sources. Griffin and Mahon suggest that there are some existing internal dynamics which lead a company to invest more in socially responsible behaviour. Simpson and Kohers (2002) claim that, despite the substantial improvements in methodology, the effectiveness of empirical research on the corporate social performance-financial performance (CSP-FP) link is still under question. The investigation of the relationship is argued to be theoretically and methodologically intractable (Carroll, 2000a; Rowley and Berman, 2000). A number of studies claim the correlation to be positive (Frooman, 1997; Griffin & Mahon, 1997; Preston & O’Bannon, 1997; Roman et al., 1999; W. G. Simpson & Kohers, 2002; Stanwick & Stanwick, 1998; Waddock & Graves, 1997). The nature of the relationship will continue to have a great impact upon many stakeholders’ decisions, including resources allocations for social purposes which are the focus of this work.

CSR is a long researched subject (Bowen, 1953; Heald, 1970) revitalised through the debate on globalisation and sustainable development, particularly since the Earth Summit in 1992. Figure 2.2 illustrates the timeline of CSR. In this work the emphasis is put not so much on the concept definition, as it has been in much of the management literature (Carroll, 1999; Carroll & Shabana, 2010), rather than on a further aspect of integration of CSR into corporate strategy. This integration involves addressing social, political, economic and environmental impacts of corporate operations, and meeting stakeholders’ objectives while
considering multiple conflicting criteria. Environmental concerns have been initially considered within the framework of CSR (Wood, 1991); later the environmental literature evolved into a separate research stream. The overlap of environmental issues with social and economic ones, however, is of high significance for industry in general, and the extractive sector in particular. This is especially because of the contested nature of its operations that involves potential negative socioeconomic, environmental, and to some extent political effects (Frynas, 2008; Jenkins & Yakovleva, 2006; Rae, Rouse, & Solomon, 2002). The tools, techniques, and frameworks presented in later chapters of this work have been initially developed having in mind the extractive sector, however, they are applicable across other industries. Furthermore, the four aspects, that are social, political, economic and environmental, ought to be considered part of CSR as they are its important features. Notwithstanding the broad definition of the CSR term, this research focuses on the investigation of the four factors influencing sustainability of projects. Despite the important role of the socio-political aspect in the discussion on CSR, especially with respect to the extractive industry, the theme is absent from the management literature. The relationship has been investigated on the individual, organisational and social spectrum (Wood, 1991); however, as pointed out in Zald (2002), it is also political institutions and regulatory apparatuses that the management training and capitalism depend upon. The political dimension of CSR offers an interesting scale of company analysis, and hence the political factor was considered within the framework developed in this work. Social, political, economic and environmental impacts of corporate operations are important aspects of integration of CSR into corporate strategy.
Chapter 2

Figure 2.2 CSR timeline

CSR and Globalisation

Globalisation is of a contested nature and its relevance to CSR refers to the involvement in the prevalence of market capitalism as the dominant form of economic and social organisation (Zald, 2002). Globalisation has been seen as shifting from stakeholder to shareholder capitalism, with a state developmental role changing and moving away from its traditional functions. Critics of the process argued that CSR is tied with the globalisation movement through the shifting forms of governance, both at global as well as local levels. Influential and powerful corporations have been accused of driving this process. These changes in governance structures are termed as “new” (Moon, 2002) or “network” (Ruggie, 2002) governance. Within the new governance agenda, an increase in social and political expectations for business has been noted. Business organisations have been increasingly expected to provide social goods and services, and minimise harmful effects of some of
their operations (Moon, 2002). Another distinctive characteristic of the new governance is the shift of responsibility for policy making and implementation towards a number of social actors, with a special role for business.

New governance in terms of the convergence of CSR and multi-stakeholder initiatives has both its opponents and defenders. The first criticised the concept for weakening the key drivers of responsibility, such as regulation, role of trade unions, and NGO activism. The latter praised its role in creating a constructive project which the global public sector is not yet equipped to deliver environmental, social, and economic sustainability (Scholte, 2001). The ideological positions regarding the role of business in society still vary.

2.3 Defining Corporate Social Responsibility

The search for a formal universally agreed definition has not really been successful (Coelho, McClure, & Spry, 2003; Lantos, 2001; Pinkston & Carroll, 1996). In both the corporate and academic world there is confusion as to how CSR should be defined (Dahlsrud, 2008). Some even go further, claiming that definition of the concept is impossible (Jackson & Hawker, 2001), while others see an abundance of definitions often biased toward specific interests (Dahlsrud, 2008; Marrevijk, 2003). In general terms, CSR denotes “the commitment of business to behave ethically and contribute to sustainable economic development while improving the quality of life of employees, their families, local communities and society at large” (World Business Council for Sustainable Development, 2000). Box 2.1 presents selected CSR definitions. Definitions of the concept are claimed to be not contradictory but evolutionary, as many authors have contributed to the shaping of the construct (Carroll, 1999). Thus, the CSR concept is comprised of many theories, approximations and

<table>
<thead>
<tr>
<th>Box 2.1 Selected definitions of CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>World Business Council for Sustainable Development (2000)</strong></td>
</tr>
<tr>
<td><strong>Carroll (1999)</strong></td>
</tr>
<tr>
<td><strong>McWilliams and Siegel (2000)</strong></td>
</tr>
<tr>
<td><strong>Commission of the European Communities (2003)</strong></td>
</tr>
</tbody>
</table>
### Box 2.2 Key elements of CSR process

<table>
<thead>
<tr>
<th>Elements of CSR process</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maxim of No-harm</strong></td>
<td>The principle draws upon the rights philosophy and demands that the firm does not engage in any action leading to harm. The principle applies to people, environment and eco-systems.</td>
</tr>
<tr>
<td><strong>Maxim of Transparency</strong></td>
<td>The principle requires the firm to openness in its activities that is in its full disclosure, provision of information to all parties.</td>
</tr>
<tr>
<td><strong>Maxim of Voice</strong></td>
<td>The principle draws on provision of stakeholders with a representation in the business. It assumes active participation of stakeholders in the decision making.</td>
</tr>
<tr>
<td><strong>Maxim of Equity</strong></td>
<td>The principle draws on equal treatment in the actions of business.</td>
</tr>
<tr>
<td><strong>Maxim of Benefit</strong></td>
<td>The principle examines benefits of an action, who wins, who loses, what are the gains and the losses. It attempts to establish how to create the greatest amount of good for stakeholders affected by the action.</td>
</tr>
<tr>
<td><strong>Maxim of Integrity</strong></td>
<td>It is based on integrity in all forms of agency that form the firm.</td>
</tr>
<tr>
<td><strong>Maxim of Liberty</strong></td>
<td>It is primarily based on an assumption that an individual can freely engage or disengage from the firm’s transactions.</td>
</tr>
<tr>
<td><strong>Maxim of Care</strong></td>
<td>The principle is derived from virtue ethics and rights</td>
</tr>
</tbody>
</table>
As Carroll (2008) notes, CSR definitions seem to fall under two general schools of thought. The first one recognises the corporate duty of shareholders’ profit maximisation (Friedman, 1970; Levitt, 1958), whereas the second school of thought suggests a broader range of responsibilities towards society (Carroll, 1981; Epstein, 1987).

### 2.4 Corporate Social Responsibility Theories

A variety of theoretical justifications have been used to explain the underlying notion of CSR, to include agency theory (French, 1979; Goodpaster & Matthews, 1982), social contract theory (Donaldson & Dunfee, 1994, 1999), legitimacy theory (Moir, 2001; Suchman, 1995), stakeholder theory (Donaldson & Preston, 1995; Evan & Freeman, 1988; Freeman, 1984, 1994; Freeman & Phillips, 2002), property based theory Hoffman and Fisher (1990) and Klonoski (1986) cited in Schwartz and Carroll (2007), and utilitarian theory (Uyl, 1984).

Numerous attempts have been made to classify these theories. Far-reaching and complete reviews of research on the issue have been undertaken by several authors (Carroll & Shabana, 2010; Fredrick, 1986, 1998; Garriga & Melé, 2004; Klonoski, 1991; Preston, 1975; Secchi, 2007). These classifications are valuable contributions, and are rich in scope. For instance, Garriga and Melé (2004) develop a comprehensive framework to distinguish between theories. The authors divide the theories into four groups: instrumental theories focusing on achieving economic objectives; political theories focusing on a responsible use of business power in the political arena; integrative theories focusing on the integration of...
social demands; and ethical theories focusing on the right thing to achieve a good society. Secchi (2007), on the other hand, classifies CSR theories into utilitarian, managerial and relational, while Carroll and Shabana (2010) review CSR concepts, research and practice, and group theories according to the time frame. The 1960s have been marked by the CSR literature, what social responsibility meant and the concept’s importance to business and society has been emphasised. The 1960s and 1970s have been defined as the corporate social responsiveness phase. The 1980s produced fewer definitions. Global corporate citizenship entered the scene in the 1990s. Business ethics rose in importance in the 2000s in the light of corporate scandals (e.g. Enron), and the sustainability theme became a dominant theme in the early 2000s.

The involvement of businesses in CSR initiatives is tied in with the economic perspective adopted by the firm (Moir, 2001). Some key theoretical explanations employed to explain business involvement in CSR are discussed in following sections.

*Milton Friedman and Corporate Social Responsibility*

In accordance with the neo-classical view, a firm’s only responsibilities are provision of employment and payment of taxes. This view was taken to the extremes in 1970 by the Nobel Laureate Milton Friedman who questioned the validity of the CSR concept. The free-market economist addressed the debate concerning corporate social responsibilities in the article “The Social Responsibility of Business is to Increase Its Profits”, which appeared in the New York Times Magazine on September 13, 1970. Since then the article has become an encapsulation of shareholder theory of the firm and remains the most often cited reference
for shareholder primacy. According to Google Scholar it has been cited 6763 times at the time of writing this thesis.

Friedman denounced the idea that shareholders may not be the only relevant parties, and that corporate concerns may be other than financial. Shareholders own the company stock and are entitled to the corporation’s profits. The duty of managers, who act on their behalf, is to protect shareholders’ rights and act according to their interests. Friedman’s primary argument was that shareholders demand purely profit maximisation. In other terms, managers who act according to the general social interest, violate shareholders’ rights. According to Friedman, the contractual relationships between employees, managers, customers, suppliers, and the local government are in line with the terms freely agreed upon. The contractual arrangements between the parties are also met.

Furthermore, Friedman claims that the idea of social responsibility of business undermined the basis of a free society. The corporation as an artificial person cannot have responsibilities; only individual proprietors can have responsibilities. Since managers have responsibility towards shareholders only, their duty is to make as much profit for them as possible. Since shareholders expect a return on their investment, managers ought to act according to their objectives and ensure profit maximisation while conforming to the rules of law.

Pursuing the general social interest means acting against the interests of employers. Erosion of corporate profits is an inevitable consequence of such actions. Despite the goals being noble, it does not lay within a manager’s competencies to act at the expense of shareholder profits. Interestingly, Friedman suggested that corporate expenditure for social purposes
resulting in a long-term profit for the company can be easily justified on grounds other than ‘social responsibility’. According to him, social responsibility may be merely a cover for business decisions. Acting towards socially accepted goals, according to Friedman, could not have been a motivating factor for managers.

The shareholder primacy norm, reflected in Friedman’s work, assumes that there is one and only one responsibility of business, to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud (Friedman, 1970). The underlying argument in Friedman’s work was the recognition of shareholder concerns. What Friedman did not acknowledge, were interconnections between business and wider stakeholder groups, which need to be managed in order to achieve sustainable success for the company (Radin, 2003).

The "neo-classical" view of the firm has been challenged considerably over the last decades because of a number of theoretical developments and empirical evidence that managers may not pursue the interests of shareholders (O. Hart & Moore, 1998). Behavioural theorists (Cyert & March, 1992) present a contrasting view of the firm in which managerial behaviour is influenced by political and other than economic aspects, e.g. social gains. Two streams of thought developed from behaviourial theory. The first one maintains that a moral or ethical obligation of business is to be involved in social issues. Because of having resources and skills, business ought to assist in the solving of social problems without expecting any profits and without bearing responsibility for the causes of those problems (Holmes, 1976, cited in Moir (2001).
The second strand recognises the enlightened self-interest of business when engaging in CSR. Supporters of this view argue that both companies as well as society benefit internally and externally from the involvement in social activities. Companies boost their image, create short-term employment thorough various projects, find it easier to recruit employees and retain them because of the engagement in CSR activities. Society and companies are mutual beneficiaries as the involvement in social activities pays back with the growth and health of business (Centre for Corporate Public Affairs, 2000). Hence, the enlightened self-interest approach, a moral approach related to social expectations, and the neo-classical approach are the three strands of thinking in the debate around CSR (Moir, 2001). It would be interesting to find out whether the underlying motive behind the enlightened self-interest approach is the profit potential advocated by Friedman. Is CSR regarded simply as a manner of shareholder wealth maximisation or an underlying moral or ethical imperative? The discussion around the contested nature of CSR still remains open and the role of the corporation and its duties towards society and the environment are being continuously questioned.

**Stakeholder Theories**

Stakeholder thinking is a possible approach to give explanation and support for the idea that a corporation has obligations beyond its traditionally-accepted fiduciary duties to shareholders. In contrast to the shareholder theory, there is no accepted and well-defined form of the stakeholder theory. Although stakeholder thinking is constituted of various types of stakeholder ‘theories’, the basic shared premise underlying the message conveyed by all stakeholder theorists is the rejection of shareholder primacy. Stakeholder theories
suggest an entirely opposite view to the one espoused by shareholder theory. Stakeholder theories posit that a corporation affects a multitude of individuals and groups who have a ‘stake’ in the firm. Therefore, the corporation has a duty towards entities it benefits from.

Background

While the research stream has its roots in academic work related to the field of strategic management (Freeman, 1984; Clarkson, 1995), its reach was extended to organisation theory and business ethics subsequently (Donaldson & Preston, 1995; R. A. Phillips & Reichart, 2000). Only recently it entered the debate about social responsibility and sustainable development.

Stakeholder Approach

The debate around the idea that a corporation has obligations beyond its traditionally accepted fiduciary obligations to shareholders started before Freeman’s influential publication. His contribution in the debate surrounding the role of the manager and his responsibilities served only as a catalyst, according to Radin (2003). The term gained such popularity, though, that the stakeholder model has become the primary model for CSR and its potential is still subject to further investigations.

The stakeholder model of the firm generally acknowledges that individuals or entities other than investors can have legitimate claims on the firm as a result of bilateral relationships between them. According to the original stakeholder model the firm is situated in the centre of a number of bilateral relationships. It recognises the existence of multiple legitimate stakeholders whose interests are equal to those of shareholders. Managers recognise a
broader stakeholder perspective in managing the firm rather than the narrow shareholder perspective (Freeman, 1984).

Moreover, stakeholder thinking waves away the idea of shareholders’ supremacy. Shareholders’ interests are identified by traditional fiduciary law as well as corporate law. Managers, as a firm’s employees, ought to serve the company and not act against its profitability. However, their obligations are also to other stakeholders as secured by federal or state law (Radin, 2003). Consumer protection laws, labour and safety laws, or environmental laws are good examples of the legal restraints that managers are confronted with.

The current stream in stakeholder thinking recognises the complexity of relationships between the company and its stakeholders. The original stakeholder model proposes the bilateral relationships between the parties; however, in fact the relationships between stakeholders are more often recognised as networked or interrelated. The relationships between the stakeholders and the firm are seen often in the form of a network (Radin, 2003). Since the interconnectedness of the multiple, overlapping stakeholder relationships is vast, a firm’s bilateral relationships with stakeholders solely do not show the entire picture.

**Freeman and Stakeholder Theory**

The concept of stakeholder was mentioned initially by Rhenman and Stymne (1965), it was, however, Freeman (1984) who brought it to wider attention. Corporate planning, systems theory, and CSR were the fields which Freeman drew on to frame the concept. Freeman’s initial intent was to develop a theory which could adequately address the changes occurring
in the business environment such as increasing environmental concerns or rising foreign competition. Freeman further suggested the classification of stakeholders so as to better understand their interests and to predict their behaviours. Freeman’s following works ‘A Stakeholder of the Modern Corporation: Kantian Capitalism’ and ‘Corporate Strategy and the Search for Ethics’, which he co-authored with Gilbert (1988) and Evan (1988) subsequently, departed from the initial strategic focus and become known as normative theory (Donaldson & Preston, 1995). The theory has been subject to substantial criticisms due to its paradoxical nature. Freeman (1994) claimed that the theory was combining business and morality and therefore its validity may be questioned by some authors. Freeman (2009) claimed that the roots of the problem lay in the interpretation of stakeholder theory by managers. The later work of Freeman concentrated on refinement of stakeholder theory and eliciting its socialist roots (Freeman & Phillips, 2002).

Stakeholder Theory Debate

The stakeholder theory of the firm is a useful framework for analysing groups of stakeholders to whom the firm is responsible (Moir, 2001). Freeman (1984) advocated that managers should recognise a broader stakeholder perspective in managing the firm rather than the narrow shareholder perspective. The stakeholder theory has been suggested as an alternative to the shareholder theory (Freeman, 1994). Freeman identifies and models stakeholders’ groups of a corporation and describes methods by which management can give due regard to the interests of various stakeholders’ groups. Freeman, Wicks, and Parmar (2004) describe the focus of the stakeholder theory as being placed in two core questions. The first question asks about the purpose of the firm. The second one tries to
find out the nature of the responsibility of management towards the stakeholders. In the academic debate there is, however, disagreement according to the key features of the theory including the precise description of who the stakeholders are (Krishnan, 2009).

It is debated whether the stakeholder theory is a coherent theory or a set of theories (Treviño & Weaver, 1999). Donaldson and Preston (1995) contributed to the debate by offering three classes of the stakeholder theory: *instrumental, descriptive* and *normative*. According to the instrumental version certain actions of managers result in certain outcomes. The descriptive version deals with the managers’ actual behaviour, whereas the normative version suggests that there are certain ways in which managers ought to behave. Using the above classification Jones and Wicks (1999) tried to develop a convergent stakeholder theory. They explore the normative version even further by recognising the normative version as ethics based and the instrumental and descriptive versions as social science based theories; this is the so-called convergent stakeholder theory. In accordance with Moir (2001), the central point of the stakeholder debate is whether business takes responsibility for social issues, and which stakeholders it owes this responsibility to. According to Hamil (1999), who adopted the taxonomy suggested by Donaldson and Preston (1995), corporate actions are almost always instrumental.

The descriptive version does not have many supporters (Jones & Wicks, 1999; Margolis & Walsh, 2003). The instrumental version has had more support according to Jones and Wicks (1999). The normative version, because of its recognition of ‘moral and ethical’ arguments, has been confronted with wide criticism of shareholder wealth maximisation proponents as
it undermines the assumption of the primary goal of the theory that is shareholder wealth maximisation.

The convergent theory has also been subject to criticism. According to Treviño and Weaver (1999) what the stakeholder theory has to offer is simply stakeholder research tradition rather than the theory and as such the stakeholder theorists should work with organisational theorists because they share a common concern for the organisation of stakeholder relationships.

The prime concern of stakeholder theorists, however, is the exclusion of stakeholders, other than shareholders, from both the decision-making and the rewards system. The stakeholder theorists often tend to forget about sharing risks of failure. In other words, which stakeholders, if any, would share business risks? Shareholders, as pointed out in the finance paradigm, are recognised as the only stakeholders willing to do so and thus have legitimate claims to the residual value of the firm.

Sternberg (1999) claimed that the stakeholder theory is a mistaken doctrine. She objects to the firm’s accountability to stakeholders. Following her point of view, the concept is ‘fundamentally misguided, incapable of providing better corporate governance, business performance or business conduct’. The theory is incompatible with business and undermines private property and accountability assumptions.

Most of the stakeholder theory claims are also rejected by Jensen (2001). In his view the theory does not offer a clear organisational objective and does not say how to resolve the issue of competing interests of various stakeholders. The enlightened stakeholder theory proposed by Jensen (2001) specifies the long-term value maximisation as the firm’s
objective. Jensen claims that the firm is unable to maximise value when it ignores the interests of its stakeholders. Additionally, Charron (2007) opposes the stakeholder theorists and does not recognise any attempt at corporate control if the institution of corporation is to survive.

The stakeholder theory has both fierce proponents as well as critics and since it provokes disagreements over deeply rooted values, the consensus between them may never be found (Margolis & Walsh, 2003).

Strategies aiming at achieving competitive advantages

Among the theories on CSR, there is a group concentrated on the allocation of resources to achieve long-term social objectives and to create competitive advantage (Husted & Allen, 2007). Garriga and Melé (2004) identify three approaches within this group: social investments in a competitive context, a natural-resource-based view of the firm and its dynamic capabilities as well as strategies for the bottom of the economic pyramid. According to Porter and Kramer (2002) social investments in a competitive context approach can help gain competitive advantage through philanthropy creating a greater social value than individual or government investments. Barney (1991), cited in Garriga and Melé (2004), maintains that the firm’s ability to improve its performance depends upon a combination of human, organisational and physical resources. If a company is organised to deploy its valuable, rare, and inimitable resources accurately then a competitive advantage is to be achieved. Whereas the focus of most business strategies is on targeting products at upper and middle-class people, the strategies for the bottom of the economic pyramid can serve the poor. Social and economic conditions at the bottom of the pyramid can be improved
through disruptive innovations, that is ‘products or services that do not have the same capabilities and conditions as those being used by customers in the mainstream markets’ (Garriga & Melé, 2004, p. 55).

**Marketing strategies related to social responsibility**

Marketing strategies related to CSR aim at the maximisation of a company's profit through an association of company brand with its ethical and social responsibility activities (Varadarajan & Menon, 1988). McWilliams and Siegel (2001) argue that such marketing strategies are often met with a positive public attitude and so lead to the creation of a reliable and honest reputation of the company. Both the company and charitable institutions can become beneficiaries of cause-related marketing (Smith & Higgins, 2000).

**Corporate constitutionalism**

This group of CSR theories is focused on the connections between business and power. Business holds substantial power and its impacts upon society are vast. As a social institution it must use its powers in a responsible manner, stated K. Davis (1960), cited in Garriga and Melé (2004). Davis’s ‘social power equation’ and ‘the iron law of responsibility’ principles define the social responsibilities of business. Following his thought, in the case when the company does not exercise its powers in order to meet societal demands, it will lose its position to other groups. Davis's theory needs to be seen through the functional role of business and managers. The demands of various constituency groups limit the functional power of the organisation. These groups define conditions of the responsible use of organisational power, channel it, and protect the interests of related parties against the abuse of the power.
Social contracts theory

Integrated social contracts theory (Donaldson & Dunfee, 1999), is an extension of Donaldson’s (1982) social contracts theory. Its focus is on agreements between members of society and society itself. It considers the socio-cultural context and incorporates managerial empirical and normative powers into it. The theory assumes that the involvement of business in social initiatives may be caused by societal expectations to act justly. Donaldson and Dunfee’s theory (1999) is based upon a series of microsocial and macrosocial contracts. The theory may clarify business motivations when adopting CSR policies, however, the entire context of business involvement may still remain unexplained (Moir, 2001).

Corporate citizenship

In today’s globalised world, multinational organisations are granted substantial economic and social powers which are often more prominent than those of some governments. The concept of corporate citizenship evolved from the need to frame this reality. It is used to address relations between business and society, between the company and its key stakeholders (Carroll, 1998). There is an abundance of explanations of the concept and its meaning is not same to everyone. Carroll (1998, p. 1), for instance, comments on four ‘faces’ of the good corporate citizen where each face, aspect, or responsibility reveals an important facet that contributes to the whole. As he states, good corporate citizens are expected to be profitable, that is fulfil their economic responsibilities, obey the law, engage in ethical behaviour, and corporate contributions. Some accuse the concept of contributing little to the CSR and corporate philanthropy debate (Matten, Crane, & Chapple, 2003). Matten et al. (2003) recognise three views of corporate citizenship: a limited view, a view equivalent to
CSR, and an extended view of corporate citizenship. In spite of diverging meanings of
corporate citizenship, there are some commonalities at the heart of the debate, namely
responsibility for the community and the environment.

Issues management

The concept of ‘Issues Management’ evolved as an extension of the ‘social responsiveness’
approach which originated in the 1970s. Social responsiveness emphasised the gap between
public expectations towards organisational performance and its actual performance
(Ackerman, 1973). Issues management adds to the debate by highlighting the process of
corporate responsiveness to social issues (Wartick & Rude, 1986).

Legitimacy theory

Legitimacy theory along with stakeholder theory are ‘systems oriented theories’ adopted by
numerous researchers in recent years to explain CSR and analyse behaviour of companies.
Legitimacy, in accordance with Suchman (1995), can be defined as a perception that the
entity’s actions are desirable, proper and meet bounds and norms of the respective society.
Organisational legitimacy can be categorised into pragmatic, moral and cognitive (DiMaggio
& Powell, 1983). Gaining, maintaining, and repairing legitimacy were identified by DiMaggio
and Powell (1983) as the key challenges of legitimacy. An organisation may legitimate its
activities by various means (Dowling & Pfeffer, 1975). Any attempt to utilise legitimacy
management requires the examination of corporate communications (Suchman, 1995).

The legitimacy theory aims to ensure that organisations operate within the societal norms
and their actions are perceived as legitimate. It assumes that the organisation is expected to
respond to the constantly changing norms of society in which it operates. The concept of a ‘social contract’ between the organisation and society is the underlying notion of the theory. It emphasises society with its multitude of expectations with regard to the organisation and its operations. The legitimacy theory gives emphasis to the rights of a wider range of stakeholders, not merely investors. Dowling and Pfeffer (1975) stressed that various actions can be undertaken by organisations to create their ‘legitimate’ perception. Lindblom (1994) outlined ways to maintain legitimacy which corporations can adopt, among which four broad legitimation strategies are identified: i) seek to educate and inform its ‘relevant publics’ about changes in the organisation’s performance and activities; ii) seek to change the perception of the “relevant publics”; iii) seek to manipulate perception by deflecting attention from the issue of concern to other related issues through an appeal to emotive symbols; or iv) seek to change external expectation of its performance. Moreover, any corporate behaviour requires particular examination of context and motivations. Hence, legitimacy can be seen as the main motivation behind corporate behaviour (Lindblom, 1994; Moir, 2001). The alternative view to this suggests that society has power to influence businesses to act in legitimate ways and failure to comply may lead to sanctions being imposed by society.

**Corporate social performance**

Furthermore, a number of other researchers challenged the agency theory perspective. Among them are Preston (1978) and Carroll (1991) who proposed a corporate social performance (CSP) framework as an alternative. This model in its original version included a basic definition of social responsibility, corporate social responsiveness, and a list of issues
which incorporated social responsibility. Carroll’s (1991) ‘pyramid of corporate social responsibility’ distinguished four components of CSR: economic, legal, ethical, and philanthropic. The economic part of CSR assumes that the fundamental responsibility of business is to make profit and ensure company’s growth. The legal component presumes obeying the law. The ethical CSR recognises the responsibility of the firm to respect people’s rights and recognises obligations that the company owes to society in order to ensure these rights. The discretionary component is philanthropy to offer support to the broader community. Carroll (2000a) defined CSP as a comprehensive assessment of a firm’s social performance which is based at the minimum on four to five stakeholder groups including employees, consumers, owners, community, and environment where community and environment categories can be folded into one group. He called for not limiting CSP to one social issue only. CSP should cover economic, legal, ethical, and discretionary arenas, as Carroll (2000a) further explains. Carroll (2000b) called for the development of comprehensive measures of CSP which would really address ‘social’ performance. Schwartz and Carroll (2007) more recently proposed a three-domain model incorporating economic, legal, and ethical responsibilities through a Venn framework.

Additionally, Carroll’s model was extended by Wartick and Cochran (1985). Their formulation of CSP included corporate social involvement which rests on the principles of social responsibility, corporate social responsiveness, and issues management. Wood (1991) revisited Carroll’s three dimensional CSR model and Wartick and Cochran’s (1985) CSP model formulation and further built upon them. Matters were addressed more consistently and explicitly in Wood’s (1991) model formulation where CSR was placed in a broader context and more emphasis was put on outcomes and performance. The extended model
incorporated principles of CSR, corporate social responsiveness process, and corporate
behaviour outcomes.

*Sustainable development*

Sustainable development was an approach developed at macro level rather than corporate
level. It attempts to integrate growing concerns about a range of environmental issues with
socio-economic issues (Hopwood, Mellor, & O’Brien, 2005). The concept has evolved in the
light of the growing awareness of the global links between environmental issues, socio-
economic problems such as poverty and inequality, and concerns about a healthy future for
humanity. The Brundtland Report, released by the United Nations in 1987, defines
sustainable development as ‘*development which meets the need of the present without
compromising the ability of future generations to meet their own needs*’ (World Commission
on Environment and Development, 1987, p. 8). Sustainable development has been proposed
as an alternative for global economic development which had negative impacts upon the
environment and social development. Despite the political strength of the concept, it
contains significant weaknesses, according to Lele (1991). Among these problems Lele
(1991) points out an incomplete perception of poverty along with environment degradation,
and lack of clarity about the role of economic growth and sustainability and participation
concepts. There is confusion about many different interpretations of sustainable
development (Marrevijk, 2003). In order to deal with this problem Hopwood *et al.* (2005),
for instance, propose a mapping methodology based on combining environmental and
socioeconomic issues.


### 2.5 Dynamic map of Corporate Social Responsibility theories

In the light of a number of existing theories in the field of CSR, in this work an approach to analyse them using decision analysis tools (discussed in chapter 3) is proposed. The most relevant CSR theories, their strengths, weaknesses, opportunities and threats are briefly summarised in table 2.1. This will further be endorsed by the findings of the CSR survey carried out among practitioners (chapter 4). The framework, its results and sensitivity analysis is presented in chapter 5.

<table>
<thead>
<tr>
<th>CSR Theories</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stakeholder theory</strong></td>
<td>Maximum cooperation and effort in addressing the issues affecting multiple stakeholders; Involvement and integration of multiple stakeholder interests in the decision making processes; Consideration for the environment; Responsible corporate practices; Fairness principle; Ethics central</td>
<td>Lack of precision in definition of the actual company stakeholders;</td>
<td>Business growth; Improved image; Legitimacy; Prestige; Greater social acceptance; Shift towards the process of CSR implementation;</td>
<td>Threat to shareholders wealth;</td>
</tr>
</tbody>
</table>

Table 2.1 The CSR theories classification
### CSR Theories

<table>
<thead>
<tr>
<th>CSR Theories</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholder wealth maximisation</td>
<td>Wealth creation;</td>
<td>Social activities only means to achieve economic results;</td>
<td>Business growth;</td>
<td>Wealth creation can potentially come even at the expense of safety; Violation of ethics;</td>
</tr>
<tr>
<td>(Friedman, 1970; Jensen, 2001; Jensen &amp; Meckling, 1976)</td>
<td></td>
<td>Lack of engagement of all stakeholders;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategies aiming at achieving competitive advantage</td>
<td>Long-term social objectives, social value creation;</td>
<td>Lack of engagement of all stakeholders;</td>
<td>Improving the social and economic conditions at the “base of the pyramid”; Business growth;</td>
<td>Decrease in business growth due to the higher risk associated with disruptive innovations;</td>
</tr>
<tr>
<td>(S. L. Hart &amp; Christensen, 2002; Husted &amp; Allen, 2000; Porter &amp; Kramer, 2002; Prahalad &amp; Hammond, 2002a, 2002b)</td>
<td>Competitive advantage for business; Philanthropic activities; Disruptive innovations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing strategies related to social responsibility</td>
<td>Building the brand through marketing activities;</td>
<td>Lack of engagement of all stakeholders;</td>
<td>Brand value increase;</td>
<td></td>
</tr>
<tr>
<td>(Adkins, 2012; Barone, Miyazaki, &amp; Taylor, 2000; Bronn &amp; Vrioni, 2001; McWilliams &amp; Siegel, 2001; Varadarajan &amp; Menon, 1988; Webb &amp; Mohr, 1998)</td>
<td>Creating socially responsible attributes that affect company reputation</td>
<td></td>
<td>Improved image;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social value creation;</td>
<td></td>
<td>Business growth;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Consumer concern for business responsibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Theories</td>
<td>Strengths</td>
<td>Weaknesses</td>
<td>Opportunities</td>
<td>Threats</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Corporate constitutionalism</strong></td>
<td>Responsible use of powers by business as business is considered a social institution;</td>
<td>Lack of engagement of all stakeholders; The idea of total business responsibility is rejected;</td>
<td>Increased social position;</td>
<td>Irresponsible use of power or power abuse may result in business losing its position in society; Threat to shareholders wealth;</td>
</tr>
<tr>
<td>(K. Davis, 1960)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social contracts theory</strong></td>
<td>Social contract between business and society;</td>
<td>Indirect obligations of business to society; Lack of engagement of all stakeholders;</td>
<td>Improved image;</td>
<td>Threat to shareholders wealth;</td>
</tr>
<tr>
<td>(Donaldson &amp; Dunfee, 1994, 1999; Dunfee, 2009; Dunfee, Smith, &amp; Ross Jr, 1999)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corporate citizenship</strong></td>
<td>Consider the community in which it is operating, social investment toward the local community; Corporate philanthropy; Corporations enter the arena of citizenship at the point of government failure in the</td>
<td>Lack of engagement of all stakeholders; Business responsibilities in a global context; Improved image;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Carroll, 1998; Crane &amp; Matten, 2007; Fombrun &amp; Shanley, 1990; Maignan &amp; Ferrell, 2004; Matten et al., 2003; Waddock &amp; Graves, 1997)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSR Theories</td>
<td>Strengths</td>
<td>Weaknesses</td>
<td>Opportunities</td>
<td>Threats</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Issues management</strong></td>
<td>Takes into account social demands;</td>
<td>Content of business responsibility limited to the time and space of a situation;</td>
<td>Legitimacy;</td>
<td>Threat to shareholders wealth;</td>
</tr>
<tr>
<td>(Mahon &amp; Waddock, 1992; Wartick &amp; Rude, 1986)</td>
<td>Business intervention in the public policy process specifically in areas in which public policy is not clearly established;</td>
<td></td>
<td>Prestige;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Greater social acceptance;</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shift towards the process of CSR implementation;</td>
<td></td>
</tr>
<tr>
<td><strong>Legitimacy theory</strong></td>
<td>Organisations operate within the societal norms and their actions are perceived as legitimate;</td>
<td>Lack of precision in definition of the actual company stakeholders;</td>
<td>‘legitimate’ perception;</td>
<td>Sanctions being imposed by society in case of a failure to comply;</td>
</tr>
<tr>
<td>(DiMaggio &amp; Powell, 1983; Dowling &amp; Pfeffer, 1975; Guthrie &amp; Parker, 1989; Patten, 1992; Suchman, 1995)</td>
<td>Respond to the constantly changing norms of society in which it operates;</td>
<td></td>
<td>Image;</td>
<td>Threat to shareholders wealth;</td>
</tr>
<tr>
<td></td>
<td>Rights of a wider range of stakeholders, not merely investors;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corporate social performance</strong></td>
<td>Social legitimacy; Considers</td>
<td>Lack of emphasis on actual CSR</td>
<td>Greater social acceptance;</td>
<td>Threat to shareholders wealth;</td>
</tr>
<tr>
<td>(Carroll, 1981;</td>
<td></td>
<td></td>
<td>Image;</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CSR Theories</strong></th>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carroll, 1999, 2000a; Carroll &amp; Shabana, 2010; Rowley &amp; Berman, 2000</td>
<td>entire range of obligations which business has towards society; Focus on the integration of social demands; Consideration for the environment;</td>
<td>implementation;</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sustainable development</strong> (Hopwood et al., 2005; Lele, 1991; Redclift, 2005)</td>
<td>Consideration for the environment; Consideration of the social dimension;</td>
<td>Macro level rather than corporate level; Issues in respect to the processes and implementation strategies to meet the corporate challenge;</td>
<td>Human development achieved in an inclusive, connected, equitable, prudent, and secure manner; Custom made process - each organisation can choose its specific ambition and approach; Considers present and future generations;</td>
<td></td>
</tr>
</tbody>
</table>

Adapted from Garriga and Melé (2004)

This research was initially guided by the stakeholder theory debate (Freeman, 1984) and the “Pyramid of Corporate Social Responsibility” (Carroll, 1991).
However, as findings from the study by Garriga and Melé (2004, p. 51) suggest, there is a need to ‘develop a new theory on the business and society relationship which would integrate four dimensions’ related to profits, political performance, social demands and ethical values. In so doing, Garriga and Melé (2004, p. 66) suggest taking account of most relevant theories and consideration of their contributions and limitations. Hence, this study builds upon previous research and overcomes some limitations of most relevant theories. This research proposes a theory capable of presenting the dynamic nature of the CSR project and its key stakeholders which regularly change; they move or leave the organisation. It was felt that the need exists to update the current stakeholder management models in this research and to develop a dynamic theory of stakeholder identification and salience.
Stakeholder salience assessment models as presented in the literature are discussed in the next section. The dynamic theory of stakeholder salience, capable of providing an accurate measure of stakeholder importance and a practical way to implement CSR, is discussed in detail in chapter 5.

2.6 Stakeholders salience assessment

To tackle the sustainability challenge, the business community is making vast efforts (Merad et al., 2013). Among these attempts, companies are taking social and environmental responsibility, securing against ethical compromises, ensuring transparent governance, and becoming more accountable to stakeholders (Katsoulakos & Katsulacos, 2007). Even companies that do not fully embrace the CSR concept recognise that its implementation is essential to the long-term prosperity of the company (Sperry & Jetter, 2012). Constant pressure from global stakeholder groups forces companies to take responsibility for their actions and their impact upon society and the environment (Sperry & Jetter, 2012; Wheeler, Fabig, & Boele, 2002). Despite its prominence, the knowledge and understanding of the CSR concept remains limited. Significant questions arise with respect to the concept’s definition, its scope, business case and how to successfully implement, embed and sustain CSR in an organisation. The key challenge remains to integrate the business practices of CSR and corporate sustainability into the company mainstream strategy. The implementation of sustainability asks for more participation and increased accountability in decision framing (Merad et al., 2013); on many occasions, there is a requirement to make compromises between economic, social, political and environmental aspects, handle the lack of precision in terms of the available information and the different expectations of stakeholders. Therefore, stakeholder engagement is significant not only because of justice and ethical
considerations but it can be one of the practical ways to implement CSR. Understanding and balancing stakeholder interests makes managers aware of various issues, affects their decision-making, and ensures fair decision-making processes (Sperry & Jetter, 2012).

The integration of stakeholder concerns, however, is still at an early stage. More work has to be developed on how to identify, prioritise and integrate stakeholders’ objectives into corporate business models, effectively balance their conflicting interests, and ensure fairness in the whole process.

**Stakeholder management models**

If generic stakeholder groups are the same for every corporation, specific groups depend on the particular company, for example environmentalists. Hence, diverse methods for stakeholders’ identification and prioritisation have become important and widely discussed subjects in the stakeholder management literature (Gago & Antolin, 2004; Mitchell, Agle, Chrisman, & Spence, 2011; Mitchell et al., 1997; Parent & Deephouse, 2007).

Identification of stakeholders explores the entities crucial for an organisation’s survival. Using stakeholder analysis, the list of stakeholders is narrowed down to the most important ones in order to understand their interests, objectives, needs and concerns, and to foresee their actions (Sperry & Jetter, 2012).

Various definitions and categorisations of stakeholders have been offered in the literature. In a broad perspective, for Freeman (1984, p. 46), *a stakeholder can be anyone who affects or is affected by operations of a company*. In addition, stakeholders can be classified according to their role, such as government agencies, media, lobbyists, contractors, local
community, employees, customers, NGOs or environmentalists. Stakeholders have been typically categorised as internal and external. Internal stakeholders have been recognised as those directly involved in decision making processes. External stakeholders are referred to as those that can affect or can be affected by the project (Winch, 2004). Clarkson (1995) argues that stakeholders could be classified in primary and secondary formats. The first are engaged in transactions with the organisation, and are essential for its survival, whereas the latter, by not engaging in the organisational transactions, are not significant and have no effect upon firm’s survival. Furthermore, Philips (2003) classified stakeholders into normative and derivative groups, where normative stakeholders directly engage in the organisation’s transactions, whereas the latter affect the firm or are affected by its actions; the firm ought to be concerned with both groups although its obligations are due only to the normative group. Kaler (2004) presents an alternative view in which he advocates that contributors to the organisation are the only real stakeholders.

Many tools exist to manage stakeholders and various frameworks for their categorisation have been proposed. Mendelow (1981) offered a model for environmental scanning which included the environmental dynamism and stakeholder power to the organisation. According to Mendelow’s model, the stakeholder power to an organisation is changing according to the impact that the stakeholder has upon the environment. The two dimensional grid considers the axis power and dynamism as relevant factors. The Mitchell et al. (1997) framework has become highly popular, where stakeholders are categorised in terms of (i) power, (ii) legitimacy and (iii) urgency, as illustrated in Figure 2.4. The most salient stakeholders according to this framework possess all of these attributes. The two dimensional grid with the axis power and interest is a tool that has been used to classify
stakeholders (Johnson & Scholes, 1999). In most of the research, stakeholders are defined based on a power and influence relationship (Henriques & Sadorsky, 1999). Winch and Bonke (2002) offered the stakeholder map to analyse the problem and possible solutions which might be offered by different stakeholders in the project implementation. Furthermore, a stakeholder circle has been suggested to categorise and visualise different stakeholder attributes (Bourne & Walker, 2006). Stakeholder circle is a methodology and visualisation tool which offers a mechanism for assessment of key stakeholders’ influence and for understanding their expectations. More recently a two dimensional matrix categorising four stakeholders types has been proposed by Ackermann and Eden (2011). The limitation of these previous categorisations is that they are made according to a sharp threshold. Stakeholders having mixed characteristics cannot be defined by these frameworks. The framework proposed in this research is filling this gap by developing a more precise 3-D visual tool for stakeholder identification and salience assessment.

The most complete existing model has been proposed by Mitchell et al. (1997) and used by Bendjenna, Charre, and Zarour (2012), Parent and Deeplhouse (2007), Aaltonen, Jaakko, and Tuomas (2008). In contrast to other studies (Ackermann & Eden, 2011; Johnson & Scholes, 1999; Mendelow, 1981; Olander & Landin, 2005; Winch, 2004; Winch & Bonke, 2002), where stakeholder’s salience was rated with respect to only one or two criteria, because of one or two dimensional representations, this framework uses three attributes of power, urgency and legitimacy. Salience refers to the extent to which the management of a company gives priority to competing stakeholder claims. The Mitchell et al. (1997) framework offers a possibility for management to evaluate the importance of stakeholders (table 2.2). According to the framework, power is an attribute contributing to salience.
Power refers to the ability of stakeholders to exercise their force, which could also be political, using coercive, utilitarian, or normative means (Etzioni, 1964). Mitchell et al. (1997) define a legitimate stakeholder as one whose actions are considered desirable and proper within the context of the social system. Urgency refers to the extent to which stakeholder claims are considered critical or time sensitive and would be in need of attention.

This classification involves eight types of stakeholders (Figure 2.4). The more attributes that the stakeholder has, the greater its salience, according to Mitchell et al. (1997), and because these attributes are not static a dynamic theory of stakeholder salience is essential. Hence, the aim of this work would be to extend the Mitchell et al. (1997) theory by offering a dynamic framework that would enable the assessment of stakeholders’ salience. The dynamic framework proposed in this research provides a way of finding the precise degree to which a stakeholder belongs to each of groups defined by Mitchell et al. (1997). The suggested framework permits an assessment of stakeholders with high precision which would appear to be missing in the current research on the subject.

It was believed in this thesis that Mitchell’s work is conceptually very appealing, although lacks precision. Hence, the approach for stakeholders’ assessment proposed in this study extends the work by Ackermann and Eden (2011) and other researchers by proposing a dynamic theory for stakeholder prioritisation (discussed in chapter 5). In the framework stakeholders’ influence is measured according to power but also with respect to the levels of legitimacy and urgency that the stakeholders have.
Table 2.2 Classification of stakeholders according to three attributes of power, legitimacy, and urgency (Y=yes, N=No)
<table>
<thead>
<tr>
<th></th>
<th>Power</th>
<th>Legitimacy</th>
<th>Urgency</th>
<th>Type of Stakeholder</th>
<th>Description</th>
<th>Example of generic stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Definitive stakeholder</td>
<td>Power to impact a firm, legitimate relationship, urgent claim.</td>
<td>Management</td>
</tr>
<tr>
<td>2.</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Dominant stakeholder</td>
<td>Power and legitimacy to influence.</td>
<td>Government, Creditors, Corporate board of directors</td>
</tr>
<tr>
<td>3.</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Dangerous stakeholder</td>
<td>It has power and urgency and therefore may pose a threat to the firm through its impact upon strategic management.</td>
<td>Environmentalists</td>
</tr>
<tr>
<td>4.</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Dependent stakeholder</td>
<td>It has legitimacy and urgency. Therefore, it is important for the strategic management. It needs close attention.</td>
<td>Local community, Environment,</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>5.</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Dormant stakeholder</td>
<td>It needs monitoring as it has the power to affect the strategic management.</td>
<td>Employees</td>
</tr>
<tr>
<td>6.</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Discretionary stakeholder</td>
<td>It has legitimacy but no power and no urgent claims. Managers have no pressure to actively engage in a relationship with such a stakeholder (Mitchell et al., 1997)</td>
<td>Non-profit organisations</td>
</tr>
<tr>
<td>7.</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Demanding stakeholder</td>
<td>It has only the urgency attribute.</td>
<td>Protesters</td>
</tr>
<tr>
<td>8.</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Non-stakeholder</td>
<td>It has no power, legitimacy or urgency.</td>
<td>None of the above, Outsiders</td>
</tr>
</tbody>
</table>

Source: Adapted from Mitchell et al. (1997)
A framework for fair prioritisation of key stakeholders’ objectives capable of building stakeholders’ trust in an organisation is presented in chapter 5. The next section gives insight into the literature on fairness and its relationship with sustainability.

2.7 Sustainability and fairness

Given the previous discussion of stakeholder management models, it is necessary to develop a framework in this research to facilitate incorporation of stakeholder interests, to ensure fair decision making processes. The basic underlying theme in most studies relates to what is ‘fair’, ‘equitable’, and ‘just’ in terms of who should be the beneficiary of resource allocations, who should bear the cost and how decisions should be made (Syme, Nancarrow, & McCreddin, 1999). The philosophical stance of this research is that fairness can be defined through the concept of sustainability. The concept of sustainability has been described in the literature as a three-legged stool, in which each leg represents respectively ecosystem, economy and society. As the three elements are intricately linked with each other, any of them missing would cause instability to the system (Young, 1997). Sustainability has been further expanded to the principle of triple bottom line to find an application in the corporate community context (Elkington, 1994, 1998). Social, environmental and financial performances are underpinning pillars of the concept whose goal is sustainable development. For an organisation to be financially secure it needs to conform to the societal expectations and environmental norms (Elkington, 1994). Business prosperity and sustainability rely upon social justice and environmental quality. In this research the three-dimensional concept of sustainability is described through the lenses of stakeholders’ meaning of equity, fairness and justice, public participation, environment and futurity.
There is a more in-depth dimension to the problem investigated in this work rather than simply finding tools (decision analysis methods) to address an issue (sustainability) as fairness has an in-depth dimension. Fairness has been recognised as an important goal of priority setting (Kapiriri, Norheim, & Martin, 2009; Singer, Martin, Giacomini, & Purdy, 2000) which can build acceptability and confidence in the decisions made. It is not, however, an easy task to articulate what fairness means as a goal for stakeholder prioritisation. In this context, fairness may mean a variety of things to various people. In terms of distributive justice, fairness refers to equitable distribution of benefits and burdens (Deutsch, 1985).

In this study fairness is defined by employing the accountability for reasonableness (Kapiriri et al., 2009) that has been applied for medical resources allocation whereby publicity, relevance, appeals and regulation are the four conditions required for fair priority setting. The three additional principles of fair consideration, empowerment, and impartiality as set out by Emanuel (2002) are also considered in this work to facilitate fair consideration of stakeholders’ interests in the CSR decision-making context. Moreover, the fairness framework proposed in this study is extended by an additional dimension of transparency. The accountability framework proved to be successful in medical resources allocation, hence it has been adapted in this study in an attempt to contribute towards fairness in prioritisation of stakeholders’ objectives in the context of CSR resource allocation. The framework is explained in Table 2.3.
Table 2.3 The fairness framework

<table>
<thead>
<tr>
<th>Features of fairness</th>
<th>Description</th>
<th>How the proposed framework is responding to the listed features of fairness?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publicity</td>
<td>Decisions and their rationales must be publicly accessible.</td>
<td>The framework can be used in corporate annual reports and sustainability reports to address CSR, sustainability matters, and explain involvement of key stakeholders in the decision-making process.</td>
</tr>
<tr>
<td>Relevance</td>
<td>The rationale for decision making has to be based on evidence and reasons that fair-minded persons would affirm.</td>
<td>Decision support framework can provide rationale and evidence for decisions undertaken.</td>
</tr>
<tr>
<td>Appeals</td>
<td>Mechanism for challenging allocation decisions.</td>
<td>CSR resourcing decisions defensible as the framework can explain rationale behind the decisions undertaken.</td>
</tr>
<tr>
<td>Regulation</td>
<td>Procedure ensuring that the three above-mentioned conditions are met.</td>
<td>The framework can help ensure the success of the above-mentioned conditions of publicity, relevance, and appeals.</td>
</tr>
<tr>
<td>Fair consideration</td>
<td>System allowing inclusion of all stakeholders’ interests.</td>
<td>Stakeholders’ preferences are included in the decision-making via the decision support framework.</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Mechanism allowing stakeholders to influence decision-makers and participate in the decision making process.</td>
<td>Stakeholders can actively participate in the model building process; their preferences are included in the model.</td>
</tr>
<tr>
<td>Impartiality</td>
<td>Ensure that the decision makers (DMs) implementing resource allocation decisions have no conflict of interest.</td>
<td>Application of the decision support framework acknowledges existence of conflicts of interest. It facilitates, however, dealing with multiple interests and conflicting decision criteria. It assists group decision-making and helps in arriving at a</td>
</tr>
<tr>
<td>Features of fairness</td>
<td>Description</td>
<td>How the proposed framework is responding to the listed features of fairness?</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transparency</td>
<td>Transparency is manifested by making an institution's behaviour and motives willingly knowable to interested parties (Hale, 2008).</td>
<td>The stakeholders both internal and external can assess whether their preferences are respected.</td>
</tr>
</tbody>
</table>

Source: Adapted from Kapiriri et al. (2009, p. 768) and Emanuel (2002)

As the methodology proposed in this work includes preferences of all key stakeholders, therefore its application is a first step towards arriving at a fair decision outcome. By including the key stakeholders, the legitimacy of the decision’s outcome can be increased (Mena & Palazzo, 2012). In an attempt to provide the legitimacy in the decision-making process, the application of the framework developed in this work allows the key stakeholders to participate in the model building process, as well as influence the decisions made. As outlined by Mena and Palazzo (2012), by giving the key stakeholders the right to influence the decisions made, the framework manifests fairness. Fairness in its full meaning would be ascertained if the decision making process was followed by a negotiation stage which would result in exercising the decision accepted by the key stakeholders. By inviting the key stakeholders to take part in the modelling process and asking to rank each other’s importance with respect to CSR investment decisions, the framework contributes towards the legitimate, democratic decision-making process. It also ensures that the power relations between stakeholders are neutralised. Defining fair procedure for stakeholder management is a significant goal as it could empower those who are affected most by the industry operations. Moreover, meeting the needs of multiple stakeholders is a difficult task for all
companies and fair procedures are required to establish priorities for resourcing decisions within the CSR context.

2.8 Resources allocation to Corporate Social Responsibility programmes

Integration of CSR into a business model in an operational way requires a series of processes and resource commitments. The problem of resource allocation is a highly significant task and has been widely investigated (Bish, Lin, & Hong, 2008; Bordley & Pollock, 2012; Trutnevyte, Stauffacher, & Scholz, 2012) and is encountered in a variety of applications (Brethauer & Shetty, 1995; Calinescu, Bhulai, & Schouten, 2012; Karabati, Kouvelis, & Yu, 2001; Mjelde, 1983). Resource allocation is, however, a relatively new research area in CSR and has not been fully addressed in the literature. The task is, however, significant as it shapes the strategy (Bower et al., 2006). Resource allocation requires balancing costs, benefits, and risks, as well as diverging needs of multiple stakeholders. The task is typically confronted with several problems, to include multiple, often conflicting, objectives of stakeholders, lack of sufficient information to make informed decisions, and inefficient use of the available total resource. Resource allocation to CSR programmes highlights the need for an approach capable of addressing these constraints to construct a portfolio of alternatives that collective best use is made of the limited total resource. It involves a technical solution capable of capturing diverse aspects of the problem with a social process of the individuals engaged (Phillips & e Costa, 2007).

Approaches to facilitate resources allocation

Most of the approaches proposed for resources allocation are models for prioritisation of options. Resource allocation, however, can be approached via prioritisation, where
Chapter 2

appraisal of options leads to portfolio construction as illustrated in chapter 8 of this work. Two different prioritisation tasks have been discussed in the literature, which are appraisal of options and portfolio construction (Phillips & e Costa, 2007). The first refers to ordering of options according to their established priority; the latter relates to appraisal of options finding their best combination for a given level of resource. In this thesis, option appraisal is a first step leading to a construction of portfolio, and is further explored in chapter 6.

Portfolio resource allocation decisions can be looked at from three perspectives: corporate finance, operations research, and decision analysis. Each of these fields gives an alternative perspective on benefits, costs and risks. In the corporate finance approach, monetary terms are used to express benefits and net present value (NPV) is calculated to give an indication of whether the benefits outweigh the costs. Operations research looks at the problem from an optimisation perspective, in terms of maximising the sum of benefits of all investments where the budget is the constraint. The problem is referred to in operations research as the binary knapsack, where the knapsack has to be filled with the most valuable items to fit the limited confines of the knapsack. The final perspective looks at the resource allocation from a decision analysis point of view, where the problem can be scrutinised using traditional decision trees or approached with multi-criteria decision support tools used to value options consequences.

It is pointed out by Phillips & e Costa (2007) that a model, in order to be efficient and transparent, is required to accommodate financial information, along with non-financial benefit criteria, risk, uncertainty, data and judgement. Such a model on its own, however,

---

9 its mathematical description is discussed in chapter 4
will not suffice unless accompanied by a social process. Effective allocation of resources to CSR programmes is not merely a technical matter involving appropriate modelling. The social process of prioritisation and resource allocation is a highly important matter along with the soft issues of fairness and trust.

2.9 Gaps identified in the literature

This review has identified and discussed the current body of literature on CSR, and in the process identified existing challenges and future initiatives driven by gaps that have emerged within the literature. The scope of the review has focused on the theories on CSR, stakeholder management models and resources allocation to CSR programmes.

Gap 1  
The literature identifies the need for methodologies and frameworks that can assist in the identification and precise assessments of stakeholders’ importance. Identifying, prioritising and engaging stakeholders is an on-going process. As the key companies’ stakeholders are regularly changing, they move within the company or leave it, and their importance changes over the life cycle of a project, stakeholders’ salience assessment models are required. Hence, for the project to be effective, the stakeholder salience assessment has to be regularly updated in the light of the dynamism of the project and stakeholders’ changing attributes.
Gap 2  Significant investigation into CSR literature highlights further knowledge gaps. The literature offers no generic framework, tool, or methodology that enables an organisation to assess the firm’s economic, legal, ethical, and philanthropic responsibilities, and the business case for CSR implementation in a practical way.

Gap 3  No prescriptive methodologies exist which could help to identify the level/extent of CSR that the company should adopt and apply in order to achieve its strategic intent.

Gap 4  Frameworks, methodologies and tools should be identified by approaching all the relevant stakeholders to formulate the assessment of their expectations, needs and requirements. This enables provision of an accurate methodology to be identified to suit the CSR operational implementation. However, little understanding exists of the identity of the firm’s CSR stakeholders and their expectations.

Gap 5  Academia and business still lack a scientific and objective approach to allocate scarce resources to strategic CSR programmes while taking into consideration diverging needs of multiple stakeholders. Not all CSR programmes are claimed to create value for the firm; some are accused of
raising costs (Husted & Allen, 2007b; Tsai et al., 2010). Hence, frameworks are required to allocate resources efficiently. It has been emphasised in the literature that many existing approaches to CSR are disconnected from business and strategy which leads to failed opportunities for companies to benefit society (Porter & Kramer, 2006). CSR, however, can be a source of competitive advantage. Moreover, effective allocation of resources to CSR programmes is not only a technical matter involving appropriate modelling. The social process of prioritisation and resource allocation is a highly important matter along with trust and fairness (Phillips & e Costa, 2007). Application of decision analysis tools to facilitate effective resource allocation to CSR programmes, as discussed in chapter 3, can help to increase communication between the different stakeholders, develop shared understanding of the portfolio, and a shared sense of common purpose between the projects.

The gaps identified within the CSR literature show that there is a requirement to contribute to the body of knowledge by introducing improved methodologies that will enable practical implementation of CSR at the project stage. This will enable in the future both a more holistic but aligned CSR strategy formulation methodology for organisations.

2.10 Conclusions drawn from the overview of literature

The principal observation from the literature and the gaps identified points out the need for new frameworks and new paradigms. To address gaps in previous research on CSR it is
important to provide systematic methods for CSR integration into business strategy, methods for consistent decision-making, innovative ways to manage stakeholders’ objectives, and to allocate resources in an efficient manner.

The prevalent approach to CSR is like rearranging the deck chairs on the Titanic. In this work it is acknowledged though, that it is the course of the Titanic itself which requires changing to prevent disaster and lead towards a more sustainable future. The formulation of a decision support framework for resource allocation to CSR programmes is seen as a valuable contribution to the literature. Such a methodology will assist in active engagement of stakeholders and in meeting their demands.

Following the discussion on CSR and the importance of its practical implementation into business strategy, it is crucial to conceptualise the methodologies which can be used to put CSR into operation. The following chapter will present a literature review on decision analysis methodologies that can assist in addressing the CSR problems identified in this chapter and implement CSR in an operational way.

2.11 Chapter Summary

This chapter has presented an overview of the literature relating to CSR. The chapter commenced with an introduction of the concept of CSR, and then presented a number of competing definitions for the phenomenon. The contested nature of the concept has been examined by the lens of theory, showing how different theories can help to explain the involvement of business in CSR. Then, the stakeholder management models are discussed and the need to update them in the light of the dynamism of CSR projects and stakeholders’ changing attributes is highlighted. Finally, the need for practical, systematic methods to
allocate resources and integrate CSR into business models in an operational way is outlined. The next chapter presents a literature review on selected decision analysis methodologies.
3 Chapter Three - Decision Analysis Methods
While acknowledging social development and business viability, this chapter concentrates on significant methods which can be integrative in design to facilitate allocation of limited resources to corporate social responsibility (CSR) programmes. After presenting to the reader some existing influential classifications of decision analysis methods (section 3.2), this chapter discusses the model building and exploring the common framework of the MCDA model building process (section 3.3). The emphasis is shifted to the broader process of problem structuring to facilitate capturing and structuring of ideas (section 3.3.1), in particular using the cognitive mapping (CM) methodology (section 3.3.1.1). Then a selection of decision analysis methodologies is presented, to include Analytic Hierarchy Process (AHP) (section 3.3.2), Analytic Networks Process (ANP) (section 3.3.3), Fuzzy Logic (section 3.4.1), and the Knapsack approach (section 3.5). The gaps which are identified whilst undertaking this overview of the literature form the justification for further research (section 3.6). Finally the conclusions that can be drawn from this literature review are presented (section 3.7).

The literature overview will illustrate that the benefits of combined use of the decision analysis methodologies proposed in this chapter, to eliminate the limitations present in application of mono-methodologies. Figure 3.1 illustrates the chapter 3 within this thesis.

**Figure 3.1 Chapter three within this thesis**
3.1 Introduction

Despite the fact that major companies declare their commitment to “doing the right thing”, their CSR still does not constitute a core component of their business operations (Slack, 2012). A meaningful framework is required to facilitate social and environmental performance improvements, and enable incorporating CSR principles into companies’ business models in a more holistic way. In response to these problems, there is a growing interest in decision analysis tools to facilitate sustainable development of the sector.

Long-term success of global companies requires ability to align their interests with societal values. By undertaking strategic CSR investments, global companies can add value to their business and contribute to society. Decision analysis techniques have proven useful in assisting corporations think beyond solely seeking reputational gains, and demonstrated their capabilities in assisting companies to meet their business goals and contribute towards sustainable development. Recognising the gaps identified through the CSR literature review (chapter 2) the approach in this study attempts to avoid a normative analysis of business’ role in society. Sustainability with its numerous implications and multiple paradigms rather requires methods which could reconcile these paradigms and achieve consensus between the various stakeholders involved (Esteves, 2008). Some possible methods are suggested in this chapter.

3.2 Tools and techniques identified for Corporate Social Responsibility integration

Numerous contributions to the literature on decision analysis methods capable of addressing problems in CSR (chapter 2) have been identified (Azimi, Yazdani-Chamzini, Fouladgar, Zavadskas, & Basiri, 2011; de Siqueira Campos Boclin & de Mello, 2006; Kouikoglou & Phillis, 2011; Merad et al., 2013; Munda, Nijkamp, & Rietveld, 1994; Muñoz,
Rivera, & Moneva, 2008; Papageorgiou & Kontogianni, 2012). The literature finds decision support methods effective in implementation of sustainable development within an organisation (De Brucker, Macharis, & Verbeke, 2013; Merad et al., 2013). In the light of the abundance of approaches, Merad et al. (2013) suggest the application of an outranking approach ELECTRE and a full aggregation method (MAUT approaches with Choquet integral). Different stakeholder management approaches using multiple-criteria processes such as analytic hierarchy process (AHP) and analytic network process (ANP) to incorporate stakeholders’ views into corporate decision making processes have been previously investigated (Jackson, 2001; Herath, 2004; Bendjenna et al., 2012).

The literature illustrates that the most effective allocation of resources to CSR programmes requires application of several methodologies collectively (Tsai et al., 2010). Table 3.1 provides a comprehensive analysis of methods proposed in this study and identifies the business needs they can address in the CSR context.

<table>
<thead>
<tr>
<th><strong>Method</strong></th>
<th><strong>Application field</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive mapping</td>
<td>To structure the decision problem</td>
</tr>
<tr>
<td></td>
<td>To identify the central concepts to the problem</td>
</tr>
<tr>
<td></td>
<td>To identify most problematic areas</td>
</tr>
<tr>
<td></td>
<td>To identify multiple conflicting objectives</td>
</tr>
<tr>
<td>Analytic Hierarchy Process</td>
<td>To structure the decision problem in the form of a hierarchy</td>
</tr>
<tr>
<td></td>
<td>To identify and evaluate importance of stakeholders</td>
</tr>
<tr>
<td></td>
<td>To give the weights to the alternatives</td>
</tr>
<tr>
<td></td>
<td>To prioritise alternatives</td>
</tr>
<tr>
<td></td>
<td>To address problem dynamism via the ‘what if’ sensitivity</td>
</tr>
<tr>
<td>Method</td>
<td>Application field</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>analysis</td>
</tr>
<tr>
<td></td>
<td>To model the diverging objectives, needs and requirements of stakeholders and involve them in the decision making process</td>
</tr>
<tr>
<td></td>
<td>To include multiple, often conflicting, criteria</td>
</tr>
<tr>
<td></td>
<td>To include both qualitative and quantitative information</td>
</tr>
<tr>
<td></td>
<td>To assist both group and single decision making process</td>
</tr>
<tr>
<td><strong>Fuzzy logic</strong></td>
<td>To deal with uncertainty</td>
</tr>
<tr>
<td></td>
<td>To cope with lack of information and information incompleteness</td>
</tr>
<tr>
<td></td>
<td>To address vagueness and imprecision</td>
</tr>
<tr>
<td></td>
<td>To visualise the decision outcome with the surface output</td>
</tr>
<tr>
<td><strong>Analytic Networks Process</strong></td>
<td>To model the diverging objectives, needs and requirements of stakeholders and involve them in the decision making process</td>
</tr>
<tr>
<td></td>
<td>To structure the decision problem in the form of a network</td>
</tr>
<tr>
<td></td>
<td>To illustrate concepts’ interdependence</td>
</tr>
<tr>
<td></td>
<td>To provide feedback</td>
</tr>
<tr>
<td></td>
<td>To provide the benefits, opportunities, costs and risks analysis</td>
</tr>
<tr>
<td></td>
<td>To include multiple, often conflicting, criteria</td>
</tr>
<tr>
<td></td>
<td>To include both qualitative and quantitative information</td>
</tr>
<tr>
<td></td>
<td>To assist both group and single decision making process</td>
</tr>
<tr>
<td><strong>Knapsack approach</strong></td>
<td>To allocate resources on the basis of a variety of criteria to determine a performance score</td>
</tr>
<tr>
<td></td>
<td>To select programmes until the total programme cost reaches the available budget</td>
</tr>
</tbody>
</table>
In the light of the existence of multiple decision analysis methods, their different classifications have been proposed in the literature, some of which are discussed in the next section.

*Classification of decision analysis methods*

The taxonomies of decision analysis methods have been developed to represent the multitude of different models in the context of multi-criteria problems. More specifically, Belton and Stewart (2002, p. 9) provided a classification in which they categorise the MCDM models into: (i) Value measurement models; (ii) Goal, aspiration or reference level models; (iii) Outranking models.

The *Value measurement category* refers to the models that require numerical scores to represent the degree of the decision maker’s preference. The individual scores obtained for every criterion serve as a basis for the subsequent synthesis to produce higher level preference models through the aggregation process.

*Goal, aspiration or reference level models* require the decision makers to state their desirable or satisfactorily levels for each of the criteria. In the process the options that provide decision makers with the maximum level of satisfaction are determined.

*Outranking models* require the decision maker to compare the courses of actions in a pairwise manner. The comparison process begins with each criterion until the preference for one criterion over another is discovered and the evidence serves as a means for selecting the preferred alternative.

Huang, Poh, and Ang (1995), on the other hand, categorise the decision analysis techniques into three alternative main groups: (i) Decision making under uncertainty (DMUU); (ii)
Multiple criteria decision making (MCDM); (iii) Decision support systems (DSS). Zhou, Ang, and Poh (2006) built on the work of Huang et al. (1995) and provided a revised classification of decision analysis methods in which they propose the following: (i) Single objective decision-making (SODM) methods; (ii) Multi-criteria decision making (MCDM) methods; (iii) Decision support systems (DSS).

Following the Huang et al. (1995) and Zhou et al. (2006) classifications of MCDM approaches the multiple criteria methods include both multiple attributes and multiple objectives. Thus, according to this taxonomy the two main branches of MCDM can be categorised into multiple objective decision-making (MODM) and multiple attribute decision-making (MADM). Figure 3.2 illustrates the taxonomy by Zhou et al. (2006).

Figure 3.2 Decision analysis methods taxonomy. Source: Zhou et al. (2006)
MODM refers to multiple objective mathematical programming models in which the solution is found through optimisation with respect to a set of objectives which are in conflict with one another and are subject to a number of mathematically defined constraints. The rationale behind it is to select the best possible alternative which satisfies the specified constraints. Multiple objective linear programming (MOLP) is identified as a special case of MODM.

MADM enables preference decisions by evaluating and prioritising alternatives which are often characterised by multiple conflicting attributes. A number of popular methods in MCDM can be distinguished. Among them is multiple attribute utility theory (MAUT) which enables a decision through a consideration of a decision-maker’s preferences in the form of multiple attribute utility functions. Multi attributive value theory (MAVT) is a special case of MAUT. It is specifically characterised by the fact that there is no uncertainty in the consequences of alternatives. In order to deal with complex situations and aid a decision-maker to find a solution it is possible to use the analytic hierarchy process (AHP) which involves the structuring of a decision problem, weights scoring and synthesis.

Among other popular methods are the elimination and choice translating reality methods (ELECTRE) I, II, III, and IV methods, which are a part of a family of outranking methods. Another class of outranking methods is preference ranking organisation methods for enrichment evaluation (PROMETHEE). There are also some less-widely adopted modelling methods which are termed as multi attribute decision-making (MADM) methods. Some examples include conjunctive and disjunctive methods, and TOPSIS. An in-depth analysis and survey of methods can be found, for instance, in e Costa and Vincke (1990).
DSS are software systems that combine models, databases, and decision-aiding tools in a way that allows decision makers to easily apply them. They offer a support to complex and unstructured decision problems. Successful use of traditional versions of DSS required an expert knowledge of the subject area so as to choose right parameters and models. These days the development of intelligent DSS allows more flexibility to the users in dealing with different situations by incorporating a knowledge base that contains heuristic knowledge from domain experts.

3.3 Multiple criteria decision analysis methods

The multiple criteria decision-making (MCDM) problem refers to a decision-making context involving consideration of a wider range of criteria to select from a number of courses of action. Belton and Stewart (2002, p. 2) use MCDA “as an umbrella term to describe a collection of formal approaches which seek to take explicit account of multiple criteria in helping individuals or groups explore decisions that matter.” Due to the complicated nature of multiple criteria problems, the MCDA approaches assist decision-makers in organising and synthesising information to reach a decision with maximum satisfaction based on the fact that all factors have been considered.

The optimisation concept in its traditional sense does not have its application to MCDA as opposed to other Operational Research (OR)/Management Science divisions. The aim of MCDA is not to give a decision-maker the right answer. The tools, however, aid the decision-making process by integrating objective measurement with value judgement and making explicit and managing subjectivity (Belton & Stewart, 2002).
**Chapter 3**

*The three phases of the MCDA model building process*

The main stages of applying MCDA to a decision problem in practice can be grouped into three crucial phases: (i) problem identification and structuring, (ii) model building and use, and (iii) the development of plans of action (Belton & Stewart, 2002). The iteration within and between the key phases of the process is a natural phenomenon.

The *problem structuring* refers to the initial phase of opening up of the problem. Structure aids in visualising and understanding of the problem’s components. At this stage the complexity of the problem is uncovered. This phase provides the decision-maker with an enhanced understanding of an issue and as a result potential ways of moving forward are highlighted. Creative thinking is central at this stage. At this phase a complex problem is presented in the simplest possible way.

The *model building and use phase* requires the actors/stakeholders that take part in the decision-making process to be clearly distinguished. At this stage an appropriate MCDA technique is chosen and applied to the decision problem. The selection of an MCDA approach is highly dependent on the nature of the problem and the information given. The decision-maker or group of decision-makers have to clearly state the goal, criteria, objectives and alternatives of the problem under question. The gathered information serves as a basis for selection of an MCDA method.

After populating the model with the decision-maker’s judgements, the synthesis is carried out. The final phase, the *development of the various action plans*, is based on the outcome of the synthesis of the model.
3.3.1. Problem structuring

Capturing an appropriate structure of the decision problem is an essential part of any form of modelling. Tilanus (1983), cited in Belton and Stewart (2002), recognised the mismatch between the decision problem and the model to be one of the main reasons for failure of operational research (OR) interventions. Problem structuring is an important process through which the key factors of the problem, that is goals, actors, uncertainties, risks, benefits, costs and opportunities, as well as actions are outlined. These elements are subject then to further discussion and analysis.

The literature presents a number of managerial tools which can accompany the problem structuring process, to include: SODA (Strategic Options Development and Analysis) (Eden & Simpson, 1989), extended to the JOURNEY-Making methodology (Eden & Ackermann, 1998) which assumes formulation of a formal business model that can lead to the agreement and finding strategic issue resolution (Eden & Ackermann, 2004), or Soft Systems Methodology (Checkland, 1981).

The process of problem structuring is accompanied by one or more facilitators who work with a group and pay attention to group issues. Their task is to stimulate idea generation and capture the ideas of the group of decision makers.

The idea generation

At this stage participants contribute their knowledge towards the organisation of the problem. The first step requires all participants to have a broad understanding of the issue under consideration. This process can be accompanied by different tools such as post-it notes, flip charts or a computer. The ideas generated are gathered during the discussion or
summarised afterwards. Capturing of information by the facilitator(s) enables the use of data in following meetings. Electronic forms of gathering data have many advantages. Among them are the anonymy of participants and an electronic record of the ideas gathered. There is a variety of software providing problem structuring and analysis capabilities, e.g. Decision Explorer.

To stimulate the thinking process and ideas generation at the initial phase of problem structuring, specific activities or so-called checklists can be introduced. Such activities make sure that all aspects of the situation have been taken into account and no key information has been omitted. Checklists help to cluster and link concepts together. A variety of useful frameworks for idea generation exist. CATWOE analysis (Customers, Actors, Transformation, Worldview, Owners and Environment), CAUSE (Criteria, Alternatives, Uncertainties, Stakeholders, Environmental factors and constraints) are useful. The CAUSE concept is closely linked to the MCDA methodology. The useful framework, according to Belton and Stewart (2002), considers specific actions or alternatives and, adopting an alternative perspective to the problem, considers positive and negative aspects of the issue, and takes into account barriers and constraints present within the decision problem. It is important to point out that an application of a framework is highly dependent on the context of the problem.

**Structuring of concepts**

The structuring of ideas highlights the main areas of concern, elucidates goals and alternatives, and outlines the missing information in the decision context. One of the possible ways to structure the concepts is to form clusters of ideas with the most general concepts at the top and the specific ones at the bottom. To aid messy problems, several
problem structuring methods exist. The cognitive or causal mapping (Eden, 1998), discussed in more detail in the following sections, is one of them.

*Methods to structure ideas*

The technique of *cognitive mapping* has been claimed to have many interpretations in practice, for instance, Axelrod (1976) and Huff (1990) cited by Eden & Ackermann (2004). Cognitive mapping applies decision makers’ beliefs, values, and expertise, which it elicits from interviews, their analysis and coding of documents. This information serves as a basis for the formulation of the system presented as a cognitive map. The concepts linked together in a chain of arguments form a cognitive map (Eden & Ackermann, 2004). The cognitive maps are claimed to be solely a medium for finding the solution to the problem. However, problems can be solved and different options can be developed because of the richness of these maps.

As maps can become substantially large, support software to capture concepts and provide their graphical representation is often used. The use of software brings certain advantages, including the ability to focus on a particular part of the map to discover issues related to it and detection of emergent themes. Apart from the cognitive mapping method other techniques can help to represent and structure a decision maker’s ideas. These techniques include simple spray diagrams that allow capturing of linkages between ideas, mind maps that additionally provide a graphical representation of these ideas, and Checkland’s rich pictures that provide understanding of problems through a representation of an issue in a pictorial form (Belton & Stewart, 2002).
In the next section several decision analysis methodologies which found an application in this work are presented. Initially the origins of methodologies are presented, then the basic assumptions and implementation steps, followed by analysis details. Partial criticisms of methods concentrating only on the aspects that may have relevance to this study are provided.

3.3.2. **Cognitive mapping**

CM is a method for structuring and clarifying complex problems (Ackermann & Eden, 2001; Belton & Stewart, 2002; C. Eden & Ackermann, 1998). It employs 2-D graphs linked by nodes that take a form of a map. It was developed by Eden, Jones, & Sims (1983) and was subsequently embedded into the SODA (Strategic Options Development and Analysis) methodology for problem solving interventions. Later, it became a part of a more general approach to strategy, JOURNEY-Making (Eden & Ackermann, 1998). The term cognitive map has its origin in psychology (Tolman, 1948); it is from there that it was borrowed and applied in OR in the early 1970s. The method has seen numerous applications in a variety of domains, to include strategic change, environment, entrepreneurship, and software operations support.

**Basic assumptions of cognitive mapping**

CMs are useful tools for problem structuring and can take various forms. A causal (or influence) map has been developed for the purpose of this research due to its particular value in structuring an objective model (Keeney, 1992) and is discussed in chapter 7. CM represents an individual’s perception of a situation and/or problem in terms of bipolar constructs. Each concept is represented by a text block, with a presented pole and a contrast pole. The presented pole stands for the present situation; the contrast pole
represents the opposite of the current situation. These labels are linked with the “rather than” term and have an action-perspective orientation. Bipolar concepts are claimed to better elicit concepts’ meanings. CM, as opposed to influence diagrams or causal loop diagrams, is explicitly subjective and applies constructs instead of variables (Ackermann, Eden, & Williams, 1997). The general idea behind it is to represent the view of a group of actors, to stimulate their imagination through the visual representation, to increase their participation in the decision-making process and to promote a discussion. The facilitator’s role is to supervise the decision-making process of groups of approximately fifteen participants. Hence, the methodology enables the gathering of opinions, beliefs, and perceptions of all group members. CM is a decision support tool for defining a problem using networks of explanations and consequences that surround every single situation problem (Kpoumie, Damart, & Tsoukais, 2012). Merged group maps often acquire a number of feedback loops and therefore are frequently of interest for system dynamics modellers (Eden, 1994), but most of all they are a useful tool in aiding any team to comprehend the nature of their decision problem.

**Analysis of a causal map**

In this section, different methods of analysis of strategic causal maps are discussed, to include domain analysis, head and tail analysis, givens-means-ends analysis, and cluster analysis.

**Domain analysis**

The theory of directed graphs underpins the analysis of the causal mapping approach. The cognitive map can be represented by $n \times n$ matrix $A$. The number of elements in the map is
denoted by \( n \). The direct causal relationship from a concept \( i \) to concept \( j \) is the value of every element of \( A \). When the strength of relationships is not considered then \( A \) is a signed binary matrix. In such a case \( a_{ij} \) is assumed to take values of either 1, 0, or -1.

The positive relationship from \( i \) to \( j \) found in a map is \( a_{ij} = 1 \), negative is denoted by \( a_{ij} = -1 \), and lack of relationship is denoted by \( a_{ij} = 0 \). A total matrix \( T \) is obtained when the adjacency matrix \( A \) is raised to the \( k^{th} \) power. All paths of \( k \) length from \( i \) to \( j \) can be seen in the total matrix. From the direct effects matrix, all relationships both direct and indirect, can be calculated with Equation (1):

\[
T = \sum_{k=1}^{n-1} A^k
\]

When a non-zero value in \( T \) exists, then a direct or indirect relationship between considered elements in a cognitive map can be found. In adjacency matrix \( A \), the outdegree of concept \( i \) is given by the column sum of absolute values of the elements. The outdegree is the number of concepts believed to be affected by the concept \( i \).

The indegree of concept \( i \) is given by the column sum of the absolute values of the elements of column \( i \). The indegree indicates the number of concepts which are believed to affect the concept \( i \). The total degree can be obtained by the sum of the outdegree and indegree. This is an effective measure of a centrality of a concept which can be calculated by domain analysis existent in Decision Explorer (Banxia, 1996).

**Head and tail analysis**

Head and tail analysis is used to identify the concept’s goal and policy in the system. No outgoing links are present in head concepts. Therefore, these concepts are affected by other
model/system variables. A large number of heads in a model may suggest multiple and often conflicting objectives of decision-makers. Tail concepts, on the other hand, have no incoming links and as so they are the concepts influencing other concepts in the model.

**Givens-means-ends analysis**

Givens-means-ends analysis (GME) is the ratio between inflow and outflow that can be calculated for every variable. According to this ratio, variables/concepts can be classified into three classes as follows.

i) Ratio < 1 signifies concepts with a higher number of outflows than inflows. These concepts are termed as “givens”.

ii) Ratio > 1 indicates variables which have a higher number of inflows than outflows and are termed as “ends”.

iii) Variables with roughly the same number of both outflows and inflows are termed as “means”.

Moving from “givens” to “ends” allows checking of the direction of causality in the map. It may also allow detection of hierarchical structures, if they are not found with the use of head-tail analysis. Ends can be identified as goals of the system as they are, in most cases, influenced by other variables. Givens can be thought of as strategies because they influence “means” and “ends”. A map’s emerging characteristics can be found by checking the hierarchical arrangement of the map’s concepts, which is a feature of the cognitive mapping methodology. It enables analysis of concepts from “givens” to “ends” to detect any hierarchical structures in the map. Centrality measure in cognitive mapping identifies
concepts which are more interlinked and possess more cumulative ‘influence’ than others. The central node in the map is mostly central to the situation problem.

*Cluster analysis*

Another form of analysing the cognitive map is clustering. Cluster analysis divides the model into sections which later give an overview of the entire model. Another term used for clusters is “topical islands” (Eden, 2004). Clusters can be represented in the form of separate maps. Key themes emerge from examination of separate maps. It is rare that a map forms a single “unbreakable” cluster; on most occasions maps form networks of clusters and nodes. Therefore, cluster analysis is useful in finding interdependent themes within the decision problem.

In the next section, partial criticism of cognitive mapping is provided, concentrating only on the aspects of the methods that may have relevance to this study.

*Limitations of cognitive mapping*

By creating a conceptual model, decision makers identify a number of decision problem elements. In doing so, a structure of their thinking may be imposed since decision makers are often forced to address issues which, in normal circumstances, would not occur to them (Ackermann et al., 1997). Such circumstances may occur in the case of any formal modelling approach, including problem structuring techniques (Rosenhead, 1989). By applying cognitive mapping, on the one hand, decision makers’ creativity might be fostered. However, on the other hand, the reasoning process that leads to their decision may be lost. As a consequence, cognitive mapping, being a flexible approach for structuring the decision-making process, may allow decision-makers to state complicated and multifaceted issues in
an unclear form which can subsequently prevent effective problem solution (Ackermann et al., 1997). Following this thought, Ackermann et al. (1997) state that soft OR methods, among them cognitive mapping, may sometimes be accused of not forcing the decision maker to deal appropriately with the underlying logic of the situation problem.

The next section discusses the AHP methodology. The application of the methodology to this work is illustrated in chapter 5 and chapter 6. In the following section the origins of the methodology are presented, its basic assumptions and implementation steps, followed by its limitations.

### 3.3.3. Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP), a semi-qualitative multi-criteria decision analysis (MCDA) technique, was developed by Saaty (1980). It is regarded as a useful support tool enabling evaluation while also taking into consideration conflicting decision objectives and uncertainty (Ananda & Herath, 2003). It has seen an extensive acceptance in many fields and had numerous applications to operational decisions in a diverse range of areas. Saaty and Forman (1993) offer a compilation of its numerous applications.

**Basic assumptions of Analytic Hierarchy Process**

AHP helps the decision maker to arrive at a scale of preference drawn from a set of alternatives (Saaty, 1980). It is well suited to aid complex decision making as it enhances the understanding of the problem area. The application of AHP requires several steps (Saaty, 1980) to include:

i) Decomposition of the decision problem into several elements;

ii) Construction of a hierarchy of elements and factors;
iii) Determination of importance of every element and factor by assigning them numerical weights;

iv) Synthesis of the weightings to determine priorities of these factors.

The elements of the problem are evaluated in a pair-wise manner with respect to the level above in the hierarchy. When comparing two elements it is a matter of the importance of one element over another with the question being asked ‘which of the two elements is more important and to what extent’. The intensity of preference between the two elements can be expressed on a nine-point scale (Table 3.2). The determination of the value for every element is dependent on the choice of the decision maker.

Table 3.2 AHP measurement scale of preference between two elements (Saaty, 1980)

<table>
<thead>
<tr>
<th>Intensity of relative importance</th>
<th>Degree of preference</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equally</td>
<td>Equal importance of two attributes with respect to the objective</td>
</tr>
<tr>
<td>3</td>
<td>Moderately</td>
<td>Weak importance of one element over another</td>
</tr>
<tr>
<td>5</td>
<td>Strongly</td>
<td>Essential or strong importance of one element over another</td>
</tr>
<tr>
<td>7</td>
<td>Very strongly</td>
<td>Demonstrated importance, strong importance of one element over another and its dominance can be shown in practice</td>
</tr>
<tr>
<td>9</td>
<td>Extremely</td>
<td>Absolute importance of one element over another</td>
</tr>
<tr>
<td>2, 4, 6, 8</td>
<td>Intermediate values</td>
<td>Applied to demonstrate compromises between preferences in weights 1, 3, 5, 7, 9</td>
</tr>
<tr>
<td>Reciprocals</td>
<td>Opposites</td>
<td>Used for inverse comparison</td>
</tr>
</tbody>
</table>
The final results of an AHP approach are weightings of the factors, class weightings, and a consistency ratio (CR). The next section discusses the consistency ratio in AHP.

**Measure of Consistency in the Analytic Hierarchy Process**

The consistency measure is an advantage of AHP and its essential part. It validates the logic of decision-makers’ preferences when making decisions. Furthermore, the consistency measure aids in acquiring better responses to the questionnaires. It enables detection of inconsistency in respondent answers through screening of comparisons (Cheng & Li, 2003). Inconsistency in group decision making with a number of decision-makers, in fact, is not unusual. Saaty (1980) defines inconsistency as a lack of transitivity in respondent’s preferences. Inconsistency can be caused by several things, to include arbitrary response, careless mistake, lack of knowledge or experience in the subject under scrutiny.

The consistency measure is a critical component of AHP. Consistency ratios (CR) measure the transitivity of judgements in the pair-wise judgement matrix. The consistency ratio is considered satisfactory if it meets certain requirements as Cheng and Li (2003, p. 237) note. Following this thought, for a 3 x 3 matrix the ratio is approximately 5% (i.e., 0.05), for a 4 x 4 matrix it is 8% (i.e., 0.08), and for larger matrices 10% (i.e. 0.1). The weight results are only valid if the acceptable level of consistency ratio is met. The consistency ratio is underpinned by mathematical calculation. Cheng and Li (2003) present a procedure to perform the mathematical calculations adapted from Crowe, Noble, and Machimada (1998) and Canada and Sullivan (1989).
In general terms, the measure of consistency is calculated by multiplication of the pair-wise comparison matrix $A (a_{ij})$ with the estimated solution vector $B (b_j)$, which results in the new vector $Cc_i$. Thus, the procedure is (Cheng & Li, 2003, p. 237):

$$c_i = \sum_{j=1}^{n} a_{ij}b_j \ (i=1, 2, \ldots, n)$$

Then, by dividing vector $C$ over its corresponding part in vector $B$, the eigenvector $D$ is obtained.

Finally, the maximum eigenvalue $\lambda_{max}$ is computed by averaging the numbers in vector $D$.

Using the formula $CI=(\lambda_{max} - n)/(n - 1)$ the consistency index (CI) for an $n$ size matrix is obtained.

The computation of the consistency ratio is achieved with the formula $CR=CI/RI$ where $RI$ signifies the random index for the $n$ size matrix. $RI$ is the average value of $CI$ for randomly chosen entries in $A$ (provided that $\alpha_{ij} = 1$ and $\alpha_{ij}=1/a_{ij}$). Table 3.3 presents average random index $RI$ values for common matrix sizes, obtained using a sample of 500.

Table 3.3 Average random index RI values for different matrix sizes

<table>
<thead>
<tr>
<th>Size of matrix</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RI</td>
<td>0.58</td>
<td>0.90</td>
<td>1.12</td>
<td>1.24</td>
<td>1.32</td>
</tr>
</tbody>
</table>

Adapted from (Saaty, 1980) cited in (Cheng & Li, 2003).

**Intransitivity of preferences**

A lack of transitivity in respondents’ answers results in the CR greater than the acceptable. Saaty (1980) proposes a natural approach to improve consistency which involves revisions of judgements. Cheng and Li (2003) suggest that questionnaires with a number of
inconsistent answers should be analysed using arithmetic methods for the judgemental revisions. In cases of high inconsistency the questionnaires should be disqualified (Cheng & Li, 2003).

**Group decision-making and AHP**

As previously mentioned, the AHP methodology can aid in decision-making in both individual and group decision settings. To accommodate preferences of all group participants, a number of methods can be used. Lai, Wong, and Cheung (2002, p. 135) outline four ways to set the priorities: consensus, vote or compromise, separate models or players, and geometric mean of individuals’ judgements. Consensus in group decision-making is concerned with reaching consent between group participants. Voting can be applied to reach consensus in participants’ judgements. Furthermore, consensus can be reached by calculating an average of the individuals’ judgements. If the objectives of individual participants differ significantly, a decision can be made by creating separate models or can be based on different players. Building separate models requires group members to populate their models separately, and in order to reach a decision an average is calculated. Reaching consensus among separate players necessitates each participant to populate their part of the combined model. Because of the synthesis capabilities, the AHP is a helpful tool aiding group decision-making processes.

**Aggregation of individual judgements and priorities with AHP**

In terms of group decision-making and AHP, the methods to aggregate information in group settings where several members take part in the decision process are numerous. Three widely-used methods to aggregate information can be outlined: (i) aggregation of individual
judgements for every set of pair-wise comparisons into an ‘aggregate hierarchy’; (ii) aggregation of priorities resulting from the synthesis of each of the individual hierarchies; (iii) aggregation of individual priorities resulting from each node in the hierarchy (Forman & Peniwati, 1998, p. 166).

Aggregation of individual judgements (AIJ) and individual priorities (AIP)

The most meaningful and commonly applied approaches in AHP group decision-making to aggregate individual judgements are (i) Aggregation of individual judgements (AIJ) and (ii) aggregation of individual priorities (AIP) (Dong, Zhang, Hong, & Xu, 2010; Escobar & Moreno-Jiménez, 2007; Forman & Peniwati, 1998). The former is applied when the group acts together as a unit while the latter when it acts as separate individuals. The third method of aggregation of individual priorities resulting from each node in the hierarchy has been found to have lesser significance (Forman & Peniwati, 1998). The application of a mathematical procedure to calculate individual judgements is highly dependent upon whether AIJ or AIP is applied depending on whether the decision is taken by a group that acts as a unit or separate individuals; different ways of aggregating individual preferences can be applied (Dong et al., 2010).

Forman and Peniwati (1998) stress that the AIJ procedure is used in cases when calculating the individual priorities is not required and no synthesis for each individual is carried out. The reciprocity requirement for judgements is satisfied as the group makes decisions as one individual, thus, in a case like this the geometric mean has to be used. Individual decision-makers provide judgements for each cluster of elements in the hierarchy. If high inconsistency in the process occurs, the group may consider asking an individual to revise
the judgements provided. Because of inconsistency issues, it may also be that one or more individual’s judgements are excluded from the analysis.

When a decision is carried out by an individual acting independently, it has to result in an aggregation of individual priorities. Thus, according to Forman and Peniwati (1998), either the geometric or arithmetic mean can be applied as it does not violate the Pareto principle.

*The Pareto principle*

The Pareto principle in social choice theory comes in a form of a possible behavioural law or a statement of normative position (Plott, 1976, p. 529). It assumes that given the alternative X is available and every member of a group of individuals ranks alternative X above alternative Y, then the group should decide on alternative X (Plott, 1976). Plott states that it is also important that there is unanimity determined in the social preference.

Furthermore, according to Forman and Peniwati (1998, p. 167), the AIJ assumes the aggregation of judgements of individuals who put their individual preferences aside in order to assure the well-being of the organisation. Already the first step of ‘modelisation’, when a common hierarchy has to be agreed on among different individuals, is a step towards creating a new ‘individual’ that represents the group’s preference. Following, as a next step, it is vital for a group to agree on the importance of criteria. Forman and Peniwati (1998) argue that the individual importance of criteria becomes irrelevant in such cases. Thus, the Pareto principle does not apply as there is no synthesis for each individual.

*The use of arithmetic or geometric means in aggregation*

Various aggregation procedures have been discussed in the literature, however, the most significant for ratio scale measurements with AHP are arithmetic and geometric means (Aull-
Hyde, Erdogan, & Duke, 2006). Both the arithmetic and the geometric mean are problem specific.

The geometric mean is an average which signifies a central tendency of a set of numbers. By applying the geometric mean, the ranges which are being averaged are normalised. Thus, the weighting is not dominated by any of the two properties, and a change in any of them has the same effect on the geometric mean. To simplify, the geometric mean is calculated by multiplying the \( n \) numbers and taking the \( n^{th} \) root. For example, a geometric average of 2 and \( \frac{1}{2} \) is calculated \( \sqrt{2 \times \frac{1}{2}} = 1 \). More generally, the geometric mean is defined by the equation (Forman & Peniwati, 1998, p. 167):

\[
\prod_{i=1}^{n} a_i \geq \prod_{i=1}^{n} b_i
\]

provided \( a_i \geq 0 \) and \( b_i \geq 0 \), \( i=1, 2, \ldots, n \).

The arithmetic mean is an average of a set of numbers. To calculate the arithmetic average the sum of numbers is divided by the quantity of those numbers. For the arithmetic mean (Forman & Peniwati, 1998, p. 167):

\[
a_i \geq b_i, \ i=1, 2, \ldots, n \text{ then } \sum_{i=1}^{n} a_i/n \geq \sum_{i=1}^{n} b_i/n
\]

To aggregate priorities with \( AIJ \) use of the geometric average is required (Escobar & Moreno-Jiménez, 2007), whereas with \( AIP \) either an arithmetic or geometric mean can be applied (Forman & Peniwati, 1998). The Pareto principle will be satisfied through the aggregation of individual priorities with the use of either arithmetic or geometric means.
The weighted arithmetic and geometric means

When individuals are assumed to be of equal importance, the arithmetic or geometric means are applied. Weighted arithmetic or geometric means are applied when the importance of group members differs. The weighted geometric mean was applied in this study to calculate the average of respondents’ answers. The stakeholders’ importance calculation is presented in chapter 5 of this research. Forman and Peniwati (1998, p. 168) define the weighted geometric mean of AIJ in the following way:

\[J_g(k, l) = \prod_{i=1}^{n} J_i(k, l)^{w_i}\]

where \(J_g(k, l)\) relates to the judgment of the group with respect to the factors \(k\) and \(l\), \(J_i(k, l)\) refers to individual \(i\)’s judgment of \(k\) and \(l\) importance. The weight of the individual \(i\) is signified by \(w_i; \sum_{i=1}^{n} w_i = 1\); the decision makers’ number is \(n\). Furthermore, the AIP geometric mean is (Forman & Peniwati, 1998, p. 168):

\[P_g(A_j) = \prod_{i=1}^{n} P_i(A_j)^{w_i}\]

where the group priority of alternative \(j\) is signified by \(P_g(A_j)\), \(P_i(A_j)\) refers to individual \(i\)’s priority of alternative \(j\). The weight of the individual \(i\) is signified by \(w_i; \sum_{i=1}^{n} w_i = 1\); the decision makers’ number is \(n\).

The weighted arithmetic mean for AIP can be defined in more general terms by (Forman & Peniwati, 1998, p. 168):

\[P_g(A_j) = \prod_{i=1}^{n} w_i P_i(A_j)\]
where the group priority of alternative $j$ is signified by $P_g(A_j)$, $P_i(A_j)$ refers to individual $i$'s priority of alternative $j$. The weight of the individual $i$ is signified by $w_i; \sum_{i=1}^{n} w_i = 1$; the decision makers’ number is $n$.

**Limitations of AHP**

All MCDA methods, including AHP, are subject to some criticisms. A number of papers provide valuable theoretical comparison of the MCDA methods or group them by similarities (Al-Shemmeri, Al-Kloub, & Pearman, 1997; Guitouni & Martel, 1998b; Kornyshova & Salinesi, 2007; L. Simpson, 1996). Despite its popularity, the conventional AHP still cannot reflect the human thinking style. Several drawbacks associated with the technique are listed in the literature, including the inability to deal with the inherent uncertainty and imprecision associated with the mapping of a decision maker’s perception of exact numbers (Duran & Aguilo, 2008; Lefley & Sarkis, 1997), and representation of human judgements as exact numbers (Duran & Aguilo, 2008). In reality the human preference model is claimed to be uncertain and decision-makers might be reluctant or unable to assign exact numbers to the comparison judgements. Regardless of the use of the discrete scale of 1-9 and the simplicity associated with its application, the AHP does not take into account the uncertainty related to the mapping of judgement to a number (Duran & Aguilo, 2008).

These shortcomings can be overcome by the application of other techniques, for instance fuzzy logic, which is discussed later in this chapter. Therefore, it is suggested that the techniques are applied integratively.

The next section discusses the ANP methodology which is an extension of AHP. ANP in this work was used to build the network of relationships between the concepts identified from
the strategic cognitive map. Initially the origins of the methodology are presented, then its basic assumptions and implementation steps, followed by its limitations.

### 3.3.4. Analytic Network Process methodology

The diverging interests and objectives of stakeholders can be successfully dealt with through the application of MCDA techniques. With the help of MCDA, feasible alternative decisions can be identified while taking into consideration the numerous goals of multiple stakeholders. ANP is one of several MCDM methodologies. ANP is a semi-qualitative MCDA technique developed as a generalisation of AHP by Saaty (1996). It has been considered as a useful support tool enabling evaluation of decisions with a high degree of uncertainty involving multiple stakeholders who often possess diverging objectives, several criteria, both qualitative and quantitative, as well as dependence and feedback. The method has gained wide acceptance in many disciplines and has been applied to a range of decision problems in various areas, for instance Saaty (2006) or Saaty and Ozdemir (2006), and has been proved to be a valid decision support tool for many different fields (Kirytopoulos, Voulgaridou, Platis, & Leopoulos, 2011). Its application is not restricted to business only (Aragonés-Beltrán, Aznar, Ferrís-Oñate, & García-Melón, 2008). Saaty and Ozdemir (2005) have illustrated numerous applications of this methodology. Its widespread application ranges from operations research, health care and engineering to environmental management. Its relevance in the present context is that firms’ actions cover multiple dimensions (e.g. economic, social, environmental, etc.), where many stakeholders (e.g. customers, suppliers, government, community) are involved. It provides a way of unifying these into a new measurement of value through the application of a decision-making framework. The technique enables effective decisions on complex issues by simplifying and
expediting the natural decision-making processes (Saaty, 1996) and is based on the
description of the problem by means of the network. It can be used to elicit judgements
from an individual or a group of decision makers and employs a computer software package,
Super Decisions.

**Basic assumptions of Analytic Network Process**

ANP is a mathematical extension of the AHP theory that assumes that a hierarchy is a
special case of a network. With ANP, the feedback process and interdependent relations
among decisions and alternatives are allowed. The ANP model consists of a set of elements
and clusters which are connected in a network rather than in levels as in AHP. Any element
can be connected to the other elements that influence it. Once the model is built,
judgements need to be made on the influencing elements with respect to the element they
influence. Then, through computing the supermatrix limit (eigenvector), ratio scales (metric)
are derived that are internally located in a stochastic supermatrix (matrix of matrices).
Finally, in ANP all the different interactions between clusters, nodes and alternatives are
reflected. This process applies a higher level strategic hierarchy that controls all the benefit,
cost, risk and opportunity subnets, that the problem may involve (Garuti & Sandoval, 2002).
Similarly to AHP, the decision maker is asked to provide judgements using the fundamental
AHP nine-point scale (Saaty, 1996).

The determination of the value for every element is dependent on the choice of the decision
maker. Therefore, a question is asked as to which of the two elements X and Y influence
more the third element Z and to what extent with respect to the control criterion. It is
important that all comparisons are performed with respect to the same criterion, the so-
called control criterion, in order for the synthesis to be meaningful. The control criterion is
linked with the entire problem structure and represents the ultimate goal. The following section discusses ANP implementation steps and its general theoretical assumptions.

**Implementation of Analytic Network Process**

In order to implement ANP, the priority development of Benefits Opportunities Costs Risks (BOCR) has to be considered. The BOCR subnet priorities can be later combined using two methods. The first one is a multiplicative analysis and the latter an additive analysis. (a) *Multiplicative analysis.* When benefits, costs, opportunities, and risks are all equally important, a single overall weight for each alternative can be obtained. To find this weight, the ratio of the four is used: BOCR that is (benefits x opportunities) over (costs x risks) and therefore, the alternative with the highest value can be found. (b) *Additive analysis.* When benefits, costs, opportunities, and risks are not of the same importance, the BOCR has to be rated one at a time with respect to high-level personal or corporate strategic criteria which are used to evaluate the merits of different decisions.

The ANP implementation process involves construction of the model, pair-wise comparison of clusters and elements, formulation of the supermatrix and determining the limit supermatrix and synthesis of results.

Mathematically, implementation of ANP involves following triple supermatrix calculation (Saaty, 1996). Blocks of pair-wise comparisons matrices for interconnections between criteria and clusters are used to form the unweighted supermatrix. The relative weights of importance of clusters and criteria are determined by Equation (2): \( Aw = \lambda_{max} w \), where \( A \) denotes a pair-wise comparison matrix, the largest eigenvalue of \( A \) is indicated with \( \lambda_{max} \) and the priority vector is \( w \).
Chapter 3

The weighted supermatrix is formed on the basis of the unweighted supermatrix by multiplying the unweighted supermatrix values with their associated cluster weights. The weighted supermatrix is made column stochastic by the normalisation process. This means that elements of each column can be summed to one enabling it to be converted into a limit matrix. In order to find the long-term relative influences of elements on one another, it is necessary to raise the entire supermatrix to powers. By raising the weighted supermatrix to powers the limit matrix is formed (Saaty, 1996). The convergence in terms of a limit of the average supermatrix is determined by Equation (3):

\[
\lim_{k \to \infty} \left( \frac{1}{N} \sum_{k=1}^{N} w^k \right)
\]

Where \( w \) denotes the weighted supermatrix, \( N \) signifies the number of iterations, and the exponent determined by iteration is \( k \). The limit matrix yields limit priorities by capturing all indirect influences that every element has on every other element. The final solution is derived from the limit matrix. The limitations of the ANP methodology are discussed in the next section.

Limitations of Analytic Network Process

Similarly to other MCDM methods, ANP methodology is subject to some drawbacks. One of them is cognitive limitations with respect to subjectivity and uncertainty. The ANP technique, similarly to AHP, reflects the relationship between the conditioning attributes and CSR programmes. The ANP model produced in this study is based on the rating system provided by professionals. Professionals’ opinions are vital to populate the model. Nevertheless, decision makers may change their opinions and as a result the model can be subjected to cognitive limitations with subjectivity and uncertainty. Despite its popularity,
AHP/ANP can be accused of being incapable of reflecting the human thinking style. The techniques have been claimed to have a number of pitfalls, including an inability to deal with inherent uncertainty and ambiguity when mapping decision makers’ perceptions to exact numbers (Duran & Aguilo, 2008; Lefley & Sarkis, 1997). Traditional AHP/ANP represents human judgements as exact numbers (Duran & Aguilo, 2008), whilst in reality the human preference model is uncertain. Therefore, decision-makers might be hesitant or incapable of giving accurate numbers to comparison judgements. Regardless of the fact that the methodology employs a discrete scale of 1-9 which is simple in application, it is evident that it does not take into account the uncertainty related to the mapping of one’s judgement to a number (Duran & Aguilo, 2008). All these shortcomings can be overcome by the application of fuzzy logic, which is discussed in the next section.

Despite its many advantages, the ANP method also entails some limitations with respect to the ease of calculation (Kirytopoulos et al., 2011). Significant effort by an analyst is required in terms of the extensive number of calculations that have to be performed for the many comparisons (Bayazit & Karpak, 2007, p. 94). However, application of a software package aids the process to some extent. In order for the results to be stable and reliable, ANP employs a ‘power’ matrix method, which is considered to be one of its complications as the N x N matrix has to be raised to an arbitrarily large power until it converges.

All MCDA methods, however, are subject to some criticisms. Any method has its advantages and drawbacks. There are number of papers which provide a valuable theoretical comparison of the MCDA methods or group them by similarities (Al-Shemmeri et al., 1997; Guitouni & Martel, 1998a; Kornyshova & Salinesi, 2007; L. Simpson, 1996). However, Ishizaka, Balkenborg, and Kaplan (2010) state that no method seems better on all aspects.
Hence, despite some of their disadvantages, it was felt in this work that the methods presented in this chapter are suitable to address the problems in CSR. When these methods are applied in combination (e.g. ANP and CM in this work, chapter 6), their weaknesses can be mitigated and their strengths will be fully exploited.

The next section addresses fuzzy systems and the fuzzy logic methodology. Fuzzy logic methodology and its usefulness in dealing with uncertainty present in decision-making will be discussed.

3.4 Fuzzy Systems

This section introduces the concept of fuzzy systems and fuzzy logic methodology. It discusses the assumptions behind the method, basic implementation steps and its limitations.

Some problems are inaccessible and unsolvable with the use of standard MCDM techniques because of uncertainties present in real world problems. Therefore, Bellman and Zadeh (1970) and later Zimmermann (1978) introduced fuzzy sets into the MCDM field. There are a number of reviews on the subject of fuzzy MCDM (Fodor & Roubens, 1994; Sakawa, 1993). Chen & Hwang (1992) offer a distinction between fuzzy ranking methods and fuzzy multiple attributive decision-making methods. The first group contains a number of ways to assign the rankings, to include: degree of optimality, Hamming distance, comparison function, fuzzy mean and spread, left and right scores, centroid index, area measurement, and linguistic ranking methods. The latter group offers different MADM methods to assess the relative importance of multiple attributes: fuzzy simple additive weighting methods, fuzzy
AHP, fuzzy conjunctive/disjunctive methods, fuzzy outranking methods, and maximin\textsuperscript{10} methods (Carlsson & Fuller, 1996).

\textit{Fuzzy systems and uncertainty in decision making}

The majority of problems in real world situations contain uncertainty. Vagueness and imprecision are often typical characteristics of information content. This uncertainty can be caused by a problem complexity. Due to the specific nature of uncertainty, an appropriate method is required to express it. Vagueness and fuzziness in systems can be successfully represented using fuzzy systems. In some cases precise information may not be possible to implement practically. Therefore, a variety of uncertainties can be successfully represented using fuzzy systems (Ross, 2004).

Uncertain or approximate reasoning can be modelled using a fuzzy system. For such a system a mathematical model is difficult to derive. Fuzziness, lack of accuracy, or incompleteness may be present in the input and parameter values of the system. Likewise, the formulas or inference rules may be imprecise or incomplete. Decision making under incomplete information can be successfully modelled with the help of fuzzy logic as it outperforms conventional methods in such situations.

Fuzzy systems enable representation of descriptive and qualitative expressions which are natural for human judgemental statements and rules. Fuzzy systems can be successfully applied to real world problems due to their capability of solving problems efficiently and within short periods of time. What is more, they provide an easy way to describe control

\textsuperscript{10}The maximin method employs a strategy that tries to avoid the worst possible performance, maximising the minimal performing criterion. Furthermore, according to Fülöp (2005, p. 5)\textquotedblleft the alternative for which the score of its weakest criterion is the highest is preferred. The maximin method can be used only when all criteria are comparable so that they can be measured on a common scale, which is a limitation (Linkov et al. 2004)\textquotedblright.
rules. Better system performance can be achieved thanks to tractability, robustness and a low cost of implementation. Therefore, complex problems involving human intuitive thinking can be dealt with by the aid of fuzzy systems (Munakata, 2008).

3.4.1. Fuzzy logic

“Fuzzy logic is a tool for embedding structured human knowledge into workable algorithms” (Kecman, 2001, p. 365). The concept of fuzzy logic can have various meanings (Zadeh, 1965). Fuzzy logic, in its most narrow sense, is considered a logical system that is an extension of multivalued logic. It provides a model for approximate modes of human reasoning. It aims at describing fuzziness in human intuitive thinking. Using basic knowledge expressed in a common language it can be applied to construct intelligent systems. The idea was originated in the 1930s by Jan Lukasiewicz, a Polish logician and philosopher. He extended the range of truth values to all real numbers in the interval between 0 and 1. A number in this interval was used to represent the statement of true or false which subsequently led to the formulation of possibility theory. In 1937, a paper ‘Vagueness: an exercise in logical analysis’ was published by a philosopher Max Black (Black, 1937). According to Black (1937) continuum implies degrees. If a continuum is discrete, each element in the continuum can be allocated a number. The number will signify a degree. Black has made an important contribution in defining a fuzzy set and outlining the basic ideas of fuzzy set operations. Zadeh (1965) identified, explored and promoted ‘Fuzzy sets’ and further extended the work on possibility theory into a system of mathematical logic and originated the application of natural language terms. Fuzzy logic is often used synonymously with the fuzzy set theory."
Fuzzy logic is different in both concept and substance from traditional multivalued logical systems (Ross, 2004). The methodology application is most suitable to complex real life problems where exact analysis cannot be applied.

**Basic assumptions of fuzzy logic**

Fuzzy logic, introduced by Zadeh (1965), intends to model imprecise modes of reasoning in human thinking to ensure rationality in decision making processes. A methodology for implementing fuzzy logic is the fuzzy inference system (FIS)\(^\text{12}\). Fuzzy inference systems have seen successful applications in many areas, to include decision analysis, expert systems, data classification, automatic control and computer vision. Fuzzy inference refers to the mapping from a given input to an output using fuzzy logic and involves the application of Membership Functions, Logical Operations and If-Then Rules\(^\text{12}\). Several types of fuzzy inference systems can be distinguished, to include Mamdani\(^\text{13}\) and Sugeno\(^\text{14}\) inference systems which are among the most commonly used approaches\(^\text{15}\), and Larsen and

\(^{12}\)Alternatively, the fuzzy inference system has been called fuzzy systems, fuzzy-rule-based systems, fuzzy expert systems, fuzzy modelling, fuzzy associative memory or fuzzy logic controllers.  

\(^{13}\)Mamdani-Type Fuzzy Inference Systems is one of the first controlling systems constructed using the fuzzy set theory. Its origins date back to 1974 when it was designed by Ebrahim Mamdani (Mamdani, 1974) to control a steam engine and boiler combination with the help of linguistic rules derived from human operators. Mamdani’s work was based on Zadeh (1973) seminal paper on fuzzy algorithms for complex systems and decision processes. Mamdani-type fuzzy inference is the most commonly applied methodology. What distinguishes the Mamdani from other methods is that the output membership functions are fuzzy sets. The fuzzy set is the output obtained, after the aggregation process, from every variable subject to the defuzzification stage. It is more efficient on many occasions, however, to use a singleton output membership function, rather than a fuzzy set. The singleton is a single spike output membership function that can be used instead of a distributed fuzzy set. The singleton can be alternatively termed as a pre-defuzzified fuzzy set. It can greatly simplify the computation process through enhancing the efficiency of the defuzzification phase (Mathworks, 2012).  

\(^{14}\)Sugeno-type fuzzy inference system also called Sugeno, or Takagi-Sugeno-Kang method fuzzy inference (Sugeno & Kang, 1988). It shares many similarities with the Mamdani inference system. The first two phases of applying the inference system are common to both Mamdani and Sugeno, that is fuzzifying the input and applying the fuzzy operator. They differ with respect to output membership functions which are linear or constant for the Sugeno-type inference system.  

\(^{15}\)Sugeno and Mamdani approaches have their important benefits. The Sugeno methodology can be effectively used with other computational techniques for constructing fuzzy models. It can be successfully used with linear, optimisation, and adaptive techniques. The output surface can have continuity and it can be applied to
Tsukamoto fuzzy inference systems. In this study a Mamdani-type fuzzy inference system, which assumes that the output membership functions are fuzzy, was considered suitable to the assessment of sustainability undertaken in this research. The Mamdani fuzzy model is argued to be most often applied in a sustainability context as it is intuitive and allows appropriate modelling of human input (Munda et al., 1994; Phillis & Andriantiasaholiniaina, 2001).

Implementation steps

Muñoz et al. (2008, p. 832) identify five functional blocks constituting the FIS (Fig. 3.3), which are:

(i) database - describes membership functions of the fuzzy sets;

(ii) rule base - includes fuzzy if-then rules;

(iii) decision making unit;

(iv) fuzzification interface;

(v) defuzzification interface.
The fuzzification is the first phase of the fuzzy logic approach. It refers to the evaluation of the input values which are mapped into fuzzy sets. Fuzzification determines the degree to which the crisp values belong to the fuzzy sets using the membership functions. In the fuzzification phase, the input is a crisp number and the output is a fuzzy set comprised of intervals. During the fuzzification stage crisp numbers are converted into fuzzy ones. In this process the numerical values are used to represent linguistic variables. The fuzzy values serve as an input to the fuzzy if-then rule based controller. The fuzzy inference controller is ruled by a set of if-then rules and membership functions. In a rule-based fuzzy model for inference, the fuzzy propositions are required to be represented by an implication function, also called fuzzy conditional statement or an if-then rule.

The membership function of the fuzzy set refers to the coding of the membership degree to each of the set’s elements and is often termed as the membership curve. The membership curve can be linear, a S-curve, triangular, trapezoidal, or a “bell” curve shape, as outlined by
Cox (1994). Due to its ease of use and calculation, the triangular or trapezoidal functions have been employed frequently (H.-Y. Lin, Hsu, & Sheen, 2007; Muñoz et al., 2008; Ordoobadi, 2009); they have also been found to be the most suitable for sustainability assessment (Andriantiatsaholiniaina, Kouikoglou, & Phillis, 2004) and therefore employed in this work.

The defuzzification phase changes it back to the numerical value. It is considered to be a reverse of the fuzzification in a sense. The fuzzy terms formed by the fuzzy logic rule base are converted into crisp values. These values are then sent to the system to execute the control. In order to execute the defuzzification phase several steps have to be taken. Defuzzification requires the membership functions to assess the degree of membership. Subsequently, the grade of membership is employed in the fuzzy logic equation to define a region from which the output is specified. By merging all control outputs obtained from the rule base an overall crisp output $u$ is obtained using one of the three techniques below:

i) maximise to select the maximum output;

ii) weighted average;

$$u(kT) = \frac{\sum_{i=1}^{N} \mu_i u_i(kT)}{\sum_{i=1}^{N} \mu_i}$$

(Chen & Pham, 2006, p. 151)

iii) centroid (and its variations) to find the centre of mass

**Limitations of fuzzy logic**

Fuzzy logic has been criticised in the literature for lacking the capabilities of machine learning, which are present, for instance, in neural network-type memory, and for lacking
Chapter 3

pattern recognition. Hence, some specific applications required hybrid systems such as neurofuzzy systems. Verification and validation of a fuzzy knowledge-based system is subject to some constraints. Hence, extensive and often also costly testing with hardware in the loop is often involved. In this research, due to the availability of the software, extensive testing has been employed to verify the fuzzy logic controller for the stakeholders’ importance assessment (see chapter 5 for results).

Another difficulty arises with determination of exact fuzzy rules and membership functions. It is difficult to predict an accurate number of membership functions even after testing. Another concern related to fuzzy control is stability (Akerkar, 2010). What is more, the crisp/precise models sometimes can be more efficient and convenient than a fuzzy knowledge-based system. It may also be the case that approaches other than fuzzy logic might be formally verified to function. Another limiting factor is the inability of fuzzy logic to solve problems when no one knows the solution. Experts must exist who know how to create the rule sets needed to make a fuzzy logic system work; without an expert, a fuzzy logic controller cannot be created.

The example of fuzzy logic application to evaluate the stakeholders’ importance in the context of resources allocation to CSR programmes is discussed in detail in chapter 5. In the next section the Knapsack approach for resources allocation is described. Its assumptions are presented, followed by implementation steps and limitations.

3.5 The Knapsack approach

The nature of the relationship between CSR and a firm’s financial performance has often had a great impact upon many stakeholders’ decisions, including resources allocations for social purposes (see section 2.2 in chapter 2).
The knapsack approach is a multi-criteria approach which has been widely researched (Cherfi & Hifi, 2010; Erlebach, Kellerer, & Pferschy, 2002; Sinha & Zoltners, 1979) and has seen extensive application to resource allocation issues (Bitran & Hax, 1981; Mjelde, 1983), strategy formulation (Labib, Read, Gladstone-Millar, Tonge, & Smith, 2013), selection of programmes and projects (E. Y. H. Lin & Wu, 2004; Marinoni, Higgins, Hajkowicz, & Collins, 2009). CSR programmes are selected on the basis of a variety of criteria to determine a performance score and selected until the total programme cost reaches the available budget. In this work, a portfolio of projects for consideration is chosen to determine the combination of them that would return a maximum aggregated performance (utility or benefit) score whilst staying within the available budget (illustrated in chapter 6).

The problem of selection of an optimum portfolio of options is a combinatorial optimisation problem known as a knapsack problem, facilitating distribution of resources under constraints to different options. The problem is often portrayed as a knapsack where one is faced with filling the knapsack with several items where each item has a specific value and the volume of the knapsack is the constraint. This binary decision problem is a significant issue that many decision makers have to face when identifying an optimal subset of decision options while keeping to a budget constraint. Its mathematical formulation is as follows:

maximise

$$\sum_{i=1}^{n} p r_i \times s_i$$

subject to:
where:

\[ \sum_{i}^{n} c_{ij} \times s_{i} \leq F_{j} \]

\[ s_{i} \in \{0,1\} \]

\( s_{i} = 1 \) if alternative \( i \) is selected

\( = 0 \) otherwise

\( i=1,\ldots, n \)

\( j=1,\ldots, n \)

\( F_{j} \) is the available amount of resource \( j^{th} \) at the company

\( s_{i} \) is alternative CSR programme \( i \).

\( pr_{i} \) is importance of \( i^{th} \) alternative acquired through the AHP model.

\( c_{ij} \) is the required quantity by the alternative \( i \).

\( n \) alternatives necessitates \( m \) resources.

In order to maximise the utilisation of the resources and satisfaction, the resources have to be optimally assigned to strategic alternatives. The analysis of results obtained from the application of the knapsack approach to allocate resources to CSR programmes is presented in chapter 6. The final section summarises the chapter and addresses the question of how to
use the aforementioned techniques within a CSR context while considering the limitations they have.

3.6 Conclusions drawn from the overview of the literature

This chapter has presented several decision analysis tools which can find an application in the CSR field. The features of the methods proposed in this research recognise the complex nature of social systems and avoid imposing prematurely notions of objectivity, rationality, as well as mechanistic and predictable causality on the decision problem (Mendoza & Martins, 2006). Furthermore, the particular strength of the tools offered in this study lies in their ability to address decision-making problems where single and multiple decision-makers can be involved and to take into account the diverging objectives and multiple criteria of different stakeholders. The problems in the CSR domain (chapter 2) require rational and structured management approaches that the methods proposed in this thesis can provide. Figure 3.4 illustrates the applicability of methods to address problems identified in the CSR literature.
These methods have certain properties that make them appealing and practical to address CSR issues. The capability to deal with multiple, conflicting criteria, problem structuring, facilitating model construction, reaching rational, justifiable, and explainable decisions are only some of the many summarised from the literature. These tools can be characterised by high capability to deal with both quantitative and qualitative data, as well as experts’ opinions. Because investments in CSR are uncertain, the ability to accommodate information gaps and knowledge with experts’ opinions is their invaluable asset. These features, among others, make them appropriate to analyse the complex CSR problems identified in chapter 2.

The traditional models, however, have been subject to critical discussions due to their limitations. Some of the obvious drawbacks of the traditional models have been summarised in previous sections of this chapter. Additionally, Rosenhead (1989) mentions several criticisms of MCDA methods, including: i) ‘comprehensive rationality’ that is
substituting the judgement with analytical computations and results; ii) creative invention of alternatives; iii) misconceptions of the reasons behind the public involvement; iv) no value framework apart from the ‘utilitarian precepts’. In view of limitations of traditional models, a more robust, flexible and broad approach to apply decision analysis methods within CSR is necessary. An approach capable of dealing with messy, ill-defined problems, multiple and often undefined objectives, unknown problem elements, and a lack of predictability in cause-effect relationships between the decision problem elements is required. Drawbacks of the traditional models stress this need and call for innovative thinking about MCDA to address the difficulty to describe problems (Checkland, 1981; Rosenhead, 1989).

This study does not try to undermine the value of traditional models but rather it attempts to emphasise, as suggested in the literature (Belton & Stewart, 2002; Mendoza & Martins, 2006), the requirement to shift from problem solving methods to methods of problem structuring. The complexity of the problems in the CSR domain requires novel models. Hence, soft operational research approaches such as the CM proposed in this thesis can put an emphasis on definition of most relevant factors, perspectives and issues that require consideration in the field of CSR. Facilitating and structuring, which are at the centre of the soft systems approach, provide an environment where stakeholders can take part in a properly channelled discussion. Stakeholders can contribute their knowledge, experience and expertise through direct participation and involvement in the modelling process. There is also a need, however, to apply tools capable of analysing ‘hard’ information in the sustainability context. The formal analysis of qualitative problems can be undertaken, for instance, with the aid of fuzzy logic as suggested in this chapter, or with the assistance of
artificial neural networks, expert systems and knowledge bases (this pathway poses an area for future research).

Hence, the ‘integration’ of tools called for by Belton and Stewart (2002) and more recently by Mendoza and Martins (2006) is fundamental in this work. Merging a qualitative approach, problem structuring with ‘hard systems’ analytical capabilities is the main aspect of the integrated approach offered in this work and is presented in chapters 5 and 6.

Embracing the strengths of decision analysis methods and mitigating their limitations is at its heart. Consequently, participatory decision-making processes, commitment and active involvement of stakeholders are made possible. Systematic and more objective decision-making, on the other hand, can be facilitated by the quantitative ‘hard systems’ approach and will strengthen the transparent, accessible, and participatory modelling process.

To sum up, the approach adopted in this work contributes to the emergence of hybrid techniques in the field of decision analysis, as referred to by Mingers (2001) as the multi-paradigm multi-methodology.

In subsequent chapters, the proposed integrated decision framework can offer a more thorough understanding of the decision problem in CSR (Esteves, 2008; Mendoza & Martins, 2006). In so doing, the framework goes beyond the traditional participatory methods where stakeholders are involved in problem structuring. It offers stakeholders a possibility to get involved throughout the entire development process of CSR strategy. The integrated approach combines several of the decision analysis tools presented in this chapter, enabling mitigation of their limitations and embracing their strengths. The approach enables
visualising areas requiring attention and corporate spending and illustrates wider social, environmental and business implications of CSR projects.

By employing a hybrid integrated approach, this work provides a platform in bridging the gap between the soft qualitative paradigm and the analytical, more structured quantitative paradigm. By integrating these two paradigms, an attempt to address the complexity of the CSR resource allocation problem is made, embracing its environmental, social, economic and, to some extent, political aspects, capturing the multitude of concerns and conflicting objectives of stakeholders. The ‘synergistic’ approach in this work concentrates on the accumulation of insights from various methods, identification of common elements and emphasis of their strengths. The MCDA school of thought principles can inform implementation of other techniques and result in ‘Meta-MCDA’ (Belton & Stewart, 2002) and the joint use of ‘soft’ and ‘hard’ systems can advance the intervention process (Mingers, 2001).

This chapter presented a selection of decision analysis tools to facilitate CSR implementation. The discussion offered in this chapter has laid down a platform for the development of the hybrid integrated framework to allocate resources to CSR programmes, which will be illustrated in chapters five and six.

3.7 Chapter summary

This review has identified and discussed current contributions to the literature on decision analysis methodologies. The scope of the review has focused upon the methods assumptions, implementation steps, strengths and limitations. The research took the application of decision analysis methods into a new domain of CSR as the literature review (chapter 2) identifies the need for methodologies and frameworks that can be applied to
allocate resources to CSR programmes (Tsai et al., 2010). The decision analysis tools represent a systematic, holistic, transparent and rational approach to decision-making. The next chapter describes the research methodology adopted for the study.
Part II: Top-Down: Application of a decision-making framework
to allocate resources to Corporate Social Responsibility programmes

Traditional resource allocation processes may prove to be dysfunctional when diversified companies are faced with decisions regarding large, upfront investments in turbulent new markets (Bower & Gilbert, 2006). A top-down management approach may speed up decision making in terms of resource allocation to CSR programmes. The chapters in Part I of this thesis suggest several directions for corporate intervention in strategic CSR resource allocation processes. Two models are applied: i) the dynamic theory of stakeholders’ identification and salience, and ii) the integrated MCDA model to allocate resources to CSR programmes. The documented framework combining the models results from a structured development and test programme.
4 Chapter Four - Methodology
The review of literature relating to corporate social responsibility (CSR) (chapter 2), decision analysis techniques (chapter 3), and the gaps identified have established the area of interest for this research. The following sections of this chapter give an overview of the link between the research object and methodology (section 4.1) as well as emphasise research questions. The research philosophical stance (section 4.2), the iterative research process (section 4.3), the research design (section 4.4), and research ethics (section 4.5) are described. This is followed by the discussion of data collection methods (section 4.6) and descriptive data evaluation and analysis to discuss the demographics of respondents (section 4.7). Subsequently, the research evaluation (section 4.8), methodology and models validation (section 4.9) were discussed. The research summary has been presented in the final part of this chapter (section 4.10). Figure 4.1 illustrates chapter 4 in this thesis.

**4.1 Introduction: Linking research objective and methodology**

A conceptual and theoretical foundation for expanding knowledge on the development and application of the hybrid integrated decision framework was provided in this work (chapters 1, 2 and 3). In the preceding chapters, the definition of CSR, its motivating forces, and
Chapter 4

decision analysis methods for CSR implementation across various industry settings were provided. The gaps inform that there are few insights into methodologies seeking to optimally allocate resources to CSR programmes. Furthermore, the literature review has informed that there are few insights into stakeholders’ prioritisation methodologies capable of addressing their expectations and visualising their accurate importance. The research object is hence defined as a decision support framework for resources allocation to CSR programmes.

The purpose of this study is to develop a novel model that could cope with the interdependencies and interactions among conflicting criteria as well as constraints on resources, allow fair stakeholder prioritisation and assessment, and demonstrate how to select CSR programmes for implementation. A framework enabling prioritisation of CSR programmes aimed to improve the company’s capacity to address the challenge of sustainable development more effectively. The framework proposed in this work employs a set of methodologies in a joint manner. Cognitive mapping is applied to structure the problem in CSR, MCDA techniques prioritise programmes, fuzzy logic to cope with vagueness of information, and a knapsack approach that is able to optimise allocation of resources.

In the research questions listed in the introductory chapter (and reproduced in Box 4.1), the first research question looks at CSR paradigms capable of facilitating sustainability development. As to the second research question, which relates to the factors influencing the corporate decision making process to CSR investments, it is interpreted in terms of the roles and interrelationships between economic, social, environmental and political drivers. The third research question looks at the decision-making tools to aid allocation of resources
to CSR programmes. The fourth research question looks at how the process of resources allocation to CSR programmes can be improved. This process relies upon effective management and prioritisation of stakeholders who often hold diverging objectives. As such, the fifth research question looks at how managers can identify and prioritise important stakeholders with often diverging objectives and incorporate their preferences in the decision-making process. The sixth question, pertaining to companies’ efforts in implementing CSR, is primarily concerned with the nature of the decision-making framework that could facilitate evaluation and selection of CSR programmes. The seventh research question looks at how to validate the credibility and robustness of the framework.

Box 4.1 Research questions revisited (from the introductory chapter)

1. What are the CSR paradigms capable of facilitating sustainability implementation?
2. What are the factors influencing corporate decision-making processes in resources allocation to CSR investments?
3. What are the decision-making tools to aid allocation of resources to CSR programmes?
4. How can the process of resources allocation to CSR programmes be improved?
5. How can managers identify and prioritise important stakeholders with often diverging objectives?
6. What should be the decision-making framework aiding evaluation and selection of portfolio of CSR programmes for implementation?
7. How to validate the credibility and robustness of the framework?

The worldview of this researcher is pragmatism, characterised by deductive and inductive thinking. This research nature is exploratory and explanatory based on the conceptual tools and methods developed in preceding chapters. This research adopts a predominantly
qualitative approach to mixed methods study (Creswell & Plano Clark, 2007; Hesse-Biber, 2010) and has been motivated to a large extent by the contested nature of CSR, as discussed in chapters 1 and 2, as well as by the complexity of decision analysis tools presented in chapter 3.

This research adopts a predominantly qualitative approach to a mixed method design to address the gaps in previous research. The empirical data in this research has been collected using mixed method, however, predominantly qualitative approach. The qualitative method in this work highlights the understanding of the social world which is interpreted through an examination of that world by its participants. Qualitative enquiry aids to view the world from the respondent perspective and hereby get their perception and experiences. Taking the predominantly qualitative standpoint in this work helps to build the understanding of the phenomenon investigated in this work. The quantitative perspective to this research, on the other hand, allows to analyse the data using a rigorous structured process (Blumberg, Cooper, & Schindler, 2005). More specifically, the qualitative data was collected in this study via focus groups approach, as well as a questionnaire survey which is traditionally viewed as a quantitative data collection instrument. The qualitative data in the form of respondents’ perceptions and judgements is analysed with a quantitative framework combining several decision analysis methods.

In this work the research object has been defined as decision support tools to facilitate implementation of CSR. The definition of the research object evolved within the course of this research with the choice of relevant methods as suggested by Kleining (1982, cited in Flick, 2002, p. 8) and revealed itself fully at the end of the research project. The discussion between theory and methodology will be presented in the next section of this chapter.
Flick (2002, p. 5) advocates the design methods to be appropriate to the object under study to be able to uncover its full complexity. Hence, in this research it is the object of the study that has determined the research methods. What is more, findings of the research have to be grounded in empirical material, and methods appropriately selected and applied to the object under study.

To determine an appropriate research design corresponding with objectives of this study, the focus of this chapter is on understanding the research methodology (Saunders et al., 2007). Thus, it is important to discuss philosophical aspects and questions behind the methodological approach which can facilitate in bringing forward new knowledge (Eriksson & Kovalainen, 2008). In its subsequent parts, epistemology and ontology are considered that defined the paradigm that is a feature of this work. The research process and methodology choice are explained, followed by the limitations of the approach.

### 4.2 Philosophical Stance

The understanding of research philosophy is essential for recognising, selecting or creating appropriate research designs. As questions of what and how to research are being continuously asked by researchers, the individual underlying perceptions of the world have significant impact on the answers (Saunders et al., 2007, p. 101). The philosophical stance is related to the underlying research motives and can provide confidence in the appropriateness of the selected research methodology. The philosophical stance can increase the reliability of the results, and lead to the development of research skills (Holden & Lynch, 2004, p. 406).

To establish the research design based on the research goals and objectives, it is important to consider both epistemology and ontology. Epistemology is defined as the research
position regarding the concern of what forms acceptable knowledge (Saunders et al., 2007, p. 108). Ontology is concerned with the nature of reality (Saunders et al., 2007, p. 108) and is used to embrace the ideas about the existence of and relationship between people, society and the world in general (Eriksson & Kovalainen, 2008, p. 13).

This research adopts a predominantly qualitative approach to a mixed method design to address the gaps in previous research, identified in chapters 1, 2 and 3. The qualitative component is privileged in this framework, with quantitative methods playing an auxiliary role in this approach (Howe, 2004, p. 54). An active engagement and participation of stakeholders is facilitated in such a design to make sure that all relevant voices are heard (Howe, 2004, p. 54). Qualitative approaches, such as the one adopted in this research, can provide a deeper understanding and a more accurate description of opinions held and formulate a more advanced understanding of social life (Howe, 2004, p. 54). Both qualitative and quantitative methods can be employed concurrently as advocated by Hesse-Biber (2010, p. 67), as in the case of this study:

- To gain a more robust understanding of qualitative results by employing a quantitative instrument.
- To triangulate research findings.
- To explore divergent or disparate findings.

The mixed method design employed in this work requires mixing both quantitative and qualitative methods within the research project, with the qualitative component playing a dominant role. By engaging such a study design, a quantitative instrument was used to analyse the qualitative data. As Hesse-Biber (2010, p. 68), the quantitative component plays a secondary role here, and is a backdrop to the dominant qualitative approach.
Chapter 4

The sequential mixed method approach ensures that the ideas generated from a qualitative component are tested out through the quantitative component. This is an iterative design to research, in which *theory generated from the qualitative component is tested, findings are compared, and then the theory is revised and tested out again, if such need occurs, in an ongoing process of theory generation and testing in a series of ‘wave’ studies* (Hesse-Biber, 2010, p. 71). The success of such a mixed method design hangs upon a methodological awareness coming from the paradigmatic assumptions of the researcher. According to Giddings and Grant (2007) this awareness is crucial for successful integration of methods. Hence, an understanding and appreciation of different methodological assumptions and how they can enrich the mixed method study may be necessary for more in-depth integration of mixed methods designs (Giddings & Grant, 2007, p. 58). In addition, Hesse-Biber (2010, p. 75) notes that a mixed methodological stance necessitates a keen sense of interdisciplinarity. The interdisciplinary project – such as this - requires from the researcher a certain set of skills, to include “*reliability, flexibility, patience, resilience, sensitivity to others, risk taking, a thick skin, and a preference for diversity and new social roles*” (Klein (1990) cited in Hesse-Biber (2010, p. 75); these are discussed in the final section of this chapter.

The worldview can both inform and provide legitimacy for mixed methods inquiry (Creswell & Plano Clark, 2007, p. 21). In this study, the world view adopted is *pragmatism*. Table 4.1 provides an overview of the assumptions guiding the pragmatic worldview. Table 4.2 presents the pragmatic worldview implications for practice. The focus of pragmatism is on consequences of research, and by employing the multiple methods of data collection it informs the problem under study. Pragmatism is a *pluralistic approach, oriented at what*
works and practice (Creswell & Plano Clark, 2007, p. 23). In this research, deductive and inductive thinking is applied over the research to process the qualitative data collected, and analyse it using a quantitative framework.

Table 4.1 The worldview used in the research

<table>
<thead>
<tr>
<th>Pragmatism</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consequences of actions</strong></td>
<td>The focus of the research is delivering an effective hybrid integrated decision support framework to optimise allocation of resources to CSR programmes while taking into consideration multiple criteria and stakeholders with diverging objectives and requirements. The framework can facilitate practical integration of CSR into business models.</td>
</tr>
<tr>
<td><strong>Problem centred</strong></td>
<td>The problem is centred at effective stakeholders’ prioritisation, framework for optimal allocation of resources.</td>
</tr>
<tr>
<td><strong>Pluralistic</strong></td>
<td>This research has multiple aspects and parts.</td>
</tr>
<tr>
<td><strong>Real-world practice oriented</strong></td>
<td>This research is oriented at practical implementation of the framework in the real world. Therefore, this work is pluralistic and oriented at “what works”.</td>
</tr>
</tbody>
</table>

Adapted from Creswell and Plano Clark (2007, p. 22)
Table 4.2 The pragmatic worldview implications for practice

<table>
<thead>
<tr>
<th>Worldview Element</th>
<th>Pragmatism</th>
<th>Pragmatism in this work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontology</td>
<td><em>Singular and multiple realities</em></td>
<td>The researcher tested the hypotheses and provided multiple perspectives of various stakeholders in the study of resource allocation to CSR programmes.</td>
</tr>
<tr>
<td>Epistemology</td>
<td><em>Practicality</em></td>
<td>The researcher collected data by looking precisely at “what works”, which decision analysis tool to adopt, how to modify the questionnaire to collect the relevant data in order to address the research questions.</td>
</tr>
<tr>
<td>Axiology</td>
<td><em>Multiple stances</em></td>
<td>The researcher included both biased and unbiased perspectives of stakeholders. For instance, even the biased self-evaluation of stakeholders in terms of how important they find each other to be has been taken account of in this work.</td>
</tr>
<tr>
<td>Methodology</td>
<td><em>Combining</em></td>
<td>The researcher collected qualitative data using a quantitative instrument. A quantitative model was used to analyse data. Hence, a mixed method approach was adopted in this research.</td>
</tr>
<tr>
<td>Rhetoric</td>
<td><em>Formal or informal</em></td>
<td>The researcher employed mostly formal styles of writing and agreed definitions. On very few occasions, though, the work was written in an informal style.</td>
</tr>
</tbody>
</table>

Adapted from Creswell and Plano Clark (2007, p. 24)
In pragmatism the emphasis is on what works, using diverse approaches. At the same time it values both the objective and subjective knowledge. Tashakkori and Teddlie (2003), cited in Creswell and Plano Clark (2007, p. 26), link the pragmatic approach to mixed method enquiry by highlighting the fact that quantitative and qualitative approaches can be used in a single study. Following their argument, it is the research questions which should be of primary importance and methodological choices can be guided by a practical and applied research philosophy.

In this study, the mixed-methods approach best addresses the research problem as one single approach to research would be inadequate to address the issue. This way a more complete picture can be provided by noting trends and generalisations as well as in-depth knowledge of participants’ perspectives (Creswell & Plano Clark, 2007, p. 33).

It is often stressed in the literature that research methods should match the problem (Creswell & Plano Clark, 2007, p. 32). Therefore, the main criterion of good quality research is explicitness of method (Ferlie, 2001, pp. 28-29). It is important to clearly distinguish the methodology and the methods used. Methodology relates to the research design and an overall strategy of the study, whereas methods refer to the data collection techniques (Green & Thorogood, 2004, p. 39). In terms of the research design, the rationale behind it can vary. The research design can serve exploratory, descriptive, or explanatory purposes (Saunders et al., 2007, pp. 132-134). Exploratory studies aim at exploration of new fields, descriptive studies describe certain persons, events or situations in detail, while explanatory studies explain a situation or a problem by identifying the causal relationship(s) between the variables involved. This research aims at being exploratory and explanatory in nature. It
explains the problem situation by identifying the causal relationship between involved variables and further explores the field.

4.3 The research process: an iterative approach

The theory-method dialogue has significant implications for research strategy, as it sheds light on and often complicates the simple portrayal of inductive or deductive procedures. Nevertheless, the process followed in this research was both deductive and inductive, as well as iterative (the implications flowing from the inductive and deductive approach are discussed in Appendix A). To address the gaps in previous research iterative design, which is a process-based design methodology and a form of design research, was applied in this study (Kruchten, 2001; Larman & Basili, 2003; Pratt, 2009).
Table 4.3 Design research overview

<table>
<thead>
<tr>
<th><strong>Design research</strong></th>
<th><strong>Application in this research</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Researcher’s understanding and development of practice</td>
<td>Researchers’ understanding of the resource allocation problem in CSR was enhanced through the</td>
</tr>
<tr>
<td>are forced through the design process.</td>
<td>iterative design of the study.</td>
</tr>
<tr>
<td></td>
<td>It is a research driven methodology which requires systematic documentation, along with formative</td>
</tr>
<tr>
<td></td>
<td>evaluation and generalisation.</td>
</tr>
<tr>
<td></td>
<td>The research process undertaken has been documented systematically, the data was evaluated after</td>
</tr>
<tr>
<td></td>
<td>every collection stage, and conclusions were drawn from every analysis phase which lead to</td>
</tr>
<tr>
<td></td>
<td>reiterations and improvements in the hybrid framework.</td>
</tr>
<tr>
<td>Domain theories, design frameworks and design methodologies</td>
<td>The problem undertaken in this study has been continuously evaluated. The framework has had</td>
</tr>
<tr>
<td>are generated in the process; they often go beyond the</td>
<td>several reiterations. Each time another decision analysis tool has been added to the framework</td>
</tr>
<tr>
<td>specific design context.</td>
<td>to achieve better results. The research has exceeded the scope; however, the plan for future work</td>
</tr>
<tr>
<td></td>
<td>has been agreed.</td>
</tr>
</tbody>
</table>

*Design research* is a flexible methodology involving analysis, design, development and implementation stages. It requires collaboration between researchers and practitioners (Wang & Hannafin, 2005). Table 4.3 presents a brief overview of the design research. The approach is characterised as being i) pragmatic; ii) grounded; iii) interactive, iterative, and flexible; iv) integrative; and v) contextual (Wang & Hannafin, 2005, p. 7). The approach followed in this research shared these important features as discussed in table 4.4.
Table 4.4 Design research characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pragmatic</td>
<td>Both theory and practice are refined in the process</td>
</tr>
<tr>
<td></td>
<td>The importance of theory is appraised by the degree to which its principles impact upon practice</td>
</tr>
<tr>
<td>Grounded</td>
<td>A theory-driven design, grounded in relevant research, theory and practice</td>
</tr>
<tr>
<td></td>
<td>Design is studied and redefined throughout the research process</td>
</tr>
<tr>
<td>Interactive, iterative, and flexible</td>
<td>Designer along with participants involved in the study process</td>
</tr>
<tr>
<td></td>
<td>Iterative cycle of analysis (involving design, implementation and redesign)</td>
</tr>
<tr>
<td></td>
<td>Initial stage lacks detail</td>
</tr>
<tr>
<td>Integrative</td>
<td>The credibility of research is enhanced through a mixed method approach</td>
</tr>
<tr>
<td></td>
<td>Application of diverse methods during different study phases through which the research evolves</td>
</tr>
<tr>
<td></td>
<td>Maintenance of rigour and discipline throughout the framework development</td>
</tr>
<tr>
<td>Contextual</td>
<td>Careful documentation of research process, findings and changes</td>
</tr>
<tr>
<td></td>
<td>Results are connected with the study settings and design</td>
</tr>
<tr>
<td></td>
<td>The depth and content of generated results varies</td>
</tr>
<tr>
<td></td>
<td>Guidance is crucial for the application of generated principles</td>
</tr>
</tbody>
</table>

Adapted from (Wang & Hannafin, 2005, p. 8)

The iterative approach employed in this study was based on a cyclic process of piloting, testing, analysing, and refining (Kruchten, 2001; Larman & Basili, 2003). In each phase of the process, new questions emerged out of the very process of design; questions which were
not included within the initial investigation stage were nevertheless addressed through iterations and design (Pratt, 2009, p. 1). The compatibility of the decision analysis tools proposed here and their suitability and capability to address the problem, and the extent to which they could address the problem was too complex to script out in advance. These elements could have not been foreseen. Only the constant balancing of testing and analysis could have provided the refinement of the framework. In iterative design, there is a blending of designer and user (Edelson, 2002; Kruchten, 2001; Larman & Basili, 2003; Pratt, 2009). Hence, a constant reinvention of a model is required, as it was in this research. In the process of the design the designer becomes a participant and can therefore, criticise the model in the process and re-fashion it into something new. This type of research process is a procedure of investigation and experimentation (Edelson, 2002). Iteration allows for discovery of answers to questions the investigator did not know existed (Bailey, 1993). The iterative process has been previously used successfully to design and improve the usability of a product (Bailey, 1993), which makes it a significant and powerful form of design research. Over the course of the project, successive versions or iterations of the methodology were implemented, resulting in the development of a more robust and successful final product.

Kruchten (2001, p. 3) points out the many benefits of this approach. In contrast to other methods, it allows for spotting serious errors early in the lifecycle. Furthermore, the system can be designed according to the feedback from participants. The designer is focused only on the issues critical to the project/model. An objective assessment of the model is enabled through continuous, iterative testing. Any inconsistency evident in requirement, design, or
implementation can be detected early. The constant improvement of the model and study process is possible as the lessons learnt are continuously taken on board.

However, there are also some risks associated with application of the approach; these can be mitigated early in the lifecycle of model building. Kruchten (2001, p. 3) argues that a risk exists that a wrong final product can be built, however, he further explains that an iterative process results in a more robust architecture because you correct errors over several iterations. Flaws are detected in early iterations as the product moves beyond inception. Despite any limitations, this particular study design was well-suited to build a hybrid resource allocation framework comprising a number of models in this research. The iterative process diagram for this research is illustrated in figure 4.2.

Figure 4.2 The Iterative Process Diagram. Source: Deming (1982)

As the Plan Do Check Act (PDCA) cycle illustrates, the first phase of this research process was a field observation, then used to identify needs in the CSR context. Subsequently, the initial model was developed to suit the problem, tested on several occasions and iterated over the duration of the research. Verification and validation supplemented and complemented this research process with objectivity.
The other qualitative research strategies as outlined by Saunders et al. (2007, p. 135) include i) case study, ii) action research, iii) grounded theory, iv) ethnography, v) archival research. These would not have been feasible or reasonable on practical or theoretical grounds.

Case study, which enables one to study a particular phenomenon in its real life context via multiple sources of evidence (Creswell, 2007; Saunders et al., 2007, p. 592) was not applied in this research. Although the case study approach is appropriate to achieve depth and accuracy in research, a different approach was taken as there was little possibility of interviewing respondents working in the sector. Instead, the author decided to organise focus groups.

Action research requires close collaboration between researcher and practitioners in real life settings (Saunders et al., 2007, p. 136). The researcher is expected to be a part of an organisation. As the author is not employed by an extractive organisation, access was not possible due to the strict non-disclosure policy of extractive companies. As a result, an alternative approach was carried out.

Grounded theory and ethnography are approaches not based on an initial theoretical framework (Bryant & Charmaz, 2007; Locke, 2001; Saunders et al., 2007, p. 142). It was not possible to apply the grounded theory approach due to practical reasons associated with the lack of access to carry out interviews with extractive sector stakeholders.

This research relies on qualitative methods; however, to an extent it also employs the statistical quantitative capabilities of decision analysis tools. Therefore, the iterative process design methodology was found to be the most useful approach adopted in this study.
4.4 Research Design

In this study a three phased iterative research design is employed. In each phase specific issues are highlighted and questions raised, which are then developed in subsequent phases. Each phase is exploratory and explanatory. Therefore, necessary understandings of the process undertaken in this work as well as its outcomes are provided. This design is illustrated in Figure 4.3 where the procedural steps in data acquisition are highlighted.

The exploratory design commences with phase I “Pilot”. Prior to the pilot study a detailed literature review was conducted in the areas of CSR and the extractive industry, decision analysis methods, including problem structuring methods, multi-criteria decision analysis, fuzzy theory, stakeholder prioritisation and assessment methods. The purpose of this was to develop a conceptual and theoretical awareness of the problem context. As a result, clear research objectives were defined and a pilot study was conducted to build a rich picture of the problem. A strategic cognitive map was formulated as an outcome of phase I and served to build a hybrid framework employing several techniques in phase II. Once the framework was formulated in phase II, a pilot of the survey was carried out with seven Executive MBA students in May 2012. The participants were professionals familiar with decision analysis and had work experience in various industries. The knowledge gained from the pilot survey and the issues identified, provided additional insight into the structure of the questionnaire. It enabled formulation of a robust research instrument for the main survey to study CSR practices. The hybrid framework built in phase II was tested in phase III with the help of a survey and series of focus groups. The main survey data involved data collection using postal and online surveys. Additionally, questionnaires were distributed during two MBA workshops where data was collected with the help of focus groups, one conference and
through networking with professionals. After accumulating, analysing, and synthesising the information gathered in phase III, the framework was validated during two sessions with students from the Executive MBA and International MBA courses using the focus group approach. Each of the research phases is briefly summarised below (fig. 4.3). Figure 4.4 provides a brief overview of the research phases adopted in this work. Table 4.5 provides a clear summary of each source of data, details of respondents (demographics where available), population characteristics, and response rates. It clearly summarises which data sources/instruments were used in which stage of framework development.
Table 4.5 Summary of data sources/instruments used in the framework development.

<table>
<thead>
<tr>
<th>Methodology Stage</th>
<th>Brief phase description and the Research instrument used</th>
<th>Details of respondents</th>
<th>Population characteristics</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Phase I</td>
<td>Literature search</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Literature and Theory Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase I Pilot Study to construct the strategic cognitive map and initial model structure</td>
<td>Two <strong>focus groups sessions</strong></td>
<td>Professionals from the Executive and International MBA courses from the University of Portsmouth; 6 participants at the first session; 6 participants at the second session</td>
<td>Participants with knowledge of decision analysis tools, corporate social responsibility, and the extractive sector problems.</td>
<td>100%</td>
</tr>
<tr>
<td>Phase II Model building</td>
<td>Emerged as an outcome of analysis of a strategic cognitive map (Phase I) and the extensive literature review (Pre phase I)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Phase III Model testing and model population with data collected</td>
<td><strong>Focus group</strong> aimed at questionnaire testing and refinement</td>
<td>7 participants from an Executive MBA student cohort</td>
<td>The survey was pilot tested with a focus group which consisted of 7 MBA executives in May 2012. The respondents were practitioners from such industries as defence, telecommunications, software-IT, transport, and Rescue and Fire Service, and extractives. They had knowledge of CSR and familiarity of decision analysis techniques. The aim of the pilot survey was to validate the suitability of questions and guide the main survey.</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Main survey** was carried out using **focus groups**, **conference distribution**, **postal survey** and **electronic survey**.
<table>
<thead>
<tr>
<th>Methodology Stage</th>
<th>Brief phase description and the Research instrument used</th>
<th>Details of respondents</th>
<th>Population characteristics</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus groups</td>
<td>Focus groups gathering 18 participants, conducted with MBA professionals</td>
<td>Participants had diverse work experience (Xyratex, GTI Technical, VERTU, Hampshire Fire and Rescue, Seafrance, Selex, Citigroup, Brown Shoe, Alinma Investment, Ashish Construction, Harvard Group of Comdandes, NHS, Meghdoor Services, University of Portsmouth MBA student, Tachyonsoft). MBA executives (May, 2012) House of quality, MBA class Decision Analysis &amp; Lean Approaches (June, 2012)</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Conference distribution of the questionnaire at the 76th EURO MCDA Workshop (Multi-criteria Decision analysis (MCDA) in maritime, land and air transport management) and networking</td>
<td>Participants with diverse backgrounds and extensive expertise in decision analysis tools.</td>
<td>In total 20 questionnaires were distributed to delegates, from international academia and the private and public sectors. Out of the 20 questionnaires, 12 have been returned and 1 participant has refused filling out of the questionnaire.</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>Postal survey aimed at UK extractive industry</td>
<td>A postal envelope was posted to 68 entities selected from a list of UK mining entities of the trade associations, professional institutions and other minerals-related organisations, the envelope contained a cover letter explaining the research concept, the questionnaire and a return envelope with postage. 14 questionnaires returned. Participants included: Environmental NGO, Local Government (Portsmouth), Planning Division, BP shareholder, Consultant, Department of Energy and Climate Change, Local planning department, CBI mineral group, Stakeholder group: lobbying</td>
<td></td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>
### Chapter 4

<table>
<thead>
<tr>
<th>Methodology Stage</th>
<th>Brief phase description and the Research instrument used</th>
<th>Details of respondents</th>
<th>Population characteristics</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Phase III</td>
<td><strong>Bloomberg search</strong> to gather the data on the extractive sector and the companies to approach, followed by an electronic survey</td>
<td>13 professionals - Executive MBA and International</td>
<td>organisation, Federation of independent mines, Trade and management association, British aggregates association, Stakeholder group: producers, Flintshire county council, Local government, Cairn Energy plc, Federation Stone Great Britain, Intech, Journalism and administration expertise</td>
<td>Low rate of response (less than 1%)</td>
</tr>
<tr>
<td>Consistency check of the hybrid</td>
<td><strong>Two focus group sessions</strong></td>
<td></td>
<td>Investigating the significance of stakeholders influence in real terms, specific mature exchanges were selected for this study, namely the UK, US/Canada and Australia exchanges with focus on the Oil &amp; Gas, Basic Materials and IT sectors. The type of stakeholders approached for participation were senior and middle management of energy companies, technology companies, trade associations, governmental entities and affiliates, mineral-related organisations, as well as industry consultancies. 1. Exchange - Australian: Basic Materials 839 companies; Oil &amp; Gas 158 companies; Technology 75 companies. 2. Exchange - UK: Basic Materials 216 companies; Oil and Gas 156 companies; Technology 153; 3. Exchange - North America: Basic Materials 2327 companies; Oil &amp; Gas 1379 companies; Technology 1519 companies; Electronic survey was distributed randomly to 20% of the abovementioned companies.</td>
<td>100%</td>
</tr>
<tr>
<td>Methodology Stage</td>
<td>Brief phase description and the Research instrument used</td>
<td>Details of respondents</td>
<td>Population characteristics</td>
<td>Response rate</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------------------------------</td>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>integrated model</td>
<td></td>
<td>students from the University of Portsmouth</td>
<td>Manager-4 years of work experience); IT (Software Lead Engineer- 8 years); Oil &amp; Gas (Asset Maintenance and Reliability Engineer- 14 years); Public sector (State Audit of Vietnam, Auditor- 10 years); Construction (Building Management Systems, Manager- 7 years); Finance (Banking, Manager- 6 years); Student (Finance- 3 years); Public sector (Fire Service, Fire fighter- 15 years); Retail (Entrepreneur- 2 years); Public sector(Civil servant- 6 years); Student (Tourism- 3 years).</td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.3 Three phased iterative research design
Figure 4.4 Brief overview of the iterative research design employed in this work

**Pre Phase I: Literature and Theory Review**

A careful and extensive literature review has been conducted on the research topic. It offered an opportunity to provide an understanding of the existing knowledge on the subject as well as to define the rationale for this research (chapter 2). The literature review revealed a lack of research which would propose a set of tools for integrating interdependent stakeholder objectives and conflicting criteria to cope with resources allocation to CSR programmes (chapter 3). By critically evaluating previous work in the field, the need for this research was justified. This study was fundamentally necessary since it proposes a novel approach to the problem area.
**Chapter 4**

**Phase I: Pilot Study**

The first phase of research focused on the pilot study which involved two sessions with focus groups. The *focus groups* consisted of PhD candidates as well as students from the Executive MBA and International MBA courses from the University of Portsmouth. Participants had substantial expertise in CSR and awareness of issues in the extractive sector and voluntarily agreed to take part in the study. The researcher was facilitating the sessions. To avoid bias in the results, the process was overseen by another researcher.

During the first session the concept of Corporate Social Responsibility (CSR) and the research context were introduced. Additionally, participants were introduced to the decision analysis tools applied in this work to enhance their understanding of methods. Additionally, the meeting concentrated on the problem explanation, identification of problem elements and definition of potential solutions. To generate a discussion, the first session was built around six questions:

1. What does CSR cover?
2. What aspects of CSR areas do you consider important?
3. Who do you perceive to be the stakeholders in the extractive sector?
4. What are the objectives of these stakeholders?
5. What factors influence stakeholders?
6. What are the benefits, risks, costs, and opportunities for the company associated with the allocation of organisational resources to CSR programmes in the extractive sector?
Participants were asked to write their answers on post-it notes which were later placed on a large map. Subsequently, following a group discussion these answers served as a basis for the construction of an overall map of the problem. In the second session, participants were offered the opportunity to make map revisions, alterations and provide additional suggestions. These important matters are closely analysed in chapter 5.

Implementing sustainability proved to be a difficult and challenging task. A task which requires understanding of all the issues involved, constraints and opportunities related to sustainability implementation and the practical means by which improvements can be achieved. Therefore, in the pilot study respondents were invited to assess the level of companies’ engagement in CSR activities. Similarly, the interactions between economic, social, environmental factors which affect and are affected by sustainability of extractive projects were analysed in this pilot study. Thus, a rich picture of the problem was created which led to the formulation of the *strategic cognitive map*, discussed in detail in chapter 5.

**Phase II: Framework building**

In phase II a novel integrated framework enabling the company to improve its capacity to address the challenge of sustainable development more effectively through CSR programmes prioritisation was formulated (chapter 5 and 6). This novel framework aims to approach the resource allocation problem via prioritisation. CSR programmes evaluation was a first step which led then to an overall ordering of several options. This was followed by portfolio construction and appraisal of the CSR options available, and finding the best combination of them for a given level of resource.
Chapter 4

Phase III: Framework testing

Once the framework (phase II) was formulated, a pilot survey and subsequently a postal and electronic survey was conducted in Phase III (as described in the next section) with the aim to test the framework. Testing also involved seven focus group sessions with MBA executive students from the University of Portsmouth (a list of the focus groups is provided in Appendix B). During these sessions the questionnaire was distributed.

Post Phase III: Validation/Consistency check of the hybrid framework

After the framework was tested, it was crucial to check its consistency in post phase III (chapter 7). The assessment of the hybrid framework was carried out during two MBA Master classes in Decision Analysis at the University of Portsmouth in May 2013, which were jointly delivered by the author of this work. Participants were executive and international cohorts of MBA students. Because of respondents’ expertise face validity has been considered the most suitable framework validation technique for this study. Participants were considered as legitimate validators because of their familiarity with decision analysis methodologies and CSR practices. Over the framework’s consistency assessment process the decision problem of resource allocation was rigorously evaluated.

4.5 Research Ethics

The rights of all participants involved and affected in the course of this work were respected and taken account of during every stage of this project beginning with the formulation of the research questions, through the research design, gaining access to information, processing, storing, analysing the data, and writing up the findings (Saunders et al., 2007). Please refer to Box 4.2 for a brief outline of research ethical policy. Before the data
collection commenced, the researcher sought approval for the study by the University’s internal, ethical review process. Please refer to Appendix C for the PBS Ethics Review document. This research was guided by an explicit ethical policy which was made available to all participants.

Confidentiality of participants has been ascertained through confident and high standards of research ethics which were maintained through application of the specific norms as outlined in Box 4.2. Participants’ consent was sought to make sure they wished to interact voluntarily during the research process, and that they were confident of its high ethical standards. Anonymity of respondents was ensured throughout the research process by making sure that their personal details and their names were kept secret to protect informants from any harm potentially arising as a result of publication. Access was made available to any text submitted for publication where a quotation was used, and in which informants could be identified. Any quotes in this study, however, were made anonymous to make sure that their source could not be identified.
Box 4.2 A brief outline of the PhD ethical research policy

Confidentiality and ethics

Confidence and high standards of research ethics was maintained throughout the process of this study, through the following standards:

- Participation in the study was voluntary and informed consent was sought.
- Detailed study information including research objectives and outcomes, potential publications etc. was made available to participants.
- Privacy and confidentiality of personal data was ensured throughout the research process as the responses were coded.
- Informants’ views were not misrepresented.
- Access to the information gathered (relevant notes, transcripts, presentations etc.) was ensured to participants.
- Potential conflicts of interest between research and other activities were made explicit.

4.6 Data collection methods

Multiple sources of evidence were used in this research in order to ensure comprehensiveness of findings (Keen, 2006). While the main source of data collection was survey and focus groups to ensure the validity of the data, the analysis and to improve reliability of the framework. The researcher has the relevant skills and/or expertise in facilitating focus groups (Appendix D). The key data generation methods are summarised in Box 4.3. Appendix E summarises the workshops and conferences attended (it does not,
however, include the informal discussions held). As there have been an extensive number of
documents reviewed, they are not listed. They are referenced in the text where
appropriate. Table 4.6 illustrates the limitations of the two main data collection methods
and the approaches adapted to mitigate them. The criterion for selecting the methods
mentioned below is driven by the scope of this study and its iterative design.

**Box 4.3 Outline of data collection methods employed in this research**

- **Postal and electronic survey:** A survey was carried out among practitioners to find
  out about respondents’ perceptions of CSR practices.

- **Focus groups:** A series of focus groups has been conducted over the process of this
  study, facilitated by the researcher, with objectives to construct, test and validate
  the hybrid sustainability framework as well as develop areas of this research.

- **Informal discussions:** Informal discussions were carried out over a number of
  conferences and workshops with potential informants. Any informal interactions did
  not give rise to quotations or direct referencing.

- **Email communication:** Email communication between the researcher and some
  participants has been maintained to provide an exchange of ideas or information.

- **Participation at workshops and conferences:** Attendance at workshops and
  conferences enabled participant engagement with the prevalent narratives on
  decision analysis techniques, CSR and related matters. For instance, an International
  Doctoral School on Decision Analysis or CSR and Stakeholder Engagement in the
  Extractive Sector. An opportunity arose to observe an interaction between the
  extractive companies, regulating bodies and sector’s stakeholders.
Table 4.6 Limitations of the main data collection methods used in this study

<table>
<thead>
<tr>
<th>Data collection method</th>
<th>Limitations</th>
<th>Approach to mitigate these risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus Groups</td>
<td>Accused sometimes of collecting the “surface” information on individual respondents. Validity of data can be affected by “the collective group effect” and the moderator impact upon the individual participation.</td>
<td>Questionnaire was designed to ask about respondents’ individual preferences and prevent both the collective group effect as well as the surface information. Respondents were given an opportunity to express their point of view individually.</td>
</tr>
<tr>
<td>Survey</td>
<td>Problems with response rate, validity of data collected, reliability of data, can occur.</td>
<td>Extensive review of literature to design the questionnaire. Careful design of individual questions. Clear layout of the questionnaire. Avoidance of open-ended questions as they can be time consuming and difficult to code. Explanation of the purpose of the questionnaire given to respondents prior to its administration. Pilot test of the questionnaire to refine questions, to make sure no problems arise with its completion and data recording. Survey size and time required for its completion and administering assessed before the actual administration through the pilot test. Piloting the questionnaire with seven individuals, two with work experience in the extractive industry. Discussion of the questionnaire between the</td>
</tr>
</tbody>
</table>
## Data collection method

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Approach to mitigate these risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>researcher and pilot respondents.</td>
<td></td>
</tr>
<tr>
<td>Final design amended by the feedback and recommendations collected.</td>
<td></td>
</tr>
<tr>
<td>Final version of the questionnaire revised by supervisory team.</td>
<td></td>
</tr>
<tr>
<td>Careful planning and administration of the questionnaire.</td>
<td></td>
</tr>
</tbody>
</table>

Source: The author

### Survey

A survey is a planned collection of data with an aim of description or prediction for the purpose of analysing the relationships between certain variables (Oppenheim, 1984). It is conducted with the purpose of advancing scientific knowledge and gaining such information as characteristics, actions, or opinions of the studied population (Easterby-Smith, Thorpe, & Lowe, 1991; Pinsonneault & Kraemer, 1993). In a survey, research data collection can be achieved through questionnaires or interviews. In this research, data collection was achieved using a questionnaire as a survey instrument. Sampling was used to construct a representative sub-set of the wider population (Easterby-Smith, et al., 1991). The purpose of sampling is to obtain as much information as possible to reconstruct the processes of interest. Two types of sampling, probability and non-probability sampling methods, can be distinguished. The choice between either probability or non-probability approaches is dependent upon methodological considerations derived from the research objectives as

---

17 Sample size and response rate will be discussed in chapter 5 and 6.
well as from such practical issues such as availability of resources and time (Tansey, 2007). This research employed non-probability sampling approach.

Sampling

Non-probability sampling involves drawing samples from a larger population without random selection. In this type of sampling the decision of which units of the population to include in the sample lies with the researcher. This was the case in this research. The researcher held control over the selection process as well as including the important respondents in the sample. This type of sampling, however, incurs greater scope for selection bias and limited potential to generalise from the sample to the wider population. Thus, robustness of findings and generalisations can be affected in the process. However, the nature of this work and its iterative design dictated that non-probability sampling to be the suitable strategy allowing approaching only the crucial stakeholders and professionals. These respondents had specific knowledge of the business sector and familiarity of the CSR practices within the industry. Non-probability sampling should be used only when probability samples are not viable (Henry, 1990). In this case, probability sampling was not applied due to the risk of accidentally omitting important respondents in the process which is one of the common risks of this sampling approach (Davies, 2001). A number of non-probability sampling approaches can be distinguished, to include convenience, quota, purposive, self-selection and snowball sampling (see Appendix F). Probability sampling methods are inapplicable in this research as subjects constitute a small part of the general population.

Non-probability sampling has been employed in this work, namely purposive and snowball sampling. Purposive sampling enables including respondents in the sample who are the
most important and influential actors. The key stakeholders in the extractive sector have been identified over the course of this research through an extensive literature review (pre phase I) and pilot study (phase I). The information obtained from these key actors was crucial as they had an understanding of decision analysis tools and were familiar with CSR practices in the extractive industry. Furthermore, purposive sampling assumes that the purpose of the study and the researcher’s knowledge of the population are the main drivers guiding the process. It is only particular respondents who are the most appropriate for the research needs that are being selected as subjects (Tansey, 2007). It is important that the sample developed suits the needs of the study. In this work, the methods used to build the framework, that is AHP and ANP required specific respondents rather than a certain number of respondents. Therefore, this study did not require a large sample of respondents to be interviewed. Instead, it was a case of selecting the 'right' participants. Herath (2004) states that “AHP is not a statistically based procedure and theoretically a sample size of one is enough to implement it”. Many studies have used a small number of experts, for instance, Peterson, Silsbee, and Schmoldt (1994) used five respondents, while Mawapanga and Debertin (1996) used eighteen participants. Whitmarsh and Wattage (2006) claim that AHP is arguably more of a qualitative approach, although given that the output is statistical it is technically possible to analyse responses using some statistical tests (e.g. correlation, t-test). Whitmarsh and Wattage, for instance, undertook correlation of AHP scores to explore how respondents trade-off different goals.

Snowball sampling, also employed in this study, assumes that the subjects under scrutiny can provide further access to other potential respondents who share similar characteristics and are of relevance to the research. Given that the population of interest may not be fully
visible, approaching the participants may be troublesome. The most influential stakeholders are often not easily accessible. By identifying an initial set of relevant respondents, further access to potential subjects can be obtained through networking. As snowballing is an uncontrolled method of sampling, it is up to the researcher to develop, manage, and progress the sample while making sure that the chain of recommendations does not exceed the boundaries of the research (Tansey, 2007). To ensure robustness of data, the sample has to be adequately diverse. In this study, several respondents working for extractive companies provided access to further participants with an extensive knowledge about CSR practices in the industry. Participants, who hold different degrees of responsibility in the companies, work for different departments, and are various stakeholders, were approached with the aim of ensuring diversity.

As this research is iterative in design, the sample size and the response rate is discussed in chapter 5 (primary framework) and chapter 6 (refined framework).

Pilot survey and questionnaire refinement

To make sure that the respondents understood the questions, to verify the available response choices in the questionnaire and to increase the reliability of the results, a pilot test was carried out. The survey was pilot tested with a focus group which consisted of seven Executive MBA course students in May 2012. The respondents were practitioners from industries such as defence, telecommunications, software-IT, transport, Rescue and Fire Service, and extractives. They were professionals with knowledge of CSR practices and familiarity of decision analysis techniques. The aim of the pilot survey was to validate the suitability of questions and guide the main survey. Following an explanation about the study, the participants were asked to provide answers to the survey questions and indicate
their relative preference with respect to the pair-wise comparisons of elements. They were also invited to give their recommendations and comments on the survey scheme.

➢ The pilot survey contributed significantly towards this research. The questionnaire was modified according to the findings that emerged from the pilot survey. As a result, an improved integrated framework in the main survey was delivered.

➢ The pilot survey proved that the definitions of alternatives needed more clarification. Initially, an assumption was made that a few key words for each of the alternatives would make it fairly easy for the respondents to carry out pair-wise comparisons. After the pilot, it became clear that the definitions of alternatives required expansion to enable participants to distinguish between them.

➢ The suggestions from the pilot study resulted in a decreased number of sub-criteria. To ensure that a distinction between the sub-factors could be easily made and to prevent confusion when rating them, the sub-criteria were grouped under four headings: economic, social, environmental and political.

➢ The number of stakeholders was diminished by eliminating competition as a possible stakeholder from the survey questionnaire.

➢ What is more, the question asking for the indication of company’s level of CSR engagement by specifying the extent of their involvement was modified to avoid misunderstandings. Initially this question provided ranges from ‘low’ to ‘high’. Instead the question about CSR engagement invited respondents to specify the percentage of the annual profit their company spends on CSR.

➢ Additionally, the questionnaire was amended by the insertion of a table in which participants indicated to which stakeholder group they belonged. This facilitated
further data analysis by ensuring a degree of fairness (section 2.7) in stakeholder importance rating.

➢ In an attempt to avoid future uncertainty in judging the preference between the pair-wise comparisons of two elements, pictures of hierarchy graphs above each of the comparison tables were included in the survey questionnaire.

The final version of the survey questionnaire (Appendix G) was modified according to the feedback, recommendations and suggestions coming from the pilot study.

Questionnaire

A questionnaire survey is a cost effective way of collecting data which allows large scale investigations (Easterby-Smith et al., 1991, p. 119). A questionnaire is “a scientific instrument for measurement and for collection of particular kinds of data” (Oppenheim, 1984, p. p.2). The careful design of a questionnaire’s content, structure and response format can ensure its accuracy and success. Therefore, it is important to carefully consider the design of questions and the general questionnaire layout (Easterby-Smith et al., 1991).

Typically two types of questions can be distinguished, ‘open’ and ‘closed’ questions. Also a number of pre-emptive measures have to be taken into account when designing a questionnaire format to motivate participants to complete it: (i) the questionnaire has to be well-produced and easy to complete, (ii) questions have to be clear, and easy to understand, (iii) the length and correct sequencing of the questions have to be considered, (iv) answers recorded have to be easily edited and coded. Increasingly popular are electronic mailed questionnaires due to their low cost and speed of distribution, although the traditional postal questionnaires are still very much in use. The questionnaire formulated for the purpose of this study was based on an extensive literature review presented in chapters 2
and 3. To ensure the ease of analysis and reporting, the questionnaire was divided into three parts: (i) demographic information, (ii) CSR Engagement of oil, gas and mining companies, and (iii) preference of criteria section.

Questions in the first as well as the second part of the questionnaire invited respondents to rank the importance of factors on a five-point Likert scale, ranging from “very low” (1) to “very high” (5). The questions in the first part concentrated on general information such as type and size of the company, company’s age and annual turnover, and information relating to the ownership. The questions in the second part tackled the extent to which the organisation is involved in CSR by disclosing the percentage of annual profit spent on CSR investments. It then embarked upon the specific CSR programmes the company might be involved in. These are ‘economic advancement of communities’, ‘education and training’ and ‘implementing environment pollution controlling plan’. Subsequent questions attempted to find out whether and to what extent such bodies as management, community, employees, environmentalists, government, NGOs, shareholders, suppliers, media, and customers influence resource allocation to CSR programmes in the extractive sector. The final question in this section asked for ratings of the importance of economic, social, environmental, and political factors.

With respect to the assessment of stakeholders’ importance, respondents were asked to which group of stakeholders they belonged. The survey questionnaire also confirmed the factors which have the main influence upon stakeholders and their CSR investment decisions, as well as verifying the suitability of CSR programme alternatives selected in the course of this research. Part three of the questionnaire invited participants to reflect on how strongly they feel about a choice between pairs of criteria. All the questions within the
questionnaire were closed-type questions where respondents are offered a number of options to select from. In some cases participants are offered an option to give an answer which is not listed. These responses were evaluated and applied to the questionnaire design. The results from the survey questionnaire were then combined using the geometric mean approach described in detail in chapter 3. Data was subsequently analysed using Excel and Expert Choice software.

Distribution of the questionnaire

The survey was distributed electronically and via the post. Questionnaires were also handed out during MBA workshops, at one conference and through networking with professionals from the extractive industry. The questionnaires were distributed at the 76th EURO MCDA conference ‘Multi-criteria decision analysis (MCDA) in maritime, land and air transport management’ hosted by the Portsmouth Business School, September 13-15, 2012. The conference scope was broad in order to make sure that principles of decision support were covered. Participants were approached in an effort to collect data for this research.

The questionnaire was distributed to different stakeholders approached during the entire data collection process who were senior and middle management, trade associations, government entities and affiliates, mineral-related organisations, public as well as industry consultancies.

Focus groups

Another key source of data collection was focus groups. Focus groups broadly refer to collective conversations or group interviews (Kamberelis & Dimitriadis, 2005; Powell & Single, 1996). Their size can differ as well as the rationale behind them with an aim of
advancing the causes and concerns of research. Since their origin in 1920s, they have evolved into a widely employed data collection technique used across the social sciences (Powell & Single, 1996).

Focus groups can generate a rich picture of the problem area. They can aid in elicitation of experiences and the reasoning behind them, actions, beliefs, perceptions and attitudes of informants. The information can be used to clarify subject matter. The “focus” underpinning the discussion is what helps to engage the focus group in a collective activity. It could be, for instance, a film or a presentation. Focus groups can serve to derive the knowledge of a subject when elaboration of issues is required before a relevant and valid questionnaire can be constructed (Powell & Single, 1996). Validity of complex investigations can be ensured by conducting focus groups as the study’s most pertinent variables can be investigated using this method. What is more, focus groups can be a practical way to explore complex phenomena not amenable to quantitative research and enable presentation of another face of reality. Participants are given a chance to respond to the questions in a manner they choose. Interaction among informants is highly encouraged during the process (Krueger, 1998, p. 6). Participation in a focus group discussion enables simultaneous identification of the full range of perspectives held by respondents.

Nevertheless, focus groups have some limitations. The method has been accused of collecting the “surface” information on individual respondents. Doubts also exist with respect to the extent to which both “the collective group effect” and the moderator impact have upon the individual participation in a focus group (Powell & Single, 1996).

In this study, participants were asked to individually fill out the questionnaire (as presented in the previous section) enquiring about their individual preferences. What is more, the
moderator had the necessary set of skills and expertise to run the focus groups and prevent bias. Hence, an attempt was made to mitigate the risks discussed above. Focus groups were employed throughout the entire research process. Over the duration of this study seven sessions were held (Appendix B lists the focus groups). Focus groups helped to create a rich problem picture. They served as a way to obtain a collective view of respondents.

The number of participants taking part in focus groups can vary. In this study the number of participants ranged between seven and 15. Sessions lasted between 90 and 120 minutes. The length of the sessions was determined by the complexity of the subject. Figure 4.5 displays photographs taken during one of the focus groups aiming at construction of the rich problem picture. The groups comprised participants from a diverse range of industries (including the extractive industry) who had a wide range of backgrounds, views and experiences. Each session commenced with an introduction of decision analysis tools followed by a presentation of the resource allocation issue to CSR investments in the extractive sector. After gaining an insight into the study objectives, participants were asked to fill out the questionnaire indicating their preferences. The moderator facilitated a discussion and gave participants a chance to make comments and suggestions.
Chapter 4

Figure 4.5 Photographs taken during the initial focus group session

Thematic Analysis

The thematic analysis preceded the framework construction stage (Pre Phase I) and was used to build the initial version of the framework. The documents were gathered using the Bloomberg database. The document analysis looked at quantitative and qualitative data extracted from publicly available companies’ vision and mission statements, corporate
codes of conduct, and annual reports. In addition, such secondary data as sustainability reports and financial statements of some major extractive companies were investigated.

Apart from the formal data collection, an informal interaction with informants over workshop coffee breaks, telephone conversations, and emails was considered as a useful source of information. The notes taken during informal discussions were used to provide iterations to the framework design and improve the general research quality. For instance, the notes gathered were used to redefine the question on companies’ CSR annual spending in order to obtain the precise range of the payments. The next section presents the analysis of the responses to the first part of the questionnaire survey and the demographic data of respondents.

### 4.7 Presentation of Survey Results

This research employed a survey questionnaire in collecting data on sustainability practices from different stakeholders. Section 4.5 presents the detailed information on the design of the questionnaire and the research questions it addresses. The extensive literature review presented in chapter 2 and 3 has facilitated the development of the questionnaire. Comments on results and analysis of responses to the questions in the first part of the questionnaire are presented in this section. The analysis of the second part of the questionnaire is presented in chapters 5 and 6. Hence, in this section important stakeholders’ opinions and comments on the state of the art of sustainability practices in the extractive sector are presented. The comments upon the analysis of data offered in this section precede the development of the generic hybrid integrated framework discussed in chapters 5 and 6.
Chapter 4

Analysis of respondents’ demographic data

In this section basic demographic data of respondents and data related to their organisations is outlined. The response size across available categories is signified with the number of respondents (n).

**Stakeholder Analysis**

Informants were asked with which stakeholder group they identify themselves. Analysis revealed that the majority of stakeholders approached in the course of this study are managers (23) as indicated in figure 4.6, followed by employees (9), and government officials (8) and community (6). A diverse group of stakeholders has been approached in this study to verify the efficiency of the hybrid framework. The opinions obtained through the survey tend to be more representative of management stakeholders as these respondents are highly experienced with decision making practices and familiar with CSR practices. Hence, their opinions can be regarded as credible, reliable and important.
Figure 4.6 Stakeholder groups

Source: Analysis of surveyed data, 2012

**Work experience of respondents**

Figure 4.7 indicates that 43 informants are employees of other sectors than extractive. The remaining 17 respondents are working within the extractive sector. Hence, the opinions obtained through this survey are representative for respondents working in a wide range of industries, including the extractive industry. As depicted in figure 4.8, 34 respondents are employed within public organisations, 26 in private and one informant is still in education.
Figure 4.7 Organisation type
Source: Analysis of surveyed data, 2012

Figure 4.8 Organisation ownership
Source: Analysis of surveyed data, 2012
Organisation size

In order to estimate the size of their organisations, respondents were asked about the number of employees working in their companies. Figure 4.9 indicates that 25 informants work in large organisations employing over 500 staff; 14 are employed in medium sized companies with 51-249 staff members; 6 informants are working in medium sized organisations employing 250-500 staff. The remaining respondents work in small organisations. Small organisations are characterised by employing up to 50 staff, medium organisations employ between 51-249 people, and large organisations employ over 250 staff.

![Organisation size](image)

Figure 4.9 Organisation size

Source: Analysis of surveyed data, 2012
Age of organisation

The results of the analysis (figure 4.10) show that 21 respondents are employed within organisations already well established with over 40 years presence on the market. Hence, these organisations are assumed to follow clear decision-making processes. Nine respondents have 11-20 years of market existence, eight informants are employed in organisations operating for between 21 and 30 years, eight informants work in fairly young organisations with under 5 years of history, six informants are employed in organisations operating for around 31-40 years, and five informants work for organisations with 6-10 years of history. Involvement and operational practices of these companies can be affected by the length of the organisation’s existence and, hence, provide a valuable insight into the problem of resource allocation to CSR programmes and applicability of the decision framework proposed in this work. The data gathered in this study suggests that the age of an organisation together with its market capital have an impact upon allocation of profits to CSR investments.
One of the purposes of the survey was to consider the annual turnover of organisations and what factor it plays in resources allocation to CSR investments. As depicted in figure 4.10, 21 respondents indicated a turnover of over £100m, six respondents indicated an annual turnover rate between £26m and £100m, seven between £5m and £25m, and 13 below £5m. The data gathered implies that the bigger the annual turnover of an organisation, the more commitment to and investments in CSR is manifested.
One of the purposes of this research is to investigate the resource allocation decision-making practices to CSR programmes. In this study respondents have been invited to assess the level of their companies’ engagement in CSR activities. To examine the extent to which extractive sector companies are involved in CSR activities, the participants have been asked to give the percentage of annual profit turnover allocated to CSR investments. Figure 4.12 shows the results which suggest that 14 respondents claim their organisations allocate around 0-0.5% of profit for CSR purposes, followed by 12 respondents who declare no allocation. 11 respondents declare the amount of investments to range between 0.5% and 1.0% of their annual profit turnover, followed by 6 informants who declare more than 5% of resources allocation to CSR. The allocation of profit ranging between 2.5% and 3% was declared by four informants, and 2 informants indicated between 1.5% and 2.0%
allocations; one respondent declared allocation of profit to CSR projects ranging between 2% and 2.5%.

![Annual profit turnover allocated to CSR investments](image)

Figure 4.12 Resources allocation to CSR
Source: Analysis of surveyed data, 2012

In this section the demographics of respondents taking part in the survey, and their perception of CSR practices in the extractive sector have been discussed. The next section presents the research evaluation.

### 4.8 Research Evaluation

The quality of research, how it can or should be determined, and what criteria the research should satisfy, have been a subject of discussion for some time (Steinke, 2004, p. 184). In a mixed methods study, such as this one, a set of criteria from both quantitative and qualitative schema may be of concern. Along with a set of qualitative measures, the traditional quantitative measures of research quality, that is objectivity, reliability and validity, were considered. Miles and Huberman (1994) suggest adding credibility into the
quantitative schema to evaluate qualitative research. Furthermore, Ferlie (2001, pp. 28-29) along with Donovan and Sanders (2005, pp. 526-528) suggest a number of additional strategies to ensure rigour and quality of mixed methods or qualitative research:

**Transparency, Reliability and Dependability:** methodology clearly and explicitly exposed; strong link between the theory, methods, data collection and analysis that can be retraced by fellow researchers.

**Internal and External Validity, Credibility and Plausibility:** careful investigation of data and minding deviant and disconfirming data, respondent validation if applicable, and richness of information including study context information. Deviant and disconfirming data was not taken account of in this work. Respondents’ validation was undertaken in post phase III.

**Comparison:** to other studies.

**Reflexivity:** the role and influence of the researcher upon research outcomes. An attempt to practice reflexivity was made in this work, as discussed in the next paragraph.

**Relevance and Generalisability:** transferability of the research concepts, theories to other settings, the importance of the research to a wider public.

This research was guided by these strategies. Throughout the research process the methodology was clearly and explicitly exposed. A control group of three researchers ensured that the methods, data collection and analysis are *transparent, reliable* and *dependable*. While collecting data using the focus group approach, the researcher was accompanied by another member of staff to ensure that the data collection process met the criteria above. Additionally, the questionnaire has been reviewed by two other members of
the research team. Their recommendations have been taken account of and resulted in the questionnaire reiteration.

*Validity* and *plausibility* criteria have also been paid attention to in this study. Hence, two workshops carried out with MBA students have been devoted to framework validation. The detailed description of the process is presented in chapter 7. *Comparisons* of this work to other studies are developed in the following section.

In terms of *reflexivity*, as suggested by Flick (2002, p. 6) *the subjectivities of the researcher and of those being studied are part of the research process*. Hesse-Biber (2010, p. 81) notes that reflexivity has to be addressed throughout the entire research project. A reflexive researcher is independent and external; hence, the impact of the researcher can be reduced to a minimum or even eliminated. The researcher’s assumptions, social origin, and separation from the research object can make the research findings more defensible. Attempts to practice reflexivity were made during this research.

Accordingly, the researcher is a young female with university-placement experience in the UK, Germany, and Belgium, currently pursuing a PhD in England. Different types of bias could arise as a result, both on the side of the researcher as well as study participants. The author may have a more idealised academic understanding of the CSR topic and decision analysis tools in contrast to participants who are full-time employed in the industry and have more insight into the decision-making practices. Participants, on the other hand, may position the researcher according to their own beliefs. Different factors might have influenced participants, to include: their age, gender, and position in a professional hierarchy, their experience with academic studies, and their opinion about the value of the research.
Some degree of bias is unavoidable (Keen, 2006, p. 118). Hence, a *reflexive awareness of research process* is required (Green & Thorogood, 2004, p. 195) which can be achieved through an *awareness of the wider social context, and social interactions between study participants, theoretical awareness of assumptions*, and an *explicit methodological awareness*.

In terms of the research context, a potential bias could occur with respect to the wider social context. The study participants come from different backgrounds and differ in age, gender, and professional experience. The awareness of issues in the extractive sector varied between participants. This bias might mean that participants’ understanding of the aims of the research, the decision analysis tools and their operationalisation within the CSR context and its importance may differ. The author addressed this issue by giving a careful explanation of the research problem area and a presentation before each data collection stage commenced.

In addition, the author might not be entirely free of bias. A neutral stance to the research, and an attempt to maintain objectivity during the data collection process was practised. This took a form of neutral language used by the researcher during data collection, for example, and an answer to any of the questions was not imposed by the researcher. The presence of another team member was also crucial to reduce potential sources of bias.

With respect to the generalisability, understanding is required from the theoretical proposition. It is concepts, patterns and themes emergent in the data that can be generalised to theory. Yin (2003) signifies that replication of findings in similar settings is useful. In this study, the replication was achieved by carrying out two validation workshops.
where the framework’s credibility and robustness was validated and compared between two different data sets in two different workshops (see chapter 7).

In terms of methodological awareness, it has been developed in this chapter. The preceding chapters built up theoretical awareness about assumptions. The researcher had to remain objective throughout the study process and bear in mind that participants may not necessarily agree with the usefulness or effectiveness of decision analysis tools.

### 4.9 Validation

The validity concept is complex and controversial in every discipline of science (Carley, 1996; Groesser & Schwaninger, 2012) and surrounded by an extensive debate in the literature about how it can be interpreted (Anastasakis, Olphert, & Wilson, 2007; Creswell, 2007; Finlay, 1998; O'Keefe & Preece, 1996). Validity and reliability play an important role in research in general, and in mixed methods research in particular. Hesse-Biber (2010, p. 86) stresses the importance of the *correctness* of design procedures. Furthermore, correct mixed methods design involves having the right *methods elements*. The validity of mixed methods design is measured by *how well the problem and method are linked, whether the method provides a “goodness of fit” to answer the original problem and questions* (Hesse-Biber, 2010, p. 87). Some studies, such as this one, may necessitate a *mixed process of validation*, which involves both qualitative and quantitative approaches to validation. This research employs validation of methodology and validation of the integrated framework to find the ranking of CSR programmes and their portfolio for subsequent implementation. The validation of the decision support framework aims to check framework’s robustness. It refers to the assessment of the consistency of the framework. It verifies how the methods fit together and how consistent is their joint use.
4.9.1. Validation of Methodology

No universal criteria exist for validation, as validity judgements are subjective and differ from individual to individual. As suggested by Gass (1983), the methodology can be considered valid when it meets the theoretical, data and operational validity criteria.

Transparency, simplicity and flexibility were the three additional criteria, as suggested by Creswell (2007), employed in this work towards measuring the degree of conformity. The methodology offered in this work is based on well-defined methods such as focus groups and questionnaire, as well as techniques to analyse the data, to include CM, AHP, ANP, fuzzy logic, and Knapsack optimisation. It employs both tangible and intangible data which were derived from real sources and subjective judgements of decision-makers.

What is more, the operational validity comes from several activities carried out between the stages of the methodology. Among them is the application of an integrated hybrid approach combining methods which eliminate each other’s drawbacks and the use of sensitivity analysis.

Furthermore, the methodology is considered as simple, accurate and easy to use. Simple pair-wise comparisons represent judgements of decision makers determining the relative importance of criteria and sub-criteria. The methodology can be considered as transparent. Transparency is manifested by the fact that each stage of methodology applied in this research is traceable. It is, for instance, ensured by detection of inconsistencies using the inconsistency ratio in AHP. What is more, the logical connection between each of the stages of the methodology makes it not only operationally valid but also understandable.
The methodology is *flexible* as it can be used for both single and multiple stakeholders. A useful decision support tool to aid both individual and group decision making is provided in this work which includes tangible and intangible criteria. Insufficient reason has been found to invalidate the methodology employed in this research.

The mixed methods approach to data collection is advocated by many authors, however, it is often arguable how best to combine the various techniques (Keen, 2006; Saunders *et al.*, 2007). Triangulation is argued to be the most efficient way to validate methodology. To increase the robustness of findings, the triangulation approach was applied in this research aiming at cross-checking the data through multiple sources. Triangulation was employed in this study to contribute towards the increase in the credibility of findings by supporting the argument with the data collected from multiple sources (Davies, 2001). Several sources of data were employed to validate, justify and underpin findings as advocated by Flick (2004, pp. 178-179). In this work, different samples, theories, literature and alternative data sets support the validity of the contributions of this thesis.

Four types of triangulation can be distinguished, as mentioned in the literature (Flick, 2004, p. 179), to include: *data triangulation*, *methodological triangulation*, *investigator triangulation*, and *theory triangulation*. Data triangulation refers to the use of different sources to support the argument and increase the credibility of findings. Methodological triangulation refers to the use of diverse methods employed to study the same issue. Investigator triangulation requires different researchers to investigate the same issue (this is not feasible, however, in the context of PhD research as only one researcher is involved in the process). Theory triangulation refers to the use of different theories to interpret the same sources (Flick, 2004; Patton, 2002). The literature review revealed a set of competing
theories in the field and a combination of two theories was used to address different areas within the specific field of this research which is discussed in more detail in the next paragraph. This research involved theory, data, and methodological triangulation. The triangulation approach applied in this research, aiming at cross-checking the data through multiple sources, is discussed below.

**Triangulation using different samples and theories**

With respect to different samples and different theories, the analysis has been developed from different people, sectors, and related to the Pyramid of Social Responsibilities (Carroll, 1991) and Stakeholder theory (Freeman, 1984). The analysis has included 61 respondents from diverse industries, among whom were participants from the extractive industry. The hybrid framework built using the various decision analysis techniques and presented in the output of this work was triangulated across these different people and industries. The rich thesis picture has been formed thanks to the triangulation across these multiple cases.

The Corporate Social Responsibility (CSR) model (Carroll, 1991) and Stakeholder Theory (ST) (Freeman, 1984) were selected and applied to explore the data and develop the qualitative analysis. The conceptual frameworks behind these theories resonated with emergent themes in the data.

**Triangulation relating to different literature**

With respect to the different literature, this work relates to the different approaches and results in the literature that is closely related to this research and its concerns. By highlighting the similar work of other researchers in the field, support to the research results is given. In this study, corroboration with different literature research streams has
been developed, to include corroboration with CSR research, and corroboration with decision analysis methods use and practice in sustainability implementation.

**Corroborating with literature on CSR**

With respect to the research on CSR and the extractive industry, the findings of this thesis are in line with the available literature, thus providing support for its contribution.

**Corroborating with similar research on decision analysis methods use and practice in sustainability implementation**

Studies on implementation of decision analysis methods to aid complex decision making and improve sustainability of corporate operations (Andriantiatsaholiniaina et al., 2004; Kouikoglou & Phillis, 2011), and allocate resources to facilitate implementation of sustainable development of the sector (Brice & Wegner, 1989) have resonance with the findings of this thesis, thereby providing support for its contribution.

**Triangulation using an alternative data set: workshop on decision analysis**

In addition, a qualitative analysis was performed on 13 participants at the Artificial Business Intelligence MBA workshop in May 2013, on the subject of “Application of fuzzy logic to assess stakeholders’ salience in the extractive sector”. The themes that emerged during the focus group exercise corroborated results from this thesis. The three main categories of the study were the scope of the framework, its capability to facilitate sustainability implementation and adequacy and appropriateness of techniques applied. Within these themes, the detail and complexity of the framework versus broadness and lack of complexity, the distinctive features of the framework to implement sustainability, the precision and capabilities of the decision analysis technique employed, and the technique
limitations were discussed. This qualitative study provided support for the usefulness of the decision analysis tools and techniques application in the CSR context.

**Methodological triangulation**

The qualitative data collected during this research was analysed using the quantitative framework. Hence, this study involved qualitative and quantitative methodologies to produce robust findings. The themes that emerged corroborated results from this thesis.

### 4.9.2. Validation of the Framework

Framework validation is significant for decision-making success (Borenstein, 1998; Landry, Banville, & Oral, 1996) and helps to build confidence in the model structure (Balci, 1994; Groesser & Schwaninger, 2012; Lane, 1998; Sargent, 2009). The term validation here refers to the assessment of the framework’s consistency to make sure the methods fit together.

The nature of preference models and the means of their validation have been subject to an intensive discussion among MCDA practitioners in the 1980s-1990s (Landry & Oral, 1993; Roy, 1987, 1993). As computational models have been increasingly employed in developing and testing theories, an enhanced understanding of their potential is crucial. The objective is to learn the value of these models in theory building through verification and validation as concerns often arise with respect to whether models and their results are “correct”. While verification refers to the program of the computerised model and correctness of its application, that is “building the system right” (O’Keefe & Preece, 1996), validation refers to how accurate the model is with respect to its intended application (Anastasakis et al., 2007; Sargent, 2009), and refers to “building the right system” (O’Keefe & Preece, 1996). Validation attempts to determine the degree to which a theory, an approach or a model
Chapter 4

represents the reality from the perspective of their intended use (Anderson & Bates, 2001; Gass, 1983) and determines whether the model can predict the system behaviour. The basic assumption behind model construction is accuracy and simplification as the model should be an abstract idealisation of the problem (Hillier & Lieberman, 1995). Along with performing its task, the concern of the validation is quality, the degree of accuracy, and robustness (O’Keefe & Preece, 1996); it is also often interpreted in the literature as confidence in the model, relation with the model’s purpose, and usefulness (Pala, Vennix, & Kleijnen, 1999). Verification has been considered as a part of the validation as no system can be right unless it is built correctly (O’Keefe & Preece, 1996).

Interestingly enough, the perceptions of whether all models can be validated widely differ. As models are solely approximations of reality, their complete validation is not possible (Babuska & Oden, 2004; Landry & Oral, 1993). However, models should mirror the problem situation as closely as possible. Hence, questions often arise with respect to when and how validation should occur as it is not a requirement for all models and the level of validation is dependent on the model’s purpose. The validation process enables testing the agreement between the model behaviour and the real world system as the extent to which the model can be considered “correct” is subjective and differs from individual to individual. It is due to the subjective judgements of individuals that the general validation of models, approaches and theories is not always achievable. An absolute validation would require an infinite number of tests to be performed, and therefore a complete validation is virtually not feasible (Anderson & Bates, 2001). A model cannot be proved correct due to its inability to absolutely reproduce or predict the environment behaviour (Gass, 1983).
Scientific theories cannot be proved but only tested through observations (Popper, 1968, p. 112; Psillos, 1999, p. 4). Proving an agreement between observations and predictions does not validate the theory. It is the observation of an exception which can lead to invalidation (Babuska & Oden, 2004). Therefore, a theory, an approach or a model cannot be found valid; there may only be insufficient evidence to reject them. When no such evidence is found, they can then be considered valid, for the time being (Popper, 1968, p. 113).

In addition, validation facilitates criticisms with respect to the model structure and can strengthen the confidence in its outputs (Balci, 1994; Gass, 1983; Sargent, 2009). Understanding full capabilities of a model, its limitations, and suitability to the decision problem can increase the confidence in its predictive capabilities (Gass, 1983).

On the other hand, one must accept that absolute validity or complete confidence in the model outputs is not possible to obtain (Zeigler, Praehofer, & Kim, 2000); validity is a matter of degree and never an absolute property (Groesser & Schwaninger, 2012), however, the operational validity of the model can be confirmed. It can clarify whether the model is accurate enough to predict the real environment. Operational validity assesses the significance of errors discovered while undertaking the technical validity and approves the use of the model in the light of the existent errors. Therefore, the model’s solutions are approved pending the positive outcome of the analysis. Operational validity enables checking whether the model is capable of producing unacceptable answers for adequate ranges of parameter values (Gass, 1983). By producing useful information to the decision maker, it confirms its ability to predict outcomes of an event (Gass, 1993).

Furthermore, the degree of the overall validation requirement has been argued in the literature (C. Eden, 1995; Finlay, 1998). C. Eden (1995) suggested the theoretical validity as a
sufficient overall validation approach, whereas other authors, among them (Finlay, 1998),
recommended seeking experimental validity. Lack of experimental validity leaves the DSS
model substantially invalidated (Finlay, 1998). Although, the theoretical validity has been
found as important, the full validation still requires an experimental validity. The validation
techniques as presented in the literature are discussed in the next section.

4.9.1. Framework validation strategies
Validation is a method employing a coherent procedure or set of rules to achieve a goal
(Groesser & Schwaninger, 2012). The term validation in this work refers to the assessment
of the consistency of the hybrid decision support framework. A number of techniques and
tests exist as defined in the literature which can be used to verify the consistency of the
framework (Gass, 1983; Sargent, 2009). These tests can be used either subjectively or
objectively with the latter referring to mathematical procedures or statistical tests (O'Keefe
& Preece, 1996; Sargent, 2009). The current body of knowledge provides essential as well as
sophisticated techniques (Groesser & Schwaninger, 2012). Frequently these techniques are
used in combination. Table 4.7 offers a brief description of these techniques as presented in
the literature (Sargent, 2009).
Table 4.7 Framework consistency assessment techniques (Sargent, 2009)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animation</strong></td>
<td>Graphical animation is used to display the model’s operational behaviour in order to compare it with the actual system’s behaviour.</td>
</tr>
<tr>
<td><strong>Comparison to other models</strong></td>
<td>Results of one model are compared with results obtained from another valid model.</td>
</tr>
<tr>
<td><strong>Degenerate Tests</strong></td>
<td>By selecting appropriate values of the input and internal parameters, the degeneracy of the model’s behaviour is tested.</td>
</tr>
<tr>
<td><strong>Event Validity</strong></td>
<td>The events appearing in the operational model’s behaviour are compared with the actual system’s behaviour for similarity check.</td>
</tr>
<tr>
<td><strong>Extreme Condition Tests</strong></td>
<td>Structure and outputs of the model should be possible for any, even highly unlikely, combination of events/factors in the system.</td>
</tr>
<tr>
<td><strong>Face Validity</strong></td>
<td>The model’s behaviour and the logic of its operations are checked by individuals familiar with the system.</td>
</tr>
<tr>
<td><strong>Historical Data Validation</strong></td>
<td>Historical data collected for building and testing of the model can also be used to test its behaviour. One part of the data can be used to build the model and the remaining data is used to determine the system behaviour.</td>
</tr>
<tr>
<td><strong>Historical Methods</strong></td>
<td>Rationalism, empiricism and positive economics are the three historical methods of validation.</td>
</tr>
<tr>
<td><strong>Internal Validity</strong></td>
<td>In order to check the validity of the model, a number of runs are made to determine the amount of internal stochastic variability of the model. What makes the model questionable is the lack of consistency or an extensive variability in its results.</td>
</tr>
<tr>
<td><strong>Multistage Validation</strong></td>
<td>The multistage validation process involves the joint application of three historical methods of rationalism, empiricism, and positive economics. It consists of three steps, to include: i) Development of the theoretical assumptions of the model along with observations and general knowledge; ii) Validation of model assumptions using empirical tests; iii) Comparison of the input-output relationships between the model and the real system.</td>
</tr>
<tr>
<td><strong>Operational Graphics</strong></td>
<td>The underpinning assumption of this validation technique is to check the model’s performance indicators as the model runs through time in order to verify whether it behaves correctly.</td>
</tr>
<tr>
<td>Technique</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Parameter</td>
<td>By manipulating the input and internal parameters’ values, the variations in the model’s behaviour or output can be checked. What is more, a comparison between the model and the real system are possible.</td>
</tr>
<tr>
<td>Variability</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
</tr>
<tr>
<td>Predictive</td>
<td>The system behaviour can be forecasted using the model. The comparison of the model’s behaviour and the actual system’s behaviour are used to determine the validity of an actual system. Operational system data or the data obtained from the field tests can be used to perform the validation.</td>
</tr>
<tr>
<td>Validation</td>
<td></td>
</tr>
<tr>
<td>Traces</td>
<td>The behaviour of various parts of the model needs to be verified in order to establish whether the model and its outputs are accurate.</td>
</tr>
<tr>
<td>Turing Tests</td>
<td>This validation method requires individuals with an extensive knowledge of the system to discriminate between the system and the model outputs.</td>
</tr>
</tbody>
</table>

### 4.10 Chapter summary

This chapter has laid out the methodological underpinnings of research design, implementation, evaluation and validation for this thesis to provide an understanding of the process of hybrid framework formulation and its application within the CSR context in the following chapters.
Chapter Five - A dynamic theory of stakeholder identification and salience using Fuzzy Logic and the Analytic Hierarchy Process methodology in Corporate Social Responsibility
The previous chapter has presented and discussed the iterative methodology adopted in this thesis. This chapter’s focus is on the development of a dynamic theory of stakeholder identification and salience measurement in corporate social responsibility (CSR) (proposed in chapter 2). Since one of the objectives of this study is to propose a tool for fair stakeholder prioritisation (fairness as defined in chapter 2, table 2.3), this chapter offers a framework employing two decision support tools. This framework employs fuzzy logic (section 5.3) and Analytic Hierarchy Process (AHP) methodologies (section 5.4) in an integrative manner to eliminate deficiencies of both tools. The proposed framework is capable of precisely assessing stakeholders’ importance by indicating the exact degree to which a stakeholder belongs to a particular group. The framework is generic and applicable across different sectors. In this chapter, the extractive industry is used as an illustrative example (section 5.2). The key extractive sector stakeholders identified in the course of this study through empirical investigation and their attributes in the CSR context are taken into consideration. Thereafter, fuzzy logic methodology is applied to the stakeholder taxonomy to ensure a participative fair way of modelling stakeholders’ salience, followed by an application of AHP. As stakeholder attributes are not static, a dynamic theory of stakeholder salience is provided in this chapter. The innovative methodology discussed in this work ensures fairness in the priority setting process. The proposed decision-making framework can provide a practical basis for socially and environmentally responsible decision-making. Conclusions of the chapter are offered in the section 5.5, followed by summary of the chapter (section 5.6). Figure 5.1 provides an overview of this chapter within the thesis.
5.1 Introduction

The concept of stakeholder management and the importance of methodologies for stakeholder importance assessment (section 2.6) using fair procedures (section 2.7) have been introduced earlier within this thesis. However, these contributions have only been offered brief references. The research aim is to develop a decision framework that will allocate resources to multiple stakeholders with diverging objectives. This section of the thesis discusses further the concept of fair stakeholder prioritisation using a dynamic theory of stakeholder prioritisation and salience developed in this research. The methods used in this chapter to develop the framework take into account of the uncertainty and vagueness of the stakeholders’ positions. In this chapter, fuzzy logic and AHP methodologies (chapter 3) are proposed to manage stakeholder objectives.

The subjectivity in expressing individual preferences can be successfully captured by employing the fuzzy logic tool. Fuzzy logic offers, to decision makers, a “fine-tuning” stakeholder prioritisation approach with the help of a 3-D model, for a better visualisation of the consequences when varying different factors, power, urgency and legitimacy. This research provides a framework to assist decision makers in managing stakeholders who
have diverging objectives, interests and needs. Hence, this research employs first a classification model by Mitchell et al. (1997) which categorises stakeholders in terms of power, legitimacy and urgency (section 2.6). Then, it applies a set of fuzzy logic rules to quantify stakeholders’ priorities. The focus of the empirical work is being illustrative of CSR implementation in the extractive industry. Thereafter, the AHP methodology is applied to the Mitchell et al. (1997) stakeholder typology to ensure a fair way of modelling stakeholders’ salience. As stakeholder attributes are not static, a dynamic theory of stakeholder salience is provided in this thesis. The two methodologies are compared and contrasted. The application of the two techniques in an integrative manner allows the use of them as fair measures of stakeholders’ assessment that can help eliminate the limitations persistent in the application of a mono-methodology.

As an iterative methodology has been applied in this research (chapter 4), in seeking to formulate the framework it is important to understand the data sources and data collection.

### 5.2 Method and data

**Data Sources and Data Collection**

A survey in the extractive sector, which comprises oil, gas and mining sectors in the UK, was conducted in order to identify and rank stakeholders in the context of CSR resourcing decisions. In the design of this study, a survey is used to collect data with respect to CSR practices over a period of three months. The survey was administered to 70 participants who are the main stakeholders in the sector according to the UK Directory of Mines and Quarries (Cameron et al., 2010). The sampling frame was considered to be appropriate for the research. Self-administered questionnaires were sent by mail in July 2012 to the participants, with a reply-paid envelope and accompanying letter. A total of 16
questionnaires were returned, of which 14 were usable. To develop a dynamic framework and understand the stakeholder salience in the extractive sector, the stakeholders’ attributes of power, urgency, and legitimacy were measured by evaluating answers to closed questions with a Likert scale. The representatives of the following interest groups were approached: management, community, employees, environmentalists, government, NGOs, shareholders, suppliers, and media as Mitchell et al. (1997) refers to these stakeholder examples in their work (see chapter 2, table 2.2). Hence, these stakeholders are hereafter referred to in this work as definitive, dominant, dangerous, dependent, dormant, discretionary, and demanding stakeholders, using the terms proposed by Mitchell et al. (1997, p. 860). As the key stakeholders are continuously changing for every organisation, the aim of this work is also to verify the validity of the stakeholders proposed by Mitchell et al. using empirical work.

To effectively balance stakeholders’ needs, to meet their diverging objectives, and to improve the broader societal and environmental impacts of corporate decisions, it is important that managers are equipped with a set of tools. Building on the recent work in the stakeholder management area, a dynamic 3-D fuzzy approach to monitor stakeholder salience was provided in this work, using the Mitchell et al. (1997) framework as an illustration. In the next section, the fuzzy logic framework and its development are discussed.
5.3 Fuzzy logic framework for stakeholder salience assessment

This section discusses the evaluation steps that lead to the creation of the fuzzy logic framework for stakeholder salience assessment.

Evaluation steps

After applying the Mitchell et al. (1997) taxonomy (section 2.6) to classify stakeholders with respect to power, legitimacy and urgency criteria, it is necessary to carry out further evaluation steps.

In total the evaluation process requires nine key steps, presented below. The steps denoted by (*) are performed within the system and hence, necessitate no input from the decision maker.

(1) A respondent is offered three attributes: power, legitimacy, urgency and is asked to evaluate every stakeholder defined by Mitchell et al. with respect to these three criteria. The respondent is asked to express the importance of stakeholders’ attributes using the Likert scale 0-3 (none=0, low=1, medium=2, high=3).

(2) *The scores are converted into fuzzy weights with the use of fuzzy membership functions.

Assume $w_1$ is the fuzzy importance weight of criterion $j$, and $j = 1, 2, ..., m$. Thus, according to the linguistic scale by Zimmermann (1996) presented in table 5.5, “Low=1” importance of criterion 1 Power to the decision maker would be denoted with the fuzzy importance weight $w_1 = (0, 0, 0.6, 1.2)$. 
(3) The subsequent step requires identification of potential stakeholders to consider for ranking, where \( n \) is the number of stakeholders.

(4) Subsequently, the selected stakeholders are subject to evaluation by the respondent according to the linguistic terms, either “low”, “moderate”, or “high salience”.

(5) * The linguistic terms are converted into the fuzzy rating using the membership functions. Assume \( r_{ij} \) be the fuzzy performance rating of stakeholder \( i \) with regard to criterion \( j \), where \( i = 1, 2, \ldots, n \) and \( j = 1, 2, \ldots, m \).

\[
R = \begin{bmatrix}
    r_{11} & r_{12} & \cdots & r_{1m} \\
    r_{21} & r_{22} & \cdots & r_{2m} \\
    \vdots & \vdots & \ddots & \vdots \\
    r_{n1} & r_{n2} & \cdots & r_{nm}
\end{bmatrix}
\]

Assume the stakeholder’s value to the company with respect to criterion 2 **Urgency** is “Low=1” then the fuzzy rating \( r_{13} = (0, 0, 0.6, 1.7) \) according to the scale in table 5.6.

(6) * The aggregate fuzzy score for every stakeholder is computed; the stakeholder for all criteria is denoted by \( ss_i = \sum r_{ij} w_j \), where \( ss_i \) stands for stakeholder \( i \)'s aggregate fuzzy score for all criteria, and where \( j = 1, 2, \ldots, m \) and \( i = 1, 2, \ldots, n \).

\[
SS = \begin{bmatrix}
    ss_1 \\
    ss_2 \\
    \vdots \\
    ss_m
\end{bmatrix} = \begin{bmatrix}
    r_{11} & r_{12} & \cdots & r_{1m} \\
    r_{21} & r_{22} & \cdots & r_{2m} \\
    \vdots & \vdots & \ddots & \vdots \\
    r_{n1} & r_{n2} & \cdots & r_{nm}
\end{bmatrix} \times \begin{bmatrix}
    w_1 \\
    w_2 \\
    \vdots \\
    w_m
\end{bmatrix}
\]

(7) *The weighted average defuzzification method is used to transform the aggregate fuzzy scores into real numbers.

(8) * Stakeholders are ranked with respect to those numbers. The stakeholder that scores highest is at the top of the ranking. Thus, this stakeholder’s value and importance to the company is the highest and should be prioritised.
To have a full profile of the stakeholder, and by consequence find out its salience, the respondents’ preferences with respect to the three criteria of power, legitimacy and urgency are elicited. Table 5.1 presents respondents’ judgements and includes the list of anonymised respondents that took part in the survey. The circles in the table indicate the self-perception of power, legitimacy and urgency by stakeholders. Legitimacy of the decision making process is affected by how stakeholders are able to influence this process. Legitimate rules allow stakeholders to have a voice, and to ensure such rules in this work each participant was asked to state on the scale of 0-3 what was the legitimacy, power and urgency level of each of eight types of stakeholders.

The average score of respondents’ answers was then calculated in respect to every attribute (table 5.1). These inputs then served as a basis for fuzzy calculations and to determine the ranking of stakeholders. The “min”, “average”, and “max” value from respondents’ answers were taken for every stakeholder attribute. A fuzzy number generated using “min”, “average”, and “max” values was used to describe the importance rating for every stakeholder attribute (table 5.2). Later, by calculating an average value for every stakeholder fuzzy attribute importance score, a fuzzy salience score for every stakeholder was obtained (table 5.3).

Table 5.1 Respondents’ answers in respect to legitimacy, power and urgency of each of eight types of stakeholders in the context of resources allocation to CSR programmes (Scale 0-3: none=0, low=1, medium=2, high=3)
<table>
<thead>
<tr>
<th>List of anonymised participants</th>
<th>NGO</th>
<th>Federation of Independent Mines</th>
<th>Local Government</th>
<th>Trade Association</th>
<th>Oil Company Management</th>
<th>Governmental Department</th>
<th>Environmentalist (Planning Officer responsible for minerals)</th>
<th>Government Department of Energy and Climate Change</th>
<th>CBI (Confederation of British Industry) Minerals Committee</th>
<th>Independent Consultant (Energy Sector)</th>
<th>BP shareholder</th>
<th>Supplier (Onshore operator)</th>
<th>Contractor</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attributes</td>
<td>n 1</td>
<td>n 2</td>
<td>n 3</td>
<td>n 4</td>
<td>n 5</td>
<td>n 6</td>
<td>n 7</td>
<td>n 8</td>
<td>n 9</td>
<td>n 10</td>
<td>n 11</td>
<td>n 12</td>
<td>n 13</td>
<td>n 14</td>
</tr>
<tr>
<td>Power</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Urgency</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Legitimacy</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Power</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.85</td>
</tr>
<tr>
<td>Urgency</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Legitimacy</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Role</td>
<td>Power</td>
<td>Urgency</td>
<td>Legitimacy</td>
<td>Weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
<td>---------</td>
<td>------------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1.785</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmentalists</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>1.642</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2.642</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NGO</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0.071</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shareholders</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0.714</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.357</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Notes:*
- **Power** represents the level of power held by each role.
- **Urgency** represents the urgency level.
- **Legitimacy** represents the legitimacy level.
- The weights are calculated as the sum of the products of power and urgency for each role.
<table>
<thead>
<tr>
<th></th>
<th>Legitimacy</th>
<th>Power</th>
<th>Urgency</th>
<th>Legitimacy</th>
<th>Power</th>
<th>Urgency</th>
<th>Legitimacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media</td>
<td>3 3 2 3 2 2 2 1 1 2 2 3</td>
<td>1 0 0 0 3 3 2 2 0 0 1 1</td>
<td>3 1.142</td>
<td>3 3 3 3 2 2 1 1 1 2 2 3</td>
<td>3 2.285</td>
<td>3 0 0 0 0 0 0 0 0 0 0 0</td>
<td>3 2.071</td>
</tr>
<tr>
<td>Customers</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0</td>
<td>0 0 0 0 1 1 0 1 3 2 0 0 0</td>
<td>3 0.785</td>
<td>0 2 2 2 1 3 3 2 2 2 2 0</td>
<td>0 1.857</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0</td>
<td>0 0 0 0 0 0 0 0 0 0 0 0</td>
</tr>
</tbody>
</table>
### Table 5.2 Fuzzy stakeholder attributes importance ratings

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Attributes</th>
<th>Fuzzy number</th>
<th>Crisp score for every attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>Power</td>
<td>(2, 2.857, 3)</td>
<td>2.678</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(2, 2.857, 3)</td>
<td>2.678</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(2, 3, 3)</td>
<td>3</td>
</tr>
<tr>
<td>Community</td>
<td>Power</td>
<td>(0, 0.857, 2)</td>
<td>0.928</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(3, 3, 3)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(3, 3, 3)</td>
<td>3</td>
</tr>
<tr>
<td>Employees</td>
<td>Power</td>
<td>(1, 1.785, 3)</td>
<td>1.892</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(0, 0.857, 3)</td>
<td>1.178</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(0, 0, 0)</td>
<td>0</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>Power</td>
<td>(1, 1.642, 3)</td>
<td>1.821</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(1, 2, 3)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(0, 0.071, 1)</td>
<td>0.285</td>
</tr>
<tr>
<td>Government</td>
<td>Power</td>
<td>(2, 2.642, 3)</td>
<td>2.571</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(0, 0.928, 3)</td>
<td>1.214</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(2, 2.5, 3)</td>
<td>2.5</td>
</tr>
<tr>
<td>NGO's</td>
<td>Power</td>
<td>(0, 0.071, 1)</td>
<td>0.285</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(0, 0.5, 3)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(1, 2.642, 3)</td>
<td>2.321</td>
</tr>
<tr>
<td>Shareholders</td>
<td>Power</td>
<td>(0, 0.714, 3)</td>
<td>1.107</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(3, 3, 3)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(3, 3, 3)</td>
<td>3</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>Attributes</td>
<td>Fuzzy number</td>
<td>Crisp score for every attribute</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
<td>--------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Power</td>
<td>(0, 0.357, 1)</td>
<td>0.428</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(0, 0.214, 1)</td>
<td>0.357</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(1, 2.071, 3)</td>
<td>2.035</td>
</tr>
<tr>
<td>Media</td>
<td>Power</td>
<td>(0, 1.142, 3)</td>
<td>1.321</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(1, 2.285, 3)</td>
<td>2.142</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(0, 0, 0)</td>
<td>0</td>
</tr>
<tr>
<td>Customers</td>
<td>Power</td>
<td>(0, 0.785, 3)</td>
<td>1.142</td>
</tr>
<tr>
<td></td>
<td>Urgency</td>
<td>(0, 1.857, 3)</td>
<td>1.678</td>
</tr>
<tr>
<td></td>
<td>Legitimacy</td>
<td>(0, 0, 0)</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 5.3 Fuzzy stakeholder salience score

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Fuzzy stakeholder salience score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>(2, 2.904, 3)</td>
</tr>
<tr>
<td>Community</td>
<td>(2, 2.285, 2.666)</td>
</tr>
<tr>
<td>Employees</td>
<td>(0.333, 0.880, 2)</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>(0.666, 1.238, 2.333)</td>
</tr>
<tr>
<td>Government</td>
<td>(1.333, 2.023, 3)</td>
</tr>
<tr>
<td>NGO's</td>
<td>(0.333, 1.0714, 2.333)</td>
</tr>
<tr>
<td>Shareholders</td>
<td>(2, 2.238, 3)</td>
</tr>
<tr>
<td>Suppliers</td>
<td>(0.333, 0.880, 1.666)</td>
</tr>
<tr>
<td>Media</td>
<td>(0.333, 1.142, 2)</td>
</tr>
<tr>
<td>Customers</td>
<td>(0, 0.880, 2)</td>
</tr>
</tbody>
</table>

In order to provide a ranking of stakeholders, it is necessary to rank fuzzy numbers. However, ranking of fuzzy numbers is not obvious. Hence, fuzzy numbers have to be transferred into crisp values. This can be accomplished with defuzzification methods, such as the weighted average method, the centroid method, the mean-max membership, the centre of sums, the max-membership principle, or maxima (Ross, 2004). The weighted average defuzzification method, is one of the most prevalent and appealing of all the
defuzzification methods according to Ross (2004) and therefore was applied in this work.

The weighted average can be calculated using the equation:

\[ Y = \frac{\min_i + 2 \times \text{average}_i + \max_i}{4} \]

To illustrate, the crisp score calculation for the “Management” stakeholder:

\[ Y = \frac{2 + 2 \times 2.904762 + 3}{4} = 2.702381 \]

The following calculation has been applied to obtain crisp scores for all remaining stakeholders. The crisp score and the stakeholder ranking is presented in table 5.4.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Crisp score</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>2.702</td>
<td>1</td>
</tr>
<tr>
<td>Community</td>
<td>2.309</td>
<td>3</td>
</tr>
<tr>
<td>Employees</td>
<td>1.0238</td>
<td>8</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>1.3690</td>
<td>5</td>
</tr>
<tr>
<td>Government</td>
<td>2.095</td>
<td>4</td>
</tr>
<tr>
<td>NGO's</td>
<td>1.202</td>
<td>6</td>
</tr>
<tr>
<td>Shareholders</td>
<td>2.369</td>
<td>2</td>
</tr>
<tr>
<td>Suppliers</td>
<td>0.94</td>
<td>9=</td>
</tr>
<tr>
<td>Media</td>
<td>1.154</td>
<td>7</td>
</tr>
<tr>
<td>Customers</td>
<td>0.94</td>
<td>9=</td>
</tr>
</tbody>
</table>
Chapter 5

Membership functions

Trapezoidal membership functions are defined for the purpose of this research. Membership functions are defined for the selection criteria (Fig. 5.2) and for the rating of stakeholders with regards to each attribute (Fig. 5.3). Trapezoidal functions are used for criteria and stakeholders’ assessments to represent an increased uncertainty involved in the computation (Zimmermann, 1996). Hence, these functions have been found to be the most suitable to prioritise stakeholders according to the three attributes of power, urgency and legitimacy as set out by Mitchell et al. (1997) in the sustainability context (Andriantiatsaholiniaina et al., 2004).

Evaluating importance of criteria

The legitimacy, power, and urgency criteria are evaluated with the values: “absent legitimacy”, and “present legitimacy”; power and urgency criteria are evaluated with respect to “low importance”, and “high importance”. This set of answers has its corresponding fuzzy numbers. The thresholds have been estimated with respect to the Mitchell et al. (1997) framework and its representation of legitimacy, power and urgency that is illustrated with the three intersecting circles (chapter 2, figure 2.4). The circles represent the criteria level, either to be low, high or none. Hence, the linguistic evaluation of criteria importance requires to be represented by a fuzzy number. Table 5.5 presents the linguistic importance scale of criteria. Figure 5.2 (a) and (b) illustrate the membership functions of criteria importance. For each membership function, the average value is the point at which the degree of membership reaches one, or full membership for that set. Lower and upper limits are the points at which there is no membership signified by zero. The membership curve determines other degrees of membership.
### Criteria Importance

#### Legitimacy

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Importance Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent Legitimacy</td>
<td>(0, 0, 0, 0)</td>
</tr>
<tr>
<td>Present Legitimacy</td>
<td>(0, 0.6, 3, 3)</td>
</tr>
</tbody>
</table>

#### Power & Urgency

<table>
<thead>
<tr>
<th>Importance</th>
<th>Importance Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low importance</td>
<td>(0, 0.6, 1.2)</td>
</tr>
<tr>
<td>High importance</td>
<td>(0.6, 1.2, 3, 3)</td>
</tr>
</tbody>
</table>

#### Legitimacy criterion importance

![Legitimacy criterion importance graph](attachment:legitimacy_graph.png)
Evaluating importance of stakeholders

Stakeholders are evaluated with the set of values: “low salience”, “moderate salience”, and “high salience”. This set of answers has its corresponding fuzzy values on the numeric scale 0-3. This stakeholder salience terminology corresponds also to the Mitchell et al. (1997) intersecting circles where four classes of stakeholders can be distinguished. Stakeholders which fall into the category of no importance are outside the three circles, low salience is possessed by stakeholders 1, 2, and 3; stakeholders 4, 5, and 6 have moderate salience; and stakeholder 7 placed in the middle of the three circles has high salience (chapter 2, Figure 2.4). The linguistic representation of no salience, low, moderate and high salience requires
representation using fuzzy numbers. Table 5.6 presents the linguistic value scale. Figure 5.3 illustrates the membership functions of criteria importance.

Table 5.6 The linguistic value scale of stakeholders’ importance

<table>
<thead>
<tr>
<th>Stakeholders’ importance</th>
<th>Value scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low salience (L)</td>
<td>(0, 0.6, 1.2)</td>
</tr>
<tr>
<td>Moderate salience (M)</td>
<td>(0.6, 1.2, 1.8, 2.4)</td>
</tr>
<tr>
<td>High salience (H)</td>
<td>(1.8, 2.4, 3, 3)</td>
</tr>
</tbody>
</table>

Figure 5.3 The membership functions of the linguistic importance weight of stakeholders

Fuzzy calculations followed once the elicitation process was completed and the decision makers’ preference judgements were applied. Fuzzy computations were carried out with the aid of MATLAB’s fuzzy logic toolbox. The idea of applying the fuzzy logic approach in the
Chapter 5

CSR context was to assess the precise importance of stakeholders with respect to three criteria using fair procedures. These importance values were chosen to reflect the degree of membership of a set, based on the subjective judgements of the respondents to the survey. This data served as a basis for describing the fuzzy membership functions. In a rule-based fuzzy model for inference, the fuzzy propositions are required to be represented by an implication function, also called fuzzy conditional statement or an if-then rule. The fuzzy inference system is governed by a set of fuzzy IF-THEN rules (Table 5.7) derived corresponding to the three intersecting circles proposed in the Mitchell et al. (1997) framework (Fig. 2.4). To illustrate the first rule assumes that “If Legitimacy is Absent and Power is High and Urgency is Low” then the stakeholder is a “Dormant stakeholder” and it has a low salience, which corresponds with the intersecting circles (Fig. 2.4). The remaining rules are derived in the same way and their detailed description is offered in table 5.7.
Table 5.7 The fuzzy IF-THEN rules

<table>
<thead>
<tr>
<th>Salience</th>
<th>If-then rules applied in the study</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rule no.</td>
<td>Antecedent part</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td>If Legitimacy is Absent and Power is High and Urgency is Low</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>If Legitimacy is Present and Power is Low and Urgency is Low</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>If Legitimacy is Absent and Power is Low and Urgency is High</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>If Legitimacy is Present and Power is High and Urgency is Low</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>If Legitimacy is Absent and Power is High and Urgency is High</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>If Legitimacy is Present and Power is Low and Urgency is High</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>If Legitimacy is Present and Power is High and Urgency is High</td>
</tr>
</tbody>
</table>
Chapter 5

## Salience

<table>
<thead>
<tr>
<th>Rule no.</th>
<th>Antecedent part</th>
<th>Consequent part</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>If Legitimacy is Absent and Power is Low</td>
<td>Then Stakeholder is Non-Stakeholder</td>
</tr>
<tr>
<td></td>
<td>and Urgency is Low</td>
<td></td>
</tr>
</tbody>
</table>

An output of the analysis is a 3-D framework that illustrates tipping points visibly, and a fuzzy logic approach to the scores on the axes.

### Results

The fuzzy logic decision surface assesses extractive sector’s stakeholder salience with respect to *power* and *urgency* (Fig. 5.4). To illustrate, three types of stakeholders have been placed on the surface. Case A indicates the *Management* stakeholder who, according to the Mitchell *et al.* (1997) framework (Fig. 2.4), possesses a high degree of all three attributes. According to our results *Management* has high *power* (2.678), *legitimacy* (2.678) and *urgency* (3); its salience is the highest in our ranking with the score 2.702. Case B forms the *Employees* stakeholder which has moderate *power* (1.892), moderate *urgency* (1.178) but no legitimacy (0) and scored eighth in our ranking (1.023). The *Media* stakeholder is seventh in the ranking (1.154) with *power* (1.142), *urgency* (2.142) and no *legitimacy* as signified in Case C. The remaining stakeholders’ salience is *Community* (2.309), *NGO’s* (1.202), *Suppliers* (0.94) and *Customers* (0.94).
Figure 5.4 Fuzzy logic decision surface for the relationship between urgency and power

The Mitchell et al. (1997) work, although conceptually very appealing, lacks precision in terms of stakeholder classification. The Mitchell et al. model is a Boolean equivalent of the framework proposed in this work. In this study, a fuzzy framework assesses the extent to which a stakeholder belongs to a particular group. By looking at Mitchell’s stakeholder model (Figure 2.4), it is not an easy task to distinguish when the dangerous stakeholder becomes dangerous rather than simply being dormant or demanding. Mitchell et al. (1997) claim that by possessing the two attributes of power and urgency the stakeholder becomes a dangerous one. However, how much urgency and power does a stakeholder need to possess to qualify as a dangerous stakeholder? The framework proposed here allows a decision maker to find an attribute level which defines the degree at which a stakeholder belongs to a certain category. The framework is dynamic in the sense that it allows the
manipulation of the degree of legitimacy, power or urgency. The decision maker has an opportunity to modify the level of the attributes that the stakeholder possesses. Similarly, the importance of any of the stakeholders indicated in the Mitchell et al. model (Fig. 2.4) can be assessed using the developed framework.

The fuzzy logic slope specifically points out areas at which the degree of membership of a stakeholder is undefined. For instance, the slope of the surface between the Management stakeholder and the Employees stakeholder is shaded. The area where the slope is most steep and marked with a grey shade (a mix of turquoise and green) is called the ‘shade area’ and it is at this point that the degrees of power and urgency attributes possessed by the stakeholder are ‘fuzzy’. According to Mitchell’s framework a stakeholder placed in this fuzzy area does not yet qualify as a dangerous stakeholder. However, it is claimed in this work that the boundaries between the circles’ membership are not sharp but fuzzy. Thus, a stakeholder, by possessing even the smallest degree of power or urgency, can turn out to be a dangerous one. Hence, the fuzzy logic decision surface becomes a dynamic stakeholder map.

The fuzzy decision map can be generated for the stakeholder relationship between power and legitimacy (Fig. 5.5).
Case D presents the Environmentalist stakeholder who possesses attributes of power (1.821) and legitimacy (0.285) and a salience level of 1.369 (five in the ranking). Case E illustrates the Government stakeholder who possesses the attribute of power (2.571), urgency (1.214), and legitimacy (2.5), and is fourth in the ranking with a salience score of 2.095. The Shareholders are illustrated with the case F, their salience is second highest in the ranking with a score of 2.369. Shareholders according to the results have a high degree of legitimacy (3), urgency (3) and power (1.107).

Similarly to the discussion above, the slope between cases D and F (Figure 5.5) takes different colours ranging from a light green to dark green. This area of the slope is the fuzzy surface where the degree of power and legitimacy that the stakeholder holds is changing.

Figure 5.5 The fuzzy decision surface for the relationship between power and legitimacy
Therefore, the stakeholder possessing these levels of power and legitimacy gradually becomes a member of another circle. All the different stakeholders as specified by Mitchell et al. (1997) can be visibly mapped on the fuzzy logic surface. A similar decision map can be generated for the relationship between legitimacy and urgency.

By applying fuzzy logic to the Mitchell et al. (1997) model, a precise way to illustrate how Mitchell circles overlap can be offered. The fuzzy logic framework is a precise measure of the degree of the overlap. Furthermore, this updated decision making framework allows the incorporation of the judgements of the decision maker and an accurate calculation of the degree of the power, urgency or legitimacy that the stakeholder possesses.

**Discussion of the fuzzy logic framework**

This section proposes a fuzzy logic approach to prioritise stakeholders’ objectives with respect to CSR resourcing decisions and illustrates the application of the methodology in the non-renewable extractive sector. As society and business are highly interdependent (Porter & Kramer, 2006) and resources for CSR activities are limited (Tsai et al., 2010), stakeholder engagement is vital to ensure fair allocation. In contrast to other stakeholder management models, the proposed approach offers evaluation of stakeholders with respect to three attributes of power, urgency, and legitimacy, allows monitoring of stakeholder salience with respect to the changing level of criteria. As a result, a dynamic map of stakeholder salience is produced. Fuzzy logic methodology defines the relationships between the parameter pairs and appears to have higher prediction accuracy in terms of stakeholder ranking than the Mitchell et al. (1997) Boolean model of intersecting circles. Since the output is a 3-D model, the results are easy to understand by the decision maker and stakeholders can be more visibly mapped. The framework built in this work can be also compared with the direct
salience evaluation of stakeholders. As indicated with the red circles in table 5.1, the self-perception of importance by stakeholders differs from the values assigned by other respondents. It is believed in this study that the 3-D model is also a more objective framework of the stakeholders’ power, urgency and legitimacy assessment than the direct self-evaluation of importance by stakeholders.

Why support decision-making processes with models instead of relying solely on intuition? Human beings in general have a tendency to rely on intuition, which often leads to erroneous decisions. In this respect, Kahneman (2011), in his debate about human rationality and irrationality, may convince many decision makers of the usefulness of decision support models. He suggests that intuition guides human thinking on most occasions as it is simply impossible for everything to be closely analysed. However, intuitive decision making does not always result in success, as some experts led by their intuition are capable of recognising patterns within a split second but are unable to explain their actions. Hence, their decision making simply lacks the feedback that the decision support frameworks can provide.

Overconfidence and optimism result in failed decisions, which highlight that human beings lack consistency in their decision making. Hence, their reactions to identical situations on many occasions differ, and as long as the system is guided by basic principles, we can trust our judgements. When uncertainty steps in, we do not know what is unknown to us. Therefore, an increased system complexity asks for a decision support approach that can provide a structure for the problem under review. Flexible tools could provide a structure that could lead to better decision outcomes. Feedback derived from decision support tools could ensure that mistakes can be learnt from and prevented in time. Decision makers are
prone to cognitive biases, including experts, and frequently it is experts, overly confident in their predictive abilities, that lead to failures or even disasters. The greatest disasters could have been avoided if the decision makers involved had learnt from their mistakes (Labib & Read, 2013), and spontaneous, intuitive decision making is not advisable in many complex systems. Therefore, a framework such as the one proposed here for stakeholder prioritisation allowing incorporation of human judgement may serve as a useful tool to guide the decision making process.

Defining precise stakeholders’ importance is significant in planning processes. Identifying, prioritising and engaging stakeholders is an on-going process. The key stakeholders are changing; they move within the company or leave it. The importance of stakeholders changes over the life cycle of a project. The stakeholders’ salience assessment may require updating several times over the duration of a project due to the dynamic nature of the project and stakeholders’ changing attributes. Hence, for the project to be effective the stakeholder salience assessment has to be regularly updated and our dynamic stakeholder theory can help reflect the dynamic nature of the CSR project and its stakeholders.

The fuzzy logic 3-D framework proposed in this section aids in rating and selection of key stakeholders in different scenarios. From a list of attributes, solely the relevant criteria are selected by the decision maker. Then these criteria are subject to assessment by the decision maker. These preferences are used for the evaluation of criteria and subsequent assessment of stakeholders. It is all accomplished by imposing a set of fuzzy logic rules. For the purpose of this study, fuzzy membership functions were assigned based on the professionals’ judgements. Considering the fuzzy if-then rules, the stakeholders’ map emphasising their salience is produced. By calculating fuzzy scores for every stakeholder,
their ranking becomes a straightforward task. Then, the stakeholder, or portfolio of stakeholders, with the highest score for consideration may be selected. The subjectivity of decision makers’ preferences along with a quantitative ranking system are incorporated in the model. The fuzzy logic framework allows visualisation of the decision problem and orders parametric significance to the decision problem attributes. The framework is based on the relation values portraying a parametric relationship on power, legitimacy, urgency and stakeholders’ salience.

5.4 Analytic Hierarchy Process framework for stakeholder salience assessment

The Analytic Hierarchy Process (AHP), a semi-qualitative multi-criteria decision analysis (MCDA) technique (Saaty, 1980) (see chapter 3), has been previously employed to prioritise stakeholders objectives (J. Jackson, 2001) and in the CSR context (Brice & Wegner, 1989). In this section the AHP has been applied to prioritise stakeholders in the CSR context.

**Evaluation steps**

Figure 5.6 illustrates the three level hierarchy for the stakeholder prioritisation problem with the goal of stakeholder prioritisation at the left. Moving to the right the three attributes of power, urgency and legitimacy are at the Level 1 and Level 2 is composed of alternatives, which are the eight different types of stakeholders.
The elements of the problem are then evaluated in a pair-wise manner with respect to the level above in the hierarchy. When comparing two elements it is a matter of the importance of one element over another. To compare the elements, a question is asked: “which of the two elements is more important and to what extent”. The intensity of preference between the two elements can be expressed on a Saaty (1980) nine-point scale. The determination of the value for every element is dependent on the choice of the decision maker. In this work, a prioritisation of stakeholders’ in CSR is presented, to illustrate the application of the

---

**Figure 5.6** The three level hierarchy for the stakeholder prioritisation problem
methodology (Figure 5.7 and Figure 5.8). The values used to populate the framework are estimated based on the survey discussed in section 5.2.

Results

The final results of an AHP approach are weightings of the factors, class weightings, and a consistency ratio (CR), discussed in chapter 3 (based on the ‘eigenvalue’ method), which is applied to check the consistency of respondents’ answers; where a CR of less than 10% indicates consistency of judgements (Saaty, 1980). In this study, the CR was 0.02, well below the 0.1 threshold value suggested by Saaty (1980) as an acceptable limit for consistency, (see Figure 5.7).

![Synthesis with respect to: Goal Selecting Key Stakeholder Overall Inconsistency = .02](image)

Figure 5.7 AHP synthesis with respect to goal, which also provides weightings calculation and the rate of inconsistency
The level of consistency in the pair-wise comparisons is sufficient to recognise the factor weights. Consequently, the stakeholders have been prioritised through the auspices of respondents with the *definitive stakeholder* scoring the highest 0.351, followed by the *dominant stakeholder* at 0.177, *dangerous stakeholder* at 0.114, the *dependent* at 0.100, the *dormant* at 0.097, the *discretionary* at 0.077, and the *demanding stakeholder* at 0.047.

The AHP methodology is accompanied by a sensitivity analysis that shows how sensitive the alternatives are to the changes in attributes. The two dimensional plot (Fig. 5.8) illustrates the relationship between power and urgency and how change in these two attributes affects the prioritisation of stakeholders.

![Figure 5.8 The 2-D plot](image-url)
The dormant, demanding and dangerous stakeholders are highlighted in figure 5.8 within the circles, showing that the dangerous stakeholder, possessing both power and urgency, is placed more towards the middle part of the graph where the power and legitimacy level is substantially high. The dormant stakeholder, possessing the attribute of power, lies significantly higher on the y-axis, which means that its power is fairly extensive. While the demanding stakeholder, whose powers are limited or virtually none, is placed lower on the y-axis. Figure 5.8 therefore illustrates the relationship between the attributes and the change in stakeholders’ priority as set out by Mitchell et al. (1997), as well as stakeholders’ ranking. The precise distance in the stakeholder ranking is captured in the AHP framework which is missing from the relatively simple but conceptual model by Mitchell et al. (1997) as illustrated in the intersecting circles in figure 2.4 (chapter 2). The methodology by itself is not capable of illustrating with precision the overlap between attribute circles which the fuzzy logic methodology can do. Therefore, when methods are applied jointly, they produce more satisfactory results.

5.5 Conclusions

This chapter presented an integrated approach, using fuzzy logic and AHP, to prioritise stakeholder objectives and balance their needs. The framework was tested in the non-renewable extractive industry. As the framework is generic, it can be applied across various industries. The application of the framework can be the first essential step to arrive at a fair decision.

The purpose of the technical eclecticism was to identify techniques for effective prioritisation of stakeholders. The approach employed in this chapter combines fuzzy logic with AHP to manage stakeholders’ diverging requirements and ensure sustainable
development of industry in the long-term. The eight stakeholders as set out by Mitchell et al. (1997) were evaluated with respect to three attributes: power, urgency, and legitimacy in relation to CSR resourcing decisions.

In applying the aforementioned framework, it has been possible to provide a methodology that can facilitate decision-making by obtaining qualitative data. This is an innovation in itself and a useful approach for obtaining stakeholder ranking. This work contributes to the scarce research investigating fairness in decision making procedures that involve multiple stakeholders or subgroups. The decision support framework allows organisations to meet several, if not all, of the conditions required for fair priority setting. The conditions, defined in the initial part of this study, are publicity, relevance, appeals, regulation, fair consideration, empowerment, and impartiality. By using the framework, organisations can provide a rationale behind their CSR resourcing decisions, which can be made publically accessible through online CSR reports and annual sustainability reports. Resource allocation decisions would be justified by evidence and reason in the form of a dynamic map that can give credibility to the decisions taken. Stakeholder opinions are included within the model building and in the decision-making process, hence stakeholders are empowered through their active participation. The framework can help reach consensus in cases where conflicting interests occur. Fairness perception can be maximised in a dynamic decision-making group context and translated into commitment to the group. Negative reactions and disastrous consequences such as subversion, revolt or secession in the case of undesirable decision outcomes can be avoided as a result.

The developed framework is not free from limitations, however. It contributes, indeed, towards procedural fairness by engaging key stakeholders in the decision-making process. It
is, however, only a first step in arriving at a fair decision. The fact that the key stakeholders’ voices are included in the framework does not necessarily mean that the decision which they will arrive at will be implemented. The decision support framework solely assists in the decision-making process; often extensive negotiations follow as a next stage. Approaches, such as the one offered in this work, enable inclusion of various stakeholders’ opinions, using fair process, and could potentially be invaluable in facilitating integration of CSR into business strategy.

5.6 Chapter summary
This chapter has proposed the framework to assess stakeholder salience. The fuzzy logic methodology was applied in the first part (section 5.3), followed by AHP in the second part (section 5.4) to prioritise stakeholders in CSR. In the next chapter the author seeks to deliver a framework/methodology (chapter 6) to optimally allocate resources to CSR programmes while considering the stakeholder importance as derived in chapter 5.
Chapter Six - A hybrid framework for resources allocation to Corporate Social Responsibility programmes
Chapter 6

The previous chapter presented and discussed the stakeholder salience evaluation methodology. This chapter employs the stakeholder priority results and refines the approach by applying additional decision analysis tools to assist CSR resourcing decisions and facilitate strategy development methodology. The following sections of this chapter provide an introduction to the hybrid framework (section 6.1), discuss the methodology (section 6.2), and the synthesis of methods (section 6.3). The full presentation of methods including their advantages and limitations, which triggered their integrative use are given in chapter 3. Conclusions are drawn in the final section of this chapter (section 6.4). Figure 6.1 provides an overview of this chapter within the thesis.

6.1 Introduction

Determination and implementation of sustainable strategies is essential. Analysis of both the external as well as internal environments with the use of multi criteria decision-making methods (MCDM) can help to determine the prospects and challenges significantly influencing integration of CSR into business strategy (chapter 2). A hybrid integrated framework combining cognitive mapping (CM), analytic hierarchy process (AHP) and analytic networks process (ANP) (see chapter 3) is proposed in this chapter to determine, prioritise
and select CSR programmes and ensure sustainable development. CM is applied to identify factors which affect the situation in the extractive sector, and to determine their relationships with one another. Then, the strategic cognitive map serves as a foundation to build the ANP model and find the importance of CSR programmes. The degree of each concept’s influence is established using the AHP.

The literature identifies a lack of a structural approach regarding the problem of resources allocation (chapter 2). This decision context is even more difficult since it involves multiple stakeholders with often diverging opinions and conflicting objectives, so that it is quite unlikely that consensus can be reached (section 2.6). Hence, it is necessary to investigate the problem of sustainability implementation, and in particular, the issue of resources allocation to CSR programmes.

There is a need to clearly structure the problem of sustainability implementation as a multiple-criteria decision analysis (MCDA) problem to address the complex nature of the issues and respond to the needs of the multiple stakeholders involved. MCDA is a methodology that aids decision-making processes characterised by multiple, often conflicting, criteria and a selection of a number of alternatives or courses of action. MCDA has not been extensively applied to decision-making problems tackling implementation of CSR.

An integrated approach combining cognitive mapping (CM) (C. Eden, 1988, 1992, 2004; C. Eden & Ackermann, 2004; C. Eden & Simpson, 1989) to structure the problem, and MCDA was used in this study as an effective way to deal with the sustainability development challenge (Merad et al., 2013; Montibeller & Franco, 2010; Montibeller et al., 2009). The
MCDA methods applied in this research are AHP and ANP, where ANP is an extension of the AHP methodology.

Seeking to better understand this complex problem, this study employed CM (Belton & Stewart, 2002; Mingers & Rosenhead, 2004; Rosenhead, 1989) in a workshop, gathering researchers from the University of Portsmouth to elicit participants’ opinions, identify the problem’s criteria and the relevant stakeholders (Neves, Dias, Antunes, & Martins, 2009; Neves, Martins, Antunes, & Dias, 2004; Petkov, Petkova, Andrew, & Nepal, 2007). Individual participant opinions were then aggregated by the researcher and a single collective cognitive map was proposed and discussed in the research workshop. CM has seen numerous applications in various disciplines (J. Davis, MacDonald, & White, 2010; C. Eden & Ackermann, 2004; C. Eden & Simpson, 1989; Howick, Eden, Ackermann, & Williams, 2008; Ülengin, İlker Topcu, & Şahin, 2001). CM allows presentation of group ideas through graphical representation and facilitates subsequent discussion leading to the identification of values and the specifics of the decision problem. Moreover, the collective rationality of multiple stakeholders can be viewed in the form of a cognitive map. In addition, transparency of the decision making process and legitimacy of the agreed decision can be ensured throughout the process, owing to CM application. A joint understanding of the problem is achieved, while managing the plurality of stakeholders’ objectives and their subjective reality interpretations (Lane & Oliva, 1998). Thereafter, the map gathering the collective ideas serves to build a network of relationships for MCDA.

In this chapter the integrated application of CM, AHP and ANP methodologies is demonstrated to overcome the limitations of mono-methodologies and support the implementation of sustainability programmes. The focus of the empirical work is being
‘illustrative’ of the extractive industry. Applying the methodologies in an integrative manner potentially allows the limitations to be eliminated. A synthesis of approaches is not only operationally possible but also practical. However, for the synthesised framework to have practical value, the theoretical assumptions behind the methods have to be consistent. C. Eden and Simpson (1989) suggest that an intervention approach should be consistent in terms of theory, tools, techniques and methods in order to avoid the difficulty associated with mixing superficial methods and to ensure that their assumptions are consistent. A lack of consistency does not equal failure, but it may mean that there is an absence of intellectual coherence in the individual approaches. Hence, in order to add to the practical value of this work, a combination of methods within a single social theoretical framework is proposed. This work illustrates that integrated use of CM, AHP and ANP can aid successful formulation of decisions in the context of CSR implementation. Furthermore, an attempt is made to prove that these methods, initially fit for individual decision-making, can be fruitfully used to support a group decision-making process. Finally, a network of relationships for various extractive companies is presented to enable effective integration of CSR programmes into a company strategy. In so doing, this work contributes to the literature on sustainability implementation. The author is unaware of any prior work reporting the integrated use of CM, AHP and ANP to support the implementation of CSR in an operational way and to assist carrying out sustainable management practices.
6.2 Decision support framework

This chapter proposes a decision support framework that guides practitioners in their future strategic decisions by using multi-methodology. The stakeholder priority results obtained from chapter 5 are employed in the framework discussed in this chapter. Synthesising aspects of CM and MCDA is possible because of their simplicity as well as ease of use, and has certain advantages as the methods used in combination can eliminate each other's drawbacks. CM cannot provide measures for the strength of influences nor does it facilitate assessment of different modes of action which MCDA methods such as AHP and ANP can do. Figure 6.2 briefly outlines the contribution of each of the methods in the synthesis. In this research, the joint use of techniques is investigated to create an additional value for sustainability implementation compared to using the methods separately. In the proposed framework, the concepts generated in CM serve as an input to the ANP network, and the cause-effect direction of concepts’ influences is established using CM. The strength of the influences of the concepts is measured with AHP. Then, the different CSR programmes are evaluated with the ANP methodology. The centrality measure in CM has been used to report the significant concepts playing a crucial role in the network. It is demonstrated in this work that the coupled use of these methods can enhance the process of problem structuring as well as aid in preference-based assessment of CSR programmes. The joint application of CM and ANP/AHP techniques has been seen in previous applications in different fields, for instance, in environmental management to map sustainability indicators (Wolfslehner & Vacik, 2011), strategy management of performance measurement systems (Bititci, Suwignjo, & Carrie, 2001), or in evaluation of transport investment alternatives (Caliskan, 2006). This research aims to verify how sustainability can be practically implemented through the novel approach offering an ANP/AHP-based framework and its
integrated use with CM. It is believed in this study that no previous research proposing this integrated framework has been applied to implement sustainability in an operational way. In this study, CM is used for identification of sustainability indicators, CSR programme alternatives and to discover the direction of influences among the concepts. The AHP is applied to assess the degree of strength that these concepts have on one another. What is more, in this research, the Mitchell et al. (1997) classification of stakeholders is employed and AHP is applied to derive the priorities of different stakeholders. By transferring the central concepts from the cognitive map to ANP, the application of MCDA applications is permitted. Despite the multitude of approaches capable of tackling multi-criteria problems (Belton & Stewart, 2002), few can deal with interactions among the criteria (Wolfslehner & Vacik, 2011). According to Wolfslehner, Vacik, and Lexer (2005), the interdependence among the variables can be successfully demonstrated by means of ANP. The CM, AHP/ANP-based framework can permit realistic and sound decision-making and lead towards making rational and justifiable decisions.
In the first stage of this study the key concepts that affect, or are affected by, extractive companies from various perspectives, namely environmental, political, social and economic, were determined. In order to validate the suitability of the proposed framework a pilot study involving two sessions was conducted in which the extractive sectors’ relationships with environmental, economic and socio-political factors were analysed. This phase of the study required two sessions with MBA students\(^{18}\) and researchers from the University of Portsmouth. The first was a brain-storming session, the latter a discussion on the model that had been generated from the first event. The detailed explanation of the research phases can be found in chapter 4. During the first session an aggregated cognitive map of the

\(^{18}\) Executive and International cohorts of MBA students.

237
problem was created. The map illustrated how the studied concepts relate to one another and the interrelationships between them. In the next phase, the different CSR programmes, to include environment pollution controlling plan, education and training, and economic advancement of communities, which were derived from the strategic cognitive map, were evaluated using the MCDM technique to select/rank or build a portfolio of programmes for implementation. The approaches adopted in this work are briefly discussed below to give the reader background information. Assumptions behind each of the methods are examined followed by an explanation of how these are important for an intervention process.

Application of Cognitive mapping methodology

CM, presented in detail in chapter 3, is a method for structuring and clarifying complex problems (Ackermann & Eden, 2001; Belton & Stewart, 2002; C. Eden & Ackermann, 1998). A causal (or influence) map has been developed for the purpose of this research due to its particular value in structuring an objective framework (Keeney, 1992).

The use of CM in this study was motivated by the fact that in the light of incompleteness of data, individuals irrespectively make causal inferences allowing its interpretation and, according to Huff (1990), interactively generated maps, concentrating on causal relationships, seem to be attractive as decision supports, allowing decision-makers to focus on action.

Hence, a strategic cognitive map of the system was built in the first stage of this work to structure the problem. Firstly, the main concepts were determined, and then the causal relationships between them were identified, followed by analysis of the strategic causal map.
Analysis of a causal map

Different methods of analysis of strategic causal maps, as discussed in detail in chapter 3, are available. Among these methods are domain analysis, head and tail analysis, givens-means-ends analysis, and cluster analysis, which have been applied in this work to analyse the strategic cognitive map. The outcome of the analysis is presented in section 6.3.

The next section discusses the use of ANP methodology to build the network of relationships between the concepts identified from the strategic cognitive map. The origins of the methodology, its basic assumptions, detailed implementation steps, and mathematical explanation are provided in chapter 3.

Application of Analytic Network Process methodology

The diverging interests and objectives of stakeholders can be successfully dealt with through the application of MCDA techniques. As a result feasible alternative decisions can be identified while taking into consideration the numerous goals of multiple stakeholders. ANP is a semi-qualitative MCDA technique developed as a generalisation of AHP by Saaty (1996) which, in broad terms, involves construction of the model, pair-wise comparison of clusters and elements, formulation of the supermatrix and determining the limit supermatrix and synthesis of results.

Application of Knapsack approach

In this research the Knapsack optimisation framework is proposed to allocate resources under constraints and illustrated through the application in the extractive industry. The method discussed in chapter 3 proves to be flexible, generic and systematic. It allows
consideration of different stakeholders’ objectives in strategic prioritisation of CSR investment options and optimisation of scarce resources.

6.3 Data Analysis and Results

The Pilot Study

Integration of CSR into strategy can be recognised as a way of managing the company by harmonising profitability while ensuring sustainable development of the sector (Vintro & Comajuncosa, 2010). The key areas that extractive projects can impact upon and hamper sustainable development are environmental, social, political and economic. Thus, it is these interactions that were analysed in the pilot study. The intervention process is summarised below.

Problem definition

In the first stage, to create a rich picture of the situation problem and develop a mutually exclusive and selectively exhaustive list of the main concepts in the causal map, an extensive literature review was carried out. Then, several workshops with professionals aware of CSR practices across industries were conducted in which participants were encouraged to identify the variables relevant to sustainable development in extractive industries. The workshops spanned a period of three months. Throughout the decision process, the researcher was acting as a facilitator. The workshops were conducted with six professionals, three of which had extensive expertise in CSR, and one in total quality management; one of the professionals was an engineer with extensive practical experience in the sector; the remaining one was a practitioner who could contribute in terms of the environmental aspect of the framework. All of them were researchers from the University of Portsmouth.
The participants were initially asked to identify all the crucial concepts and variables that influence or are influenced in extractive projects and that could hamper sustainable development. Initially, participants revealed their thoughts by writing them on post-it notes. In this way their individual ideas with respect to the analysis of extractive projects’ sustainability implementation were gathered. Thereafter, these ideas were aggregated into a map that the professionals could comment upon. Decision Explorer software (Banxia, 1996) was applied to manage the thoughts and ideas of the group of participants that surrounded the complex problem. Figure 6.3 reveals the complex map of the problem created using the Decision Explorer software package, which facilitates the use of CM. The full map is presented in Appendix H.

The strategic cognitive map

![Figure 6.3 A view of the part of the strategic cognitive map](image)

The most central concepts discovered in the analysis process were governments in all countries of operations, shareholders, local community, investments in CSR, Eco-activists actions, employees, decreasing profits, profits increase in the long-term, transparent
governance which have a centrality value of 16, 16, 14, 13, 12, 12, 12, 12, 11 respectively. The centrality value represents the sum of ‘incoming to’ and ‘outgoing from’ nodes with that concept. The most densely linked concepts are the key issues in the model. In this way several crucial stakeholders in the extractive sector are revealed as illustrated in figure 6.3.

Analysis of an aggregated cognitive map reveals several loops. These causal loops demonstrate the dynamism of the problem (C. Eden, 1994) and require to be analysed with great scrutiny. Since loops in the map were discovered, the problem needed to be represented in the form of a network with dependence and feedback. Hence, as a next step the problem was formulated with the use of ANP.

Several numbers of ‘heads’ were revealed in the analysis. Heads are concepts having no outgoing arrows and the large number of ‘heads’ in the map points out multiple and often conflicting objectives of stakeholders (C. Eden, Ackerman, & Cropper, 1992).

A ‘domain’ analysis was conducted to estimate the total number of arrows entering and exiting each node. This analysis revealed nodes central to the map. As the node 5 (fulfilling CSR) is the topic under discussion, it had fifteen links (figure 6.4).
Node 29 (governments in all countries of operations) was revealed to have fourteen links, and node 43 (disseminate information) had ten links. Nodes 32 (local community) and 49 (investments in CSR) follow with eight links each, and nodes 30 (employees) and 65 (management) had six links.

The results of the ‘head’ and ‘domain’ analyses were revealed to professionals, who were also familiarised with key issues of the problem through the results of domain analysis. The map was discussed by the experts and they were asked to agree on the fundamental problem objectives and to suggest possible changes. During the debate some concepts were duplicated and therefore, the duplicates were eliminated; some similar concepts were merged (e.g. ‘maintenance of the CSR awareness/approach throughout the supply chain(s)’, ‘being legally correct’, ‘health and safety compliance-customers, suppliers, local residents’), and several other variables grouped into clusters by the facilitator with the agreement of participants. The author revised the list of concepts and provided necessary revisions. As a result, 33 variables (driving forces) were specified and agreed as the basic indicators of...
sustainable development in extractive projects. The concise list of generated concepts is presented in table 6.1.
### Table 6.1 Concepts identified in the process

<table>
<thead>
<tr>
<th>STAKEHOLDERS:</th>
<th>1) Management, 2) Community, 3) Employees, 4) Environmentalists, 5) Government, 6) NGO’s, 7) Shareholders, 8) Suppliers, 9) Media, 10) Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONOMIC:</td>
<td>11) Revenue management, 12) Linkages to the local economy, 13) Wider economic development</td>
</tr>
</tbody>
</table>
| ALTERNATIVES:         | 31) *Economic advancement of communities*  
Job creation, housing, small business development, contribution to local development; partnerships with public authorities, sponsorship and donations  
32) *Education and training*  
Support for schools, colleges, universities; employees’ training, programmes aiming at developing new talent; health and safety improvement projects; helping suppliers to incorporate social responsibility into their business strategies  
33) *Implementing environment pollution controlling plan*  
Prevention of water, air, land, pollution; waste management programmes; programmes aiming at development of clean technologies; investments in biodiesel production; programmes aiming at protection of natural habitat |
Once the list of concepts was agreed by the professionals, the next step was to use them to create a network with dependence and feedback.

The Survey

Using information gathered from the series of workshops and the resultant strategic cognitive map, a questionnaire was formulated to study CSR practices. With the intent to acquire an in-depth understanding of CSR programme implementation in the extractive sector, it was vital to scrutinise corporate extractive decision-making practices and determine the importance of the different stakeholders involved in the process. Thus, data was collected using postal and online surveys. Questionnaires were also distributed during two MBA workshops, one conference and through networking with professionals. A total of 61 questionnaires were collected in the process. The type of stakeholders approached for participation in the study were senior and middle management of extractive companies, trade associations, government entities and affiliates, mineral-related organisations, as well as industry consultancies.

The postal survey has been discussed in detail in chapter 4. Self-administered questionnaires were distributed to the main stakeholders in the UK mining sector (Cameron et al., 2010). A total of 16 questionnaires were returned, of which 14 were usable.

Along with the postal survey, an online survey was carried out aiming at 20% of still active companies with the highest market capital from the list of 5,075 companies compiled using a Bloomberg database. Investigating the significance of stakeholders’ influence in real terms, specific mature exchanges were selected for this study, namely the UK, US/Canada and Australia exchanges, with a focus on the Oil and Gas, and Basic Materials (which
includes mining) sectors, accessed through a Bloomberg database. The 5,075 companies were selected based on the following criteria (1) Exchanges: UK, North American and Australian, (2) Sectors: Oil and Gas, and Basic Materials, (3) time period: current. The Bloomberg search returned the following number of companies from the Australian Exchange: 839 companies from the Basic Materials sector and 158 companies from Oil & Gas. The UK Exchange search resulted in 216 companies from the Basic Materials sector and 156 companies from Oil & Gas. The North American Exchange provided 2,327 companies from the Basic Materials sector and 1,379 companies from Oil & Gas. Subsequently, an online survey was distributed to 20% of still active companies with the highest market capital from the compiled sample. Out of 15 returned questionnaires, 11 were of use in the study. A significant amount of secondary data (e.g. annual reports, CSR reports, CSR statements, standards of business conduct, financial statements, sustainability reports) about the extractive sector’s CSR practices was collected using this approach. The information was in line with data gathered during pilot study workshops and confirmed our findings in terms of the key strategic factors influencing CSR investments.

In the questionnaire, respondents were asked to answer a set of questions describing the CSR engagement of oil, gas and mining corporations, to indicate important criteria and stakeholders in the sector, and to rate the latter’s importance on a Likert scale, ranging from 1 - little importance, to 5 - highly important, and finally to indicate their preference(s) in terms of factors affecting CSR programme implementation.

The survey results matched those found in the literature. After close examination, the significant factors were classified into benefits, costs, opportunities and risks. These
categories were then divided into subcategories. Subsequently, the fundamental 1-9 AHP scale was employed to assess the relative importance of factors.

**Determining weights of ‘head’ and ‘tail’ concepts using the Analytic Hierarchy Process (AHP)**

The ‘head’ and ‘tail’ concepts revealed during the analysis of the strategic cognitive map can be prioritised using the AHP methodology in order to elicit the intensity of their influence upon the implementation of CSR programmes. In this step, the concepts are evaluated using linguistic values. 27 ‘head’ and 9 ‘tail’ concepts have been revealed in the earlier analysis and ranked with the AHP methodology. The importance weights are provided in table 6.2 for the head concepts and table 6.3 for the tail concepts.

**Table 6.2 The ranking of the importance of the head concepts**

<table>
<thead>
<tr>
<th>‘Head’ Concept</th>
<th>Concept weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(11) risk of the loss of license to operate</td>
<td>0.053</td>
</tr>
<tr>
<td>(3) maintained license to operate</td>
<td>0.048</td>
</tr>
<tr>
<td>(44) minimise negative environmental impact</td>
<td>0.047</td>
</tr>
<tr>
<td>(46) ensure positive contribution to economy</td>
<td>0.045</td>
</tr>
<tr>
<td>(59) require health and safety compliance (customers, suppliers, local residents)</td>
<td>0.045</td>
</tr>
<tr>
<td>(61) CSR awareness throughout the supply chain</td>
<td>0.045</td>
</tr>
<tr>
<td>(41) improve sustainable environment life cycle</td>
<td>0.044</td>
</tr>
<tr>
<td>(60) have to be legally correct</td>
<td>0.044</td>
</tr>
<tr>
<td>(36) customers buying the product</td>
<td>0.043</td>
</tr>
<tr>
<td>(6) risk of going out of business</td>
<td>0.042</td>
</tr>
<tr>
<td>(54) respect human rights</td>
<td>0.041</td>
</tr>
<tr>
<td>(58) leaving resources to ensure being of future</td>
<td>0.040</td>
</tr>
<tr>
<td>'Head' Concept</td>
<td>Concept weight</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>generations</td>
<td></td>
</tr>
<tr>
<td>(57) prevent one population to deprive another</td>
<td>0.038</td>
</tr>
<tr>
<td>(47) minimise negative social impacts</td>
<td>0.037</td>
</tr>
<tr>
<td>(39) safe working conditions will be ensured</td>
<td>0.036</td>
</tr>
<tr>
<td>(52) societal balance</td>
<td>0.036</td>
</tr>
<tr>
<td>(10) poor image &amp; media relations</td>
<td>0.033</td>
</tr>
<tr>
<td>(45) create jobs</td>
<td>0.033</td>
</tr>
<tr>
<td>(8) high probability of investment failure</td>
<td>0.031</td>
</tr>
<tr>
<td>(12) high expenditures on uncertain programs</td>
<td>0.031</td>
</tr>
<tr>
<td>(40) secure employment</td>
<td>0.031</td>
</tr>
<tr>
<td>(38) maximise profit</td>
<td>0.028</td>
</tr>
<tr>
<td>(42) make profit</td>
<td>0.027</td>
</tr>
<tr>
<td>(1) loyalty and reputation</td>
<td>0.026</td>
</tr>
<tr>
<td>(14) new markets</td>
<td>0.026</td>
</tr>
<tr>
<td>(13) bottom line is money</td>
<td>0.025</td>
</tr>
<tr>
<td>(27) international communities</td>
<td>0.024</td>
</tr>
</tbody>
</table>
Table 6.3 The ranking of the importance of the tail concepts

<table>
<thead>
<tr>
<th>‘Tail’ Concepts</th>
<th>Concept weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>(24) personal beliefs / ethics</td>
<td>0.152</td>
</tr>
<tr>
<td>(49) investments in CSR</td>
<td>0.143</td>
</tr>
<tr>
<td>(37) affordable prices</td>
<td>0.141</td>
</tr>
<tr>
<td>(20) economic market conditions</td>
<td>0.129</td>
</tr>
<tr>
<td>(26) cost at point of service</td>
<td>0.120</td>
</tr>
<tr>
<td>(21) organisational profit maximisation</td>
<td>0.113</td>
</tr>
<tr>
<td>(23) lobbying environmental organisations</td>
<td>0.075</td>
</tr>
<tr>
<td>(22) political pressure</td>
<td>0.068</td>
</tr>
<tr>
<td>(25) media</td>
<td>0.060</td>
</tr>
</tbody>
</table>

The ANP decision model

When developing the ANP model the strategic cognitive map described in the previous section was used. Since there is dependence and feedback between the different factors included with the issue of CSR programme implementation in the extractive industries, the ANP-based framework seemed to be suitable to evaluate their relative importance and is discussed in this section.

BOCR weight development

The ANP model considers different weights for the merits. In this work the merits are considered to be equally important in the assessment process. Therefore, they have the same weights. The single overall weight for each alternative was obtained using the
multiplicative analysis calculated using the ratio formula, discussed in section 3.3.3, and therefore the alternative with the highest value can be found.

**Model construction**

The overall objective of the ANP model (figure 6.5) developed in this study is to assess the importance of different factors which influence the implementation of CSR programmes in the extractive sector. Appendix I illustrates the BOCR network and the interdependence between its elements. The factors used in the evaluation process were elicited from the strategic cognitive map built in a previous part of this study. Three alternatives, namely economic advancement of communities, education and training, and environment pollution controlling plan are considered and will be evaluated according to these factors.

The stakeholder weightings have been calculated using the AHP pair-wise comparisons approach. The extractive sector’s stakeholders were determined according to the Mitchell et al. (1997) framework. The stakeholders were classified according to the three attributes of power, urgency and legitimacy. Consequently, the stakeholders have been prioritised with the definitive stakeholder scoring the highest 0.351, followed by the dominant stakeholder at 0.177, dangerous stakeholder at 0.114, the dependent at 0.100, the dormant at 0.097, the discretionary at 0.077, and the demanding stakeholder at 0.047. In order to ensure fairness in the decision making process, the stakeholders’ preferences with respect to the BOCR model have been considered proportionally to the ratings specified above.

Furthermore, four feedback networks have been determined: benefits, opportunities, costs, and risks. Each of the networks has between three and four general controlling factors which are merits of the decision (table 6.4).
These controlling factors that extractive projects can impact upon and therefore hamper sustainable development are *environmental, social, political* and *economic*. Similarly, these factors can in turn influence sustainability of extractive projects. Extractive industries have to face future challenges, among which sustainable development plays an important role. The expectations and requirements of various company stakeholders along with the preservation of the environment can be met with a CSR comprehensive business model (Vintro & Comajuncosa, 2010).

The *benefits* network reflects the advantages associated with implementation of CSR programmes. It has four controlling factors: *economic, social, political* and *environmental*. The *opportunities* network reflects potential gains associated with implementation of CSR programmes. Within this network three controlling factors, namely *economic, social* and *political* were determined as no environmental opportunities have been identified. The *costs* network reflects the disadvantages of CSR programme implementation. *Economic, social, political* and *environmental* controlling factors have been distinguished as significant and influential in terms of the implementation of CSR programmes. The *risks* network reveals potential shortcomings when implementing CSR, whereas the controlling factors within this network are *economic, social, political* and *environmental*.

In the first instance, all decision elements involved in CSR implementation were classified into benefits, opportunities, costs and risks (table 6.4). Subsequently, the controlling factors within each of the networks, discussed above, were determined. Then the elements were grouped into clusters under their respective merits in all four BOCR networks. Within all of the networks there is an *alternatives* cluster under every respective merit. The clusters with their elements are presented in table 6.4. Moreover, a detailed graphical representation of
the four sub-networks of the ANP framework is provided in Appendix 1 illustrating, respectively, benefits, opportunities, costs, and risks. Arrows connecting the elements between the clusters mark relationships between them. Inner dependence within a cluster is illustrated using a looped arc. The dependence is indicated by the direction of the arc.

Figure 6.5 The ANP decision framework
Table 6.4 The BOCR networks, the controlling factors, clusters and elements in the ANP framework and their priorities.

<table>
<thead>
<tr>
<th>BOCR</th>
<th>Control Criteria</th>
<th>Clusters</th>
<th>Elements</th>
<th>Local Priorities</th>
<th>Global Priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Stakeholders</td>
<td>Management,</td>
<td>0.1215</td>
<td>0.0053</td>
<td></td>
</tr>
<tr>
<td>(0.17501)</td>
<td>Community,</td>
<td></td>
<td>0.1159</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employees,</td>
<td></td>
<td>0.1002</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmentalists,</td>
<td></td>
<td>0.1167</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Governments,</td>
<td></td>
<td>0.0773</td>
<td>0.0033</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NGO’s,</td>
<td></td>
<td>0.0773</td>
<td>0.0033</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shareholders,</td>
<td></td>
<td>0.1071</td>
<td>0.0046</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suppliers,</td>
<td></td>
<td>0.0887</td>
<td>0.0038</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Media,</td>
<td></td>
<td>0.0995</td>
<td>0.0043</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customers,</td>
<td></td>
<td>0.0952</td>
<td>0.0041</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>Image</td>
<td>Company,</td>
<td>0.6721</td>
<td>0.0486</td>
<td></td>
</tr>
<tr>
<td>(0.28936)</td>
<td></td>
<td>Product,</td>
<td>0.3278</td>
<td>0.0237</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social responsibility</td>
<td>Development and labour,</td>
<td>0.3333</td>
<td>0.0241</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Respect for human rights,</td>
<td>0.3333</td>
<td>0.0241</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migration, resettlement and land rights</td>
<td>0.3333</td>
<td>0.0241</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>Logistics,</td>
<td>0.5000</td>
<td>0.0361</td>
<td></td>
</tr>
<tr>
<td>(0.24627)</td>
<td></td>
<td>Service</td>
<td>0.5000</td>
<td>0.0361</td>
<td></td>
</tr>
<tr>
<td>Political</td>
<td>Political stability</td>
<td>Conflict,</td>
<td>0.5000</td>
<td>0.0307</td>
<td></td>
</tr>
<tr>
<td>(0.24627)</td>
<td></td>
<td></td>
<td>0.5000</td>
<td>0.0307</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Law and regulation</td>
<td>Local,</td>
<td>0.2171</td>
<td>0.0133</td>
<td></td>
</tr>
<tr>
<td>BOCR</td>
<td>Control Criteria</td>
<td>Clusters</td>
<td>Elements</td>
<td>Local Priorities</td>
<td>Global Priorities</td>
</tr>
<tr>
<td>------</td>
<td>------------------</td>
<td>----------</td>
<td>----------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>National, International policies</td>
<td>0.4680, 0.3148</td>
<td>0.0288, 0.0193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Natural Environment</td>
<td>0.3333</td>
<td>0.0241</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Air, Land, Water</td>
<td>0.3333, 0.3333</td>
<td>0.0241, 0.0241</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vendors, Customers, Partners</td>
<td>0.3321, 0.3491, 0.3186</td>
<td>0.0240, 0.0252, 0.0230</td>
</tr>
<tr>
<td></td>
<td>Economic (0.33333)</td>
<td>Economic opportunities</td>
<td>Reduced corporate tax, Ahead of competition</td>
<td>0.5000, 0.5000</td>
<td>0.0416, 0.0416</td>
</tr>
<tr>
<td></td>
<td>Social (0.33333)</td>
<td>Social opportunities</td>
<td>Maintaining reputation, Provision of sustained development</td>
<td>0.5000, 0.5000</td>
<td>0.0416, 0.0416</td>
</tr>
<tr>
<td></td>
<td>Political (0.33333)</td>
<td>Political opportunities</td>
<td>Passing the corporate audit, Meeting IRS requirements</td>
<td>0.5000, 0.5000</td>
<td>0.0416, 0.0416</td>
</tr>
<tr>
<td></td>
<td>Economic (0.39521)</td>
<td>Stakeholders</td>
<td>Management, Community, Employees, Environmentalists, Governments, NGO’s, Shareholders</td>
<td>0.1107, 0.0927, 0.1003, 0.0974, 0.0978, 0.0936, 0.1125</td>
<td>0.0109, 0.0091, 0.0099, 0.0096, 0.0096, 0.0092, 0.0111</td>
</tr>
<tr>
<td>BOCR</td>
<td>Control Criteria</td>
<td>Clusters</td>
<td>Elements</td>
<td>Local Priorities</td>
<td>Global Priorities</td>
</tr>
<tr>
<td>------</td>
<td>-----------------</td>
<td>----------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>Social (0.19760)</td>
<td>Image</td>
<td>Company, Product</td>
<td>0.6625</td>
<td>0.0327</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3374</td>
<td>0.0166</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>Logistics, Service</td>
<td>0.5000</td>
<td>0.0247</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5000</td>
<td>0.0247</td>
</tr>
<tr>
<td></td>
<td>Social responsibilities</td>
<td>Development and labour</td>
<td>0.3333</td>
<td>0.0164</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Respect for human rights</td>
<td>0.3333</td>
<td>0.0164</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migration, resettlement, land rights</td>
<td>0.3333</td>
<td>0.0164</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Political (0.16817)</td>
<td>Political stability</td>
<td>Conflict, Corruption</td>
<td>0.5000</td>
<td>0.0210</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5000</td>
<td>0.0210</td>
</tr>
<tr>
<td></td>
<td>Law and regulation</td>
<td>Local, National, International policies</td>
<td>0.1958</td>
<td>0.0082</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4933</td>
<td>0.0207</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3108</td>
<td>0.0130</td>
</tr>
<tr>
<td></td>
<td>Environmental (0.23902)</td>
<td>Natural Environment</td>
<td>Air, Land, Water</td>
<td>0.3333</td>
<td>0.0199</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
<td>0.0199</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business Environment</td>
<td>Vendors, Customers</td>
<td>0.3333</td>
<td>0.0199</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3333</td>
<td>0.0199</td>
</tr>
<tr>
<td>BOCR</td>
<td>Control Criteria</td>
<td>Clusters</td>
<td>Elements</td>
<td>Local Priorities</td>
<td>Global Priorities</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>BOCR</td>
<td>Control Criteria</td>
<td>Clusters</td>
<td>Elements</td>
<td>Local Priorities</td>
<td>Global Priorities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Partners</td>
<td>0.3333</td>
<td>0.0199</td>
</tr>
<tr>
<td>Economic</td>
<td>(0.25000)</td>
<td>Stakeholders</td>
<td>Management, Community, Employees, Environmentalists, Governments, NGO’s, Shareholders, Suppliers, Media, Customers</td>
<td>0.0886 0.1280 0.0952 0.1098 0.1078 0.0882 0.0946 0.0920 0.0886 0.1066</td>
<td>0.0055 0.0080 0.0059 0.0068 0.0067 0.0055 0.0059 0.0057 0.0055 0.0066</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Economic (0.25000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>(0.25000)</td>
<td>Image</td>
<td>Company, Product</td>
<td>0.5000 0.5000</td>
<td>0.0312 0.0312</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Social responsibilities</td>
<td>0.3333 0.3333 0.3333</td>
<td>0.0208 0.0208 0.0208</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Development and labour</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Respect for human rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Migration, resettlement and land rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Infrastructure</td>
<td>Logistics, Service</td>
<td>0.5000 0.5000</td>
</tr>
<tr>
<td>Political</td>
<td>(0.25000)</td>
<td>Political stability</td>
<td>Conflict, Corruption</td>
<td>0.5000 0.5000</td>
<td>0.0312 0.0312</td>
</tr>
<tr>
<td>Political</td>
<td>(0.25000)</td>
<td>Local, National, International policies</td>
<td>0.1301 0.5498 0.3199</td>
<td>0.0081 0.0343 0.0199</td>
<td></td>
</tr>
</tbody>
</table>
After the framework is constructed, the interdependence between the elements needs to be indicated. The interrelationships were formulated by asking the question: ‘With respect to a specific criterion, which of a pair of criteria has more influence upon it?’ Once the links are established, pair-wise comparisons are performed and interdependency within the network between all factors is established.

Once the connections are established, clusters are weighted. Subsequently, clusters are subject to pair-wise comparisons with respect to the clusters they are linked to. This results in the formulation of a cluster matrix of priorities.

The economic benefits sub-network (table 6.5) is used as an example to discuss the detailed relationships in the system.
Table 6.5 Cluster matrix

<table>
<thead>
<tr>
<th>Cluster Node Labels</th>
<th>Alternatives</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternatives</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 6.5 portrays the cluster matrix which consists of eigenvectors derived from making pair-wise comparisons of clusters and shows the specific degree to which one cluster influences another one. In the case when a direct relationship exists between clusters, the value is 1 and when there is no relationship between clusters the value is 0.
Table 6.6 The relationships between the elements in the benefits sub-network - the un-weighted supermatrix

<table>
<thead>
<tr>
<th>Cluster Node labels</th>
<th>CSR programmes</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic advancement</td>
<td>Education and training</td>
</tr>
<tr>
<td>Economic advancement</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Education and training</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Environment protection</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Community</td>
<td>0.1145</td>
<td>0.1340</td>
</tr>
<tr>
<td>Customers</td>
<td>0.1270</td>
<td>0.0836</td>
</tr>
<tr>
<td>Employees</td>
<td>0.1149</td>
<td>0.0897</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>0.1797</td>
<td>0.0836</td>
</tr>
<tr>
<td>Government</td>
<td>0.0423</td>
<td>0.0836</td>
</tr>
</tbody>
</table>
Table 6.6 illustrates a part of the unweighted matrix portraying the intensity of the relationships between the elements of one cluster with the elements of another cluster. For instance, the implementation of the *Economic advancement CSR programme* is influenced by the community (0.1145). The cluster of alternatives *CSR programmes* is influenced by all elements of the *Stakeholders* cluster.

The weighted supermatrix (table 6.7) is determined by weighting the blocks in the unweighted supermatrix by the corresponding priority found in the cluster matrix, illustrated in table 6.5. The entries of the weighted supermatrix indicate the direct influence of any one factor upon another. Lack of interaction between factors is indicated by zeros in the matrix (table 6.7).

Table 6.7 The weighted supermatrix

<table>
<thead>
<tr>
<th>Cluster Labels</th>
<th>Alternatives</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic advancement</td>
<td>Education and training</td>
</tr>
<tr>
<td><strong>Employees</strong></td>
<td>0.1149</td>
<td>0.0897</td>
</tr>
<tr>
<td><strong>Environmentalists</strong></td>
<td>0.1797</td>
<td>0.0836</td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td>0.0423</td>
<td>0.0836</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>0.0722</td>
<td>0.1498</td>
</tr>
<tr>
<td><strong>Media</strong></td>
<td>0.1445</td>
<td>0.0760</td>
</tr>
<tr>
<td><strong>NGO’s</strong></td>
<td>0.0722</td>
<td>0.0935</td>
</tr>
<tr>
<td><strong>Shareholders</strong></td>
<td>0.0534</td>
<td>0.1038</td>
</tr>
<tr>
<td><strong>Suppliers</strong></td>
<td>0.0787</td>
<td>0.1016</td>
</tr>
</tbody>
</table>
Table 6.8 illustrates the stable priorities for the factors in the economic benefits sub-network. Factor priorities, as well as alternatives priorities, are extracted and normalised from this limit supermatrix.

Table 6.8 Limit supermatrix

<table>
<thead>
<tr>
<th>Cluster Node labels</th>
<th>CSR programmes</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic advancement</td>
<td>Education and training</td>
</tr>
<tr>
<td>CSR programmes</td>
<td>0.1632</td>
<td>0.1632</td>
</tr>
<tr>
<td>Education and training</td>
<td>0.1526</td>
<td>0.1526</td>
</tr>
<tr>
<td>Environment protection</td>
<td>0.1841</td>
<td>0.1841</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>0.0579</td>
<td>0.0579</td>
</tr>
<tr>
<td>Community</td>
<td>0.0476</td>
<td>0.0476</td>
</tr>
<tr>
<td>Customers</td>
<td>0.0501</td>
<td>0.0501</td>
</tr>
<tr>
<td>Employees</td>
<td>0.0583</td>
<td>0.0583</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>0.0386</td>
<td>0.0386</td>
</tr>
<tr>
<td>Government</td>
<td>0.0386</td>
<td>0.0386</td>
</tr>
</tbody>
</table>

In the limit supermatrix the values in the columns are the same. In order to calculate the final local priorities, the factors’ priorities need to be normalised to one for each cluster in the columns of the matrix. For instance, the Management factor in the Stakeholders cluster in economic benefits subnetwork is considered of the highest importance with 0.1215 or 12.15% as shown in table 9. The second is Environmentalists 0.1167 or 11.67 %, followed by Community with 0.1159 or 11.59%, followed by Shareholders with 0.1071 or 10.71%.

262
Table 6.9 Priorities for the elements in the benefits economic subnetwork

<table>
<thead>
<tr>
<th>Cluster Name</th>
<th>Factors</th>
<th>Normalised By Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternatives</strong></td>
<td>Economic advancement</td>
<td>0.3264</td>
</tr>
<tr>
<td></td>
<td>Education and training</td>
<td>0.3053</td>
</tr>
<tr>
<td></td>
<td>Environment protection</td>
<td>0.3682</td>
</tr>
<tr>
<td><strong>Stakeholders</strong></td>
<td>Community</td>
<td>0.1159</td>
</tr>
<tr>
<td></td>
<td>Customers</td>
<td>0.0952</td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td>0.1002</td>
</tr>
<tr>
<td></td>
<td>Environmentalists</td>
<td>0.1167</td>
</tr>
<tr>
<td></td>
<td>Government</td>
<td>0.0773</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>0.1215</td>
</tr>
<tr>
<td></td>
<td>Media</td>
<td>0.0995</td>
</tr>
<tr>
<td></td>
<td>NGO's</td>
<td>0.0773</td>
</tr>
<tr>
<td></td>
<td>Shareholders</td>
<td>0.1071</td>
</tr>
<tr>
<td></td>
<td>Suppliers</td>
<td>0.0887</td>
</tr>
</tbody>
</table>

Subsequently, the overall priorities for the factors are calculated by weighting the local priorities by the priority of the economic (0.1750) and benefits (0.2500) merits. For instance, for the economic advancement the calculation is $0.32647 \times 0.17501 \times 0.25000 \approx 0.01428$. Similarly, the overall priority for the Management is $0.12159 \times 0.17501 \times 0.25000 \approx 0.005319866$, and for the Community is $0.11598 \times 0.17501 \times 0.25000 \approx 0.005074415$. The overall priorities for all the factors in the decision-making framework have been calculated in this way (see table 6.4).
Chapter 6

Obtaining the overall outcome

In the final step of the proposed framework, the multiplicative synthesis has been applied to generate the final decision outcomes. The alternative values for benefits and opportunities sub-networks are multiplied; later the result is divided over the values obtained from the costs and risks sub-networks. The highest priority has been found to be the Environment protection programme (0.5084), followed by Economic advancement of communities (0.3038) and Education and training (0.1877) (see table 6.10).

Table 6.10 Synthesis of results

<table>
<thead>
<tr>
<th>Alternative CSR investments</th>
<th>Overall priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment protection programme</td>
<td>0.5084</td>
</tr>
<tr>
<td>Economic advancement of communities</td>
<td>0.3038</td>
</tr>
<tr>
<td>Education and training</td>
<td>0.1877</td>
</tr>
</tbody>
</table>

Application of Knapsack approach to resources allocation

In this research the Knapsack optimisation framework is proposed to allocate resources under constraints. The method discussed in chapter 3 proves to be flexible, generic and systematic. It allows consideration of different stakeholders’ objectives in strategic prioritisation of CSR investment options and optimisation of scarce resources. Once the priorities of CSR programmes have been established, it is crucial to identify how to allocate resources across alternatives to produce the maximum benefit for the organisation. CSR programmes have to be analysed in terms of how strongly they meet company’s objectives and what is the cost of their implementation. On some occasions, two CSR programme alternatives may accrue greater benefit than implementing one.
The input to the knapsack method is the overall CSR programme alternatives obtained using the ANP (table 6.10). The total resources available are the second input (table 6.11). The third input are the resources required to implement each CSR programme (table 6.12).

Table 6.11 Resources available

<table>
<thead>
<tr>
<th>Money (£)</th>
<th>Personnel (No. of staff involved)</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>100,000</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Table 6.12 Resource requirements

<table>
<thead>
<tr>
<th>Alternative CSR investments</th>
<th>Money (£)</th>
<th>Personnel (No. of staff involved)</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment protection programme</td>
<td>90,000</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Economic advancement of communities</td>
<td>30,000</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Education and training</td>
<td>20,000</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Since the objective is to maximise the utility, the method starts by choosing the CSR programme with the highest utility, according to table 6.10, *Environment protection programme* (0.5084). Taking into consideration the resources available (table 6.11) and the resources required for the implementation of the *Environment protection programme* (table 6.12), the resources available after this CSR programme implementation (table 6.13) can be computed as follows:

Money= 100,000-90,000= 10,000

Personnel= 5-3= 2

Time= 50-30= 20
Table 6.13 Resources available after implementation of “Environmental protection programme”

<table>
<thead>
<tr>
<th>Value</th>
<th>Money (£)</th>
<th>Personnel (No. of staff involved)</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>10,000</td>
<td>2</td>
<td>20</td>
</tr>
</tbody>
</table>

Having an amount of resources as indicated in table 6.11 it is not possible to implement any other CSR programme as their implementation requires more resources as indicated in table 6.12.

Alternatively, the decision maker can decide to implement the *Economic advancement of communities* programme and *Education and training* programme. The utility gain would be (0.3038 + 0.1877 = 0.4915). The utility is not much lower than when employing the *Environmental protection* programme (0.5084). Resources available after the implementation of the *Economic advancement of communities* programme and *Education and training* programme are illustrated in table 6.14.

Table 6.14 Resources available after implementation of “Education and training” and “Economic advancement of communities”

<table>
<thead>
<tr>
<th>Value</th>
<th>Money (£)</th>
<th>Personnel (No. of staff involved)</th>
<th>Time (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50,000</td>
<td>50,000</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

This iteration illustrates that although the *Environment protection programme*, the best ANP option, is desirable, but given the resources requirements, similar utility (satisfaction) can be obtained and less resources consumed by implementing the second and third best options instead. This iteration is based on the dynamic programming approach.
6.4 Distinctive features of the synthesis

This study attempts to apply CM to model the problem situation and ANP/AHP to incorporate multiple stakeholder objectives, to give weights to the important concepts and objectives, and to enable CSR programme implementation. This work proposes a synthesis of approaches to ensure fair, effective management of the needs of various stakeholders, whilst satisfying the prerequisites of acquiring societal benefit and obtaining competitive advantage for business. Despite their undisputable advantages, both methods have some limitations due to their inherent assumptions. It is a mistake to try and fit a problem in the method rather than vice versa. Therefore, a hybrid approach where the drawbacks of one method can be overcome with strengths of another is suggested. For a mutual benefit of approaches, CM, which is no evaluation tool (Montibeller & Belton, 2009), can be successfully applied with AHP and ANP (Salo & Hämäläinen, 1997). The problem-structuring phase accompanied by CM feeds well into a technical environment of MCDA, and specifically into software-driven ANP analysis (Wolfslehner & Vacik, 2011). Evaluation of alternatives and preference-driven information of stakeholders can be carried out with a quantified ANP decision analysis employing network structures.

The creation of a conceptual framework using an aggregated cognitive map, provides a structured and proven way of viewing the problem from multiple perspectives and studying it carefully prior to any ANP modelling. Hence, ‘group think’ can be prevented and creativity fostered throughout the process. Application of cognitive mapping allows deconstruction of a complex problem into its elements and in consequence makes it more controllable, and fosters rational decision-making.
Chapter 6

6.5 Conclusions

Through the joint application of these techniques, decision makers can be provided with a better understanding of the problem area. The uncertainty in their judgements can be either fully eliminated or at least diminished. A mixed-methods approach allows the application of the techniques which are best suited to the decision problem. As a result, better models can be produced as the techniques can inform and enrich each other (Ackermann et al., 1997). Using several methods in conjunction may aid in the framework’s validation.

Formal modelling approaches such as CM introduce a great degree of creativity, flexibility and transparency in the decision-making process. In order to build a rigorous, objective framework structure, a number of gaps in the decision problem have to be explored. The use of a cognitive map in conjunction with the ANP methodology allows a dialogue which can increase the group’s confidence in the framework. Because of the rigorous character of each modelling method, decision makers can fully understand the weaknesses of each method and value their strengths.

6.6 Chapter summary

This chapter has proposed the decision making framework to allocate resources to CSR programmes and illustrated the application of the framework in the extractive sector. In its first part the decision support framework was discussed (section 6.2), followed by the analysis of data and presentation of results in the second part (section 6.3). In its final part the distinctive features of the synthesis were presented (section 6.4). In the next chapter the author seeks to validate the framework for optimal allocation of resources to CSR programmes.
Part III: Bottom-up: Framework Consistency Check

This part of the thesis checks the consistency of the decision-making framework for resources allocation to corporate social responsibility (CSR) programmes from a bottom-up perspective by practitioners from various industries. It is argued that the framework is generic. Its adoption and adaptation can be understood, and is shown to be feasible, useable and useful.
Chapter Seven – Consistency Assessment of the Hybrid Decision Support Framework
Chapter 7

The objective of this research as posed in chapter one was to develop a decision support framework for resources allocation to CSR programmes. The previous chapter 6 discussed the framework developed in this research. This chapter reports on the validation process of the hybrid and integrated approach to implement CSR in organisations. The validation is a matter of robustness. It needs to be emphasised that this research is checking how methods fit together. Hence, validation in this work aims to assess how consistent are the methods together within the framework. The validation in this chapter is hypothetical. It would be highly beneficial to further test the framework with the company in the future.

Firstly it provides background to the study (section 7.1). Subsequently, an overview of the consistency assessment approach and the rationale behind the adopted approach are discussed (section 7.2). Followed by the discussion of the consistency assessment questionnaire and its development (section 7.2.1), panel of professionals (section 7.2.2), participants’ response (section 7.2.3) and findings (section 7.2.4) are explained. The final section summarises the chapter (7.3). Figure 7.1 illustrates chapter 7 within this thesis.

![Figure 7.1 Chapter seven within this thesis](image-url)
7.1 The hybrid integrated framework overview

The decision making framework proposed in this research combines the problem-structuring method CM with MCDA techniques, fuzzy logic, and the Knapsack approach. This hybrid framework supports integration of diverging objectives of multiple stakeholders, with conflicting criteria, in a company’s strategic management and selection of CSR programmes for implementation. The prioritisation of options aims to build a portfolio that provides the best overall value for a given budget. The integrated framework discussed in detail in chapter 5 and 6 provides a practical approach for sustainability principles’ implementation into strategy in organisations. The hybrid framework proposed in this work, incorporating economic, social, political and environmental criteria, was developed due to the lack of frameworks capable of integrating CSR in practice, as identified in the literature review in chapter 2. It can facilitate stakeholder engagement in the light of an increasing pressure from different stakeholder groups such as local and global communities, governments, NGOs, customers, etc. calling for more sustainable practices (Wheeler et al., 2002).

7.2 Framework consistency assessment adopted in this research

No uniform consistency assessment methodology exists for all models (Gass, 1983). Therefore, the adopted technique has to be dependent upon the problem situation being analysed and the specificity of the model being used. In this work, the constructivist perspective to MCDA modelling has been followed as suggested, for instance, in Montibeller (2005) requiring the involvement of participants in the process of problem structuring. Therefore, the constructivist perspective facilitated the development of participants’ preferences and arrival at a requisite framework guided by sensitivity analysis which is facilitative in nature. In contrast to the realist view of modelling, the constructivist
Chapter 7

perspective allows constructing decision-makers references during the MCDA modelling process rather than attempting to discover them in decision-makers minds. Therefore, the constructivist view has been adopted in this work as it is widely accepted in the operations research domain. This work in its design attempted to reach beyond the boundaries of the constructivist perspective to validate the MCDA intervention. An effort has been made to rigorously evaluate the decision problem, to verify whether the claims have been achieved, to appraise the alternative options available as well as present their intrinsic qualitative nature during two MBA Master classes in Decision Analysis at the University of Portsmouth. The consistency of the framework for resources allocation to CSR programmes was assessed with the help of decision makers during these two Master classes held in May 2013 in order to obtain participants’ comments about the hybrid integrated framework. The participants were from the Executive and International cohorts of the MBA course and can be considered as legitimate validators due to their familiarity with decision analysis and CSR practices. After carefully scrutinising the different techniques, face validity (as discussed in chapter 4) has been considered the most appropriate consistency assessment method and therefore was used in this research. Acquiring professionals’ knowledge was vital to validate the hybrid framework and check its suitability for industry application. The aim of consistency assessment was to measure the feasibility of models in terms of adequacy, clarity and robustness. The approach considered most appropriate for this research was a focus group. Focus groups are a way of data collection through group discussion where the researcher plays an active role in stimulating the group interaction (McLafferty, 2004). In addition, the consistency of the framework in this research was verified by checking inputs (parameters) and outputs of the models, as well as sensitivity analysis. The model inputs were real values obtained for tangible criteria. Subsequently, they were incorporated into
AHP in order to generate criteria weights. Therefore, the input data can be considered reliable and the AHP outputs can be justified with the aid of sensitivity analysis.

A detailed description of the consistency assessment approach employed in this research is presented below. The following sections discuss the development of the questionnaire, the selection of a professionals’ panel and their response to the questionnaire as well as findings.

### 7.2.1. The consistency assessment questionnaire and its development

The subsequent stage involved development of a questionnaire which required the knowledge and opinions of professionals on the subject matter (Appendix J). The questionnaire was designed bearing in mind several important aspects, as outlined in Gass (1983), which are accuracy and precision, completeness, transparency, and cost effectiveness. The respondents have been invited to answer questions regarding the importance of the problem of CSR practices in the extractive sector, the capability of the decision support framework to address this issue, the ease and effort of the framework implementation, the completeness and comprehensibility of the decision support framework, as well as the adequacy of the techniques used. The respondents were invited to contribute their extensive knowledge and use their expertise to ensure a high degree of accuracy and precision of the framework. The degree of the comprehensiveness of the framework has been taken into account along with its transparency and ease of use. Finally, the cost-benefit ratio has been considered, that is the extent to which the benefits of the framework implementation outweigh the costs (Gass, 1983). The consistency assessment process is discussed in detail in the next section.
Chapter 7

7.2.2. Panel of professionals

Constructive and appropriate comments were obtained from professionals possessing relevant expertise in the field. Therefore, two groups of decision makers from the University of Portsmouth Executive MBA were invited to participate in this study. The participants had extensive work experience and knowledge of sustainability implementation in various sectors, and were employed on a full-time basis in a broad range of industries. The consistency check of the framework undertaken with the help of practitioners from various disciplines demonstrates the framework’s transferability to other sectors. The aforementioned participants in the study possessed significant work experience, expertise and knowledge of the field, along with their academic and professional qualifications. The purpose of the consistency assessment was clearly explained to the individuals and they were familiarised with the research. Participants were also familiar with the MCDA tools and techniques and thus a good response rate was ensured. Prior to the distribution of the questionnaire, the participants were presented with a description of the framework, the application of the methodology and framework’s outcomes. Subsequently, they received the assessment questionnaire with a brief covering letter, stating the purpose of the research and the idea behind the consistency assessment process. It was clearly explained what was required from them and the analysis of their responses is presented in table 7.2.
### Table 7.1 Panel of professionals

<table>
<thead>
<tr>
<th>Participant no.</th>
<th>Sector</th>
<th>Expertise</th>
<th>Years of experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Public sector</td>
<td>Ministry of Defence, Armed Forces, Civil servant</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Student</td>
<td>Finance</td>
<td>8 months</td>
</tr>
<tr>
<td>3</td>
<td>Defence</td>
<td>Engineer/ Project Manager</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>IT</td>
<td>Software Lead Engineer</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Oil &amp; Gas</td>
<td>Asset Maintenance and Reliability Engineer</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Public sector</td>
<td>State Audit of Vietnam, Auditor</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Construction</td>
<td>Building Management Systems, Manager</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Finance</td>
<td>Banking, Manager</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>Student</td>
<td>Finance</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Public sector</td>
<td>Fire Service, Fire fighter</td>
<td>15</td>
</tr>
<tr>
<td>11</td>
<td>Retail</td>
<td>Entrepreneur</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Public sector</td>
<td>Civil servant</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>Student</td>
<td>Tourism</td>
<td>3</td>
</tr>
</tbody>
</table>

### 7.2.3. Participants’ response

Professionals familiar with sustainability implementation and decision analysis techniques were approached in an effort to test the framework’s robustness. They were presented with a summary of results of the MCDA framework and asked questions regarding the reasonableness of the framework. A total of twelve questions were included in the questionnaire and further elaboration was invited. The questions were accompanied by the graphical representation of the framework and a detailed explanation of CSR alternative options. Every effort was made to clarify the theme, concepts, and structure of each
question. The respondents had sufficient opportunity to ask questions. The summary of the respondents’ response is provided in table 7.3.
Table 7.2 Summary of respondents’ response

<table>
<thead>
<tr>
<th>Validation criteria</th>
<th>Participant response</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>Validation %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of the problem</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>High</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>Very high</td>
<td>100%</td>
</tr>
<tr>
<td>Capability of addressing the problem of resources allocation in CSR</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>Capable</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Easiness of implementation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>85%</td>
</tr>
<tr>
<td>Framework comprehensibility</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100%</td>
</tr>
<tr>
<td>Framework completeness</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Not sure</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>85%-93%</td>
</tr>
<tr>
<td>Adequacy of methods/tools applied to address the problem</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Not sure</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100%</td>
</tr>
</tbody>
</table>
Importance of the resources allocation problem

The respondents were asked whether they considered the resources allocation to CSR programmes as an important problem. All participants found the problem of resources allocation as important. Seven out of 13 respondents found the problem to have a very high degree of importance and the remaining six found the problem to be important.

Capability of the framework to address the issue of resources allocation to CSR programmes

Subsequently, participants were invited to assess the capability of the decision support framework offered in this research to address the problem of resources allocation to CSR programmes. In their answers all respondents have found the framework to be highly capable of addressing the issue.

Effort of framework implementation

The effort of framework implementation, in terms of cost, time, and personnel has also been a subject of participants’ assessment. Twelve respondents have found the implementation of the framework to be reasonable, and one of the participants found the implementation effort to be too high.

Suitability of CSR programmes alternatives

Furthermore, respondents were invited to assess the completeness and comprehensibility of the framework, specifically the suitability of the CSR programme alternatives suggested. Most of the respondents have found the three CSR programmes proposed as all relevant options. Twelve respondents found the three options to be sufficient. One of the
participants disagreed with the statement. As a supplementary comment the possibility of adding an additional CSR alternative related to technology has been invited.

**Identification of relevant stakeholders**

Identification of the stakeholders was also subject to participants’ assessment. Respondents were asked whether the stakeholders in the framework, to include management, community, employees, environmentalists, government, NGOs, shareholders, suppliers, media, and customers, are all relevant stakeholders. All thirteen respondents agreed that the proposed stakeholders are all crucial stakeholders. However, the possibility of inclusion of another stakeholder was proposed, for instance, competition.

**Acceptability of objectives**

The respondents were invited to assess whether the four major objectives, economic, political, environmental, and social, are a fair representation of what is required to implement sustainable development in the sector. Eleven respondents replied “Yes”, one answered “No”, and one was unsure. Supplementary comments included a possibility of adding technology as an additional objective in the framework. Technology was claimed to be a crucial determinant in the extractive industry which can decide on the extent to which the project impacts upon the environment.

**Representation of four major objectives by twenty sub-objectives**

Participants were asked whether the twenty sub-objectives selected to define sustainable development practices in the sector reasonably represented the problem situation. All thirteen participants agreed that the sub-objectives adequately represent the objectives. Supplementary comments included a possibility of adding additional sub-objectives, such as
marketing’. The importance of the ‘corruption’ sub-objective was questioned by respondents. Respondents also suggested adding the ‘global warming’ sub-objective.

**Overall framework structure**

The overall framework structure was also subject to assessment. Participants were asked whether they consider the framework to include all relevant matters of importance. Respondents agreed that they do find the overall framework’s structure reasonable. It was, however, suggested that the ‘customer expectation’ should be strengthened in the framework as CSR is now expected by customers and therefore, their view as a clear driver has to be highly visible.

**Adequacy of methods used to rank CSR programmes**

Additionally, participants were asked about the adequacy of the techniques applied to rank CSR alternatives and select the portfolio of them for implementation. Three participants found the methods applied in this study to be very suitable. Nine participants considered these techniques to be suitable and one participant was not sure of their suitability due to his lack of familiarity with MCDA methods.

**Suggestions of alternative approaches**

Respondents were asked to suggest alternative methods for ranking of CSR programmes. Eight respondents would not select other techniques to rank CSR options. The remaining five respondents were aware of the existence of other tools; they would, however, apply the tool offered in the study. Due to their interest in MCDA methods, they would also be interested in the application of alternative MCDA methods as a means of comparison.
Additionally, participants inquired about any disadvantages of the methods proposed in the study.

*General suggestions for framework improvement or regarding the techniques used*

The last question inquired about any additional suggestions that respondents may have regarding improvement of the framework or applicability and adequacy of techniques used. Participants found the framework and techniques in accord with their expectations and appropriate for ranking of CSR programmes and selecting a portfolio of them for implementation. The general comments found the framework to be suitable. Overall, the participants were reasonably satisfied with the framework, and where criticisms have been raised, the approach appears to be defensible due to the high degree of consistency suggested by professionals. The face validity testing and the focus group testing in general enhance the credibility of the resources allocation framework.

*7.2.4. Findings*

To assess the framework’s overall reliability for its intended tasks it was vital to recognise that the MCDA analysis of environmental and natural resource management issues requires an appropriate approach for evaluation. To build confidence in the resources allocation framework, three stages of testing the methodology, consistency assessment of framework and sensitivity analysis have been performed. The face validity and focus group approaches involved eliciting judgements of professionals about various analysis aspects. Professionals’ judgements were generally supportive of the modelling process. Despite the complexity of the MCDA approaches applied in this study, the framework analysis can be considered robust as it incorporates preferences of various stakeholder groups. The framework’s credibility was enhanced through the consistency assessment process and it can be stated
that validation, in general, is a useful approach. It demonstrated that the framework is an adequate representation of the real system and serves the purpose for which it was designed. The results of sensitivity analysis provided further confidence in the framework.

7.3 Chapter summary

This chapter reports on the assessment of consistency of the framework for resources allocation to CSR programmes. In its first part, the overview of framework is given, followed by the explanation of the consistency check adopted in this work. The comments of participants on the framework are offered and their views with respect to framework’s accuracy, comprehensiveness, transparency and cost effectiveness are presented. The following chapter will offer concluding remarks for this research whilst presenting the contribution that this work has made to the body of knowledge. Limitations of this work and future research opportunities will also be discussed.
Part IV: Conclusions

This part concludes the thesis by reflecting on its contributions and suggestions for future work.
8 Chapter Eight - Conclusions
Chapter 8

This thesis proposes an innovative decision-making framework built of a set of methodologies that may prove useful in formulating strategy for CSR resources allocation. Several studies were conducted to understand the issue of CSR practices and implementation. Two models were developed to construct a framework aiding decision making in scarce resources allocation: (i) a dynamic methodology of stakeholder identification and salience; and (ii) a hybrid MCDA framework to optimally allocate resources to CSR programmes. In the first model, two methodologies were proposed to assess stakeholders’ salience. The two methodologies were compared and contrasted to show the usefulness of both tools in the CSR context, and to illustrate that, if applied jointly, they produce improved results. In the second model, an approach to prioritise CSR programmes was proposed, and a set of methodologies - CM, AHP, ANP, and the Knapsack approach - were proposed. The model offered a new perspective on CSR programme selection via prioritisation. Appendix K provides a list of articles submitted for publication illustrating the application of the two aforementioned models in the CSR context.

In this chapter, the main findings of the two consequent studies are summarised (section 8.1), and a relationship between the findings and the research questions is outlined. Then research limitations and future research avenues are commented upon (section 8.2). By summarising the main study findings, the contribution to theory in the fields of CSR and decision analysis methods is outlined. Finally, concluding remarks are provided (section 8.3). Figure 8.1 illustrates chapter 8 within the thesis.
8.1 Main findings and implications

8.1.1. Corporate Social Responsibility practices

The need for companies to become socially responsible has been a widely discussed topic dating back to the 1950s (Bowen, 1953). The development of an unbiased CSR definition remained a challenge as no appropriate methodology was identified which would enable the verification of the concept (Dahlsrud, 2008). In chapter 2 the literature on CSR was reviewed and several theories and concepts around CSR were investigated. What is more, the literature review revealed a lack of systematic methods to implement CSR into strategy, to allocate resources and to prioritise stakeholders’ conflicting objectives in the light of multiple conflicting criteria. It came to light that there is a need for consistent decision-making in the CSR context and hence that operational tools could be of use.

Since there are a number of theories and concepts around CSR, the characteristics of some important CSR theories, discussed in chapter 2, were analysed using the AHP and fuzzy logic methodologies. The outcomes of the analysis have been discussed in chapter 5 to understand and analyse these new developments, and a quantitative dynamic methodology to enable a critical analysis and evaluation of CSR theories was proposed. Distinctive characteristics of some important CSR theories have been outlined using the decision
analysis methods. The findings from chapter 2 and chapter 5 answer the first research question (What are the CSR paradigms capable of facilitating sustainability implementation?), and the second research question (What are the factors influencing corporate decision-making processes in resources allocation to CSR investments?). Table 8.1 illustrates the relationship between findings and the research questions.

Table 8.1 Research questions and findings

<table>
<thead>
<tr>
<th>No.</th>
<th>Research questions</th>
<th>Chapter related</th>
<th>Main contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What are the CSR paradigms capable of facilitating sustainability implementation?</td>
<td>Findings of chapters 2 and 5</td>
<td>(1) An innovative approach combining AHP and fuzzy logic to analyse CSR theories and concepts, which is comprehensive taking into account existing theories and concepts and their characteristics. A general approach that can be transferred to other industries/sectors. (2) A theoretical contribution to the CSR field: a dynamic framework capable of monitoring the effects of varying the priorities of different criteria has been developed.</td>
</tr>
<tr>
<td>2</td>
<td>What are the factors influencing corporate decision-making processes in resources allocation to CSR investments?</td>
<td>Findings of chapter 2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>What are the decision-making tools to aid allocation of resources to CSR programmes?</td>
<td>Findings of chapter 3</td>
<td>(1) Decision analysis tools that can be applied in the CSR context are studied; (2) The process of resources allocation and integrated frameworks to allocate resources are examined; (3) The benefits of decision analysis tools and their limitations are highlighted; (4) The integrated use of several tools to eliminate their individual drawbacks is proposed.</td>
</tr>
<tr>
<td>4</td>
<td>How can the process of resources allocation to CSR programmes be improved?</td>
<td>Findings of chapter 3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>How can managers identify and prioritise important stakeholders?</td>
<td>Findings of chapter 5</td>
<td>(1) Application of two new methodologies to assess stakeholders’ importance in the CSR</td>
</tr>
<tr>
<td>No.</td>
<td>Research questions</td>
<td>Chapter related</td>
<td>Main contributions</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>stakeholders with often diverging objectives?</td>
<td></td>
<td>context. The methods are compared and contrasted, and their joint use is recommended to obtain high accuracy. It was shown that fuzzy logic methodology can generate more precise results, which is a significant methodological contribution. It is implied in this thesis that the separate approaches, fuzzy logic and MCDM, can be also used integratively to prioritise stakeholders. The joint use of methods generates best results and reduces methods’ limitations. (2) By engaging different stakeholder groups in the framework and incorporating their preferences in the decision-making process, a contribution to the stream of research on fairness and trust in decision-making was made. (3) The application of MCDM in social sciences in itself is a contribution, as the MCDM methods have been traditionally used in the field only to a limited extent due to the methodological background of the scientist involved. Furthermore, the application of decision analysis methods in a CSR context (in particular) in this thesis is a contribution to knowledge as it has facilitated the bridge between the two fields.</td>
</tr>
<tr>
<td>6</td>
<td>What should be the decision-making framework aiding evaluation and selection of portfolio of CSR</td>
<td>Findings of chapters 5 and 6</td>
<td>(1) Several new methodologies were applied to model the complexity of the CSR implementation, and a hybrid framework was delivered in the process; (2) It was illustrated how each of the methods can eliminate</td>
</tr>
<tr>
<td>No.</td>
<td>Research questions</td>
<td>Chapter related</td>
<td>Main contributions</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td>programmes for implementation?</td>
<td></td>
<td>drawbacks of another; (3) A framework to allocate resources to CSR programmes in an operational way was delivered; (4) The framework is flexible, generic and systematic, which is a contribution of this thesis. It considers different stakeholders, their objectives, multiple criteria, strategic CSR investment options, and optimises the scarce resources allocation process.</td>
</tr>
<tr>
<td>7</td>
<td>How to validate the credibility and robustness of the framework?</td>
<td>Findings of chapter 7</td>
<td>The framework proved effective to rank CSR investment projects and to obtain a multi-criteria knapsack solution to optimise CSR programmes’ selection.</td>
</tr>
</tbody>
</table>

In this work it was shown that a hybrid integrated framework for sustainability implementation can be successfully envisioned through the Pyramid of Social Responsibilities (Carroll, 1991) and Stakeholder Theory (ST) (Freeman, 1984). Through ST the engagement of stakeholders to whom the organisation has a responsibility, relationship, or dependency (Freeman, Wicks & Parmar, 2004) can be explained. This relationship has high significance in the hybrid framework, in the data as well as in the sustainable development of the sector and in achieving a company’s competitive edge. Additionally, through the CSR pyramid such phenomena as economic, legal, ethical, and discretionary responsibilities are considered (Carroll, 1991). These responsibilities are taken into account in the hybrid integrated framework for sustainability implementation in a similar way to how they have been considered in other models. This study goes further by providing an
approach to enable the company to operationalise these responsibilities through a hybrid integrated framework.

Furthermore, the environmental, social, economic, and political implications of the industry operations outlined in chapter 2 have highlighted the need for companies to adjust their business management processes. There is also a growing requirement, as emphasised in chapter 2, to employ tools that can facilitate the operationalisation of CSR and its integration into business models.

In summary, the main contributions of this part of the thesis are: (1) an innovative approach combining AHP and fuzzy logic to analyse CSR theories and concepts, which is comprehensive taking into account existing theories and concepts and their characteristics. Moreover it is a general approach that can be transferred to other industries/sectors. (2) A theoretical contribution to the CSR field is made, in the sense that a dynamic framework capable of monitoring the effects of varying the priorities of different criteria has been developed.

8.1.2. Decision Analysis tools to integrate Corporate Social Responsibility into corporate business models

As mentioned before, the main focus of this thesis is upon decision support tools to operationalise corporate CSR investment practices. In chapter 3, several decision analysis tools have been studied. The findings of chapter 3 answers the third research question (What are the decision-making tools to aid allocation of resources to CSR programmes?), and the fourth research question (How can the process of resources allocation to CSR programmes be improved?). In this chapter, decision analysis methods have been reviewed and a handful of tools have been proposed, to include CM, AHP, ANP, fuzzy logic, and the
knapsack approach. The benefits of applying these methods and their limitations have been considered.

The findings of chapter 3 revealed that the stream of research on decision analysis focuses on the application of single (Ostrega, 2010; Uberman & Ostrega, 2005) as well as multiple decision analysis methods (Tsai & Chou, 2009; Tsai, Hsu, Chen, Lin, & Chen, 2010; Tsai & Hsu, 2008). In terms of the application of single decision analysis tools, the Brice and Wegner (1989) study, for instance, applied AHP to allocate organisational resources to competing demands in the area of CSR. The usefulness of their approach is illustrated with two case studies of South African organisations, one of which was a company operating in the extractive sector. They demonstrate how the preferences and perceptions of decision makers can be translated into quantitative measures with the aid of a single decision analysis tool. At the broad level their framework is simple. It considers the criteria and CSR programmes relevant for the South African mining company. They propose allocation of resources based on the outputs of the AHP model. However, the approach proposed in this work is more advanced as it involves a greater degree of complexity. This thesis offers an instrument that takes into account the wider problem context through an application of several tools. It contributes by offering a precise assessment of stakeholder importance that incorporates the uncertainty often present in the decision making process. The hybrid approach offered in this thesis also enables the elimination of the aforementioned methods’ drawbacks, for example vagueness and imprecision in decision making. Another set of similar studies revealed in the course of the literature review is by Andriantiatatsaholiniaina et al. (2004) who employed fuzzy logic to evaluate sustainable development strategies and Kouikoglou and Phillis (2011) who proposed a model based on fuzzy logic methodology to
measure companies’ sustainability performance. In their research Kouikoglou and Phillis employed sensitivity analysis to find the most crucial indicators affecting sustainability and illustrated the usefulness of their model with two case studies of cement companies. Despite some similarities in these studies there are fundamental differences between them and this thesis. As implied in chapter 2, the literature review identified a set of problems in the CSR context that necessitate the application of a collection of methods. As none of the previous studies addressed the methods’ drawbacks, nor engaged different stakeholder groups, nor ensured fairness throughout the decision making process, in chapter 3 a need for an integrated set of tools was proposed.

In terms of studies on multiple decision analysis tools, Tsai et al. (2010) carried out research focused on the application of multiple decision analysis tools. They used hierarchical structures to model CSR in the hotel industry. An integrated approach combining such techniques as the Decision Making Trail and Evaluation Laboratory method (DEMATEL), ANP/AHP, Zero-one Goal Programming (ZOGP), and Activity-Based Costing (ABC) was used in their study to select CSR programmes and evaluate costs in the hotel industry. An analytic structure was created for CSR programme selection which helped to identify costs and benefits criteria as well as relevant stakeholders. DEMATEL was applied to uncover the relationships and construct a network structure among costs and benefits criteria. ANP/AHP and ZOGP methods were employed to select CSR programmes under limited resources and constrained situations. Cost evaluations were undertaken with the ABC method. Similarly, Tsai and Hsu (2008) offered a hybrid framework of CSR programmes’ choice and costs assessment in the airline industry. Tsai and Chou (2009) demonstrated a hybrid framework for selection of management systems under resource constraints.
In contrast, this study offers an objective approach to allocate resources under constraints to strategic CSR programmes taking into consideration the local communities’ needs and using a different selection of decision analysis tools. The joint use of the methods proposed in this work allows elimination of their drawbacks and increases the credibility of the framework. As many existing approaches to CSR are disconnected from business and strategy, there are failed opportunities for companies to benefit society (Porter & Kramer, 2006). In contrast to other work in this field, the literature review undertaken in chapter 3 revealed a need to apply an integrated approach combining CM, AHP/ANP, and fuzzy logic to optimally allocate resources to the knapsack problem by taking account of the diverging preferences of stakeholders. Because society and business are highly dependent (Porter & Kramer, 2006) and resources in CSR activities are limited (Tsai et al., 2010), this work uses a hybrid approach to satisfy the abovementioned prerequisites, and to acquire societal benefit and competitive advantage concepts. The findings of chapter 3 indicated that an application of several decision analysis tools is required to eliminate shortcomings of decision analysis techniques. Apart from the application of AHP, this work applied problem structuring methods such as CM, as well as ANP, fuzzy logic, and the Knapsack method. The outputs from one method serve as inputs to another. For instance, the weights obtained from an ANP framework are used as resources weights employed in the knapsack approach.

In summary, the main contributions of this part of the thesis are: (1) Decision analysis tools that can be applied in the CSR context are studied; (2) The process of resources allocation and integrated frameworks to allocate resources are examined; (3) The benefits of decision analysis tools and their limitations are highlighted; (4) The integrated use of several tools to eliminate their individual drawbacks is proposed.
8.1.3. Assessing Stakeholders’ Salience using the Dynamic Methodology

Traditionally in social sciences (in general) and in a CSR context (in particular), there is a lack of applications of artificial intelligence (AI) and decision-making methodologies. In chapter 5, two different methodologies have been employed to identify and prioritise stakeholders’ salience: (i) fuzzy logic; (ii) AHP. Fuzzy logic and AHP methodologies are new applications of decision-making methodologies in this field. They can be used separately, however, the joint integrative use generates better outcomes. Through the integrated use of methodologies, the limitations present in their mono-applications are minimised. As outlined in chapter 5, in many real-world situations, managers are faced with a number of stakeholders who often have conflicting objectives and require prioritisation. Hence, the findings from the study documented in chapter 5 answers the fifth research question ‘How can managers identify and prioritise important stakeholders with often diverging objectives?’

The capabilities of fuzzy logic and AHP proved to be useful in determining the weights of decision elements providing a fairly small number of cases. When applying the two methodologies, fuzzy logic and AHP, the judgements and opinions of decision-makers are crucial.

In fuzzy logic the decision problem is visualised through the 3-D framework and parametric significance is given to the decision problem attributes. In AHP, on the other hand, the sensitivity output is in a form of a 2-D model. The 3-D model allows a better visualisation of stakeholders and, hence, maps them with more precision. In addition, the fuzzy logic based methodology defines the relationships between the parameter pairs, while the AHP technique reflects the relationship between the conditioning attributes and stakeholder...
Chapter 8

salience. The overall fuzzy logic framework appears to have a higher prediction accuracy than the AHP model.

In the first part of this study, the stakeholder prioritisation problem has been addressed through imposing a set of fuzzy logic rules. It allowed the establishment of fair procedures and the demonstration of more effective management of stakeholders to meet CSR objectives and ensure procedural fairness in the allocation of resources. The proposed fuzzy logic based model aids in the rating and selection of key stakeholders in different scenarios. In the fuzzy logic methodology, from a list of attributes, solely the relevant criteria are selected by the decision maker. Then these criteria are subject to assessment by the decision maker. These preferences are used for the evaluation of criteria and subsequent assessment of stakeholders. It is all accomplished by imposing a set of fuzzy logic rules. For the purposes of this study, fuzzy membership functions were assigned based on the professionals’ judgements. Considering the fuzzy if-then rules, the stakeholders’ map emphasising their salience is produced. By calculating fuzzy scores for every stakeholder, their ranking becomes a straightforward task. Then, the stakeholder, or portfolio of stakeholders, with the highest score for consideration may be selected. The subjectivity of decision makers’ preferences along with a quantitative ranking system are incorporated in the model. The fuzzy logic framework allows visualisation of the decision problem and orders parametric significance to the decision problem attributes. The framework is based on the relation values portraying a parametric relationship on power, legitimacy, and urgency as well as stakeholders’ salience.

In the second part of the work, the AHP framework has been produced, based on the rating system provided by decision-makers. Professional’s opinions are useful to prioritise
stakeholders and allocate resources to CSR programmes. However, changes of opinion may happen for every decision maker and therefore can be subjected to cognitive limitations with subjectivity and uncertainty. Hence, the fuzzy logic based methodology defines the relationships between the parameter pairs, while the AHP technique reflects the relationship between the conditioning attributes and stakeholder salience. The overall fuzzy logic framework appears to have a higher prediction accuracy than the AHP framework, and it is believed in this study that due to the subjectivity concept the AHP method may lead to less precise results than in fuzzy logic. Since the fuzzy logic output is a 3-D framework, the results are easy to understand by the decision maker and more exact. On the other hand, the AHP sensitivity output which is a 2-D framework offers less precision. The stakeholders are more visibly mapped on the 3-D fuzzy logic framework. It has to be noted, however, that both of the models offered in this study generate reasonable results so the methodologies can be used separately or jointly. However, if combined they eliminate each other’s drawbacks. AHP shortcomings discussed in chapter 3 can be overcome by the application of fuzzy logic. Therefore, it is suggested that the techniques are applied in a joint manner.

In applying the aforementioned multi-criteria frameworks through empirical study in the extractive sector, it has been possible to provide framework that can facilitate decision-making by obtaining qualitative data. This is an innovation in itself and a useful approach for obtaining stakeholder ranking. What is more, this study applies empirically the stakeholder classification model by Mitchell et al. (1997). It contributes to the stakeholder literature by comparing the two MCDA methodologies, allowing prioritisation of stakeholders and proves that when applied in combination they produce more reliable results. Both methods have
their strengths and limitations, however, when used jointly they override each other’s inadequacies.

Furthermore, this study contributes to the scarce research investigating fairness in decision-making procedures that involve multiple stakeholders or subgroups. The decision support framework offered in this work allows organisations to meet several, if not all, of the conditions required for fair priority setting. The conditions, defined in the initial part of this study, are publicity, relevance, appeals, regulation, fair consideration, empowerment, and impartiality. Therefore, through an application of the suggested framework, organisations have an opportunity to explain their resource allocation decisions and the rationale behind them, which can be made publicly accessible. Such resource allocation decisions would be justified by evidence and reason through the application of this decision support framework. What is more, this framework allows inclusion of all crucial stakeholder interests and empowers them through enabling participation in the decision-making process. By application of the MCDA methodology, decision makers with conflicting interests can successfully reach consensus. By attempting to ensure fairness in a dynamic decision-making group context, this work tries to maximise the perception of fairness by group members. This perception can be translated into commitment to the group. As a result it may help avoid negative reactions and disastrous consequences such as subversion, revolt or secession in the case of undesirable decision outcomes.

Fuzzy logic and AHP integrating interdependent stakeholder objectives in an attempt to ensure fairness in the decision-making process and build trust in an organisation through delivering sustainability to its operations were proposed in this work. This work shows that fuzzy logic and AHP can successfully evaluate the interests of stakeholders and are useful
methodologies, particularly when applied to a decision problem jointly, they provide most satisfying results.

In summary, the main contributions of this part of thesis are: (1) application of two new methodologies to assess stakeholders’ importance in the CSR context. The methods are compared and contrasted, and their joint use is recommended to obtain high accuracy. It was shown that the fuzzy logic methodology can generate more precise results, which is a significant methodological contribution. It is implied in this thesis that the separate approaches, fuzzy logic and MCDM, can be also used integratively to prioritise stakeholders. The joint use of methods generates best results and reduces each method’s limitations. (2) By engaging different stakeholder groups in the framework and incorporating their preferences in the decision making process, a contribution to the stream of research on fairness and trust in decision making was made. (3) The application of MCDM in social sciences in itself is a contribution, as the MCDM methods have been traditionally used in the field only to a limited extent due to the methodological background of the scientist involved (Creswell & Plano Clark, 2007). Furthermore, the application of decision analysis methods in a CSR context (in particular) in this thesis is a contribution to knowledge as it has facilitated the bridge between the two fields.

8.1.4. Integrated decision-making framework

The hybrid integrated decision making framework is a ‘model of models’. To create a ‘model of models’ capable of addressing problems in a CSR context, several decision analysis tools introduced in chapter 3 were used. Chapter 6 discussed the framework in detail. The findings of chapters 5 and 6 answer the sixth research question ‘What should be the
In chapter 5, fuzzy logic and AHP methodologies were applied to the Mitchell et al. (1997) stakeholder typology to ensure a fair way of modelling stakeholders’ salience according to the attributes of power, legitimacy and urgency. These stakeholder attributes are not steady, hence, in chapter 5 a dynamic theory of stakeholder salience is provided. The results of this analysis are part of the hybrid integrated framework. The framework combines CM, AHP and ANP to determine, prioritise and select CSR programmes for implementation and ensure sustainable development of the sector. CM is applied to identify factors which affect the situation in the sector, and determine their relationships with one another. The problem structuring CM method allowed graphical representation of group ideas. It facilitated discussion and lead to the identification of the values and specifics of the decision problem. In the process, it resulted in a formulation of a strategic cognitive map. Then, the strategic cognitive map served as a foundation to build the ANP framework and to identify the importance of CSR programmes. The degree of each concept’s influence is established using the AHP.

Subsequently, the ANP was used to create a structural model. The ANP methodology is applied to model the problem and the structure of the network of relationships between the elements, and the knapsack method is applied to build a portfolio of alternatives to which resources are allocated. A knapsack multi-criteria approach was used in this study to deliver a portfolio of CSR investment programmes and determine their combination to return a maximum aggregated performance (utility or benefit) score whilst staying within
the available budget. As a result, the findings of chapter 6 offer a multi-criteria knapsack solution to optimise CSR programmes’ selection.

In summary, the main contributions of this part of the thesis are: (1) Several new methodologies were applied to model the complexity of the CSR implementation, and a hybrid framework was delivered in the process; (2) It was illustrated how each of the methods can eliminate drawbacks of another; (3) A framework to allocate resources to CSR programmes in an operational way was delivered; (4) The framework is flexible, generic and systematic which is a contribution of this thesis. It considers different stakeholders, their objectives, multiple criteria, strategic CSR investment options, and optimises the scarce resources allocation process.

In this work, through an integrated use of multiple decision analysis techniques a beneficial CSR framework has been provided which can aid to operationally implement CSR into organisation’s business model. The framework is generic in nature and applicable to organisations regardless of type and size. It can find an application from public to private, from small-to-medium enterprises to multinational enterprises, from manufacturing to service organisations. Adopting the generic CSR framework developed in this work will provide the top management with a holistic view of the business while taking account of a single system approach to governance. To run an organisation profitably while meeting social and environmental objectives, to achieve business sustainability and stakeholder satisfaction, this work offers a generic framework for implementation of CSR in a practical way. This generic framework lies within quality management and systems thinking approach.
8.1.5. **Consistency check of the decision-making framework**

The seventh research question ‘*How to validate the credibility and robustness of the framework?*’ was answered in chapter 7. In this chapter the effectiveness and usefulness of the framework was tested by applying it to an illustrative example of CSR resources allocation in an extractive industry. The data collection and analysis was presented in chapter 7. The results indicate that the framework is effective to rank CSR investment projects and to obtain a multi-criteria knapsack solution to optimise CSR programmes’ selection in the extractive industry.

8.2 **Summary guidance on using multiple tools approach to conduct CSR**

The purpose of this thesis is to develop the framework to operationalise CSR implementation and to encourage best practice, to the benefit of both practitioners and the scientific community.

*Relevance for practitioners*

As organisations are increasingly investing in CSR implementation, the possible benefits of the hybrid framework implementation are of great value, especially to large international and geographically dispersed organisations. These organisations are in need of more effective ways to utilise their resources, among which are, for instance, time, personnel, and money, to compete in a complex and globalised world. The decision making processes surrounding the CSR resources allocation are complex, often involve multiple criteria, and a number of stakeholders competing for the resources who may have diverging demands. Hence, there is a need for empirically grounded and theoretically solid knowledge, aiding managers in obtaining organisational benefits and the competitive edge. The aim of this thesis is to provide recommendations that are understandable and usable for practitioners.
Chapter 8

A practical guide for practitioners

In this research the mechanics of the multi tools approach to conduct CSR is presented in 5 concrete steps. What is more, in the light of an increasing need in cognitive science to collect and analyse ‘messy’ verbal data (Chi, 1997) the multi method of analysing qualitative data in an objective and quantifiable way is presented. A practical guide on how to apply multi tools to conduct CSR is useful. Both qualitative and quantitative analyses have shortcomings and strengths, hence a decision analysis framework integrating elements of both methods is desirable, and may aid in answering complex questions regarding the practical implementation of CSR. Resources allocation decisions often involving immense verbal information is characterised by complexity which can be overcome with an explicit practical guide. The hybrid framework to conduct CSR consists of the following functional steps:

1. Apply cognitive mapping to structure the problem area, to identify the central concepts to the problem, to identify key stakeholders, their objectives and multiple criteria.

2. Apply AHP to prioritise stakeholders’ needs and find the stakeholders ranking. The problem dynamism is guided via the ‘what if’ sensitivity analysis.

3. Fuzzy logic is then employed to deal with uncertainty, incompleteness of information, information vagueness and imprecision. The decision outcome is visualised with a 3-D surface output.

4. To deal with dependence between decision elements, the ANP is applied. The decision problem is formulated in the form of a network to illustrate concepts’ interdependence. The method is accompanied by benefits, opportunities, costs and risks analysis.
5. Once the problem is formulated in the form of a network or a hierarchy, the Knapsack approach for resources allocation is applied. Resources are allocated on the basis of criteria to determine a performance score. CSR programmes are selected until the total budget cost is met.

8.3 Limitations and Future Research

In this thesis innovative approaches and frameworks were proposed and applied in the field of CSR. Hence, a bridge between the two fields was created. As a result a hybrid integrated ‘model of models’ was delivered. The methodologies proposed in the ‘model of models’ are novel applications in CSR. As such, it is clear that, due to the novelty of these approaches they are subject to some limitations. These limitations are discussed in this section. Based on the limitations presented here, some interesting future avenues for research are presented.

A hybrid integrated framework combining CM, AHP, and ANP is proposed to determine, prioritise and select CSR programmes (chapter 5). The revised framework acknowledges crucial interactions originally not depicted in the initial modelling process, but reflected in important observations from the later work. A knapsack framework was applied to the problem to return a maximum aggregated benefit subject to a number of constraints. The developed hybrid framework is dynamic as it has the capability of providing the ‘what-if’ analysis (chapter 6). The integrated framework, however, could be extended by other techniques to eliminate, for instance, criteria interactions and deliver a more flexible and precise resource allocation framework. This limitation suggests further research avenues in this regard.
The interactions which exist between the criteria, sub-criteria and alternatives in real-life problems can be dealt with by the Choquet integral. To take account of the interactivity of expert subjective judgement problems and minimise it, the Choquet integral, a non-additive fuzzy integral can be applied. An interesting area for future research is to use the Choquet integral in combination with the AHP/ANP methodology and/or CM.

The ANP traditionally employs the weighted average method. However, along with interdependence between the criteria, the interactivity between diverse information sources is also present in many real-world problems (Yazgan, Boran, & Goztepe, 2010). Hence, a synthesising aspect of ANP and the Choquet integral, which is a non-additive function, should be investigated. It is believed that the Choquet integral can be effectively applied instead of the weighted average. Fuzzy AHP/ANP frameworks could generate overall priorities of alternatives while taking into consideration interactivity between criteria, and serve as inputs to the knapsack method.

Allocating scarce resources to activities over time is termed as scheduling. An interesting research opportunity, for instance, would be to add a time variant in the knapsack approach which means that certain resources are released at a certain point in time (not necessarily at the same time, as is considered within the current framework). Classical scheduling formulations assume static resource requirements and initialising the activities at a certain point in time (Lombardi & Milano, 2012). In some cases, the decision maker is faced with a problem and has to decide upon releasing the resources at a specific point in time. The task is far from trivial. Hybrid techniques to address the allocation and scheduling problems are an area for future research.
Moreover, resource assignments and scheduling problems are often complicated by side constraints and unique features present in practical real-world contexts. Some of the main variants encountered in the literature include: non-renewable resources which have a starting ability and are consumed throughout the scheduling horizon, until, for instance, budget depletion. Additional features and side constraints which may complicate scheduling problems include: i) Time varying capacity of resources refers to problems where variable capacities are turned into constant ones, by introducing fictitious activities and fixing their position in the schedule with the use of time lags or time windows; ii) Time/resource trade-offs in which activities’ time duration varies according to the consumed amount of the selected resources; iii) Temporal constraint related variants which relate to start/start, start/end, end/end, precedence constraints provided the activities have fixed durations; iv) General precedence relations and time windows, and set-up times that are separation constraints between tasks on the same resources. All these features pose an area for future research.

In addition, different sets of objective function types can be taken into consideration in terms of resource assignment and scheduling problems. These objective function types which pose an area for further research include: time-based objectives, resource-based objectives, time- and resource-based objectives, and regular and non-regular objectives (common in practice, include earliness costs, set-up costs and resource-based objectives mentioned above). Hybrid approaches to address problems with the aforementioned constraints could have not been investigated in this work due to time restrictions, however, they pose an interesting area for further work.
Moreover, the resource perspective model of strategy making is unquestionably multilevel and multi-person (Bower & Gilbert, 2006, p. 13) and the outcome of resource allocation process is realised strategy (Bower & Gilbert, 2006, p. 445). However, finalising the strategy is simply beyond the scope and time of this PhD. Because of time, financial constraints and lack of access, it was not possible to empirically study the framework within a company. Hence, it also poses possibilities for future research. For future research it is suggested that the proposed framework is applied for large enterprises in various sectors, and across different countries.

In addition, an interesting future study might investigate the development of the resources allocation software. It is believed that the results of this thesis can be used to deliver software capable of allocating resources to gain a company a competitive edge.

**Limitation and reliability of data**

Nevertheless, limitations on data sources might have limited the scope of analysis, the size of the sample, and might have had an influence to an extent in framework testing. The framework was not tested in real settings, only in the controlled environment where the data sources where mainly MBA professionals who have working experience in diverse range of industries. What is more, these participants were exposed to the decision analysis tools; they were given a presentation prior to filling out the questionnaire and had knowledge of the tools used within the framework. Management in a company may not have access to such training. In real case, the help of facilitator would be required. A limited access to the software may also be another obstacle for a company management. The future venue for research would be then to test the framework in real case settings with a company.
Lack of prior research/limited research on the topic

In the light of a limited research on methods for operational integration of CSR in business models, there was a need to conduct an exploratory research design which may not be free from limitations. However, these limitations serve as an important venue for future research.

Self-reported data

This research relied on the data the research gathered herself. The data was self-reported and data may be subject to the limitation by the fact that it rarely can be independently verified. In other words, the researcher had to take the participants’ words for granted, whether in focus groups, or in questionnaires, or at face value. Yet, self-reported data may be restrained by several potential sources of bias that can be noted as limitations (Brutus, Aguinis, & Wassmer, 2013; USC University of Southern California, 2013):

- **selective memory** (remembering or not remembering experiences or events that occurred at some point in the past);
- **telescoping** (recalling events that occurred at one time as if they occurred at another time);
- **attribution** (the act of attributing positive events and outcomes to one’s own agency but attributing negative events and outcomes to external forces);
- **exaggeration** (the act of representing outcomes or embellishing events as more significant than is actually suggested from other data).
Chapter 8

Sample size

Another possible source of bias might have been the number of the units of analysis used in the research. The framework employed in this work does not require an extensive number of participants as argued in chapter 4 and the sample was dictated by the type of this research problem. It needs to be emphasised, however, that a bigger sample size might have offered more extensive analysis opportunity and posed other interesting avenues for future research.

8.4 Reflection on the research process

Further reflection on the evolution of this research process can produce future research avenues. Hence, an attempt has been made in this work to employ reflective thinking in order to ensure that the researcher can gradually improve as an analyst. Learning through experience has been advocated by some authors (Williams & Dickson, 2000) as a mean to guide the behaviour of researcher in certain situations. Kolb (1984) and Kolb, Rubin, and McIntyre (1984) describe the ability to learn through experience and reflection in a form of a four stage learning cycle (Figure 8.2).
Figure 8.2 Kolb management teaching cycle

Source: Kolb (1984)

The first phase of the learning cycle assumes that the researcher uses their abilities and previous experiences to test the various ideas which they are already familiar with. While progressing to the second phase the researcher’s observations are used in a reflective manner to mark their implications of their actions. In other words, the researcher becomes an observer of their own thinking and acting. The third phase of the cycle assumes the researcher conceptualises the observations general abstract concepts which can be applied in the future. Wider knowledge base can inform the researcher’s understanding and can impede growth in their expertise area while eliciting skills and new methods that would influence researcher’s approach. The final phase requires the researcher to apply these new insights and skills to test their approach experimentally. The cycle continues until clear understanding is reached while taking on board the reflective thinking and experimenting in different situations.
In relation to the reflective thinking approach, the researcher has used previous OR skills and abilities gained through prior studies and work experience to initiate the work on the research subject and to define and structure the problem area. Hence, the cognitive mapping approach has been used in the first instance to elicit the key problem’s concepts. As the study was iterative in nature, the researcher reassessed the multi tools approach to conduct CSR several times. Reflective observations with respect to what works and which data collection instrument to employ have been taken on board at all project phases. The framework was reiterated a number of times by adding the different decision analysis methods and checking their suitability and effectiveness to address the issue at stake. The decision analysis methods were gradually integrated within the framework pending their effectiveness. In the process a novel approach to conduct CSR was delivered and the researcher has expended her knowledge and understanding of the several OR methodologies. There have been some difficulties in the execution of the project related to framework testing and a lack of access. Without any doubt, if an opportunity occurs the researcher would like to test the hybrid framework within a company.

**8.5 Concluding remarks**

In this thesis, several decision-making methodologies which form an integrated hybrid framework to aid CSR resources allocation were studied. The framework developed provides an understanding of the resources allocation process and how it works, which is not only vital for each firm’s strategy but also crucial to the leadership of successful and sustainable companies.
References


Akerkar, R. (2010). *Knowledge-Based Systems*


Baxia. (1996). Decision Explorer


319


321


9 Appendices

Appendix A: Deduction vs. Induction

Appendix B: Focus groups conducted for the purpose of this research

Appendix C: PBS Ethics Review document

Appendix D: Researcher skills and expertise in facilitating focus groups

Appendix E: Conferences, seminars and workshops attended

Appendix F: Non-Probability Sampling Techniques

Appendix G: Questionnaire

Appendix H: Strategic Cognitive Map

Appendix I: BOCR network

Appendix J: Validation Questionnaire

Appendix K: List of articles submitted for publication

Appendix L: Research Ethics Review Checklist
## 9.1 Appendix A: Deduction vs. Induction

<table>
<thead>
<tr>
<th><strong>Deductive Approach</strong></th>
<th><strong>Inductive Approach</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Principles</td>
<td>Gaining an understanding of the meaning humans attach to events</td>
</tr>
<tr>
<td>Moving from theory to data</td>
<td>A close understanding of the research context</td>
</tr>
<tr>
<td>The need to explain causal relationships</td>
<td>The collection of qualitative data</td>
</tr>
<tr>
<td>between variables</td>
<td></td>
</tr>
<tr>
<td>The collection of quantitative data</td>
<td>A more flexible structure to permit changes of research emphasis as the research progresses</td>
</tr>
<tr>
<td>The application of controls to ensure clarity</td>
<td></td>
</tr>
<tr>
<td>definition</td>
<td>A realisation that the researcher is part of the research process</td>
</tr>
<tr>
<td>A highly structured approach</td>
<td></td>
</tr>
<tr>
<td>Researcher independence of what is being</td>
<td>Less concern with the need to generalise</td>
</tr>
<tr>
<td>researched - reliability</td>
<td></td>
</tr>
<tr>
<td>The necessity to select samples of sufficient size in order to generalise conclusions</td>
<td></td>
</tr>
</tbody>
</table>

Source: Saunders *et al.* (2007, p. 120)
9.2 Appendix B: Focus groups conducted for the purpose of this research

<table>
<thead>
<tr>
<th>Focus group sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MBA Master Class: Corporate Social Responsibility. Presenter: Dr Debbie Reed. Held on the 10th May 2011, Portsmouth Business School, Portsmouth, United Kingdom.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: Artificial Intelligence in Business and Management. Presenters: Prof Ashraf Labib, Ms Beth Rogers. Held on 20th June 2011, Portsmouth Business School, Portsmouth, United Kingdom.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: Organisations Learning from Failures. Presenter: Prof Ashraf Labib. Held on 21st June 2011, Portsmouth Business School, Portsmouth, United Kingdom.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: Quality Function Deployment (House of Quality), Speaker: Prof Ashraf Labib, 20th March 2012, University of Portsmouth, UK.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: ‘Lean and Responsive Decisions’, 11th June 2012, University of Portsmouth, Portsmouth, UK.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: ‘Multi-Criteria Decision Analysis’ 23rd April 2013, University of Portsmouth, Portsmouth, UK.</strong></td>
</tr>
<tr>
<td><strong>MBA Master Class: ‘Artificial Business Intelligence’, 25th April 2013, University of Portsmouth, Portsmouth, UK.</strong></td>
</tr>
</tbody>
</table>
9.3 Appendix C: PBS Ethics Review document

University of Portsmouth

Informed Consent Form for [______________________________]

[Name the group of individuals for whom this consent is written.]

Name of Principal Investigator: Jolanta Poplawska

Name of Organisation: University of Portsmouth

Name of Sponsor: University of Portsmouth, Portsmouth Business School

Name of Project: PhD Decision Support Framework for resources allocation to corporate social responsibility (CSR) programmes

This Informed Consent Form has two parts:

- Information Sheet (to share information about the study with you)

- Certificate of Consent (for signatures if you choose to participate)

You will be given a copy of the full Informed Consent Form.
Part I: Information Sheet

Study Title: Decision Support Framework for resources allocation to corporate social responsibility (CSR) programmes

Name of the researcher: Jolanta Poplawska

Email: Jolanta.Poplawska@port.ac.uk

University postal address:
Burnaby Building
University of Portsmouth
Burnaby Road
Portsmouth
PO1 3QL

Supervisory Research Team:
Prof Ashraf Labib [ashraf.labib@port.ac.uk]
Dr Debbie Reed [debbie.x.reed@port.ac.uk]
Prof Mike Page [Mike.Page@port.ac.uk]

University postal address:
Richmond Building
University of Portsmouth
Portland Street
Portsmouth
PO1 3DE

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. Talk to others about the study if you wish. Ask us if there is anything which is not clear.

What is the purpose of the study?
This research project aims at investigating the application of a decision analysis framework to resource allocation to corporate social responsibility programmes’ selection in an extractive sector. The framework will aid managerial decision making through the application of a scientific technique taking account of stakeholders, their objectives, companies’ competitive advantage, interdependent criteria, and limited resources.

Why have I been invited?

You were selected as a possible subject in this study because you are a stakeholder in [name of the company].

Do I have to take part?

Your participation in this research is entirely voluntary. It is up to you to decide to join the study. We will describe the study and go through this information sheet. If you agree to take part, we will then ask you to sign a consent form.

What will happen to me if I take part?

If you agree to take part in this study, you will have to fill out a questionnaire or you will be interviewed. Your participation in the study will last for about an hour. The research itself will last for another two years. The access to your personal information, questionnaire and interview will not be allowed to outside parties without your consent. The research will involve audio-recording. If you are to be identified in any published material, we will seek your consent.

What do I get for participating?
If you agree to participate in this study, we can offer you the access to the decision analysis framework, developed in the process of this study, which is likely to have a substantial impact upon the stakeholders of your company.

What will I have to do?

You will be asked to participate in an interview and fill out a questionnaire.

What are the possible disadvantages and risks of taking part?

The possible disadvantage is the inconvenience of participation. One of the risks could be being quoted verbatim in published materials and so being identified by direct quotes.

What are the possible benefits of taking part?

The access to a decision-making framework that, when combined with modern corporate governance codes, delivers tangible and intangible results with the consequential impact to stakeholders of your company.

Will my taking part in the study be kept confidential?

Your data will be kept confidential if you wish so. Your data can become accessible to other parties or through published material only with your consent. Either you or your company may wish to be named and associated with the data.

If you decide that your data stay confidential it will be safeguarded during and after the study. It will be subject to the confidentiality procedures for handling, processing, storage, and destruction of data.
The data will be stored securely at the Portsmouth Business School, Richmond Building, with an access granted only to the research team and supervisors.

The data will be used for the purpose of the development of the decision analysis framework. It will be retained for the period of the study duration, which is three years. If it is to be used in future studies, your approval will be sought.

Participants have the right to check the accuracy of data held about them and correct any errors.

What will happen if I do not want to carry on with the study?

You may withdraw your participation from the research before the interview data have been analysed. It might prove impossible to withdraw any individual’s contribution otherwise. If you decide to withdraw, your data will be destroyed.

What if there is a problem?

If you have a concern about any aspect of this study, you should ask to speak to the researcher or the supervisory team, who will do their best to answer your questions. The researcher is available under the following number: 07595430104 or email Jolanta.Poplawska@port.ac.uk. To contact with the supervisory team please use emails provided above.

What will happen to the results of the research study?

Our intention is to publish the study’s results. The results can be available to the participants in the form of a summary. The participants will not be identified in any report/publication unless they have given their consent.
Who is organizing and funding the research?

My research is sponsored by the University of Portsmouth, and by this means a proper supervision and insurance will be assured.

Who has reviewed the study?

Research in the University of Portsmouth is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the Portsmouth Business School Research Ethics Committee.

Further information and contact details

If you have questions about this research study and your rights during the course of this study, you may contact the Principal Investigator Jolanta Poplawska, tel. number: 07595430104 or email Jolanta.Poplawska@port.ac.uk.

If you have questions about the study or your rights as a participant, you can email the PBS Research Ethics Committee, which is the committee that reviewed and approved this study, email: sharman.rogers@port.ac.uk.

Concluding statement

Thank you for taking the time to read the information sheet. If you decide to participate you will be given a copy of the information sheet to keep and your consent will be sought.
Part II: Certificate of Consent

UNIVERSITY OF PORTSMOUTH

CONSENT FORM

CONFIDENTIAL

Title of project/investigation: Decision Support Framework for resources allocation to corporate social responsibility (CSR) programmes

Brief outline of project, including an outline of the procedures to be used:

This research project aims at investigating the application of decision analysis framework to resource allocation to corporate social responsibility programmes’ selection in an extractive sector. The framework will aid managerial decision making through the application of a scientific technique taking account of stakeholders, their objectives, companies’ competitive advantage, interdependent criteria, and limited resources. This study will be used to determine the extent to which the application of sophisticated decision analysis tools can be relied upon to deliver proper governance to stakeholders. It aims to gain empirical knowledge of the key stakeholders in the extractive sector as well as to uncover their reasoning behind resource allocation and investment decisions. It will focus on stakeholder preferences, decision criteria, perceived costs, benefits, and risks in natural resource management as well as wider structural and policy context governing individuals’ economic behaviour. In order to achieve this, semi-structured interviews will be conducted with the company’s shareholders, executives, management, employees, community, NGOs, government officials, suppliers, external consultants, and academics. The interviews will be digitally voice recorded and then transcribed. All interviewee participants will remain
anonymous in recordings, transcripts and subsequent research outputs, unless the interviewee states that they wish their name to be identified. If you do not wish a recording to take place, then notes will be taken as an alternative.

I, .................................................................*(participant’s full name) agree to take part in the above named project/ investigation, the details of which have been fully explained to me and described in writing.

Signed........................................ Date........................................... (Participant)

I, .................................................................*(investigator’s full name) certify that the details of this project/ investigation have been fully explained and described in writing to the subject named above and have been understood by him/ her.

Signed........................................ Date........................................... (Investigator)

*Please type or print in block capitals
9.4 Appendix D: Researcher skills and expertise in facilitating focus groups

The researcher has the necessary skills and expertise in facilitating focus groups. The researcher seeks to build on strong research skills gained through studies so far (EU Business, Politics and Languages, University of Southampton 2004-2008, and J. W. Goethe University, Germany 2006-2007, Operational Research and Finance, University of Southampton, 2008-2009) as well as through the work as a research associate at Portsmouth University (PhD candidate in Strategy and Business Systems, University of Portsmouth 2010-2013).

In addition, the researcher has necessary work experience providing the expertise in facilitating focus groups. The researcher has been involved in teaching MBA Master classes at the University of Portsmouth. The researcher carried out a research project with the UK Home Office Department (Economics and Resource Analysis Unit, London) working as a Junior Data Analyst, and worked as a Teaching Assistant at Kings School in Winchester. The researcher has also undertaken a traineeship with the European Commission in the Executive Agency for Competitiveness and Innovation (Unit - Network Operations) in Brussels, Belgium and has work experience as an interpreter.
### 9.5 Appendix E: Conferences, seminars and workshops attended

<table>
<thead>
<tr>
<th>Conferences, seminars and workshops attended</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CSR and Stakeholder Engagement in the Extractive Sector.</strong> Held on 22(^\text{nd}) October 2010, Institute of Commonwealth Studies, London, United Kingdom.</td>
</tr>
<tr>
<td>Certification of CSR activities in Oligopolistic Markets. Speaker: Dr Evangelos Mitrokostas. Held on 7(^\text{th}) October 2010, Portsmouth Business School, Portsmouth, United Kingdom.</td>
</tr>
<tr>
<td>International Doctoral School: ‘Applying Decision Analysis to Real Problems’. Held 10(^\text{th}) to 13(^\text{th}) April 2011, Manchester Business School, Manchester, United Kingdom.</td>
</tr>
<tr>
<td>Corporate Social Responsibility Interest Group. Research Symposium. Held on 23(^\text{rd}) June 2011, Bath Innovation Centre, University of Bath, School of Management and British Academy of Management, United Kingdom.</td>
</tr>
<tr>
<td>Social Research Methods. Held between October-February 2011, School of Social, Historical and Literary Studies, Portsmouth, United Kingdom.</td>
</tr>
<tr>
<td>Research Design and Data Collection in the Social Sciences. Held between October-February 2011, School of Social, Historical and Literary Studies, Portsmouth, United Kingdom.</td>
</tr>
<tr>
<td>MBA Master Class: Corporate Social Responsibility. Presenter: Dr Debbie Reed. Held on the 10(^\text{th}) May 2011, Portsmouth Business School, Portsmouth, United Kingdom.</td>
</tr>
<tr>
<td>MBA Master Class: Artificial Intelligence in Business and Management. Presenters: Prof Ashraf Labib, Ms Beth Rogers. Held on 20(^\text{th}) June 2011, Portsmouth Business School, Portsmouth, United Kingdom.</td>
</tr>
</tbody>
</table>


Sustainable Business Development Seminar, University of Portsmouth, 19th October 2011, Portsmouth, UK.

Asset Management. Speaker: Prof Ashraf Labib, University of Portsmouth, 29th February 2012, Portsmouth, UK.

Data Envelopment Analysis for Environmental Assessment - Comparison between public and private ownership in petroleum industry. Speaker: Prof Sueyoshi (New Mexico Tech), 15th March 2012, University of Portsmouth, UK.

MBA Master Class: Quality Function Deployment (House of Quality), Speaker: Prof Ashraf Labib, 20th March 2012, University of Portsmouth, UK.

Portsmouth Business School Conference, 9th May 2012, University of Portsmouth, UK.

Portsmouth Business School Research and Knowledge Exchange Conference, 20th June 2012, University of Portsmouth, UK.

76th EURO Multiple-Criteria Decision Analysis (MCDA) Conference, 13-15 September 2012, University of Portsmouth, UK.

Portsmouth Business School Conference, May 2013, University of Portsmouth, UK.

Portsmouth Business School Research and Knowledge Exchange Conference, June 2013, University of Portsmouth, UK.
### 9.6 Appendix F: Non-Probability Sampling Techniques

<table>
<thead>
<tr>
<th>Sample type</th>
<th>Likelihood of representative sample</th>
<th>Types of research</th>
<th>Relative costs</th>
<th>Control over sample contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quota</td>
<td>Reasonable to high depending on quota variables</td>
<td>Cost constraints, quick data need</td>
<td>Moderately high to reasonable</td>
<td>Relatively high</td>
</tr>
<tr>
<td>Purposive</td>
<td>Low, but dependent on choice: Extreme case, Heterogeneous, Homogeneous, Critical case, Typical case</td>
<td>Involving very small samples to focus on: Unusual/special, Key themes, In-depth, Importance, and Illustrative</td>
<td>Reasonable</td>
<td>Reasonable</td>
</tr>
<tr>
<td>Snowball</td>
<td>Low but cases have desired characteristics</td>
<td>Difficult to identify cases</td>
<td>Reasonable</td>
<td>Quite low</td>
</tr>
<tr>
<td>Self-selection</td>
<td>Low</td>
<td>Exploratory research</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Convenience</td>
<td>Very low</td>
<td>Very little variation in population</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

Source: Saunders et al. (2007, p. 228)
To Whom It May Concern:

Dear Sir or Madam,

RESEARCH INTO CORPORATE SOCIAL RESPONSIBILITY (CSR) PRACTICES IN THE EXTRACTIVE SECTOR

The Business School of the University of Portsmouth is sponsoring research aimed at investigating the application of decision analysis tools and techniques to deliver sustainable practices in the energy sector. We would appreciate it if you could spare 15 minutes of your time to complete the survey. Please note that there are no correct or incorrect responses, as we are only seeking your opinion for that is what matters. We would like to reassure you that all answers will be treated in absolute confidence and used for academic purposes only. Please use the extra space provided to expand your answers to the questions where necessary.

We do appreciate that the questionnaire will take some of your valuable time but without your input this research objective aimed at assessing the suitability of decision analysis tools to the organisational use of CSR integration cannot be realised. We would like to thank you very much for your cooperation.

Jolanta Poplawska

c/o Post Graduate Centre
University of Portsmouth Business School
Richmond Building
Portland Street
Portsmouth PO1 3DE

United Kingdom

Email: Jolanta.Poplawska@port.ac.uk

Tel.: +447535355261
# PART 1. SECTION A. BACKGROUND OF RESPONDENT

<table>
<thead>
<tr>
<th>Name of company:</th>
<th>.................................................................</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position in company:</td>
<td>.................................................................</td>
</tr>
<tr>
<td>What is your work experience in energy sector:</td>
<td>............ (Years)</td>
</tr>
<tr>
<td>Which group of stakeholders do you identify yourself most with? (Please tick √ one box).</td>
<td></td>
</tr>
<tr>
<td>a. Management</td>
<td>□</td>
</tr>
<tr>
<td>d. Environmentalists</td>
<td>□</td>
</tr>
<tr>
<td>g. Shareholders</td>
<td>□</td>
</tr>
<tr>
<td>j. Media</td>
<td>□</td>
</tr>
<tr>
<td>Other (Please specify)</td>
<td>.................................................................</td>
</tr>
</tbody>
</table>

### Optional

<table>
<thead>
<tr>
<th>Address:</th>
<th>.................................................................</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone:</td>
<td>.................................................................</td>
</tr>
</tbody>
</table>

# SECTION B. GENERAL INFORMATION (Please tick √ options where applicable)

| What type of organisation do you work for? (Please tick √ options as appropriate). |
|----------------------------------|----------------------------------|----------------------------------|
| Mining | □ | Oil | □ | Gas | □ |
| Contractors | □ | Suppliers | □ |
Others (Please specify)…………………………….

What is the size of your company/ organisation? (Please tick √ one box).

<table>
<thead>
<tr>
<th>Size of Company</th>
<th>□</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-50 staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-249 staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>250-500 staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;500 staff</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How long has your organisation been in operation? (Please tick √ one box).

<table>
<thead>
<tr>
<th>Years of Operation</th>
<th>□</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-20 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-30 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40 yrs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 40 yrs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please give an indication of the size of organisation in terms of annual turnover. (Please tick √ one box).

<table>
<thead>
<tr>
<th>Annual Turnover</th>
<th>□</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; £5m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>£5m-£25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>£26m-£100m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; £100m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Which of the following best describes the ownership of your organisation?

<table>
<thead>
<tr>
<th>Ownership Type</th>
<th>□</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private ownership</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION C. CSR ENGAGEMENT (Please tick √ options where applicable)

i) For work places with active CSR programmes: Please indicate your company’s level of CSR engagement by indicating the percentage of the annual profit your company spends on CSR (Please tick √ box as appropriate).

ii) For work places without CSR programmes, please indicate your opinion.

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>0-0.5%</th>
<th>0.5-1.0%</th>
<th>1.0-1.5%</th>
<th>1.5-2.0%</th>
<th>2.0-2.5%</th>
<th>2.5-3.0%</th>
<th>3.0-5.0%</th>
<th>&gt;5.0%</th>
</tr>
</thead>
</table>

i) For work places with active CSR programmes: Please specify the corporate social responsibility programmes your company is involved in? (Please tick √ options where applicable)

ii) For work places without CSR programmes, please indicate your opinion.

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic advancement of communities</td>
<td>Job creation, housing, small business development, contribution to local development; partnerships with public authorities, sponsorship and donations</td>
</tr>
<tr>
<td>Education and training</td>
<td>Support for schools, colleges, universities; employees’ training, programmes aiming at developing new talent; health and safety improvement projects; helping suppliers to incorporate social responsibility into their business strategies</td>
</tr>
<tr>
<td>Implementing environment</td>
<td>Prevention of water, air, land pollution; waste</td>
</tr>
<tr>
<td>pollution controlling plan management programmes; programmes aiming at development of clean technologies, investments in biodiesel production; programmes aiming at protection of natural habitat</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--</td>
</tr>
<tr>
<td>Others (Please specify)</td>
<td>□</td>
</tr>
</tbody>
</table>

i) For work places with active CSR programmes: Please indicate the number of staff involved in each of the programmes.

<table>
<thead>
<tr>
<th>Area</th>
<th>Number of staff involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic advancement of communities</td>
<td></td>
</tr>
<tr>
<td>Education and training</td>
<td></td>
</tr>
<tr>
<td>Implementing environment pollution controlling plan</td>
<td></td>
</tr>
<tr>
<td>Others (Please specify)</td>
<td></td>
</tr>
</tbody>
</table>

i) For work places with active CSR programmes: Please indicate the time spent for an implementation of each of the programmes.

<table>
<thead>
<tr>
<th>Area</th>
<th>Time necessary to carry out the programme (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic advancement of communities</td>
<td></td>
</tr>
</tbody>
</table>
i) For work places with active CSR programmes: Please give an estimated budget allocation for each of these programmes.

<table>
<thead>
<tr>
<th>Area</th>
<th>Estimated budget requirement to carry out the programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic advancement of communities</td>
<td></td>
</tr>
<tr>
<td>Education and training</td>
<td></td>
</tr>
<tr>
<td>Implementing environment pollution controlling plan</td>
<td></td>
</tr>
<tr>
<td>Others (Please specify)</td>
<td></td>
</tr>
</tbody>
</table>

ii) For work places without CSR programmes, please indicate your opinion.

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Management</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Community</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Employees</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
i) For work places with active CSR programmes: For each of the following bodies, indicate the degree of power, legitimacy and urgency that each has in CSR resource allocation on a scale 1 – 3 (The lowest = 1 and the highest = 3).

ii) For work places without CSR programmes, please indicate your opinion.

<table>
<thead>
<tr>
<th></th>
<th>Power</th>
<th>Legitimacy</th>
<th>Urgency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest= 1</td>
<td>Medium= 2</td>
<td>High= 3</td>
</tr>
<tr>
<td>Management</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Community</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Employees</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Environmentalists</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Government</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>NGO’s</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Shareholders</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Suppliers</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Media</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
i) For work places with active CSR programmes: On a scale of 1 – 5, rate the importance of the following factors when investing in CSR (The lowest = 1 and the highest = 5).

ii) For work places without CSR programmes, please indicate your opinion.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Lowest</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONOMIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linkages to the local economy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wider economic development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCIAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migration, resettlement, land rights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human rights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development and labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Company image</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product image</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous material management and transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Site contamination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water and hydrology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>POLITICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conflict and political stability</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Corruption</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local regulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>National law and regulation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>International policies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To Whom It May Concern:

Dear Sir or Madam,

RESEARCH INTO CORPORATE SOCIAL RESPONSIBILITY PRACTICES IN THE EXTRACTIVE SECTOR

As you have participated in the first part of the questionnaire which identified the corporate board decision criteria governing resources allocation to CSR, it would be much appreciated if you could in addition evaluate these criteria by assigning weights to them through pair-wise comparisons. This data will be used to validate the decision framework enabling better organisational integration of CSR. We would appreciate it if you could spare 15 minutes of your time to complete the questionnaire. Please note that there are no correct or incorrect responses, as we are only seeking your opinion for that is what matters. We would like to reassure you that all answers will be treated in absolute confidence and used for academic purposes only. Please use the extra space provided to expand your answers to the questions where necessary.

We would like to thank you very much for your cooperation. If you require any further information regarding the project, please do not hesitate to contact me.

Jolanta Poplawska

c/o Post Graduate Centre
University of Portsmouth Business School
Richmond Building
Portland Street
Portsmouth PO1 3DE
United Kingdom
Email: Jolanta.Poplawska@port.ac.uk
Tel.: +447535355261
Analytic Hierarchy Process (AHP) is a decision support tool to solve complex problems. It employs a pair-wise comparison process where one element is compared with others. Decision-maker or respondent uses a scale from 1-9 for pair-wise comparisons. By putting a circle around the number, the respondent formulates a judgement as to the relative weights of two elements under comparison.

AN EXAMPLE

You are requested to put a circle around one number, e.g. 2 or 5 or 7, which best reflects how strongly you feel about your choice between a pair of criteria. Even numbers are not defined, but they can be used to represent intensities between odd numbers. There is no right or wrong answer. Please consider this example:

“In your view which of these corporate social responsibility programmes is better able to deliver sustainable development”.

1= EQUAL   3= MODERATE   5= STRONG   7= VERY STRONG   9= EXTREME

<table>
<thead>
<tr>
<th>Economic advancement of communities</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Education and training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic advancement of communities</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Implementing environment pollution controlling plan</td>
</tr>
<tr>
<td>Education and training</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Implementing environment pollution controlling plan</td>
</tr>
</tbody>
</table>
PART 2. SECTION A. RELATIVE IMPORTANCE/ PREFERENCE OF CRITERIA (Please fill in the questionnaire based on figures below)

2.0 Select the degree of relative importance/preference of each GOAL criterion.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL  3= MODERATE  5= STRONG  7= VERY STRONG  9= EXTREME

<table>
<thead>
<tr>
<th>GOAL</th>
<th>Economic</th>
<th>Environmental</th>
<th>Political</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>9 8 7 6 5 4 3 2 1</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Environmental</td>
<td>9 8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>Environmental</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Political</td>
<td>9 8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>Economic</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Social</td>
<td>9 8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>Environmental</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Political</td>
<td>9 8 7 6 5 4 3 2 1</td>
</tr>
<tr>
<td>Environmental</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Social</td>
<td>9 8 7 6 5 4 3 2 1</td>
</tr>
</tbody>
</table>
2.1 Select the degree of relative importance/preference of each ECONOMIC criterion.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1 = EQUAL   3 = MODERATE   5 = STRONG   7 = VERY STRONG   9 = EXTREME

<table>
<thead>
<tr>
<th>Revenue management</th>
<th>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</th>
<th>Linkages to the local economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linkages to the local economy</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Wider economic development</td>
</tr>
<tr>
<td>Revenue management</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Wider economic development</td>
</tr>
</tbody>
</table>
2.2 Select the degree of relative importance/preference of each alternative from an ECONOMIC point of view.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL  3= MODERATE  5= STRONG  7= VERY STRONG  9= EXTREME

<table>
<thead>
<tr>
<th>Economic advancement of communities</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education and training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementing environment pollution controlling plan</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

358
2.3 Select the degree of relative importance/preference of each ENVIRONMENTAL criterion.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL  3= MODERATE  5= STRONG  7= VERY STRONG  9= EXTREME

<table>
<thead>
<tr>
<th>Hazardous material management and transportation</th>
<th>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</th>
<th>Site Contamination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous material management and transportation</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Biodiversity protection</td>
</tr>
<tr>
<td>Hazardous material management and transportation</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Water and hydrology</td>
</tr>
<tr>
<td>Hazardous material management and transportation</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Air Pollution</td>
</tr>
<tr>
<td>Site Contamination</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Biodiversity protection</td>
</tr>
<tr>
<td>Site Contamination</td>
<td>9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9</td>
<td>Water and hydrology</td>
</tr>
</tbody>
</table>
2.4 Select the degree of relative importance/preference of each alternative from an ENVIRONMENTAL point of view.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1 = EQUAL  3 = MODERATE  5 = STRONG  7 = VERY STRONG  9 = EXTREME
2.5 Select the degree of relative importance/prediction of each POLITICAL criterion.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL   3= MODERATE   5= STRONG   7= VERY STRONG   9= EXTREME

<table>
<thead>
<tr>
<th>Conflict and political stability</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Corruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflict and political stability</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Local regulation</td>
</tr>
<tr>
<td>Conflict and political stability</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>National regulation</td>
</tr>
<tr>
<td>Conflict and political stability</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>International policies</td>
</tr>
</tbody>
</table>

361
2.6 Select the degree of relative importance/preference of each alternative from a POLITICAL point of view.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL  3= MODERATE  5= STRONG  7= VERY STRONG  9= EXTREME
2.7 Select the degree of relative importance/preference of each SOCIAL criterion.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1= EQUAL  3= MODERATE  5= STRONG  7= VERY STRONG  9= EXTREME
| Migration, resettlement and land rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Logistics |
| Migration, resettlement and land rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
| Human rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Development and labour |
| Human rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Company image |
| Human rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Product image |
| Human rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Logistics |
| Human rights | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
| Development and labour | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Company image |
| Development and labour | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Product image |
| Development and labour | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Logistics |
| Development and labour | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
| Company image | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Product image |
| Company image | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Logistics |
| Company image | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
| Product image | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Logistics |
| Product image | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
| Logistics | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Service |
2.8 Select the degree of relative importance/preference of each alternative from a SOCIAL point of view.

By putting a circle (O) around ONE number compare the relative IMPORTANCE with respect to:

1 = EQUAL   
3 = MODERATE   
5 = STRONG   
7 = VERY STRONG   
9 = EXTREME

| Economic advancement of communities | 9 8 7 6 5 4 3 2 1 | Education and training | 9 | | | | | | Implementing environment pollution controlling plan | 9 |
| Education and training | 9 8 7 6 5 4 3 2 1 | | 9 | | | | | | Implementing environment pollution controlling plan | 9 |
This is the end of the questionnaire. Thank you very much for your time.

*NB. Confidentiality and anonymity are guaranteed. All information collected will conform to the University’s Human Research Ethical procedures.*
9.8 Appendix H: Strategic Cognitive Map
9.9 Appendix I: Benefits Opportunities Costs Risks (BOCR) network
Opportunities

**Economic**

- Economic opportunities
  - Reduced corporate income tax
  - Ahead of competition

- Alternatives
  - Economic advancement of communities
  - Education and training
  - Environment pollution controlling plan

**Social**

- Social opportunities
  - Maintaining reputation
  - Provision of sustained employment

- Alternatives
  - Economic advancement of communities
  - Education and training
  - Environment pollution controlling plan

**Political**

- Political opportunities
  - Passing the corporate audit
  - Meeting IRS requirements

- Alternatives
  - Economic advancement of communities
  - Education and training
  - Environment pollution controlling plan
To Whom It May Concern:

Dear Sir or Madam,

RESEARCH INTO CORPORATE SOCIAL RESPONSIBILITY (CSR) PRACTICES IN THE EXTRACTIVE SECTOR

The aim of this questionnaire is to seek experts’ opinions on the decision support framework aiding in delivery of sustainable practices in the extractive sector. Your valued opinion can help to validate the framework in terms of significance, correctness and adequacy in addressing the problem of resources allocation in the extractive industry.

We would appreciate it if you could spare 15 minutes of your time to complete the 12 questions covered in the survey. Please note that there are no correct or incorrect responses, as we are only seeking your opinion for that is what matters. We would like to reassure you that all answers will be treated in absolute confidence and used for academic purposes only. Please use the extra space provided to expand your answers to the questions where necessary.

We do appreciate that the questionnaire will take some of your valuable time but without your input this research objective aimed at assessing the suitability of decision analysis tools to the organisational use of CSR integration cannot be realised. We would like to thank you very much for your cooperation.

Jolanta Poplawska
c/o Post Graduate Centre
University of Portsmouth Business School
Richmond Building

Portland Street
Portsmouth PO1 3DE
United Kingdom

Email: Jolanta.Poplawska@port.ac.uk
Figure 1 The AHP model for sustainability implementation.
Table 1 summarises the three CSR program alternatives

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Economic advancement of communities</td>
<td>Job creation, housing, small business development, contribution to local development; partnerships with public authorities, sponsorship and donations</td>
</tr>
<tr>
<td>B. Education and training</td>
<td>Support for schools, colleges, universities; employees’ training, programmes aiming at developing new talent; health and safety improvement projects; helping suppliers to incorporate social responsibility into their business strategies</td>
</tr>
<tr>
<td>C. Environment pollution controlling plan</td>
<td>Prevention of water, air, land pollution; waste management programmes; programmes aiming at development of clean technologies, investments in biodiesel production; programmes aiming at protection of natural habitat</td>
</tr>
</tbody>
</table>

SECTION A. BACKGROUND OF RESPONDENT

Name of the respondent (optional):

Profession:

Name of company you are working for:

Industry in which your company is operating:

Years of experience in this industry:

Contact details (optional)

Telephone:

E-mail:

SECTION B. OVERALL FRAMEWORK IMPRESSION

1. In your opinion, is the resources allocation to CSR programs an important problem? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th>Yes</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not significant</td>
<td>□</td>
</tr>
</tbody>
</table>

375
2. What is your opinion about the capability of the decision support framework to address the issue of resources allocation to CSR programs? (Please tick √ box as appropriate)

- Yes, it is capable
- Yes, but not significantly
- Not sure
- No

Comments (if any)

3. In your opinion, is the framework clear, easy to understand and implement without practical difficulties? (Please tick √ box as appropriate)

- Yes
4. In your point of view, what is the effort of framework implementation? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th>Reasonable, the framework can be implemented</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too high, it will not be possible to implement the framework</td>
<td>□</td>
</tr>
</tbody>
</table>

Comments (if any)

5. In your opinion, are the Corporate Social Responsibility (CSR) program alternatives proposed in the framework suitable? Please find the Figure 1 illustrating the AHP framework for sustainability implantation and table 1 summarising the three CSR program alternatives attached above  (Please tick √ box as appropriate)
6. In your opinion, are the ten stakeholder groups to include management, community, employees, environmentalists, government, NGO's, shareholders, suppliers, media, customers all relevant stakeholders? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th>Yes</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>□</td>
</tr>
</tbody>
</table>

If No, please specify.

7. Would you say that the four major objectives environment, social, political, and economic are a fair representation of what is required to implement sustainable development in the extractive industry? (Please tick √ box as appropriate)
8. In your opinion, do the twenty sub-objectives selected to define sustainable practices reasonably represent the problem situation? Please answer irrespective of the sector you work in (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th>Yes</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>□</td>
</tr>
</tbody>
</table>

If No, please specify.

9. In your opinion, does the framework include all relevant matters of importance? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th>Yes</th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>□</td>
</tr>
</tbody>
</table>

If No, please specify.
**SECTION C. ADEQUACY OF TECHNIQUES USED**

10. What is your opinion about the methods/approaches used to rank CSR program alternatives and select the portfolio of them for implementation? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th></th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very suitable</td>
<td></td>
</tr>
<tr>
<td>Suitable</td>
<td></td>
</tr>
<tr>
<td>Not sure of their suitability</td>
<td></td>
</tr>
<tr>
<td>Not suitable</td>
<td></td>
</tr>
</tbody>
</table>

Comments (if any)

11. Are there any other methods/approaches you would consider in ranking CSR programs and selecting a portfolio of them for implementation? (Please tick √ box as appropriate)

<table>
<thead>
<tr>
<th></th>
<th>□</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

If Yes, please specify.
12. Please provide any other comments or suggestions for improvement on the framework or on the techniques used (continue on a separate sheet if necessary)

This is the end of the questionnaire. Thank you very much for your time! **NB: Confidentiality and anonymity are guaranteed. All information collected will conform to the University’s Human Research Ethical procedures.**
9.11 Appendix K: List of articles submitted for publication

**Article I:** A hybrid MCDA framework for sustainability implementation in the extractive industry. Submitted to the European Journal of Operational Research.

**Article II:** A dynamic theory of stakeholder identification and salience using fuzzy logic methodology in Corporate Social Responsibility. Submitted to the Journal of Management Studies. Special Issue: Managing for Political Corporate Social Responsibility.
## Appendix L: Research Ethics Review Checklist

### FORM UPR16
Research Ethics Review Checklist

*Please complete and return the form to Research Section, Quality Management Division, Academic Registry, University House, with your thesis, prior to examination.*

<table>
<thead>
<tr>
<th>Postgraduate Research Student (PGRS) Information</th>
<th>Student ID: 51492101</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Name: Jolanta Poplawska</td>
<td></td>
</tr>
<tr>
<td>Department: Strategy and Business Systems</td>
<td></td>
</tr>
<tr>
<td>First Supervisor: Prof Ashraf Labib</td>
<td></td>
</tr>
<tr>
<td>Start Date: Oct 2010 (or progression date for Prof Doc students)</td>
<td></td>
</tr>
</tbody>
</table>

#### Study Mode and Route:

<table>
<thead>
<tr>
<th>Part-time</th>
<th>Full-time</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPhil</td>
<td>MD</td>
</tr>
<tr>
<td>PhD</td>
<td></td>
</tr>
</tbody>
</table>

#### Title of Thesis:
Decision support framework for resources allocation to corporate social responsibility (CSR) programmes

#### Thesis Word Count (excluding ancillary data):
64,413

If you are unsure about any of the following, please contact the local representative on your Faculty Ethics Committee for advice. Please note that it is your responsibility to follow the University's Ethics Policy and any relevant University, academic or professional guidelines in the conduct of your study. Although the Ethics Committee may have given your study a favourable opinion, the final responsibility for the ethical conduct of this work lies with the researcher(s).

### UKRIO Finshed Research Checklist:

*(If you would like to know more about the checklist, please see your Faculty or Departmental Ethics Committee reg or see the online version of the full checklist at https://www.ukrio.org/what-we-do/code-of-practice-for-research/)*

<table>
<thead>
<tr>
<th>a) Have all of your research and findings been reported accurately, honestly and within a reasonable time frame?</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Have all contributions to knowledge been acknowledged?</td>
<td>YES</td>
</tr>
<tr>
<td>c) Have you complied with all agreements relating to intellectual property, publication and authorship?</td>
<td>YES</td>
</tr>
<tr>
<td>d) Has your research data been retained in a secure and accessible form and will it remain so for the required duration?</td>
<td>YES</td>
</tr>
<tr>
<td>e) Does your research comply with all legal, ethical, and contractual requirements?</td>
<td>YES</td>
</tr>
</tbody>
</table>

*Delete as appropriate*
### Student Statement:

I have considered the ethical dimensions of the above named research project, and have successfully obtained the necessary ethical approval(s).

<table>
<thead>
<tr>
<th>Ethical review number(s) from Faculty Ethics Committee (or from NRES/SCREC):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Signed:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Signature]</td>
<td>30/08/2013</td>
</tr>
</tbody>
</table>

If you have not submitted your work for ethical review, and/or you have answered 'No' to one or more of questions a) to e), please explain why this is so:

<table>
<thead>
<tr>
<th>Signed:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Student)</td>
<td></td>
</tr>
</tbody>
</table>

UPR 16 (2011) – August 2011