

Members influence on one another during group decision-making in a South African bank

Riyaz Smith

**A research report submitted to the Faculty of Commerce, Law and
Management, University of the Witwatersrand, in partial fulfilment of the
requirements for the degree of Master of Business Administration.**

**Wits Business School
February 2016**

ABSTRACT

Today a significant proportion of decisions in the workplace are made by teams, groups, or committees. The purpose of this research was to quantify the mutual influences amongst members in a small decision making group and ascertain benefits and pitfalls in consensus decision making. This case study research focused on Barclays Africa Mortgage Change Council located in Johannesburg, South Africa.

A critical review of the literature revealed when groups are required to reach consensus, individual members influence one another and this collective agreement results in decisions moving to more extreme positions. A model has been developed that determines how powerful each member of a group has been during interactions, and the influence of each group member on one another. Accordingly, this research analysed and evaluated the dynamics that occur before, during, and after discussions between decision makers to determine the influence members have on one another's choice shifts.

The study combines quantitative and qualitative research approaches to answer the research questions. To evaluate the dynamics that takes place during group interactions, five respondents were requested to rate ten attributes on two decision alternatives; before, during, and after group discussion. Qualitative data collected during separate semi-structured interviews with members after the group interaction, draws links to the quantitative modelling results established in the study.

The research concludes that post-discussion preferences of members in a small decision making group can be modelled as a linear function of the members' pre-discussion preferences. Furthermore, buy-in and participation to implement group decisions improved when the members converged to reach consensus. This study assists organisations to identify the presence of "groupthink" and lessen flawed decision making in working group committees should consensus be valued over the best result.

DECLARATION

I, Moegamad Riyaz Smith, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Moegamad Riyaz Smith

Signed at Glenvista, Johannesburg.

On the 24th day of February 2016

DEDICATION

To Talicia

This is the third qualification you have supported me through during our time together. Thank you for your never-ending support.

And

To my sons Shakeel, Yeshen, and Ayaan

Daddy loves you

ACKNOWLEDGEMENTS

I'd like to express my sincere thanks and appreciation to a number of people who have supported and encouraged me throughout completion of this research report:

To my entire family for their guidance, unconditional love, and support. You are my inspiration.

Thank you to Prof. Anthony Stacey, my supervisor, for pointing me in the right direction throughout my research. Your advice and encouragement is appreciated.

Sincere gratitude to all my lecturers at Wits Business School, every one of you contributed to me reaching this milestone.

Thank you to all my colleagues and friends at Barclays Africa Mortgages who offered to participate in my research.

TABLE OF CONTENTS

ABSTRACT	ii
DECLARATION.....	iii
DEDICATION	iv
ACKNOWLEDGEMENTS.....	v
LIST OF TABLES.....	ix
LIST OF FIGURES	xi
TABLE OF EQUATIONS.....	xii
CHAPTER 1. INTRODUCTION.....	1
1.1 PURPOSE OF THE STUDY	1
1.2 CONTEXT OF THE STUDY.....	1
1.3 PROBLEM STATEMENT	2
1.3.1 MAIN PROBLEM.....	2
1.3.2 SUB-PROBLEM 1	2
1.3.3 SUB-PROBLEM 2	2
1.4 SIGNIFICANCE OF THE STUDY	2
1.5 DELIMITATIONS OF THE STUDY.....	3
1.6 DEFINITION OF TERMS	3
1.7 ASSUMPTIONS	3
CHAPTER 2. LITERATURE REVIEW	4
2.1 INTRODUCTION	4
2.2 GROUP DYNAMICS IN SOUTH AFRICA	4
2.2.1 INTERGROUP THEORY	5
2.2.2 SOCIAL IDENTITY AND SELF CATEGORISATION THEORY	6
2.3 SMALL GROUP DECISION MAKING	7
2.3.1 SOCIALLY SHARED COGNITIONS	7
2.3.2 COLLECTIVE EFFICACY	7
2.3.3 GROUP POLARISATION.....	8
2.4 THEORIES OF SOCIAL INTERACTION.....	9
2.4.1 SOCIAL COMPARISON THEORY	9
2.4.2 PERSUASIVE ARGUMENTATION THEORY.....	10
2.4.3 COMPUTER MEDIATED GROUPS	10
2.5 QUANTITATIVE ASPECTS IN GROUP DECISION MAKING.....	10

2.5.1	MEASURING PREFERENCE	12
2.5.2	AGGREGATION OF PREFERENCE.....	14
2.6	CONSENSUS IN DECISION MAKING.....	16
2.6.1	BENEFITS OF CONSENSUS DECISION MAKING	16
2.6.2	PITFALLS OF CONSENSUS DECISION MAKING.....	17
2.7	CONCLUSION OF LITERATURE REVIEW	19
2.7.1	HYPOTHESIS No. 1:	20
2.7.2	HYPOTHESIS No. 2:	20

CHAPTER 3. RESEARCH METHODOLOGY.....21

3.1	RESEARCH METHODOLOGY	21
3.2	RESEARCH DESIGN	22
3.3	POPULATION AND SAMPLE.....	23
3.3.1	POPULATION.....	23
3.3.2	SAMPLE AND SAMPLING METHOD	24
3.4	THE RESEARCH INSTRUMENT	24
3.5	PROCEDURE FOR DATA COLLECTION.....	25
3.6	DATA ANALYSIS AND INTERPRETATION	26
3.6.1	QUANTITATIVE METHOD.....	26
3.6.2	QUALITATIVE METHOD	27
3.7	LIMITATIONS OF THE STUDY.....	27
3.8	VALIDITY AND RELIABILITY	27
3.8.1	EXTERNAL VALIDITY	28
3.8.2	INTERNAL VALIDITY.....	28
3.8.3	RELIABILITY	28

CHAPTER 4. PRESENTATION OF RESULTS.....30

4.1	RESULTS PERTAINING TO HYPOTHESIS 1: POST-DISCUSSION PREFERENCES OF INDIVIDUALS IN A DECISION MAKING GROUP CAN BE MODELLED AS A LINEAR FUNCTION OF THE INDIVIDUAL GROUP MEMBERS PRE-DISCUSSION PREFERENCES.	30
4.1.1	INTRODUCTION	30
4.1.2	DATA REPORTS	30
4.1.3	COLLINEARITY REPORT	35
4.1.4	POLARISATION REPORT	36
4.1.5	INFLUENCE REPORT	37
4.1.6	STABILITY REPORT	40
4.1.7	NUMBER OF EXTRINSIC ELEMENTS	42
4.1.8	CONCLUSION TO HYPOTHESIS 1	43
4.2	RESULTS PERTAINING TO HYPOTHESIS 2: CONSENSUS IMPROVES GROUP FUNCTIONING WHEN EVERY MEMBER HAS EQUAL OPPORTUNITIES TO PROVIDE DIFFERENT OPINIONS ON DECISION ALTERNATIVES.	44
4.2.1	CONSENSUS: BENEFITS AND PITFALLS INTERVIEW RESULTS.....	44
4.2.2	RESPONSES FROM DECISION MAKERS.....	46
4.2.3	CONCLUSION TO HYPOTHESIS 2	51
4.3	SUMMARY OF THE RESULTS	51

CHAPTER 5. DISCUSSION OF THE RESULTS 52

5.1	INTRODUCTION	52
5.2	DEMOGRAPHIC PROFILE OF RESPONDENTS	52
5.3	DISCUSSION PERTAINING TO HYPOTHESIS 1	52
5.3.1	MEMBERS INFLUENCE ON ONE ANOTHER IN A SOUTH AFRICAN BANK	53
5.3.2	SOCIALLY SHARED COGNITIONS	54
5.3.3	COLLECTIVE EFFICACY	55
5.3.4	GROUP POLARISATION	56
5.3.5	SOCIAL INTERACTION THEORIES.....	56
5.3.6	SOCIAL DECISION SCHEME & SOCIAL JUDGEMENT SCHEME.....	57
5.3.7	CONCLUSION TO HYPOTHESIS 1.....	58
5.4	DISCUSSION PERTAINING TO HYPOTHESIS 2:	58
5.4.1	CONSENSUS DECISION MAKING	59
5.4.2	CONCLUSION TO HYPOTHESIS 2	61
5.5	CONCLUSION	61

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS 63

6.1	INTRODUCTION	63
6.2	CONCLUSIONS OF THE STUDY	63
6.2.1	SUMMARY OF THE FINDING FOR THE FIRST HYPOTHESIS	63
6.2.2	SUMMARY OF THE FINDING FOR THE SECOND HYPOTHESIS	67
6.3	RECOMMENDATIONS	68
6.1	SUGGESTIONS FOR FURTHER RESEARCH	69

REFERENCES 71

APPENDIX A..... 80

ACTUAL RESEARCH INSTRUMENT	80
----------------------------------	----

APPENDIX B..... 81

METHODOLOGY OF DYNAMICS MODELLING	81
---	----

APPENDIX C..... 83

CHARACTERISTICS OF CHOICE SHIFT SCENARIOS (STACEY, 2002).....	83
---	----

APPENDIX D..... 84

INTERVIEW GUIDE	84
-----------------------	----

APPENDIX E 85

LETTER TO RESPONDENTS.....	85
----------------------------	----

LIST OF TABLES

Table 1: Technique comparison: Cluster analysis, Multidimensional scaling, and Conjoint analysis (Adapted from Green, Krieger, & Wind, 2001)	12
Table 2: Decision Categories and Attributes	23
Table 3: Profile of respondents	24
Table 4: Signal sets used in group discussion (Bressen, 2007)	25
Table 5: Anterior Data Trivial Scenario (Adapted from Stacey, 2002)	26
Table 6: Anterior data (X)	31
Table 7: Posterior data (Y)	31
Table 8: Differences between Anterior and Posterior attitudes (Concept A)	34
Table 9: Differences between Anterior and Posterior attitudes (Concept B)	35
Table 10: Anterior Collinearity Matrix (S_x)	35
Table 11: Posterior Collinearity Matrix (S_y)	36
Table 12: Cross Collinearity Matrix (S_{xy})	36
Table 13: Anterior polarisation report (Δp)	36
Table 14: Posterior polarisation report (Δa)	37
Table 15: Matrix of association (A_n)	37
Table 16: Standardised anterior data matrix (X_s)	38
Table 17: Matrix of residuals (E_s)	38
Table 18: Matrix of residuals (Y_s)	39
Table 19: Degrees of influence	39
Table 20: Object of influence profile	40

Table 21: Interviewee demographics	45
Table 22: Group discussion summary	45
Table 23: Quantitative and Qualitative result comparison (Subject of influence profile)	47
Table 24: Quantitative and Qualitative results comparison (Object of influence profile)	48
Table 25: Embedded-intergroup dynamic	54
Table 26: Basic Processes underlying bias toward shared information (Denis, 1996)	60
Table 27: Comparison of Anterior and Posterior Polarisation	64
Table 28: Quantitative Model Matrices (A.X)	66
Table 29: Residuals (E)	67

LIST OF FIGURES

Figure 1: Power shifts in South Africa since the first democratic elections (Adapted from Booysen, 2007)	5
Figure 2: Representation of Group Polarisation (Adapted from Neill, 2002)	9
Figure 3: Prospects theory's probability weighting function (Kahneman & Tversky 1979).....	11
Figure 4: Step by step consensus model (Hartnett, 2016)	16
Figure 5: Mixed method priority and sequence (Morgan, 2014)	22
Figure 6: Procedure for data collection	25
Figure 7: Differences between anterior and posterior data matrices	33
Figure 8: Argand diagram (Before - During)	41
Figure 9: Argand diagram (During - After)	41
Figure 10: Argand diagram (Before - After)	42
Figure 11: Degree of influence (including extrinsic element).....	42
Figure 12: Characteristics of the choice shift.....	43
Figure 13: Parameters of the quantitative dynamics model (Stacey, 2002)	43
Figure 14: Model for Group Decision Making (Adapted from Stacey, 2002)	58
Figure 15: Information Sharing - Common Phrases and Frequencies	60

TABLE OF EQUATIONS

Equation 1: Multinomial distribution (Davids, 2003)	15
Equation 2: Matrix of association (Stacey, 2002)	81
Equation 3: Standardised anterior data matrix (Stacey, 2002)	81
Equation 4: Standardised sum of squares profile (Stacey, 2002)	82
Equation 5: Quantitative model for choice shifts (Stacey, 2002)	82
Equation 6 : Normalised matrix of residuals (Stacey, 2002)	82

CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

The purpose of this research was to analyse members' influence on one another during group decision-making in a South African bank. Furthermore, the study evaluated benefits and pitfalls of consensus decision making in a working group committee.

1.2 Context of the study

One of the most frequent activities in daily life is decision making (Pieterse, de Vries, Kunneman, Stiggelbout, & Feldman-Stewart, 2013). Lewin's (1947) seminal paper described group dynamics as the process of how individuals and groups respond to changing circumstances. To understand why poor quality outcomes of human decisions happen, a need exists for research that can offer explanations of how groups communicate, co-ordinate information exchange, and make decisions (Kolbe, 2011).

Member and group performance is enhanced when a group engages in collective agreement on challenging goals (Kerr, 2003). Meta analytic studies (Beal, 2003) demonstrate, in situations where efficiency is important, better performance is achieved in cohesive groups. The literature on consensus decision making practices in organisations proposes when employees are involved in the decision making, it increases the acceptability of the resultant decision and facilitates the later implementation (Kameda, 2013).

According to Stacey (2002), member's choices after group interaction can be modelled as a linear function of their pre-discussion preferences. The management problem reviewed the dynamics that occur before, during, and after discussions between group members and what influences members have on one another's choice shifts from their initial preference.

1.3 Problem statement

1.3.1 *Main problem*

Evaluate small group dynamics that occur before, during, and after discussions between group members, and what influences group members have on an individual's choice shift from their initial preference.

1.3.2 *Sub-problem 1*

Quantify the mutual influences amongst members of a small decision making group which influences the degree of post-discussion choices.

1.3.3 *Sub-problem 2*

Establish consensus decision making benefits and pitfalls in working group committees.

1.4 Significance of the study

More than one theory may be correct in understanding the mechanisms that are applicable to small group decision making (Pruitt, 1971; Kowert, 2012). This research draws links in pre and post-discussion outcomes between members and analyses multiple variables that influence group decisions. The study attempts to, at least partially, fill a void in the theory base on group decision making by quantifying the influence of group members on one another (Stacey, 2002).

Definitive studies have not yet been done to account for choice shift in groups and this research makes a contribution in this area by examining in an empirical context, whether behaviour patterns in small groups model their preferences and choice shifts during consensus decision making.

This study hopes to benefit future group decision making research hypotheses, for example; evaluation of the degrees of influence that needs to be exercised if a decision making group is becoming polarised (Stacey, 2002).

1.5 Delimitations of the study

The scope of the study is limited to the following elements:

- Internal data of one bank's employees in the South African retail banking industry.
- Management level employees and/or employees with participation and involvement in the decision making process.
- Individuals who are willing and able to be interviewed.

1.6 Definition of terms

Choice shift: Is a comparison between individual level decisions versus post discussion group decisions. In the context of this study it refers to the mean difference of an individual's initial preference, compared to the group recommendation (Stacey, 2002).

Group polarisation: Group polarisation is when the team discussions move decisions to more extreme points in the same direction as the initial tendencies of the group members' initial choices (Mui, 1997).

Consensus in decision making: Consensus agreements require consent of all parties before an agreement is binding and imply that parties agree publicly to a decision though their underlying views about the decision may be in conflict (Thompson & Fox, 2001).

1.7 Assumptions

- Pre-outcome choice and preferences of individuals is not biased in subsequent pre-outcome discussions and interviews.
- Respondent groups have clear and consistent sets of goals and share information openly before, during, and after group interactions.
- Regular access to a decision making group is possible to perform the research.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This section contains a literature review on relevant key themes related to the research. The first area examines the group dynamics applicable to group decision making in South Africa. The literature relating to quantitative methods for measuring and aggregating preferences in groups provides context to the quantitative dynamics model used in the study. The chapter concludes by determining organisational benefits and pitfalls emanating from consensus decision making in working group committees.

2.2 Group dynamics in South Africa

Since the abolishment of apartheid, South Africa (SA) has experienced major social, political and economic transformation, leading to the current social identities in the workplace (Booyesen, 2007). Malanchuk (2005) argues such large societal transformation alters how individuals perceive their group membership. South Africans are classified by population groups and there has been a shift in membership identification from racial groups in the past, to being more centred on self-perception and self-classifications (Booyesen, 2007). According to Bornman (1999), self-concepts, either positive or negative, are often defined by the status of the group to which individuals belong, relative to other groups in society.

In cases where SA groups gain status and opportunity, the sense of loss applies more to the groups that were previously in a dominant or privileged position (example; Whites in apartheid SA) compared to those who see opportunity in the emerging future (example; Blacks in post-apartheid SA) (Booyesen, 2007). Booyesen (2007) argues that continuous interactions within an environment leads to the existence and survival of an open system and resilient societies adapt to these new conditions and shift the way they organise around identities and power relations (Booyesen, 2007). The power shifts in South Africa since the first democratic elections in 1994 is illustrated in Figure 1.

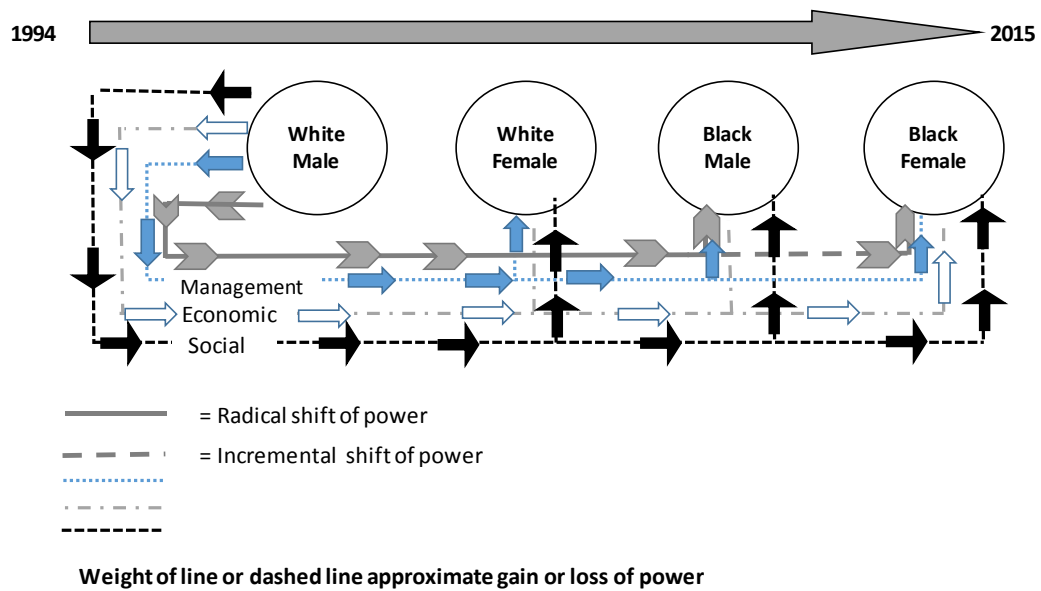


Figure 1: Power shifts in South Africa since the first democratic elections (Adapted from Booysen, 2007)

Dominance in the context of this study refers to the number of individuals, their hierarchy, status, and power within the group. Social identity group dynamics in the SA context are examined by referring to Alderfer's (1983) seminal work on embedded-intergroup theory and Tajfel and Turner's (1979) social identity and self-categorisation theory to define the effects of dominance within social identity groups.

2.2.1 *Intergroup theory*

Embedded-intergroup theory is useful to explore intergroup perspectives, identifying the effects of dominance between social identity groups, and evaluating intergroup dynamics in terms of power, cognition, affect, group boundaries, and leadership behaviour (Alderfer, 1983). Alderfer's (1983) finding infers that the effects of groups occupying favourable positions in a sub-system could potentially be reduced as a result of relative disadvantage in the supra-system.

In the context of this study, the sub-groups within the social identity group is studied, based on importance of the embedded-intergroup dynamics, for example; black and white males who share the identity group of males may have different levels of dominance due to differences in their cultural identities

(Booyesen, 2007). In other words, the primary identification is race; black or white, and the secondary identifier is male or female, and is used to draw inferences on the levels of influence that supra-systems have on sub-systems and perceived dominance by different identity groups (Alderfer, 1983; Booyesen, 2007).

2.2.2 Social identity and Self Categorisation theory

Social identity theory (SIT) maintains that human interactions are affected, based on how individuals classify themselves into social categories (Turner, 1981). SIT evaluates psychological and sociological aspects of group behaviour, group association and intergroup discrimination (Turner, 1981). Past research identified that the most salient social identity groups in SA are race, gender, religion, ethnicity and language (Booyesen, 2007; Hogg, Abrams, Otten, & Hinkle, 2004).

SIT proposes that social structures have an influence on individual actions by means of social identities and psychological mediums (Booyesen, 2007). Put differently, levels of gender, ethnic or class characteristics do not persist, due to inherent group characteristics (Abrams, 2004).

SIT comprises the following elements:

- Categorisation: How individuals place themselves and others into categories, for example; a coloured, or a banker.
- Identification: Individuals associate with certain groups which bolsters their self-esteem.
- Comparison: Individuals draw comparisons to other groups and may display a bias or positive discrimination to the group to which they belong, and often competes with other groups.

According to Abrams and Hogg (2004), self-categorisation theory renders certain attitudes and associated behaviour normative which results in individuals behaving in line with these norms. This provides context and explanations for changes in social identity by way of social categorisation of individuals assimilating the self into the in-group prototype (Booyesen, 2007).

Individuals are defined by their group membership and the social cognitive processes that are related to group member-based self-definitions, which

characterises group behaviour (Booyesen, 2007). The implication of self-categorisation is therefore that as individual attitudes about themselves and the perceptions of others about the group changes, the individual subsequently adapts their own social identity.

2.3 Small Group Decision Making

The benefits of group decision making is that members' commitment to make the final decision work increases since more knowledge and expertise is available to problem solve, examine alternatives, and better understand decisions (Lunenburg, 2011).

2.3.1 Socially Shared Cognitions

Cognitive or information processing models have been used by researchers as an organising framework to identify how task performing groups function. Social interaction leads to shared cognition by means of social comparison (Tindale, 2001). The notion of cognition refers to the nature of thoughts, memories and beliefs that are often shared among people in common social environments. Most prior research placed cognition at the individual level, however, recent reconceptualization of intragroup dynamics have revealed cognitions are social in nature (Tindale, *et al.*, 2001).

Kameda, *et al.*, (2003) referred to "social sharedness" as the theme underlying how groups process information which is often beneficial towards the group's process and performance, opposed to when information is not shared.

2.3.2 Collective efficacy

Collective efficacy refers to the group members shared perceptions about how capable their group is regarding a specific task (Bandura, 2000). Several studies indicate strong positive relationship between collective efficacy and group performance (examples; Campion, Medsker, & Higgs, 1993; Guzzo, Jung & Sosik, 1999). People work together to achieve accomplishments they would not be able to achieve on their own, for example; individuals may attempt to get others with expertise or influence to act on their behalf to attain the outcomes

they seek (Bandura, 2000). Sosik, *et al.*, (1997) found collective efficacy positively predicted group effectiveness in experimental settings.

Perceived efficacy is a key ingredient in human functioning as it affects behaviour directly and impacts other determinants, such as; aspirations, goals, and opportunities in social environments (Bandura, 2000). Though much of the research in the area of collective efficacy focused on sports teams, the concept has been successfully applied in organisational work team settings (Tindale, 2001).

The results of findings are particularly interesting as the research tends to identify that collective efficacy is an important aspect of group performance and, similar to self-efficacy, it is seen as one of the central components of different aspects of motivation (Tindale, 2001). Bandura (2000) notes that these findings highlight that people motivate and guide their actions based on their beliefs and personal efficacy. It is, however, not uncommon for groups with talented individuals to perform poorly as a collective because the group members are unable to work well together and this is because collective efficacy is not just the sum of efficacy of individual members but rather the emergent group level property (Bandura, 2000).

2.3.3 Group Polarisation

Stoner (1961) found that group decisions tend to be riskier compared to individual decisions and labelled this observation, using the term “risky shift”. Subsequent research by Lamm, *et al.*, (1978) identified that change in group decisions occur in both directions, namely; riskier or cautious, better known as group polarisation.

Mui (1997) noted that group polarisation is evident when team discussions move decisions to more extreme points in the same direction as the initial tendencies of the group members’ initial choices. Vinze (1998) supports this and highlights that group polarisation is viewed to have positive benefits in group decision making when there is a need for the group to reach consensus to an extreme position. The group polarisation phenomenon is illustrated in Figure 2.

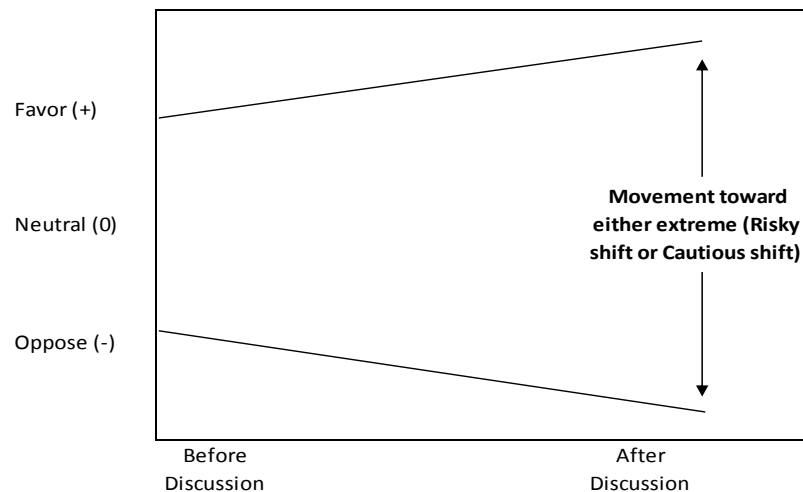


Figure 2: Representation of Group Polarisation (Adapted from Neill, 2002)

The implication of group polarisation is that, due to group dynamics, a group's final decision may change without any changes to the underlying facts that lead to the decision (Vinze & El-Shinnawy, 1998).

The body of research relating to persuasive arguments theory (Lamm & Meyer, 1978; Pruitt, 1971; Vinze, 1998) holds that decisions in groups is a function of persuasiveness of arguments that individuals are exposed to before making their final decision. Procedurally, the research focus is on discussions that precede group decisions and, in particular, the levels and nature of persuasiveness of argument exchanges in group settings (Vinze & El-Shinnawy, 1998).

2.4 Theories of Social Interaction

2.4.1 Social Comparison Theory

Polarisation of opinions result in choice shifts. Social comparison theory (Festinger, 1954; Friedkin, 1999) is used to elaborate on group member behaviour and the relevance of polarisation in group decision making.

According to social comparison theory, group members avoid being labelled as deviant by initially providing opinions which are less extreme than their true opinions until after group discussions. The choice shift occurs when other group members have similar or more extreme views on the decision which results in them also shifting their initial opinion toward their true values (Friedkin, 1999).

During group discussion individuals expose their opinions which results in a level of erosion of moderate less risky choices and provides opportunity for adopting more extreme positions (Friedkin, 1999).

2.4.2 *Persuasive Argumentation Theory*

Johnson (1973) identified that collective behaviour is parallel to shifting to risk in group decision making and this phenomenon can be conceptualised as group-induced shifts. Persuasive arguments theory helps to explain group polarisation, based on the contents of arguments that arise during group discussions (Burnstein, 1977). The theory is premised on the hypothesis that group members would draw arguments on various issues from individuals that support their initial opinion (Friedkin, 1999).

In instances where initial opinions are biased, the sample of arguments expressed during group discussions will reflect the bias and therefore influence the direction of choice shifts (Friedkin, 1999).

2.4.3 *Computer mediated groups*

The core purpose of work groups is to enhance organisational effectiveness regardless of communication type (Berry, 2006). Face-to-face communication has traditionally been assumed to be superior to other forms of communication, however, due to organisational constraints such as geographic locations of group members and time pressures it is not always possible (Berry, 2006).

Computer mediated communication (CMC) is a tool that helps organisations to increase efficiency and productivity through effective teamwork and decision making (Berry, 2006). CMC has been shown to increase and equal member's participation and creates time for additional reflection and thought by participants and achieves permanent records of all discussions.

2.5 Quantitative Aspects in Group Decision Making

The initial phase of psychological research on decision making has focused on issues of measuring utility and subjective probability (Crozier, 1997).

Researchers later explored empirical findings whereby the same decision problems produced different outcomes mainly due to variations in the way in which it was presented, or if different response measures were used as indices of preferences (Crozier, 1997). Findings were however difficult to explain using the model of rational behaviour (Crozier, 1997).

Kahneman and Tversky (1979) proposed prospect theory to describe the structural characteristics of the decision problem as the theory assumes that stated probabilities can be translated into subjective weights according to the function. Figure 3 (Kahneman, *et al.*, 1979) shows that if the weighting function follows the diagonal line, the stated outcome probabilities would correspond to the decision weights.

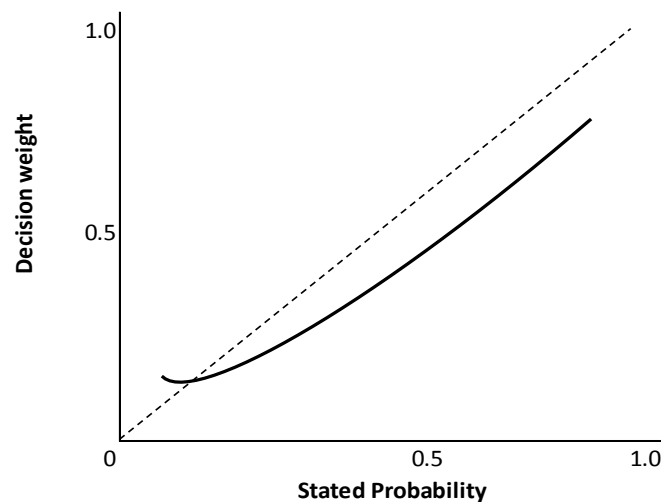


Figure 3: Prospects theory's probability weighting function (Kahneman & Tversky 1979)

The theory suggests that very low probabilities' weights are higher than stated probabilities, but in all other cases they are lower (Crozier, 1997). Kahneman and Tversky (1979) highlight that subjective estimates of probability are not represented by function as these reflects weights assigned to well-defined risk prospects in preference choice situations.

According to Crozier *et al.*, (1997) overweighting of low probabilities predicts certain aspects of risky or cautious behaviours and the slope of the function would therefore reflect the sensitivity of individual preference to the changes in outcome probabilities. In contrast to subjectively expected utility theory which assumes decisions would be reached by summing over the set of utilities weighted by the

subjective probability of occurrence, the decision weights in prospects theory is more coherent than the notion that individuals would distort stated probabilities (Crozier, 1997).

2.5.1 Measuring Preference

Three techniques introduced in the late 1960's to the early 1970's, namely; cluster analysis, multidimensional scaling (MDS), and conjoint analysis are used extensively in marketing research due to their application in identifying preferences (Green, Krieger, & Wind, 2001). Conjoint analysis has become particularly popular since the 1970's due to strong influences of developments in behavioural sciences using data analysis, modelling techniques, and software (Green *et al.*, 2001). The three methods; cluster, MDS, and conjoint analysis are briefly compared in Table 1.

Table 1: Technique comparison: Cluster analysis, Multidimensional scaling, and Conjoint analysis (Adapted from Green, Krieger, & Wind, 2001)

Cluster analysis	Multidimensional scaling	Conjoint analysis
The method provides researchers a means to identify how to base segmentation regarding the needs, or benefits sought, brand preferences and other variables (Green <i>et al.</i> , 2001)	The method constructs maps for pictorial representation of large multiway numerical tables as point geometric representations of two or even three dimensions (Green <i>et al.</i> , 2001).	Conjoint analysis deals with central problems by measuring respondent trade-offs, unlike Cluster analysis and MDS which is used as ancillary techniques for data analysis and presentation (Green <i>et al.</i> , 2001).
The data collected would enable the researcher to identify groups that share similar needs, attitudes, trade-offs, or benefits (Green <i>et al.</i> , 2001).	Marketing researchers found that in developing brand positioning maps using MDS techniques, the results were diagnostic rather than predictive (Green <i>et al.</i> , 2001).	In contrast to MDS, conjoint analysis places emphasis on the researchers' specified attribute levels and provides a basis for preference and choice responses to explicit arguments (Green <i>et al.</i> , 2001).

The methodology chosen for this research, conjoint analysis, is used extensively in experimental designs and enables researchers to estimate causal effects of multiple components and several causal hypotheses simultaneously (Hainmueller, Hopkins, & Yamamoto, 2014). Green *et al.*, (2001) cites conjoint analysis as one of many techniques to evaluate how decision makers deal with alternative options which simultaneously vary across more than one attribute. Conjoint analysis develops and presents descriptions of respondents' choices to understand how they made the trade-offs between alternatives (Green *et al.*, 2001). In designing a conjoint analysis study, the researcher develops a set of attributes and corresponding attribute levels to characterise the competitive domain (Green *et al.*, 2001).

Krantz and Tversky (1971) defined conjoint measurements as methods to analyse composition rule theories amongst severable variables using ordinal data. The technique constructs measurement scales for relevant dependent and independent variables that satisfy the composition principle as it decomposes the values of a set of individual evaluations or discrete choices from a designed set of multi-attribute alternatives (Louviere, 1988; Tversky, 1971). Most notably, conjoint analysis techniques are successfully used in marketing research and healthcare provisions, for example; developing outcome measures, and evaluating alternatives within randomised control trials (Ryan, 2000).

The advantage of using conjoint analysis is that it enables the researcher to present respondents with information and then asks them to make choices which enhances realism in that it elicits individual preferences on a single dimension for a number of varying research questions (Hainmueller *et al.*, 2014). Farrar *et al.*, (2000) states the method has shortcomings, specifically in dealing with inconsistent responders and respondents that exhibit dominant preferences and recommends future research relating to preferences should consider the extent to which inconsistent responders are acting rationally and therefore could be included in the analysis.

Stacey (2002) supports these views and says the process of group decision making is complex and individual preferences cannot be translated into group decisions with reliability, therefore when applying conjoint analysis, the researcher needs to bear in mind the additional dynamics when there are multiple

decision makers. Stasser (1999) referred to this as; “the individual into group problem”.

2.5.2 Aggregation of Preference

A large body of research has been created which focuses on how groups reach consensus. The early literature on individual decision making was dominated by preference structures over alternatives, and the process of aggregating preferences of group members to achieve consensus (Kameda, 2003). The conceptual system for describing the aggregation of preferences, Social Decision Scheme (SDS) theory (Davis 1973, 1996; Stasser, Kerr, & Davis, 1989), is premised on the assumption that small group interaction is a combinatorial process whereby individual preferences on decision alternatives must be combined for each group member to allow the group to reach consensus on a single group choice (Kameda, 2003).

Majority and plurality describes the consensus process of groups working on decision tasks and situations (Kameda, 2003). The combination process varies as a function of the group task, the environment, and other factors which are described by an SDS matrix (Kameda, 2003). The SDS matrix determines the probability of the group deciding on a particular alternative for each combination of individually chosen alternatives (Stacey, 2002). SDS is represented by a decision matrix including elements which reflect “tradition, norm, task features, interpersonal tendencies, local conditions, or a combination” (Stacey, 2002; Davis 1973).

Generally SDS assumes that individual decision makers need to select one of η mutually exclusive response alternatives, $A_j, j = 1, 2, 3, 4, 5 \dots \eta$ and the individual group members' decisions are characterised by a discrete probability distribution $\rho = \rho_1, \rho_2, \rho_3 \dots, \rho_\eta$ over η alternatives (Kameda, 2003). The concept is applied the same for groups $\rho = \rho_1, \rho_2, \rho_3 \dots, \rho_{\eta'}$. In the case of hung jury decisions, for example, it is possible that $\eta \neq \eta'$ for different individuals (Kameda, 2003).

The technique is illustrated by way of an example; prior to group discussions individual members of a three person group could array themselves in a distinguishable distribution in four different ways over two choice alternatives,

namely; (3, 0), (2, 1), (1, 2), (0, 3). This distribution reflects the response alternatives but does not distinguish individual group members (Kameda, 2003).

The probability of the distribution and members' preferences occurring can be determined through estimation in two ways, firstly; by means of direct estimates by counting the relative frequency in which the distributions are observed to occur (Kameda, 2003). In the context of this study, this option would require inspection of pre-discussion preferences in the decision making group. The second option is to estimate the probability, π_i of the i th distribution indirectly with the multinomial distribution

$$\pi_i = \left(\frac{r}{r_1, r_2, \dots, r_n} \right) p_1^{r_1} p_2^{r_2} \dots p_n^{r_n}$$

Equation 1: Multinomial distribution (Davids, 2003)

using observed estimates for each individual choice preference distribution, $\hat{p}_i$ (Kameda, 2003). Based on the distribution of opinions decided in the group the problem to solve is the probability that the group will select a given alternative (Kameda, 2003).

The preliminary hypothesis validates Stacey's (2002) quantitative model of intra-group dynamics. This is:

$\mathbf{Y} = f(\mathbf{A}_N, \Delta_a, \Delta_p, \mathbf{X}_N)$ Where:

$\mathbf{Y}$ - matrix of group member post-discussion preferences

$\mathbf{A}_N$ - matrix of the relative mutual influence among group members

Δ_a - diagonal matrix of group member power

Δ_p - diagonal matrix of group members pre-discussion preference intensity

$\mathbf{X}_N$ - matrix of group members' pre-discussion relative preferences.

- *Hypothesis No. 1:* Post-discussion preferences of members in a decision making group can be modelled as a linear function of the members' pre-discussion preferences.

2.6 Consensus in Decision Making

Consensus in decision making is when members in a group choose between two mutually exclusive actions with the intent of reaching a consensus. Understanding how consensus processes work and why they sometimes fail is essentially important in group decision making. Decision making groups use decision rules to provide the level of agreement required in order to finalise the decision; examples include unanimous agreement or simple majority (Hartnett, 2016). Scholars have formulated various step-by-step models that vary in their detail of how to make decisions by consensus. Hartnett *et al.*, (2016) provides a basic model (Figure 4) that incorporates how collaboratively the members generate proposals, how they then modify proposals to gain as much agreement in the group as possible, as well as how to identify unsatisfied concerns during group interaction.

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Discussion	Identify emerging proposal	Identify any unsatisfied concerns	Collaboratively modify the proposal	Assess the degree of support	Finalise the decision OR Circle back 1 or 3

Figure 4: Step by step consensus model (Hartnett, 2016)

Consensus reaching processes therefore aim to achieve mutual agreement in the group of decision makers prior to making a final decision (Palomares, Martinez, & Herrera, 2014).

2.6.1 Benefits of consensus decision making

Human societies are unable to function effectively without consensus decisions and many pressing problems facing humanity have resulted from large scale failures to reach a consensus (Conradt & Roper, 2005).

Consensus agreements require consent of all parties before an agreement is binding and imply that parties agree publicly to a decision though their underlying views about the decision may be in conflict (Thompson & Fox, 2001). Groups that

attempt to build consensus employ group influence tactics for others to change their opinions or choices (Thompson & Fox, 2001).

Thompson and Fox (2001) identify three main influence tactics used to persuade others within a group:

- Normative influence: Refers to the influence group members exert on one another because of each individual's desire to be respected and liked by the group as a whole.
- Informational influence: Refers to the influence attempts made by group members relying on facts and objective reasoning.
- Values influence: Refers to influence attempts made by group members that elicits the individual's desire to uphold the organisation values.

2.6.2 *Pitfalls of consensus decision making*

Compromise agreements are quicker, easier, and compelling because they appear to be fair, but they are usually inefficient because they fail to exploit possible pareto-improving trade-offs (Thompson & Fox, 2001). Consensus decisions thus may lead to the development of compromise agreements by groups identifying with the lowest common denominator (Thompson & Fox, 2001).

Communication in group decision making is of vital importance, given that every person carries the baggage of their upbringing, experiences, and cultures (Stavvers, 2011). Common problems found in group decision making include; members who may be inclined to problem solve resulting in instances where the answers or proposals are provided without others having much opportunity to contribute (House, 2011); members may speak on behalf of others, for example; "What Tony is trying to say" or falling back on their status and dominance in the group to influence others' opinions (Stacey, 2002).

Authors highlight groupthink as one of the major inhibitors of effective group decision making. Consensus decisions have disadvantages, such as creating a diffusion of responsibility and lack of accountability of decisions made by groups (Boundless, 2015). The groupthink phenomenon happens in groups of people with a desire for conformity which results in irrational decision outcomes.

Members isolate themselves from outside influences and suppress their dissenting viewpoints in order to avoid conflict which results in the group reaching a consensus without a critical evaluation of alternative viewpoints (Stacey, 2002).

Members have loyalty to the group and avoid raising issues or alternatives which leads to a loss of individual member's creativity and independent thinking. Due to dysfunctional group dynamics the "in-group" may produce an inflated certainty that the correct decision was made and therefore significantly overrate its own decision-making abilities (Boundless, 2015).

Lunenburg *et al.*, (2011) recommends the following ways in which to overcome dysfunctions of effective group decision making;

- Brainstorming: A process of creatively generating alternative solutions to problems (Osborn, 1957; Lunenburg, 2011).
- Nominal group technique: Individuals brought together to develop a solution to a problem and concerned with both the generation of ideas and evaluating ideas (Delbecq, Van de Ven, & Gustafson, 1975).
- Delphi technique: Relies completely on a nominal group and participants do not need to exchange face-to-face. Instead, uses polling via other media, for example; email responses.
- Devil's advocacy: Introduces conflict into decision making to improve quality of group decisions (Schwenk, 1984). Janis (1982) proposed that the concept is an antidote to groupthink which results in inhibitions and hasty conformity to group norms.
- Dialectical inquiry: Formation of two or more divergent groups presenting a full range of views with an attempt to achieve consensus amongst positions (Lunenburg, 2011).

In conclusion, the advantages of consensus decision making is that it leads to more effective execution when group members' apprehensions and ideas are taken into account as then they have a propensity to be inclined to actively participate, and help to implement the chosen decision. The major disadvantage is when members are subjected to the groupthink phenomena and are unaware of emerging dysfunctions in their decision making.

Hypothesis No. 2: Consensus improves group functioning when every member has equal opportunities to provide different opinions on decision alternatives.

2.7 Conclusion of Literature Review

The literature review reveals that social, political and economic transformation has changed the social identities within the South African workplace. Group dynamics describes how individuals respond to these changes and examines the intergroup perspectives in small groups, and the social structures that influence their decision making.

The literature also highlights that group members can influence one another if the group needs to reach consensus. Collective decision making results in decisions moving to more extreme positions and this can have both positive and negative consequences.

Initially, researchers focused on the qualitative aspects of group decision making, by measuring utility and subjective probabilities. Later research explored empirical findings to understand why the same decision problems produced different outcomes. The differences in outcomes were mainly due to variations of how results are presented or if different response measures were used as indices of preference. Prospect theory was one solution to address this as the theory describes the structural characteristics of a decision problem. The decision weights in prospect theory was found to be coherent, compared to subjectivity expected utility theory which assumed decisions can be reached by summing over the utility weights by the subjective probability of occurrence.

The literature review also reveals that when measuring preference construct scales for dependent and independent variables, it needs to satisfy the composition principle. Conjoint analysis is a survey method of data collection and analysis used to measure preference and decomposes the values of a set of individual choices from a designed set of multi-attribute alternatives.

The literature relating to measuring of preference SDS is a combinatorial process which requires individual preferences on decision alternatives to be combined for each group member to allow the group to reach consensus on a single group choice.

The literature on consensus processes in decision making expresses employee involvement in the decision making process in an organisation increases the acceptance of the decision and further facilitates the later implementation. There are disadvantages when members are subjected to the groupthink phenomena and are unaware of emerging dysfunctions in their decision making.

The literature review set out to answer the principal research questions:

Analyse the degree of group member's influence on one another that results in choice shifts when making decisions and the benefits and pitfalls of consensus decision making.

Following the review, the hypotheses are:

2.7.1 Hypothesis No. 1:

Post-discussion preferences of individuals in a decision making group can be modelled as a linear function of the individual group members pre-discussion preferences.

2.7.2 Hypothesis No. 2:

Consensus improves group functioning when every member has equal opportunities to provide different opinions on decision alternatives.

CHAPTER 3. RESEARCH METHODOLOGY

To recap, the previous chapter reviewed the literature relating to group dynamics, small group decision making, theories of social interaction, quantitative aspects, and consensus in group decision making. This section outlines the methodology to address the two research hypotheses that group decisions can be modelled as a linear function of pre-discussion choice preferences, and consensus process benefits and pitfall in group decision making.

The chapter discusses the research methodology and describes the mixed research method, data collection, and statistical techniques used, followed by discussion on the validity and reliability of the study.

3.1 Research methodology

Quantitative and qualitative research methodologies linked to the study in different ways. The quantitative research was performed by means of collection of decision variables or attributes to perform modelling on group decision making. The qualitative research by means of interviews after group decisions was to substantiate results and deepen the assessment of the quantitative outcomes.

Morgan *et al.*, (1998) distinguish forms of mixed methods research in terms of two issues;

1. Priority: How far is a quantitative or qualitative method the principle data gathering tool?
2. Sequence: Which method precedes? For example; quantitative method precedes qualitative method.

The level of epistemology and methodology was centred on ways of relating quantitative and qualitative research findings (Flick, 2009). The first stage of the research collected decision attributes or variables before, during, and after group discussions. The qualitative research by means of interviews was collected from individual decision makers after the group had made decisions to determine the consensus processes advantages and disadvantages in group decision making.

The mixed method priority and sequence for this study is shown in Figure 5.

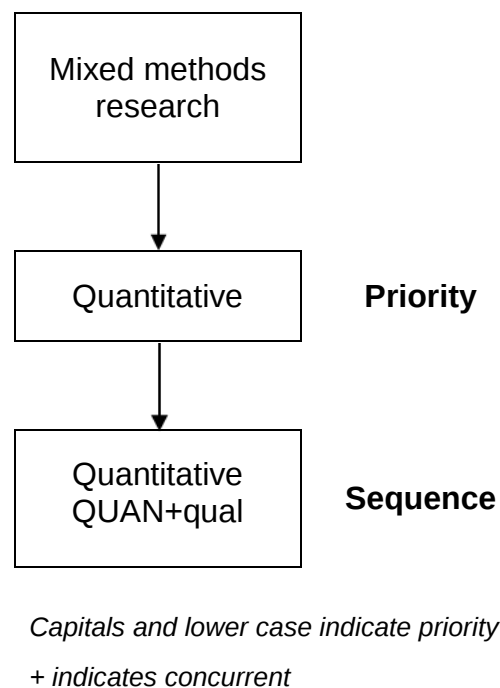


Figure 5: Mixed method priority and sequence (Morgan, 2014)

The methods remained autonomous and their meeting point is the issues under study (Flick, 2009). The approach to combine qualitative and quantitative methods is viewed as complementary in the context of this research.

3.2 Research Design

This study was a field experiment which had two components. The quantitative research method was the first movement and the qualitative movement was second (Flick, 2009).

To model group dynamics before group discussions that pertain to a particular set of concept decisions, data was collected from each individual group member prior to the group interaction (anterior data). The attributes measured and analysed are listed in Table 2. The measuring instrument used ratio data and was standardised for the population (Scale: 0-10). The posterior data was collected from the decision making group, and individually from group members after the group interaction. The same constructs and measuring instrument for collection of anterior data were used to maintain validity.

Table 2: Decision Categories and Attributes

Category	Attribute (Scale: 0-10)
Revenue	Financial Benefit
Customer	Operational Benefit
Compliance	Non-financial Benefit
Market	Problem / Opportunity
Risk	Overall Risk
Risk	Risk of non-implementation (NI)
Resource Based	Priority requirement

The second component of the research design was qualitative data collected from respondents post group interactions by conducting semi-structured interviews. This phase of the research serves two purposes; firstly to corroborate findings and deepen the assessment of quantitative results. Secondly, to evaluate consensus decisions benefits and drawbacks in group decision making. The use of qualitative data was appropriate for this step in the research as it assesses if the model outcomes mirror reality.

The research method had disadvantages due to limiting the scope to before, during, and after group discussions on the available decision cases. Corfman and Harlem (1987) says preference intensity is a measure of the overall preference of the object. What this implies is that instead of focusing on group members with the highest overall influence, it may be beneficial to communicate with members who have lower overall influence but higher influence on specific aspects of the decision. Corfman *et al.*, (1991) developed a conceptual model which reveals that factors such as reporting biases, ability to recall and perceptual biases can also result in measurement inaccuracy associated with a stated measure of influence (Johnson, 1997).

3.3 Population and sample

3.3.1 Population

The population were all existing members of Barclays Africa mortgage change council located in South Africa who are mandated to authorise business concepts presented to the forum. To constitute a decision making quorum, a minimum of five decision makers needed to be present during group interactions.

3.3.2 Sample and sampling method

The research consisted of interviews with senior members of the Barclays Africa mortgage change council. Two individual respondent interviews were performed, gathered two days prior to the group discussion. The individual interviews recorded anterior data without any inputs from other group members. Post group interaction, the same attributes were collected from the individual group members prior to the final group decision.

When group consensus was achieved, the group was requested to provide a consolidated view on the decision outcome and rate the attributes as a consolidated group decision. Post group discussion, a second interview was held with individual members to provide ratings on the same decision attributes following the group discussion and to offer responses to the interview questions.

In summary, interviews were conducted with senior managers prior to group interaction, during interactions, and after the group discussions. The profile of respondents is summarised in Table 3.

Table 3: Profile of respondents

Respondents	Gender	Age band	Grade	Qualification
Ravi	Male	40-45	AVP*	MBA
Jack	Male	40-45	VP**	MBA
Tumi	Female	35-40	AVP	B Com
Jan	Male	30-35	VP	B Com Hon
Kim	Female	35-40	AVP	B Com

(Arbitrary names) *AVP – Assistant Vice President **VP – Vice President

3.4 The research instrument

Semi-structured interviews were held with respondents in the decision making group before, during, and after group discussion using the conjoint questionnaire shown in Appendix A. The conjoint analysis stages suggested by Ryan (2000) were; firstly to identify the characteristics and assign levels to characteristics. The next step required an analysis of choice of scenarios to establish preferences. The data extracted using the instrument were inputs for further analysis by applying Stacey's (2002) quantitative dynamics model.

As the research employed mixed methods, a post discussion interview was held with participants in the decision making process. The interview guide is shown in Appendix D.

The cover letter motivating respondents is shown in Appendix E.

3.5 Procedure for data collection

Collection of anterior data for the purposes of modelling was collected in interviews with individual decision makers prior to group interaction. The decision attributes instrument is used to record pre-discussion ratings provided by individual decision makers. Collection of posterior data for the purposes of modelling was by means of interviews with individual decision makers post group discussion. Individual pre-discussion, during-discussion, and post-discussions of choice proportions on decision correctness were recorded on a coded transcript assigned to the decision maker. After the group meeting, a post-discussion interview was conducted to evaluate the second hypothesis. The end-to-end procedure map is shown in Figure 6.

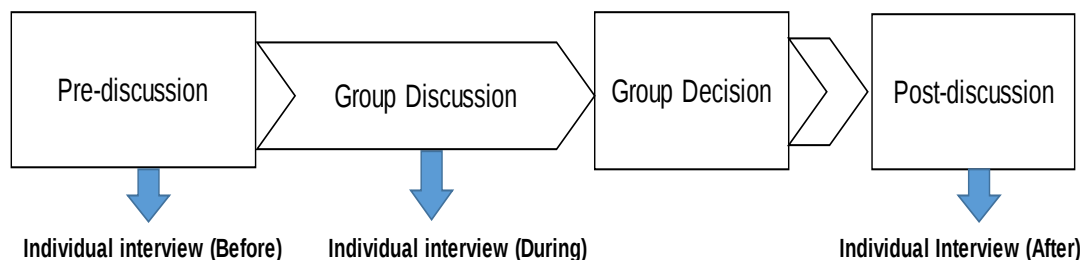


Figure 6: Procedure for data collection

Signals sets used by group members to provide inputs during discussion phase or a decision phase are summarised in Table 4.

Table 4: Signal sets used in group discussion (Bressen, 2007)

Discussion phase	Decision phase
1. Process point: Example; correcting the process.	1. Agreement is reached.
2. Question: Understanding or evaluating a proposal.	2. Stated consent with reservation.
	3. Stand aside.
	4. Block.

3.	Comment: Opinion, idea, concern, feeling.
4.	Context: Emotional response to the topic and procedures that follow, example; reflecting back on what speaker has said before proceeding further.

3.6 Data analysis and interpretation

3.6.1 *Quantitative method*

Anterior data collected comprised scales for each individual's attitude on every decision attribute. The instrument to measure individual preferences were normalised to establish the number of standard deviations away from the population mean (Stacey, 2002). To illustrate, a trivial anterior data scenario is shown in Table 5.

Table 5: Anterior Data Trivial Scenario (Adapted from Stacey, 2002)

	Concept A	Issue B	Issue C	Concept D
Jan	1,78	-0.08	0,04	-0,69
Moegamad	-0.10	2.45	-1.04	-0,75
Solly	-0,68	-0,93	1,76	-0,36

Similarly, the posterior data matrix comprised measures for every individual post group discussion attitude on every concept and/or issue. The same unit of measure applies. The methodology of the dynamics model used to answer the first research hypothesis is shown in Appendix B. The data presentation is summarised:

Data Presentation

- Data Report
- Collinearity Report
- Polarization Report
- Influence Report
- Stability Report

3.6.2 Qualitative method

The second component of the study was by means of face-to-face semi-structured interviews with every member. Interviews with individual members comprised three parts. The first part was to compare the quantitative findings to the respondent's feedback. Decision makers were asked which member influenced their decisions most during group interaction and who they believed they influenced during the group discussion.

The second part of the interview evaluated whether or not members buy-in and support increased after the consensus interaction. When appropriate, members were probed during interviews to confirm in what ways they believed the consensus outcome benefited the decision quality.

The third part of the interview focused on determining if member's participation to implement the group decision was elevated by reaching a consensus decision outcome.

All interviews were audio-recorded and transcribed to validate the study findings and ensure precise and thorough transcription.

3.7 Limitations of the study

- Results from this research are in the South African context only.
- Results are based on data collected from one bank's employees in South Africa.

3.8 Validity and reliability

Johnson (1997) notes that validity has traditionally been attached to quantitative research. There are mixed reactions by qualitative researchers if the same concepts of validity should apply. Smith (1984) suggested that traditional quantitative criteria of reliability and validity do not apply to qualitative research due to the basic epistemological and ontological assumptions of both methods being incompatible, thus the reliability and validity concepts should be abandoned. The general consensus however, by experts in the field is that select

qualitative research studies are superior to others and therefore validity and reliability highlights these differences (Burke, 1997).

The data gathered for this study was by means of both quantitative and qualitative research methods; on multiple decisions before, during and after pertinent group discussions to corroborate findings.

3.8.1 External validity

The qualitative and quantitative research methods used in this study was interested in documenting particular group dynamics in the South African context. As noted by Johnson (1997), generalisability is not the major purpose of qualitative research due to the people and settings being too randomly selected to enable the researcher to generalise from the sample to a population.

This study was restricted to group decision making in one organisation, however, it was supported by quantitative research methods and drew comparisons to past studies (example; Stacey, 2002) in small group decision making. Researchers argue that though the study may lack external validity on the basis of generalising based on findings from a particular sample, these finding can be useful to generalise to other small groups, settings, and time, to the degree they are similar to the original study (Johnson 1997; Stacey 2002).

3.8.2 Internal validity

Internal validity was maintained by coding each transcript of data and variables collected to match respondents. The variables represent accurately, opinions and preferences of each group member before and after the group discussion. Decision making groups shared the decision variables and these exceeded the number of group members.

3.8.3 Reliability

Strategies that promoted the reliability of the mixed methods used in the study:

- Triangulation: cross check conclusions with the use of multiple procedures of sources to confirm if they corroborate.

- Data and method triangulation: use of multiple data sources and research methods to understand and study the group dynamic phenomena.
- Participant feedback: Individual responses recorded pre-discussions, during, and post-discussions was compared to the group decision outcome for verification and insight.
- Pattern matching: Comparison to Stacey's (2002) findings and determining the degree to which actual results fits the predicted pattern.

(Adapted from Johnson, 1997).

CHAPTER 4. PRESENTATION OF RESULTS

The results are presented in line with the two phases of the research and according to the research methodology followed. Results of the quantitative analysis model are presented and described first.

4.1 Results pertaining to Hypothesis 1: Post-discussion preferences of individuals in a decision making group can be modelled as a linear function of the individual group members pre-discussion preferences.

4.1.1 *Introduction*

To recap, the decision making group comprised members; Ravi, Jack, Tumi, Jan, and Kim, with opinions on two concepts tabled at the change council.

The inputs to the quantitative dynamics model consists of anterior (X) and posterior (Y) data collected in one-on-one interviews with every member before, during, and after group interactions. The data in respect of the group interaction scenario is presented in a succinct table format. The methodology for calculating the data tables is completely stated in Stacey's (2002) thesis and concisely summarised in Appendix B.

4.1.2 *Data Reports*

Two choices "Concept A" and "Concept B" were evaluated against seven attributes ($n = 7$) by the five decision makers ($m = 5$). Posterior data collected after group decisions are presented to highlight differences between anterior and posterior responses of the decision makers. The anterior data in the study consists of scales for each member's attitude on every decision attribute (Table 2). The instrument to measure member's preferences was normalised to establish the number of standard deviations away from the population mean (Stacey, 2002). Anterior data is presented in Table 6.

Table 6: Anterior data (X)

	Concept A						
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.538	0.049	0.538	0.049	0.049	0.049	0.538
Jack	-0.440	-1.419	-1.419	-0.930	-0.930	-0.440	-1.419
Tumi	0.538	1.517	1.517	0.538	-0.930	1.517	1.517
Jan	0.049	0.049	1.027	0.538	1.027	1.027	1.027
Kim	0.538	0.049	-0.440	-0.930	-1.419	0.538	1.027

	Concept B						
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-1.419	-0.440	0.049	-0.440	-0.930	-0.930	-0.930
Jack	0.049	0.049	-3.376	-0.440	1.027	1.027	1.027
Tumi	0.538	1.517	0.538	1.517	-0.930	-0.930	-2.397
Jan	-0.440	0.538	0.049	0.538	-0.440	-0.440	0.049
Kim	0.049	0.049	-1.419	-0.930	1.517	1.027	0.538

Similarly, the posterior data matrix comprises of measures for every individual after the group discussion as presented in Table 7.

Table 7: Posterior data (Y)

	Concept A						
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.538	0.538	1.027	0.538	0.538	0.538	1.027
Jack	-1.419	-0.440	-0.440	-0.440	0.049	0.049	-0.440
Tumi	1.517	1.517	0.538	1.517	-0.930	1.517	1.517
Jan	0.049	-0.930	1.027	0.538	0.049	0.538	1.517
Kim	0.538	1.517	1.027	0.538	0.538	1.027	1.517

	Concept B						
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.930	0.049	-0.440	0.049	0.049	0.049	-0.440
Jack	0.538	0.538	0.538	0.538	1.027	1.517	1.517
Tumi	0.538	0.538	-1.419	-0.440	0.538	-1.419	-1.419
Jan	1.027	0.049	-1.908	0.538	0.049	1.027	1.027
Kim	0.538	0.049	-0.440	0.049	0.049	0.049	0.049

The measure of changes in attitude is shown by the differences between the anterior (Table 6) and the posterior (Table 7) matrices. The differences between anterior and posterior data matrices were as follows;

Concept A															
<u>Anterior</u>								<u>Posterior</u>							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority		Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.54	0.05	0.54	0.05	0.05	0.05	0.54	-	0.54	0.54	1.03	0.54	0.54	0.54	1.03
Jack	-0.44	-1.42	-1.42	-0.93	-0.93	-0.44	-1.42		-1.42	-0.44	-0.44	0.05	0.05	-0.44	
Tumi	0.54	1.52	1.52	0.54	-0.93	1.52	1.52		1.52	1.52	0.54	1.52	-0.93	1.52	1.52
Jan	0.05	0.05	1.03	0.54	1.03	1.03	1.03		0.05	-0.93	1.03	0.54	0.05	0.54	1.52
Kim	0.54	0.05	-0.44	-0.93	-1.42	0.54	1.03		0.54	1.52	1.03	0.54	0.54	1.03	1.52

Differences							
=	0.00	-0.49	-0.49	-0.49	-0.49	-0.49	-0.49
	0.98	-0.98	-0.98	-0.49	-0.98	-0.49	-0.98
	-0.98	0.00	0.98	-0.98	0.00	0.00	0.00
	0.00	0.98	0.00	0.00	0.98	0.49	-0.49
	0.00	-1.47	-1.47	-1.47	-1.96	-0.49	-0.49

 Differences between posterior and anterior data matrices

Concept B

	<u>Anterior</u>								<u>Posterior</u>						
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority		Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-1.42	-0.44	0.05	-0.44	-0.93	-0.93	-0.93	-	-0.93	0.05	-0.44	0.05	0.05	0.05	-0.44
Jack	0.05	0.05	-3.38	-0.44	1.03	1.03	1.03		0.54	0.54	0.54	0.54	1.03	1.52	1.52
Tumi	0.54	1.52	0.54	1.52	-0.93	-0.93	-2.40		0.54	0.54	-1.42	-0.44	0.54	-1.42	-1.42
Jan	-0.44	0.54	0.05	0.54	-0.44	-0.44	0.05		1.03	0.05	-1.91	0.54	0.05	1.03	1.03
Kim	0.05	0.05	-1.42	-0.93	1.52	1.03	0.54		0.54	0.05	-0.44	0.05	0.05	0.05	0.05

Differences

=	-0.49	-0.49	0.49	-0.49	-0.98	-0.98	-0.49
	-0.49	-0.49	-3.91	-0.98	0.00	-0.49	-0.49
	0.00	0.98	1.96	1.96	-1.47	0.49	-0.98
	-1.47	0.49	1.96	0.00	-0.49	-1.47	-0.98
	-0.49	0.00	-0.98	-0.98	1.47	0.98	0.49

 Differences between posterior and anterior data matrices

Figure 7: Differences between anterior and posterior data matrices

The comparison of the anterior and posterior data shows that there have been some shifts in the member's attitudes on both the concepts presented to the forum.

After the group interaction, the group reached a consensus decision to provide resources to implement Concept A. The differences between the anterior and posterior attitudes towards Concept A is summarised in Table 8.

Table 8: Differences between Anterior and Posterior attitudes (Concept A)

Member	Concept A	Decision before	Decision After	Choice shift (Yes / No)
Ravi	Initial attitude towards concept A was 0.54 standard deviations (SD) more positive than the population mean on the financial, operational, and the non-financial benefits. Attitude was most positively affected by the non-financial benefits 1.52 SD followed by the priority 1.01 SD.	<i>Decline</i>	<i>Approve</i>	<i>Yes</i>
Jack	Attitude was somewhat negative towards concept A's operational and non-financial benefits by 1.42 SD. Most affected by overall risk, operational risk, and risk of non-implementation by 1.01, 0.51, 0.51 SD respectively.	<i>Decline</i>	<i>Approve</i>	<i>Yes</i>
Tumi	Most positive initial attitude towards concept A, albeit a somewhat negative attitude towards the overall risk. Positively affected by the non-financial benefits and priority by 0.51 SD and 1.01 SD respectively. Negatively affected by the overall risk, operational benefits, and the risk of non-implementation by 1.01, 0.51, 0.51 SD respectively.	<i>Approve</i>	<i>Approve</i>	<i>No</i>
Kim	Attitude towards concept A was most affected during the group discussion. Initial negative attitude towards the overall risk. Most positively affected by the priority. Most negatively by the non-financial benefit and the problem/opportunity by 1.52 SD.	<i>Approve</i>	<i>Approve</i>	<i>No</i>
Jan	Negatively affected by the financial and operational benefits by 0.51 SD.	<i>Approve</i>	<i>Approve</i>	<i>No</i>

Similarly, anterior and posterior attitudes for concept B are shown in Table 9.

Table 9: Differences between Anterior and Posterior attitudes (Concept B)

Member	Concept B	Decision before	Decision After	Choice shift (Yes / No)
Ravi	Overall attitude was most affected during the group discussion.	Approve	Decline	Yes
Jack	Attitude was most negatively affected by the non-financial benefits by 3.91 SD.	Approve	Decline	Yes
Tumi	Most positively impacted by the non-financial benefits and problem / opportunity by 1.96 SD.	Decline	Decline	No
Kim	Attitude was most negatively affected by the non-financial benefits by 0.98 SD.	Decline	Decline	No
Jan	Attitude least affected during group interaction.	Decline	Decline	No

Prior to the group discussion, members Tumi, Kim, and Jan approved Concept A opposed to Concept B, whereas Ravi and Jack were more inclined to approve Concept B. Choice shift is shown by the differences in members Ravi and Jack's decision after the group interaction. The results point out the main decision criteria adopted by members, were the risk of non-implementation, and the non-financial benefits.

4.1.3 Collinearity Report

The collinearity matrix represents the alignment between the anterior and posterior preferences of the respondents. The matrix used tabulates cosines of the angles between each individual preference row in the anterior and posterior data to determine the collinearity co-efficient (Stacey, 2002).

Table 10: Anterior Collinearity Matrix (Sx)

	Ravi	Jack	Tumi	Jan	Kim
Ravi	1	-0.420	0.336	0.379	-0.258
Jack	-0.420	1	-0.595	-0.540	0.572
Tumi	0.336	-0.595	1	0.542	-0.175
Jan	0.379	-0.540	0.542	1	-0.304

Kim	-0.258	0.572	-0.175	-0.304	1
------------	--------	-------	--------	--------	---

Table 11: Posterior Collinearity Matrix (Sy)

	Ravi	Jack	Tumi	Jan	Kim
Ravi	1	-0.487	0.572	0.298	0.727
Jack	-0.487	1	-0.620	0.189	-0.273
Tumi	0.572	-0.620	1	0.213	0.685
Jan	0.298	0.189	0.213	1	0.445
Kim	0.727	-0.273	0.685	0.445	1

To determine the degree of alignment between anterior and posterior results, an analysis of cross-collinearity was performed. The greater the value of the cross-collinearity co-efficient the more results indicate that there is alignment between the respondent's anterior and posterior preferences (Stacey, 2002).

Table 12: Cross Collinearity Matrix (Sxy)

	Ravi	Jack	Tumi	Jan	Kim
Ravi	0.578	-0.389	0.491	0.752	0.050
Jack	-0.834	0.338	-0.452	-0.245	0.197
Tumi	0.312	-0.201	0.658	0.353	0.269
Jan	-0.282	0.322	0.029	0.342	0.411
Kim	0.127	-0.427	0.568	0.644	0.159

The collinearity matrices indicate that Ravi's pre and post preferences were closest aligned to other group members and Jack's preferences were least aligned to the rest of the group.

4.1.4 Polarisation Report

Anterior polarisation represents preference intensity of group members before the group discussion. The anterior polarisation matrix (Δp) is the measures of the degrees of influence which were determined by comparing how much divergence the pre-group discussion preferences are away from the population mean, in other words, the extent of either polarisation or preference of respondent's attitudes. The anterior polarisation report is shown in Table 13.

Table 13: Anterior polarisation report (Δp)

Ravi	0.648
Jack	1.279
Tumi	1.290

Jan	0.637
Kim	0.896

Similarly, posterior polarisation represents preference intensity after the group discussion as shown in Table 14.

Table 14: Posterior polarisation report (Δa)

Ravi	1.285
Jack	0.430
Tumi	0.669
Jan	1.490
Kim	0.831

The anterior polarisation report shows members Tumi and Jack had the highest preference intensities prior to the group discussion by 1.29 SD and 1.28 SD respectively. Following the interaction (posterior data) Jan had the highest preference intensity by 1.50 SD, followed by Ravi 1.30 SD, Kim 0.83, Tumi 0.67 SD, and Jack 0.43 SD. Jack's preference intensity dropped substantially compared to the rest of the group.

4.1.5 Influence report

The influence report provides the estimates of the parameters of the model (Stacey, 2002). The influence report is represented by the Matrix of Association (MOA) as shown in Table 15.

Table 15: Matrix of association (A_n)

	Ravi	Jack	Tumi	Jan	Kim
Ravi	0.272	-0.089	0.012	0.417	0.320
Jack	-0.834	-0.243	-0.350	0.178	0.079
Tumi	0.283	0.207	0.923	0.115	0.655
Jan	-0.354	0.762	0.041	0.760	0.388
Kim	-0.159	-0.556	0.156	0.450	0.558

Each column of MOA is a vector to represent influence of the object on every other object in the group (Stacey, 2002). The anterior data is standardised to the same scale. The standardised anterior data matrix is shown in Table 16.

Table 16: Standardised anterior data matrix (Xs)

Concept A							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.144	0.013	0.144	0.013	0.013	0.013	0.144
Jack	-0.118	-0.379	-0.379	-0.248	-0.248	-0.118	-0.379
Tumi	0.144	0.405	0.405	0.144	-0.248	0.405	0.405
Jan	0.013	0.013	0.275	0.144	0.275	0.275	0.275
Kim	0.144	0.013	-0.118	-0.248	-0.379	0.144	0.275

Concept B							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.379	-0.118	0.013	-0.118	-0.248	-0.248	-0.248
Jack	0.013	0.013	-0.902	-0.118	0.275	0.275	0.275
Tumi	0.144	0.405	0.144	0.405	-0.248	-0.248	-0.641
Jan	-0.118	0.144	0.013	0.144	-0.118	-0.118	0.013
Kim	0.013	0.013	-0.379	-0.248	0.405	0.275	0.144

The matrix of residuals was standardised for the number of variables in the exact same manner as the anterior data matrix. The matrix of residuals (Es) is shown in Table 17.

Table 17: Matrix of residuals (Es)

Concept A							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.042	0.110	0.067	0.105	0.062	-0.077	-0.037
Jack	-0.217	-0.053	0.026	-0.118	-0.105	0.027	0.001
Tumi	0.194	0.175	-0.108	0.445	0.082	0.035	-0.060
Jan	0.052	-0.148	0.180	0.144	-0.082	-0.180	0.184
Kim	0.055	0.260	0.041	0.091	0.105	-0.044	-0.010

Concept B							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.047	-0.041	-0.065	0.023	0.078	0.113	-0.062
Jack	-0.197	0.075	0.119	0.078	-0.016	0.123	0.005
Tumi	0.205	-0.097	-0.188	-0.204	0.162	-0.289	0.001
Jan	0.223	-0.223	-0.105	0.035	-0.180	0.123	0.028
Kim	0.127	-0.153	-0.179	-0.063	-0.055	0.005	0.019

Similarly, the matrix of posterior data (Y) is standardised for the number of variables by dividing the square root of the number of variables. The matrix of residuals (Ys) is shown in Table 18.

Table 18: Matrix of residuals (Ys)

Concept A							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.144	0.144	0.275	0.144	0.144	0.144	0.275
Jack	-0.379	-0.118	-0.118	-0.118	0.013	0.013	-0.118
Tumi	0.405	0.405	0.144	0.405	-0.248	0.405	0.405
Jan	0.013	-0.248	0.275	0.144	0.013	0.144	0.405
Kim	0.144	0.405	0.275	0.144	0.144	0.275	0.405

Concept B							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.248	0.013	-0.118	0.013	0.013	0.013	-0.118
Jack	0.144	0.144	0.144	0.144	0.275	0.405	0.405
Tumi	0.144	0.144	-0.379	-0.118	0.144	-0.379	-0.379
Jan	0.275	0.013	-0.510	0.144	0.013	0.275	0.275
Kim	0.144	0.013	-0.118	0.013	0.013	0.013	0.013

The degree of influence is now a product of the estimates of the member's preference intensity and power (Stacey, 2002) as follows;

Table 19: Degrees of influence

	Preference intensity		Power		Degree of influence	% of Group	Cumm. degree of influence
Ravi	0.65	*	1.29	=	0.84	20%	20%
Jack	1.28	*	0.43	=	0.55	13%	34%
Tumi	1.29	*	0.67	=	0.86	21%	55%
Jan	0.64	*	1.49	=	1.34	33%	87%
Kim	0.90	*	0.83	=	0.53	13%	100%

*(Preference intensity * Power = Degree of influence)*

Jan and Tumi accounted for 54% of the total influence in the group. Jan had the highest degree of influence with 33%. Tumi's degree of influence ranked second with 21% total group influence. Jack and Kim's degrees of influence were 13%

and therefore, collectively, made up 26% of the group's total influence. A summary of how individual influence was exercised within the group is shown in Table 20.

Table 20: Object of influence profile

Subject influenced	Object of influence
<i>Ravi</i>	Jan
<i>Jack</i>	Jan
<i>Tumi</i>	Kim
<i>Jan</i>	Jack
<i>Kim</i>	Jan

The impact of Tumi and Kim were greatest on themselves being 0.92 SD and 0.56 SD respectively. The result outcomes support the findings shown in Table 19 whereby Jan has the highest total influence within the group and is the greatest object of influence on other group members. The findings show that Jack, the member with the largest choice shift, had the greatest impact on Jan, the most influential group member's attitude.

4.1.6 Stability report

The stability matrix represents the individual preferences that remain unchanged before, during and after the group's interactions, based on the derived influence among group members during and after the group had interacted.

The eigenvalues for the stability report were derived from the matrix of association (Table 15). Argand eigenvalues are plotted in a two dimensional space to illustrate both real and imaginary eigenvalues as characterised in Figures 8, 9, 10. The circle indicates the boundary of eigenvalues with a modulus of less than unity (Stacey, 2002). The eigenvalue plot of individual preferences before and during the interaction is presented in Figure 8.

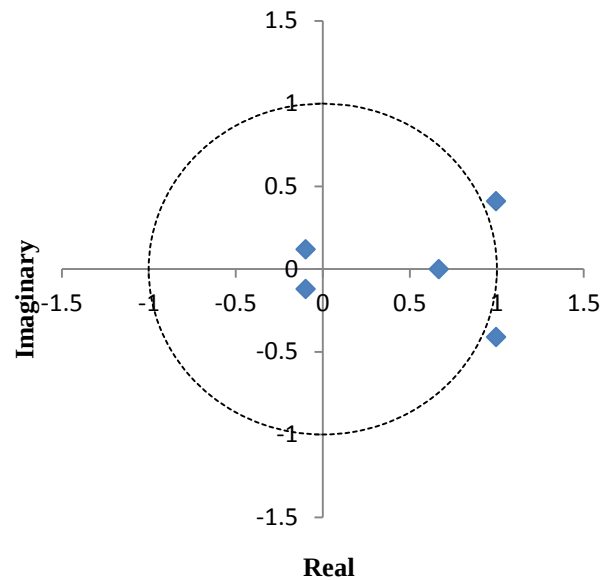


Figure 8: Argand diagram (Before - During)

The significance of the eigenvalues is that the model only converges when the moduli of the eigenvalues of the matrix of association are all less than unity (Stacey, 2002). The data collected after the group interaction from individual group members were plotted to compare if the group convergence was closer to unity after the group made its decision. The posterior eigenvalue of individual preferences during and after is presented in Figure 9.

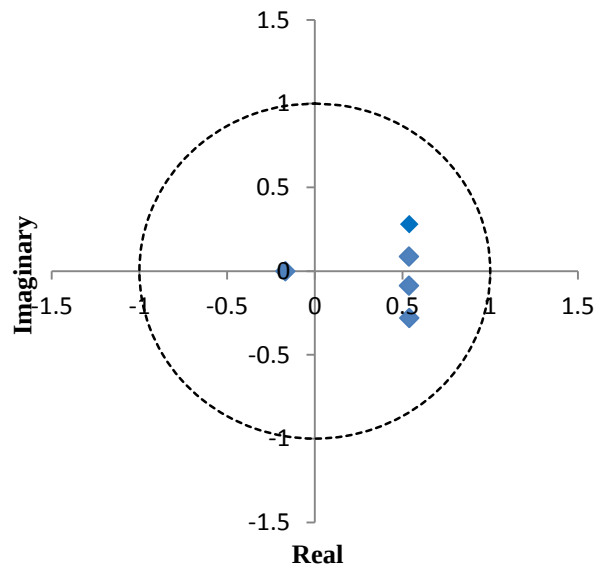


Figure 9: Argand diagram (During - After)

The final convergence of the members' preferences are now determined in the posterior eigenvalue plot shown in Figure 10.

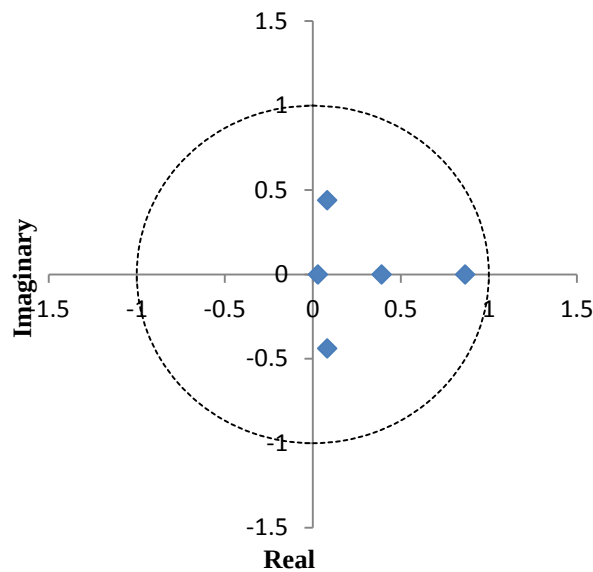


Figure 10: Argand diagram (Before - After)

The final result confirms that the members have converged close to unity as the model predicted.

4.1.7 Number of extrinsic elements

Stacey (2002) recommends if conditions of equality are not sufficiently satisfied, that is, when group members' post discussion preferences are not equal to a linear combination of pre-discussion preferences, the parameters of the choice shift model needs to be used to estimate the profile and magnitude of extrinsic influences. The extrinsic influence, including "EXT: A" profile and magnitude, is compared to the group members directly in Figure 11.

	Preference intensity		Power	Degree of influence	% of Group	Cumm. degree of influence
Jan	0.64	*	1.49	0.95	21%	21%
Tumi	1.29	*	0.67	0.86	19%	39%
Ravi	0.65	*	1.28	0.83	18%	58%
Kim	0.90	*	0.83	0.75	16%	74%
EXT: A				0.66	14%	88%
Jack	1.28	*	0.43	0.55	12%	100%

Figure 11: Degree of influence (including extrinsic element)

As Figure 11 shows, there was one complementary element which was extrinsic to the group that influences the group decision. In this instant, the extrinsic element (labelled “EXT A”) had the most positive influence on Ravi’s attitude and was 14% of the total influence in the group.

The characteristic of the choice shift was as follows;

Scenario	Individual Power	Object Influence Profile	Number of extrinsic elements *	Eigen-values	Comment
Stability	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	$ \lambda < 1$	Polarisation and depolarisation can occur.

* n = number of variables, m = number of group members

Figure 12: Characteristics of the choice shift

A complete summary of the characteristics of various choice shift scenarios is provided in Appendix C.

4.1.8 Conclusion to Hypothesis 1

The premise of the model used in the study was that post discussion preferences of members was a function of the pre-discussion preferences and external influences to which members may be subjected (Stacey, 2002). The parameters of the model (Figure 13) were determined by the measures of preferences before discussion (anterior data) and the preferences of members after discussion (posterior data).

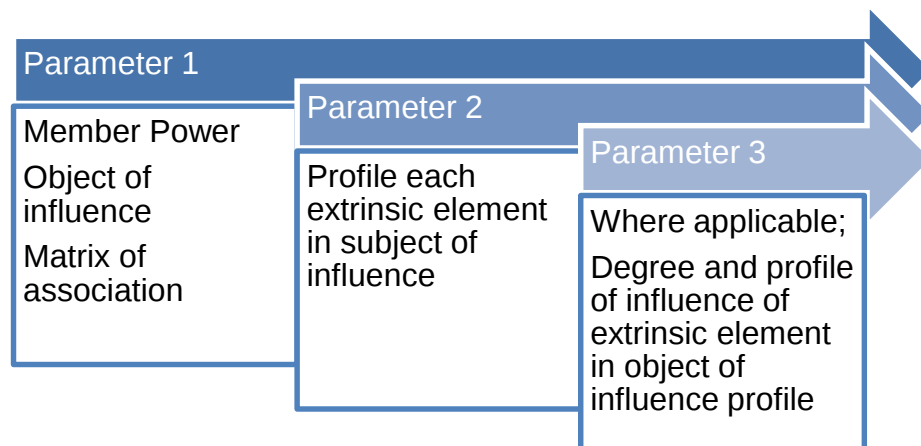


Figure 13: Parameters of the quantitative dynamics model (Stacey, 2002)

According to Stacey (2002), the higher the moduli of the eigenvalues (i.e. further away the eigenvalue are from the origin of the eigenvalue plot), the longer it would take for the preferences of group members to stabilise over time.

The stability report and eigenvalues show that the modulus for two of the eigenvalues was greater than unity in the before and during comparison of responses (Figure 8). After the group made a decision, the preferences of members intensified in the subsequent posterior responses of individual members (Figure's 9 & 10). Therefore, as the group continues to interact on an on-going basis, the preferences of the group members are expected to continue stabilising and move closer to unity.

Hypothesis No. 1: Post-discussion preferences of individuals in a decision making group can be modelled as a function of the individual group members pre-discussion preferences.

4.2 Results pertaining to Hypothesis 2: Consensus improves group functioning when every member has equal opportunities to provide different opinions on decision alternatives.

4.2.1 Consensus: Benefits and Pitfalls Interview Results

The respondents approached make decisions on a regular basis and have ample involvement with the research matter at hand. The results are presented using tables and direct quotes from respondents. The questions asked during interviews with individual group members are given in Appendix D.

Interviewees

Five members of Barclays Africa mortgage change council located in South Africa were interviewed. The interviews were to corroborate outcomes of the quantitative dynamics model and to identify consensus processes benefits and pitfalls in group decision making. The interviewee demographics are categorised based on the members; age, gender, and qualification. The demographics of the interviewees is summarised in Table 21.

Table 21: Interviewee demographics

Category	Grouping	MEMBERS	% of population
Age	30-35	1	20%
	35-40	2	40%
	40-45	2	40%
Gender	Male	3	60%
	Female	2	40%
Qualification	MBA	2	40%
	Bcom Hon	1	20%
	Bcom	2	40%

Each respondent contributed information and raised arguments in favour and against the decision alternatives presented to the forum. Table 22 summarises the key discussion points raised by each group member.

Table 22: Group discussion summary

Group discussion summary	
Jan	“Concept A will recover lost revenues and projected to generate millions in profit over the next 5 years”.
Tumi	“Concept A is a market imperative, two competitors are leading. The solution presented would enable us to leapfrog and create a solution for customers”.
Ravi	“Concept B can help to solve major pain point in operations. This must be top of mind and this call can change the business”.
Kim	“Concept A addresses a pain point for customers. Customer surveys indicate a strong need to implement the solution”.
Jack	“Concept B mitigates a significant risk. Success of concept A has been poor given current take ups. The solution components of concept A needs to be broken down further to reap true benefits”.

During the meeting, every member was provided sufficient time to provide inputs and the group were able to have broad discussions on the decision alternatives presented. Members’ arguments were based mainly on the benefits of pursuing a risk mitigation implementation versus a business growth initiative. One decision maker stated:

“The two concepts is a risk - reward trade-off. Concept A changes market position whereas concept B is business as usual and requires further investigations”.

4.2.2 Responses from decision makers

Question 1: To what extent did individual contributions make you reconsider your initial choice?

According to respondents, the contributions by other members provided broader and different perspectives that clarified whether their initial decisions were appropriate. Most indicated that information provided by other group members influenced their preferences during the discussion.

“Members provided additional details of the status on the two projects and this swayed my final decisions”.

“It helped me to be 100% convinced that my initial thinking was on the right track”.

However, one of the members also commented:

“I stuck with my choice even though Jack made some valuable arguments for me to consider concept A”.

Question 2: Did any group members influence your decision for the group to reach a consensus?

Majority of the respondents stated that every member made equal contributions and the most informed decision was made as a collective.

“Members provided opinions that were similar and different to my own which made me change my choice. None of the group members forced their views, it was an open forum discussion and consensus was reached”.

One of the respondents indicated that information provided by other members had no effect on their initial choices:

“There was nothing directly that made me change my initial decision”.

Questions 3 & 4:

Who do you believe you influenced during the group discussion?

Which member of the team influenced you most during the group discussion?

The quantitative results were paralleled to the model assessment of the subject and object of influence profiles. The respondent responses and the model assessment are compared in Table 23 and Table 24.

Table 23: Quantitative and Qualitative result comparison (Subject of influence profile)

Member interview response	Subject of influence Profile Model Comparison	Observation
Ravi: “I believe I influenced Tumi to reconsider her initial decision by providing different perspectives on the two concepts”.	Ravi influenced Jan’s opinion by 0.62 SD, then Kim 0.27 SD, followed by Tumi 0.01 SD.	No Match
Jack: “I never won the battle to motivate for concept B to be approved. Jan acknowledged my argument that concept B was an important risk mitigation tool”.	Jack influenced Jan’s opinion by 0.27 SD.	Match
Tumi: “I believe I influenced Jan then Ravi, and to a lesser extent Jack”.	Tumi influenced Kim’s opinion by 0.55 SD, then Ravi by 0.36 SD.	Partial Match
Jan: “Jack”	Jan influenced Jack’s attitude by 0.33 SD.	Match
Kim: “Jan I were aligned in supporting concept A”.	Jan was the greatest object of influence on Kim by 0.67 SD.	Match

Table 24: Quantitative and Qualitative results comparison (Object of influence profile)

Member interview response	Object of influence Profile Model Comparison	Observation
Ravi: "Jack influenced me as he provided views from a neutral perspective and he was very creative in how he phrased issues".	Jan was the greatest object of influence on Ravi by 0.62 SD.	No Match
Jack: "Kim had the most influence on me. Her knowledge of systems and processes involved swayed my decision compared to other group members".	Jan was the greatest object of influence on Jack by 0.27 SD.	No Match
Tumi: "Kim influenced me the most because of her strong operational background, and; we both initially opted for concept A however her inputs gave me comfort in my decision".	Kim was the greatest object on influence by 0.55 SD.	Match
Jan: "Mostly Jack, in the way he presented information ".	Jack was the greatest object of influence by 0.33 SD.	Match
Kim: "Jan influenced me the most, and it was really because we supported the same initiative, and he made valuable arguments towards concept A".	Jan was the greatest object of influence by 0.67 SD.	Match

Question 5: In what did they influence you to reconsider your decisions?

Distribution of information in a group influences the groups' judgements indirectly by way of group members' preferences. Denis (1992) argues that typically in decision making situations, members would share information available about decision alternatives, and this information does influence post-discussion preferences.

"I was most influenced by the operational efficiencies that would be achieved, the explanations provided on what the needs of the area were and how efficiency will change because of less waste and lower costs".

“Other members influence me by providing views on customer solution approaches, as well as financial benefits to the business and the operational efficiencies”.

“The operational benefits highlighted and the ease of implementation and what the statuses of the initiatives were. The group gave evidence and facts to support my decisions”.

Question 6: Did the information contributed by others affect your decision? (Whether you changed your decision or not)

Respondents stated when information was shared during the interaction, it affected their decisions most when other members acknowledged or supported their own opinions.

During the interviews, common themes emerged about the type of information provided by others that members valued most, such as, specialist viewpoints raised during the meeting, as well as providing inputs that could provide clarity or a broader perspective. As two of the members put it:

“The contribution of others allowed for a reflection on the bigger picture of the initiatives. It’s important to take into account others ideas and perceptions of the decision and it provides myself with a broader understanding which enables one to offset initial views which is of vital importance. It helped me to be 100% convinced that my initial thinking was on the right track!”

“Each member in the decision making group is a specialist in their respective area, ops, sales, and technology. With subject matter experts in each area giving their inputs it provides comfort for the decision you are making. The group discussion definitely assisted my decision”.

Question 7: Were your ideas and/or apprehensions taken into consideration during the group discussion?

All the members stated their ideas and apprehensions were taken into account during the group discussion. One member expanded;

“I’m not the type of person that will try to overpower others in the group with my opinions, I strive to provide my honest opinion and inputs but then the group needs to decide I’ve got a view and if the group doesn’t agree or want to take it into consideration I’m not going to force the issue among the rest of the group it’s probably in a sense a weakness on my part, but that’s how I prefer to operate”.

Question 8: In your opinion, are there any benefits to reaching consensus when making group decisions?

Members commented that consensus decisions encourage a shared understanding of decision alternatives and a means to create buy-in from various different departments to support the later implementation. Two of the members concluded the benefits of consensus.

“Yes, by reaching consensus there is a common understanding on the decision reasons and this helps for each area in the business to align to the common goal and to make the initiative a success”.

“Yes definitely, this is so important, when you get buy-in from the full team representing different areas of the business - this firstly gives you comfort you are on the right track as they provide inputs, and will make sure the decision is implemented”.

Two of the respondents made reference to consensus decisions leading to informed decisions however, that it is not always necessary for all parties to agree with the decision.

“I don’t believe everyone necessarily needs to agree with the decision, however the benefit is that when all the information is shared in the group it provides equal opportunity to change their minds. The decision may not be in alignment with every person in the group but I think as a collective it provides the basis to make a decision even if all the group members’ don’t agree”.

“Where I don’t agree I will challenge as far as I can but sometimes in a large organisation you need to go along with what has been decided

and make the most of it in terms of execution. If I really don't agree with a decision I will make sure my voice is heard".

4.2.3 Conclusion to Hypothesis 2

The respondents made reference to consensus decisions leading to informed decisions but it is not always necessary for all parties to agree with every decision. As the interviews proceeded, it became apparent that most respondents found substantial benefits in reaching a consensus decision.

Hypothesis No. 2: Consensus improves group functioning when every member has equal opportunities to provide different opinions on decision alternatives.

4.3 Summary of the results

The outcomes of the quantitative analysis identified that polarisation and depolarisation in the group can be modelled as a function of the individual group member's pre-discussion preferences. Furthermore, the group overwhelmingly acknowledged that by reaching consensus, a better quality of decision was made as a collective and the process increased members' participation to support the implementation of the decision.

Hypothesis 1:

Pre and post decision results were represented to depict individual choice shifts and the influence of each group member on one another during the decision making process.

Hypothesis 2:

Findings of consensus benefits and pitfalls established in interviews with respondents were presented.

The key findings are discussed and explained in Chapter 5.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter discusses the research hypotheses and draws comparisons to Stacey's (2002) study to highlight similarities, differences and / or alternatives between findings. In addition, academic literature summarised in Chapter 2, and inferences gleaned from interviews held with respondents are discussed in relation to the two hypotheses.

5.2 Demographic profile of respondents

The sample demographic remained unchanged during the course of the research. The decision makers approached for the study were booked in advance for interviews before, during, and after the change council meeting and there were no alterations required for the date and time of the interviews.

5.3 Discussion pertaining to Hypothesis 1: Post-discussion preferences of individuals in a decision making group can be modelled as a linear function of the individual group members pre-discussion preferences.

Group decision making studies directly or indirectly utilise one or more baseline models that predict a group's "product" under certain process assumptions (Kerr & Tindale, 2003). This research set out to quantify the influence of members on one another in a decision making setting in a South African bank and adopted Stacey's (2002) quantitative dynamics model to deepen the assessment of the choice shift scenario.

The literature is abundant with the study of individual cognitions about groups (e.g. perceived group efficacy), and interpersonal (e.g. majority influence) or intergroup processes (e.g. social judgement theory). A common theme in the literature is that single processes in groups' leads to good and poor performance, depending on the context in which the process is enabled (Kerr & Tindale, 2003). Instead of trying to explain good or poor performance as a result of the type of

group processes, recent works highlight that the same process can lead to both types of outcomes (Kerr & Tindale, 2003). For example, majority processes enables groups to perform better compared to individual members by making fewer mistakes, because most individuals would favour the better alternative. Conversely, bias at individual levels may lean towards the less optimal decision and therefore the same majority process results in poor decisions relative to individuals deciding alone.

5.3.1 *Members influence on one another in a South African bank*

The literature review drew from dominant paradigms in group decision making research, namely, social identity theory (SIT), embedded-intergroup theory, information processes in groups, and preference measurement in group decision making.

Booyesen (2007) found when social identity conflicts manifest in organisations, members experienced substantial pain and distress which, in many cases, could only be remedied through organisation wide interventions, for example, changing values. SIT evaluates psychological and sociological aspects of group behaviour, group association and intergroup discrimination (Turner, 1981). Diversity in work group demographics has far reaching effects on both the turnover in the group, and the group's performance on cognitive tasks, i.e.; decision making. Pelled (1996) says whilst diversity in many instances increases turnover, the impact on cognitive tasks tends to be mixed and can either enhance or impair group performance.

Application of social identity theories (SIT) underlined member's self-conceptualisation and the root of perceptions of other members in the group. Alderfer's (1983) embedded-intergroup theory was therefore useful to reflect the effects of dominance between different social identity groups in the study, and highlighted the importance of the embedded intergroup dynamic of sub-groups within the social identity group (race and gender). The embedded-intergroup dynamic is summarised in Table 25.

Table 25: Embedded-intergroup dynamic

Respondents	Race	Gender	Choice Shift
Ravi	Indian	Male	Yes
Jack	Indian	Male	Yes
Tumi	White	Female	No
Jan	White	Male	No
Kim	White	Female	No

Abrams and Hogg (2004) assert that self-categorisation renders certain attitudes and associated behaviour normative, resulting in individual members behaving in line with these norms. The results show choice shift was applicable to race Indian and gender male. The study determined the status and dominance in the group (Table 19), and depicts how member's behaviour evolved in tandem with group membership (Table 8 & Table 9). In alignment with Booyesen (2007), the social structures appear to have an influence on individual actions by means of social identities, based on gender and race.

5.3.2 Socially shared cognitions

Many simulations provide empirical support in a number of social aggregates, even in situations where there is little or no reason for members to change their position to match other members around them (Latané & L'Herrou, 1996). It is therefore questionable if cognitions are natural products of limited social interaction and form as a consequence of self-organising principals of social systems (Tindale, *et al.*, 2001).

Early social psychology texts (Le Bon's, 1960; McDougall's, 1920) advocated that behaviour in social aggregates was not just a function of a combination of individual acts. Later literature cited cognitions to be at the collective level and concentrated on aggregates versus individual preferences. However; key clarifying variables remain mainly at the individual level (Moreland, Hogg, & Hains, 1994). People tend to cluster in the social space based on position similarity.

Stacey (2002) identified certain rules which are consistent with the theory which provides guidance for various decision making scenarios. Clustering, for example

is evident if the data displays inadequate degrees of freedom and may require a reduction in the number of objects included in the data (Stacey, 2002).

5.3.3 Collective efficacy

Members' perceptions of collective efficacy influences the type of future they seek to achieve, how they manage their resources, construct strategies, and how much effort they put into the group's endeavours (Bandura, 2000). According to Bandura (2000), perceived collective efficacy is "a group's belief in their conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments".

The concept of collective efficacy is derived from the notion of self-efficacy i.e. member's judgements about their capability to perform specific tasks (Whyte, 1998). High collective efficacy could indicate the development of groupthink whereby the group has excessive optimism and induces members to take more extreme risks (Whyte, 1998).

Prior research found a link between collective efficacy and group performance. According to Prussia and Kinicki (1996), collective efficacy is positively related to the performance of the group similar to perceptions of self-efficacy's influence on individual performance. Generally, the more positive members' judgements of their collective efficacy, the more they achieve (Whyte, 1998).

Members made the following remarks during interviews to express their judgements of their collective efficacy:

"With the new information shared by other group members it substantiated a strong business case to approve concept A and therefore I supported we approve concept A over concept B".

"It's important to take into account others ideas and perceptions of the decision and it provides myself with a broader understanding which enables one to offset initial views which is of vital importance".

Collective efficacy increases the polarisation effects in groups by amplifying the strength of the arguments supportive of the dominant initial position (Whyte,

1998). Most authors agree that structural faults in organisations augment polarisation effects through suppression of minority view points (Whyte, 1998).

5.3.4 *Group polarisation*

Group polarisation in the context of this study relates to the differences between the anterior and posterior preference data matrices (Tables 8 and 9).

Group polarisation is the tendency of the group discussion to enhance the initial dominant point of view (Lamm & Myers, 1978). Isenberg (1986) noted the persuasiveness of arguments and information sharing during group interaction tends to drive support for the dominant initial position on decision alternatives.

Janis (1982) acknowledged polarisation in her study on groupthink but was unable to integrate the phenomenon into the groupthink model because it required the knowledge of initial preferences of group members. It is noted that certain procedures to avoid groupthink proposed by Janis would introduce extrinsic elements to the group interaction (Stacey, 2002).

When polarisation occurs, groups are normally inclined to be more risky than the average individual group member prior to the discussion. The group discussion therefore increases the extent to which group members prefer the risky option which is another characteristic of groupthink.

Groupthink in the quantitative dynamics model used (Stacey, 2002) would be characterised by high degrees of conformance in the anterior data (Table 6) and will be visible by values approaching unity in the collinearity matrix (Table 10).

5.3.5 *Social interaction theories*

Stacey (2002) advocates two theories to explain the cause of polarisation and depolarisation of preferences in group decision making: social comparison theory and persuasiveness of argumentation theory.

The model supports two complementary explanations for the phenomenon (Stacey, 2002) which is consistent with Butler and Crino's (1992) regression equation which is not reliant on pre-discussion decisions of group members, the

risk associated with the decision, and the initial tendency of the group (Stacey, 2002). The criteria used to determine stability and convergence of the model were the eigenvalue of the matrix of association.

The stability of preferences of group members is therefore not only a function of their initial preferences but includes the extrinsic elements (Figure 11). This aspect of the model is not aligned to Davis's (1973) social decision scheme theory whereby the group is related to the distribution of their pre-discussion preferences, but does align to structuration theory (Poole, McPhee, & Seibold, 1982) in terms of the objects of influence that determine the group decision outcome.

5.3.6 Social Decision Scheme & Social Judgement Scheme

Kameda *et al.*, (2003) says majority and plurality models express the influence of "social sharedness" at the preference level. Since Asch's (1957) seminal study of conformity, numerous researchers attempted to describe the relationships between magnitude of influence and the number of influence sources (e.g. Stasser, Kerr, & Davis, 1989).

Social decision scheme theory (Davis, 1973) was an early model to evaluate jury decisions, group polarisation, and choice shifts (Myers & Lamm, 1978; Stasser *et al.*, 1989). The theory accounted the distribution of group decisions based on pre-discussion preferences of group members. The corresponding to **D** in SDS is the social influence function that corresponded to a member's consensus weight to the distance between the target member's initial judgment and other members' initial judgments (Kerr & Tindale, 2003). Stasser *et al.*, (1989) suggested that the distinguishable distribution is useful to study the social influence climate. SDS theory was however not concerned with how social influence and consensus processes unfold over time (Kerr & Tindale, 2003).

Davis (1996) proposed his Social Judgement Scheme (SJS) model as an extension to his earlier work on alternative consensus processes (i.e. SDS Davis, 1973). SJS is a weighted linear combination of member preferences where the weights are a function of the distance between members' preferences and all other members' preferences. Weight specified to any of the members decreases

exponentially as an increasing function of the differences of that member's preference from the other members in the group (Davis, 1996).

Stasser and Dietz-Ulher (2002) provide common themes in charting distinguishable distributions:

- There is influence power in numbers.
- Relationship between numbers and social impact can be adequately expressed in a mathematical abstraction.
- Normative and informational influences are both operative in collective choice.

The model for group decision making used in this study is summarised in Figure 14.

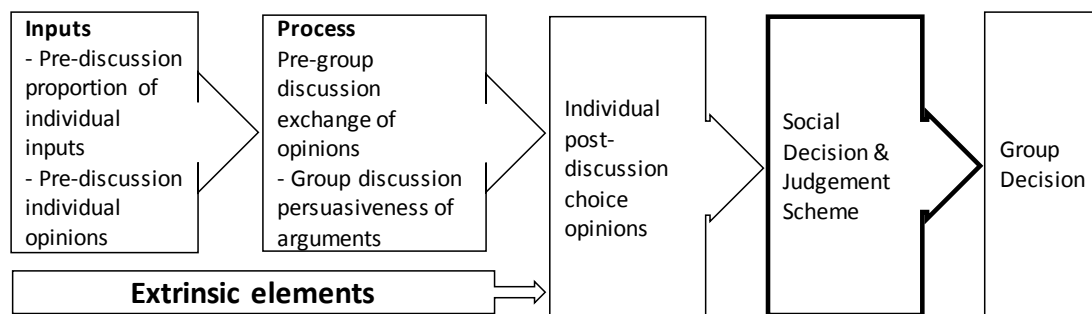


Figure 14: Model for Group Decision Making (Adapted from Stacey, 2002)

The model used in this study captured the consensus process in the aggregates and provided a conceptual tool to explore patterns on how the members' preferences were combined to yield the group response.

5.3.7 Conclusion to hypothesis 1

The results in this research indicate normative power in the group may stem from prescriptions of fairness (e.g., "majority wins") or from strategic assessments of the odds that a position will develop as the group's choice (Kerr & Watts, 1982).

5.4 Discussion pertaining to Hypothesis 2: Consensus improves group functioning when every member has

equal opportunities to provide different opinions on decision alternatives.

5.4.1 *Consensus decision making*

Denis *et al.*, (1992) summarises ways that information available to group members can be distributed;

- Common information: Information well-known to all participants
- Unique information: Known to one participant before the group discussion
- Partially shared information: Known to a few participants prior to group discussion

Higgins (1992) says rules associated with communication relates to how the speaker “tunes” his/her message to others which improves comprehension, and this leads to convergence in meaning because information shared through communication would acquire validity purely on the basis of sharing (Tindale, 2001). One member stated:

“I was impressed by what was said and how it was said”.

Past group decision making studies point out processes involved in shifting from different individual preferences to agreement on a consensus choice (Kerr & Tindale, 2003). Festinger (1954) explained group cohesiveness as “the resultant forces which are acting on the members to stay in a group”.

More recent meta-analyses revealed that cohesiveness stems from group performance enhancing and results in members and groups being more productive (if the group norms favours higher productivity), and being more committed to performance goals (Kerr, 2003).

Denis (1992) summarises the basic process underlying bias toward shared information summarised in Table 26.

Table 26: Basic Processes underlying bias toward shared information (Denis, 1996)

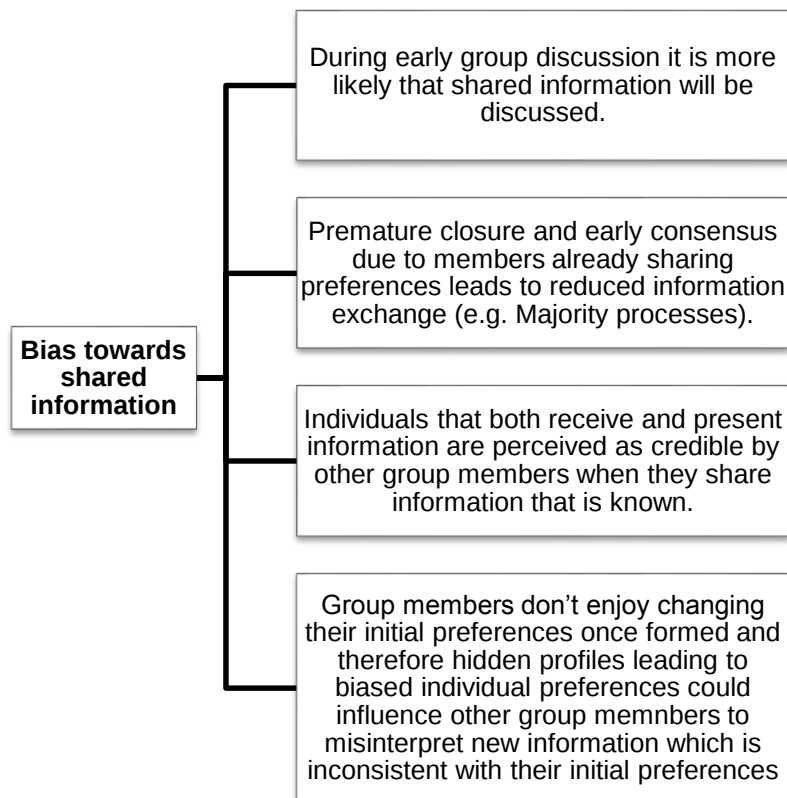


Figure 15 summarises the most common phrases used by members during interviews to describe the importance of information sharing when making decisions.

Common Phrase	Frequency
Supported / Acknowledged	16
Specialist / Knowledge	13
Clarity / Broader perspective	7
Presenting information, ideas, opinions, views	6
Collective outcome / Consensus	5
Comfort	5
Valuable arguments	5
Validating / Confirmation	5
Opportunities	3

Figure 15: Information Sharing - Common Phrases and Frequencies

Past studies find that basic group processes often result in group performance that meets or even exceeds expectations. According to Denis *et al.*, (1992) the ideas shared and known by more than one group member is often validated without requiring additional information.

Kameda *et al.*, (1995) says that trying to figure out whether majority decisions are correct or not does not always help to determine if the decision was wrong due to the group norms that have developed because they work most of the time and require little processing effort. New ideas or opinions that are shared by only one member in this study required further elaboration by the member and was influential to the degree the other members believed they were important.

5.4.2 Conclusion to Hypothesis 2

Members commented that the consensus decision taken was enabled by the shared understanding of the decision alternatives and the process facilitated member buy-in to support implementation of the decision.

5.5 Conclusion

The findings related to the first hypothesis confirmed that member's post-discussion preference of members in a decision making group can be modelled as a linear function of their pre-discussion preference:

$$\mathbf{Y} = f(\mathbf{A}_N, \Delta_a, \Delta_p, \mathbf{X}_N) \text{ Where:}$$

$\mathbf{Y}$ - matrix of group member post-discussion preferences

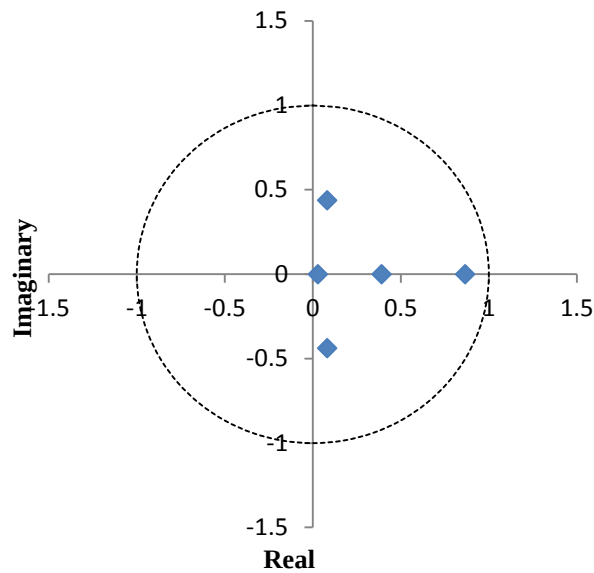
$\mathbf{A}_N$ - matrix of the relative mutual influence among group members

Δ_a - diagonal matrix of group member power

Δ_p - diagonal matrix of group members pre-discussion preference intensity

$\mathbf{X}_N$ - matrix of group members' pre-discussion relative preferences.

The final convergence shown in the posterior Argand diagram (Figure 10) shows that the members have converged close to unity as the model predicted.



The findings for the second hypothesis, consensus improves group functioning when every member has equal opportunities to provide different opinions on decision alternatives.

The following conclusions were drawn from the findings:

- Reaching consensus may lead to a better quality of group decision.
- The consensus process increased member's participation to support the implementation of the decision.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Introduction

This chapter summarises the findings and conclusions of the study, provides recommendations to decision making groups and proposes future areas of research. The research objectives were:

- Quantify the mutual influences amongst members of a small decision making group which influences the degree of post-discussion choices.
- Establish consensus decision making benefits and pitfalls in working group committees.

6.2 Conclusions of the study

There is general agreement by practitioners that groups are more complex than many theories and methods would suggest, therefore the challenge is determining how best this complexity is analysed and understood (Kerr & Tindale, 2003).

6.2.1 Summary of the finding for the first hypothesis

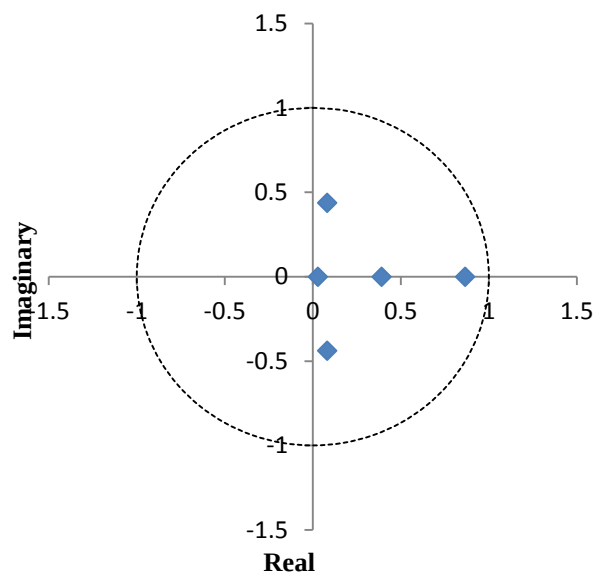
Premise	Result	Conclusion
Post-discussion preferences of individuals in a decision making group can be modelled as a linear function of the individual group member's pre-discussion preferences.	Individual power $\neq 1$ Object of influence $\neq 1$ Extrinsic elements = 1 Eigenvalues < 1 <i>Polarisation and depolarisation can occur</i>	Accept

The choice shift scenario modelled indicates the anterior polarisation and degree of influence of each member after discussion was approximately equal to unity and one extrinsic element influenced the group. The data presented in Table 13 and 14 shows the result of the occurrence of polarisation (posterior polarisation >1.00), or depolarisation (posterior polarisation <1.00).

Table 27: Comparison of Anterior and Posterior Polarisation

Member	Anterior Polarisation	Posterior Polarisation
Ravi	0.65	1.29
Jack	1.28	0.43
Tumi	1.29	0.67
Jan	0.64	1.49
Kim	0.90	0.83

The eigenvalues in the stability report (Figure 10) indicates that the model is divergent (eigenvalues = 0.08; 0.08; 0.03, 0.40. 0.87).



The preferences of the group members were shown by the differences of each member's initial preference and their final decision after the group discussion (Table 8 and Table 9). The repositioning of each group member from the anterior state to the posterior state indicates the trajectory for that member and consequently on-going group interaction would enable charting of every group member over time. The convergence of the model would not only rely on the convergence of preferences but would be demonstrated by the stability of the principle model components.

By using each member's preference before the council meeting convened and comparing their preferences after the discussion, it was possible to determine the relative power of every group member and extrinsic elements that influenced the group as well as the subjects and objects of influence profiles. These parameters enable greater detail and analysis of choice shift of members in a decision making group.

The group's preferences would change in successive interactions depending on the power of members and external influences (Stacey, 2002). Therefore given enough time the group's preferences are expected to stabilise if the interaction between members and external influence remains constant. The resultant effect may show preferences of group members becoming increasingly insignificant if the decision making process supercede the decision context.

The result in this study indicates that the embedded intergroup dynamics, namely, race and gender, plays a role in the group's decision making. Greater diversity in the group may result in more equitable degrees of influence and cause stable and coherent post discussion preferences (Stacey, 2002). Diversity would bring about extrinsic elements and this external influence can reduce the degree of influence of individual members enabling stability of post discussion preferences that is facilitated during a consensus reaching process.

The model can be used to determine how power is distributed in the group in a given situation. If the group remains constant, the power and influence pattern is expected to remain similar if the decision variables on alternatives remain consistent. Should the members of the group change over time the parameters of the model is still useful to estimate the power and influence within the new group if the decision variables remain constant.

Linear models available in the literature on group decision making have been generally accepted with sufficient evidence in support that such models are plausible and reasonable, Examples;

- additive weighting with subjective attributes (Chou, Chang, & Shen, 2008)
- generalised expected utility (Quiggin, 2012)
- decision calculus (Little, 2004)

- consensus models and quantitative judgements (Kerr & Tindale, 2003)

Linear models are expressed symbolically using matrices $Y_{(1 \times n)} = W_{(1 \times m)} \cdot X_{(m \times n)}$ (Stacey, 2002). These models are cited in support of the quantitative dynamics model which is in the form of $Y_{(m \times n)} = A_{(m \times n)} \cdot X_{(n \times n)}$ (Stacey, 2002).

The model indicated both magnitude and profile of members' influence and was applied to analyse group dynamics in a particular decision making context using supplementary variables. The model outcome is given in Table 28. The values nearest to zero show where the prediction was the closest to being correct.

Table 28: Quantitative Model Matrices (A.X)

Concept A							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.383	0.127	0.776	0.144	0.307	0.827	1.166
Jack	-0.608	-0.243	-0.539	0.001	0.442	-0.053	-0.443
Tumi	0.790	0.862	0.942	-0.147	-1.235	1.384	1.741
Jan	-0.146	-0.375	0.354	-0.002	0.355	1.213	0.827
Kim	0.334	0.544	0.873	0.199	0.147	1.193	1.555

Concept B							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.754	0.203	-0.196	-0.038	-0.242	-0.372	-0.209
Jack	1.275	0.258	0.094	0.245	1.089	1.057	1.498
Tumi	-0.228	0.900	-0.716	0.323	-0.069	-0.336	-1.424
Jan	0.193	0.884	-1.516	0.408	0.724	0.566	0.923
Kim	0.062	0.621	0.229	0.284	0.255	0.028	-0.024

The residual plots were used to assess the observed error (residual). The randomness and unpredictability of the results validates that the expected values of responses is a function of the predictor variables. The residuals represent the difference between the model prediction and results of this study. The residuals are given in Table 29.

Table 29: Residuals (E)

Concept A							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	0.155	0.411	0.252	0.394	0.231	-0.289	-0.139
Jack	-0.811	-0.197	0.099	-0.441	-0.393	0.102	0.003
Tumi	0.727	0.654	-0.404	1.663	0.306	0.132	-0.224
Jan	0.195	-0.555	0.673	0.540	-0.306	-0.675	0.690
Kim	0.204	0.973	0.154	0.340	0.391	-0.166	-0.038

Concept B							
	Financial Benefit	Operational Benefit	Non-financial Benefit	Problem / Opportunity	Overall Risk	Risk of NI	Priority
Ravi	-0.175	-0.154	-0.245	0.087	0.291	0.421	-0.231
Jack	-0.737	0.280	0.444	0.294	-0.061	0.460	0.019
Tumi	0.766	-0.362	-0.703	-0.764	0.607	-1.083	0.005
Jan	0.834	-0.835	-0.392	0.130	-0.675	0.461	0.104
Kim	0.476	-0.572	-0.669	-0.235	-0.207	0.021	0.072

The error in the model represents the difference between expected value and the observed value. Positive values for the residuals highlight where the model prediction was too low and conversely negative values identify where the prediction was too high. The quantitative dynamics model used in this study assisted to show how preferences of group members changed and therefore may predict members preferences if the group continues its function in similar contexts. In other words, stable degrees of influence would model the characteristics within choice shift situations in the group.

6.2.2 Summary of the finding for the second hypothesis

It is important for today's leaders to understand the power of putting the right people in the room for the right conversations to present multiple ideas and perspectives that are combined to make optimal decisions.

Collective decision making has become the rule rather than the expectation due to flat networks giving way to hierarchical organisations as front line employees are enabled through technology with readily available information and can therefore make well informed decisions which includes perspectives of those with

first-hand experience. Issues organisations and communities face are becoming increasingly complex and one way to navigate is by testing the implications and impacts of decisions by drawing on a wide range of resources and perspectives.

Organisations need the ability to implement decision making and therefore agility in decision making is required. Quick implementation is a product of how well people understand and support the decision and participation therefore accelerates execution. Based on the aforementioned trends, consensus decision making is the recommended approach to decision making in organisations.

6.3 Recommendations

This study exposed the need for organisations to consider the group dynamics applicable to group decision making. It is highlighted that identification of groupthink in decision making groups may improve group processes and performance outcomes.

This study assists in highlighting that consensus processes improve a group's function when every member has equal opportunity to provide opinions on decision alternatives during interactions. The researcher proposes that the findings add value to existing literature and recommends further validation in future research.

The findings in this study supports that the matrix of prevalence was a valid measure to show the extent to which group members preferences and power prevailed in the group after the group discussion. The study is however inconclusive whether or not extrinsic elements were valid measures of external influence to which members were subjected during interaction in the group. Future research should therefore evaluate the process of how decision makers determine and recommend their original preferences during the decision making process.

The object of influence profiles as a valid measure was determined by comparison of the model result and interview responses by decision makers. The object of influence profile should be further validated by measuring the relative degrees to which members and extrinsic elements influenced each member in the decision making group. The study highlights that the polarisation of

preferences can be determined primarily as a function of pre-discussion preferences. Further investigation of the long term polarisation of preferences of group members after recurring interactions may be determined as a function of extrinsic elements and interaction in the group.

The stability matrix represents the group's preferences and therefore it is suggested that the matrix of association and extrinsic elements would remain unchanged with further group interaction. Whether or not stability would persist provided extrinsic elements and interaction amongst the group remain constant would require further investigation.

6.4 Suggestions for further research

The quantitative model used in this study deals with processes associated with how groups reach consensus through discussion. To further support and explain the findings of this study, additional research and analysis should be conducted on the following aspects.

6.4.1 *Factors Influencing Group Decision Making*

The expression of group member preferences after recurring interactions are inferred based on the results derived from the MOA [Equation 2]. This aspect of the model is premised on group polarisation literature and views social comparison theory and persuasiveness of argumentation theory as complementary to explain polarisation in group settings (Isenberg, *et al.*, 1986).

- *Hypothesis No. 1a:* Degrees of influence is a valid measure to corroborate that the preferences of group members are autonomous to their initial preferences.
- *Hypothesis No. 1b:* Degrees of influence is a valid measure to analyse the group dynamics and power shifts in other South African banks.

Research can be developed where face-to-face group interaction is either limited or non-existent.

- *Hypothesis No. 2:* Choice shift scenarios in computer mediated decision making is a product of reducing degrees of influence when a group does not act on preferences of individual group members.

6.4.2 *Analysing the group dynamics in particular decision making context using supplementary variables*

The model indicates both magnitude and profile of group members including extrinsic elements. The available options for further study may be limited based on the demographic profiles available as small groups typically have less diversity. A general approach was used in this study based on the demographics profiles of the decision makers (Table 3). The following approaches are recommended for further study:

- Analyse the subject of influence profiles of respondents by applying a different technique, example; correspondence analysis.
- Utilising the aggregated demographic profiles to do comparisons and determine the correlation between member qualification and relative influence.
- Using ANOVA to study the differences between influences and whether these are significant based on demographic profiles of the decision makers.
- Using data from the choice shift scenario to evaluate influence profiles based on status and qualifications.

6.4.3 *Consensus Decision Making*

Collective efficacy appears on both theoretical and empirical grounds to be a key factor in explaining the occurrence of groupthink. The quantitative dynamics model has the capacity to explain choice shift events more prudently based on the characteristics of the anterior data and the values of the anterior collinearity matrix.

- *Hypothesis No. 3:* Promoting procedures or processes that are most effective to enhance consensus building in decision making groups improves decision quality and resultant outcomes.

REFERENCES

- Abrams, D. H. (2004). Metatheory: Lessons from Social Identity Research. *Personality and Social Psychology Review*, 8(2), 98-106.
- Alderfer, C. P. (1983). *An Intergroup Perspective on Group Dynamics*. DTIC Document. New Haven, CT: Yale University School of Organization and Management.
- Asch, S. E. (1957). An experimental investigation of group influence. *Symposium on preventive and social psychiatry* (pp. 15-17). Washington, DC: Walter Reed Army Institute of Research .
- Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current directions in psychological science*, 9(3), 75-78.
- Beal, D. J. (2003). Cohesion and performance in groups: a meta-analytic clarification of construct relations. *Journal of applied psychology*, 88(6), 989-997.
- Berry, G. R. (2006). Can computer-mediated asynchronous communication improve team processes and decision making? Learning from the management literature. *Journal of Business Communication*, 43(4), 344-366.
- Booyesen, L. (2007). Societal power shifts and changing social identities in South Africa: workplace implications: management. *South African Journal of Economic and Management Sciences*, 10(1), 1-20.
- Bornman, E. A. (1999). Predictors of ethnic identification in a transitional South Africa. *South African Journal of Psychology*, 29(2), 62-71.
- Boundless. (2015, July 21). *Boundless*. Retrieved January 14, 2016, from Advantages and Disadvantages of Group Decision Making: <https://www.boundless.com>
- Bressen, T. (2007). Consensus decision making. *The Change Handbook*(2), 212-217.

- Burke, J. (1997). Examining the validity structure of qualitative research. *Education, 118*(2), 282-292.
- Burnstein, E. V. (1977). Persuasive argumentation and social comparison as determinants of attitude polarization. *Journal of Experimental Social Psychology, 13*(4), 315-332.
- Butler, J. K., & Crino, M. D. (1992). Effects of initial tendency and real risk on choice shift. *Organizational Behavior and Human Decision Processes, 53*(1), 14-34.
- Campion, M. A. (1993). Relations between work group characteristics and effectiveness: Implications for designing effective work groups. *Personnel psychology, 46*(4), 823-850.
- Chou, S.-Y., Chang, Y.-H., & Shen, C.-Y. (2008). A fuzzy simple additive weighting system under group decision-making for facility location selection with objective/subjective attributes. *European Journal of Operational Research, 189*(1), 132-145.
- Cisek, P. (2012). Making decisions through a distributed consensus. *Current opinion in neurobiology, 22*(6), 927-936.
- Conradt, L., & Roper, T. J. (2005). Consensus decision making in animals. *Trends in ecology & evolution, 20*(8), 449-456.
- Corfman, K. P. (1991). Values, utility, and ownership: Modeling the relationships for consumer durables. *Journal of Retailing, 67*(2).
- Corfman, K. P., & Lehmann, D. R. (1987). Models of cooperative group decision-making and relative influence: An experimental investigation of family purchase decisions. *Journal of Consumer Research, 1*-13.
- Crozier, R. R. (1997). *Cognitive process models and explanations of decision making*. New York: Routledge.
- Davis, J. H. (1973). Group decision and social interaction: A theory of social decision schemes. *Psychological Review, 8*(2), 97-125.

- Davis, J. H. (1996). Group decision making and quantitative judgments: A consensus model. *1*, 35-59.
- Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning: A guide to nominal group and Delphi processes*. Glenview : Scott, Foresman .
- Dennis, A. R. (1996). Information exchange and use in small group decision making. *Small Group Research*, 27(4), 532-550.
- Festinger, L. (1954). A theory of social comparison processes. *Human relations*, 7(2), 117-140.
- Flick, U. (2009). *An introduction to qualitative research*. (4, Ed.) London: Sage.
- Forsyth, D. (2006). *Group dynamics* (4 ed.). Belmont, CA: Cengage Learning.
- Friedkin, N. E. (1999). Choice shift and group polarization. *American Sociological Review*, 64(6), 856-875.
- Green, P. E., Krieger, A. M., & Wind, Y. (2001). Thirty Years of Conjoint Analysis: Reflections and Prospects. *Interfaces*, 31(3 supplement), S56-S73.
- Hainmueller, J., Hopkins, D. J., & Yamamoto, T. (2014). Causal inference in conjoint analysis: Understanding multidimensional choices via stated preference experiments. *Political Analysis*, 22(1), 1-30.
- Hartnett, T. (2016). *Consensus Decision-Making*. Retrieved January 15, 2016, from GroupFacilitation.net: <http://consensusdecisionmaking.org>
- Higgins, E. T. (1992). Achieving 'Shared Reality' in the Communication Game. *Journal of Language and Social Psychology*, 11(3), 107-131.
- Hogg, M. A., Abrams, D., Otten, S., & Hinkle, S. (2004). The social identity perspective intergroup relations, self-conception, and small groups. *Small group research*, 35(3), 246-276.
- House, K. (2011, March 16). *Newsite*. Retrieved January 15, 2016, from Pitfalls in consensus decision making: <http://newsite.karenhousecw.org>

- Isenberg, D. J. (1986). Group polarization: a critical review and meta-analysis. *Journal of personality and social psychology*, 50(6), 1141.
- Janis, I. L. (1982). *Groupthink: Psychological studies of policy decisions and fiascoes*. Boston: Houghton Mifflin Boston.
- Johnson, N. R. (1973). Collective Behavior as Group-Induced Shift. *Sociological Inquiry*, 44(2), 105-110.
- Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education*, 118(2), 282.
- Jung, D. I. (1999). Effects of group characteristics on work group performance: A longitudinal investigation. *Group Dynamics: Theory, Research, and Practice*, 3(4), 279.
- Kahneman, D. T. (1979, March). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 47(2), 263-291.
- Kameda, T. (2013). Procedural influence in consensus formation: Evaluating group decision making from a social choice perspective. *Small Group Processes and Interpersonal Relations*, 2, 137-141.
- Kameda, T., & Hastie, R. (n.d.). Social sharedness and adaptation: adaptive group decision heuristics. *17th Subject. Probability, Utility, Decision-Making Conference*.
- Kameda, T., & Sugimori, S. (1995). Procedural influence in two-step group decision making: power of local majorities in consensus formation. *Journal of Personality and Social Psychology*, 69(5), 865-876.
- Kameda, T., Tindale, R. S., & Davis, J. H. (2003). *Cognitions, Preferences, and Social Sharedness: Past, Present, and Future Directions in Group Decision Making*. Cambridge: Cambridge University Press.
- Kerr, & Tindale. (2003). Group performance and decision making. *Annual Review Psychology*, 55, 623-655.

- Kerr, N. L., & Watts, B. L. (1982). After division, before decision: Group faction size and predeliberation thinking. *Social Psychology Quarterly*, 198-205.
- Kolbe, M., Strack, M., Stein, A., & Boos, M. (2011). Effective Coordination in Human Group Decision Making. Berlin: Springer.
- Kowert, P. A. (2012). Groupthink or deadlock: when do leaders learn from their advisors? In S. Press, *Groupthink or deadlock* (pp. 97-122). Albany: State University of New York Press.
- Lamm, H., & Myers, D. (1978). Group-induced polarization of attitudes and behavior. *Advances in experimental social psychology*, 11, 145-195.
- Latané, B., & L'Herrou, T. (1996). Spatial clustering in the conformity game: Dynamic social impact in electronic groups. *Journal of Personality and Social Psychology*, 70(6), 1218.
- Lavallee, D., Beauchamp, M., & Jackson, B. (2014). Personality processes and intra-group dynamics in sports teams. *Group dynamics in sport and exercise psychology: Contemporary themes*, 25-37.
- Le Bon, G. (1960). *The crowd* (1895). New York, Viking.
- Lewin, K. (1947). Frontiers in group dynamics II. Channels of group life; social planning and action research. *Human relations*, 1(2), 143-153.
- Little, J. D. (2004). Models and managers: The concept of a decision calculus. *Management science*, 50(12 supplement), 1841-1853.
- Louviere, J. J. (1988). Conjoint analysis Modelling of Stated Preferences. *Journal of Transport Economics and Policy*, 22(1), 93 - 119.
- Lunenburg, F. C. (2011). Decision making in organizations. *International journal of management, business, and administration*, 15(1), 1-9.
- Malanchuk, O. (2005). Social Identification versus Regionalism in Contemporary Ukraine. *Nationalities Papers*, 33(3), 346-368.
- Markus, H. K. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological review*, 98, 224–253.

- McDougall, W. (1920). *The group mind*. London: Cambridge.
- Moreland, R. L., Hogg, M. A., & Hains, S. C. (1994). Back to the future: Social psychological research on groups. *Journal of Experimental Social Psychology*, 30(6), 527-555.
- Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative health research*, 8(3), 362-376.
- Morgan, P., Collins, C., Plotnikoff, R., Callister, R., Burrows, T., Fletcher, . . . Lloyd, A. (2014). The 'Healthy Dads, Healthy Kids' community randomized controlled trial: a community-based healthy lifestyle program for fathers and their children. *Preventive medicine*, 61, 90-99.
- Mui, T. N.-L. (1997). A laboratory study of group polarisation in the team dictator game. *The Economic Journal*, 107(444), 1465-1483.
- Neill, J. (2007, October 02). *Groups-leadership*. Retrieved July 20, 2015, from Slideshare: <http://www.slideshare.net/jtneill/groups-leadership>
- Osborn, A. F. (1957). *Applied Imagination: Principles and procedures of creative problemsolving*. New York: Charles Scribner's Sons.
- Palomares, I., Martinez, L., & Herrera, F. (2014). A consensus model to detect and manage noncooperative behaviors in large-scale group decision making. *Fuzzy Systems, IEEE Transactions on*, 22(3), 516-530.
- Pelled, L. H. (1996). Demographic Diversity, Conflict, and Work Group Outcomes: An Intervening Process Theory. *Organization Science*, 7(6), 615-631.
- Pieterse, A. H., de Vries, M., Kunneman, M., Stiggelbout, A. M., & Feldman-Stewart, D. (2013). Theory-informed design of values clarification methods: A cognitive psychological perspective on patient health-related decision making. *Social science & medicine*, 77, 156-163.
- Poole, M. S., McPhee, R. D., & Seibold, D. R. (1982). A comparison of normative and interactional explanations of group decision-making: Social decision

- schemes versus valence distributions. *Communications Monographs*, 49(1), 1-19.
- Pruitt, D. G. (1971, Dec). Choice shifts in group discussion: An introductory review. *Journal of Personality and Social Psychology*, Vol 20(3),, 20(3), 339-360.
- Prussia, G. E., & Kinicki, A. J. (1996). A motivational investigation of group effectiveness using social-cognitive theory. *Journal of Applied Psychology*, 81(2), 187.
- Quiggin, J. (2012). *Generalized expected utility theory: The rank-dependent model*. Canberra: Springer Science & Business Media.
- Ryan, M. F. (2000). Using conjoint analysis to elicit preferences for health care. *BMJ: British Medical Journal*, 320(7248), 1530–1533.
- Schwenk, C. R. (1984). Cognitive simplification processes in strategic decision-making. *Strategic management journal*, 5(2), 111-128.
- Slater, P. E. (1955). Role differentiation in small groups. *American Sociological Review*, 300-310.
- Smith, J. K. (1984). The problem of criteria for judging interpretive inquiry. *University of Northern Iowa*, 6(4), 379-391.
- Sosik, J. J. (1997). Effects of leadership style and anonymity on group potency and effectiveness in a group decision support system environment. *Journal of applied psychology*, 82(1), 82-89.
- Stacey, A. (2002). *A quantitative model for analysing choice shift of individuals in a group decision making context*. University of the Witwatersrand, Faculty of Commerce, Law and Management. Johannesburg: Unpublished.
- Stasser, G. (1999). A Primer of Social Decision Scheme Theory: Models of Group Influence. *Organisational Behaviour and Human Decision Processes*, 80(1), 3-20.

- Stasser, G., & Dietz-Uhler, B. (2001). Collective choice, judgment, and problem solving. *Blackwell handbook of social psychology: Group processes*, 3, 31-55.
- Stasser, G., & Titus, W. (1985). Pooling of Unshared Information in Group Decision Making. *Journal of Personality and Social Psychology*, 48 (6), 1467-1478.
- Stasser, G., Kerr, N. L., & Davis, G. (1989). Influence processes and consensus models in decision-making groups. *Psychology of group influence*, 279-326.
- Stavvers. (2011, March 16). *stavvers.wordpress.com*. Retrieved January 12, 2016, from Wordpress: <https://stavvers.wordpress.com/2011/03/16/the-trouble-with-the-consensus-model/+&cd=1&hl=en&ct=clnk&gl=za>
- Stoner, J. A. (1961). *A comparison of individual and group decisions involving risk*. PhD Thesis, Massachusetts Institute of Technology, School of Industrial Management, Massachusetts.
- Tajfel, J. C. (1979). An integrative theory of intergroup conflict. The social psychology of intergroup relations. *The social psychology of intergroup relations*, 33(47), 74.
- Thompson, L., & Fox, C. R. (2001). Negotiation within and between groups in organizations: Levels of analysis. *Groups at work: Theory and research*, 221-266.
- Tindale, M. A. (2001). *Blackwell handbook of Social Psychology*. Oxford: Blackwell Publishers Ltd.
- Tindale, S. R., Kameda, T., & Hinsz, V. B. (2003). Group decision making. *Sage handbook of social psychology*, 381-403.
- Turner, H. T. (1981). *The Social Identity Theory of Intergroup Behavior*. Oxford: Blackwell Publishers Ltd.
- Tversky, D. H. (1971). Conjoint measurement analysis of composition rules in psychology. *Psychological Review*, 78(2), 151-169.

- Vinze, M., & El-Shinnawy, S. (1998). Polarization and Persuasive Argumentation: A study of Decision Making in Group Settings. *MIS Quarterly*, 22(2), 165-198.
- Whyte, G. (1998). Recasting Janis's groupthink model: The key role of collective efficacy in decision fiascoes. *Organizational Behavior and Human Decision Processes*, 73(2), 185-209.

APPENDIX A

Actual Research Instrument

Member Choice / Preference Data Collection Tool (pre and post)

Member Decision Before	
Business Concept	#
Respondent Code	xyz

Member Decision During	
Business Concept	#
Respondent Code	xyz

Please rate each attribute	Scale (0-10)
Financial Benefit	
Operational Benefit	
Non-financial Benefit	
Problem / Opportunity	
Overall Risk	
Risk of non-implementation	
Priority	

Please rate each attribute	Scale (0-10)
Financial Benefit	
Operational Benefit	
Non-financial Benefit	
Problem / Opportunity	
Overall Risk	
Risk of non-implementation	
Priority	

Approved	Yes
	No

Approved	Yes
	No

Member and Consensus Choice / Preference Data Collection Tool (After)

Member Decision After	
Business Concept	#
Respondent Code	xyz

Consensus Decision	
Business Concept	#
Respondent Code	xyz

Please rate each attribute	Scale (0-10)
Financial Benefit	
Operational Benefit	
Non-financial Benefit	
Problem / Opportunity	
Overall Risk	
Risk of non-implementation	
Priority	

Please rate each attribute	Scale (0-10)
Financial Benefit	
Operational Benefit	
Non-financial Benefit	
Problem / Opportunity	
Overall Risk	
Risk of non-implementation	
Priority	

Approved	Yes
	No

Approved	Yes
	No

APPENDIX B

Methodology of dynamics modelling

Matrix of association

The influence report is represented by the matrix of association (MOA) developed by Stacey (2002). Stacey (2002) demonstrates that post discussion variables can be modelled as a linear function of the objects (m) pre-discussion variables (n). Then

$$Y_{ij} = \sum_{k=1}^m a_{ik} x_{kj}$$

Where

Y_{ij} = Posterior measurement of the j^{th} variable of the i^{th} object.

a_{ik} = Influence of the k^{th} object on the i^{th} object

x_{kj} = Anterior measurement of the j^{th} variable of the k^{th} object.

Given that X and Y are known (field data collected), A is solved using equation:

$$A = Y \cdot X^T \cdot (X \cdot X^T)^{-1}$$

Equation 2: Matrix of association (Stacey, 2002)

The standardised anterior data

The standardised anterior data was normalised by pre-multiplying by the inverse of a diagonal matrix, with the Euclidean strengths of corresponding rows. The equation is:

$$X_S = \Delta p \cdot Xn$$

Equation 3: Standardised anterior data matrix (Stacey, 2002)

Xn is the standardised sum of squares profile of each response attitude. Where,

$$Xn = \frac{\Delta p^{-1} \cdot X}{\sqrt{n}}$$

Equation 4: Standardised sum of squares profile (Stacey, 2002)

Construction of the quantitative model for analysing choice shifts

$$Y = \sqrt{n} \cdot A'_N \cdot \Delta' \cdot X'_N$$

Equation 5: Quantitative model for choice shifts (Stacey, 2002)

Where,

$$A'_N = (A_N \mid P),$$

$$\Delta' = \left(\begin{array}{c|c} \Delta_a \cdot \Delta_p & \emptyset \\ \hline \emptyset & \Delta_e \end{array} \right), \text{ and}$$

$$X'_N = \left(\begin{array}{c} X_N \\ \hline Q^T \end{array} \right)$$

Complete choice shift model:

$Y = f(A_N, \Delta_a, \Delta_p, X_N)$ where:

Y is a matrix of group members' post-discussion preferences (the posterior data),
 A_N is a matrix of the relative mutual influence among group members,
 Δ_a is a diagonal matrix of group members' power in the group,
 Δ_p is a diagonal matrix of group members' pre-discussion preference intensity, and
 X_N is a matrix of group members' pre-discussion relative preferences.

Normalised matrix of residuals

The matrix of residuals was standardised for the number of variables in the exact same manner as the anterior data matrix. Then,

$$Es = \frac{E}{\sqrt{n}}$$

Equation 6 : Normalised matrix of residuals (Stacey, 2002)

The matrix of posterior data (Y) is similarly standardised for the number of variables by dividing the square root of the number of variables. Then,

$$Ys = A \cdot Xs + Es$$

APPENDIX C

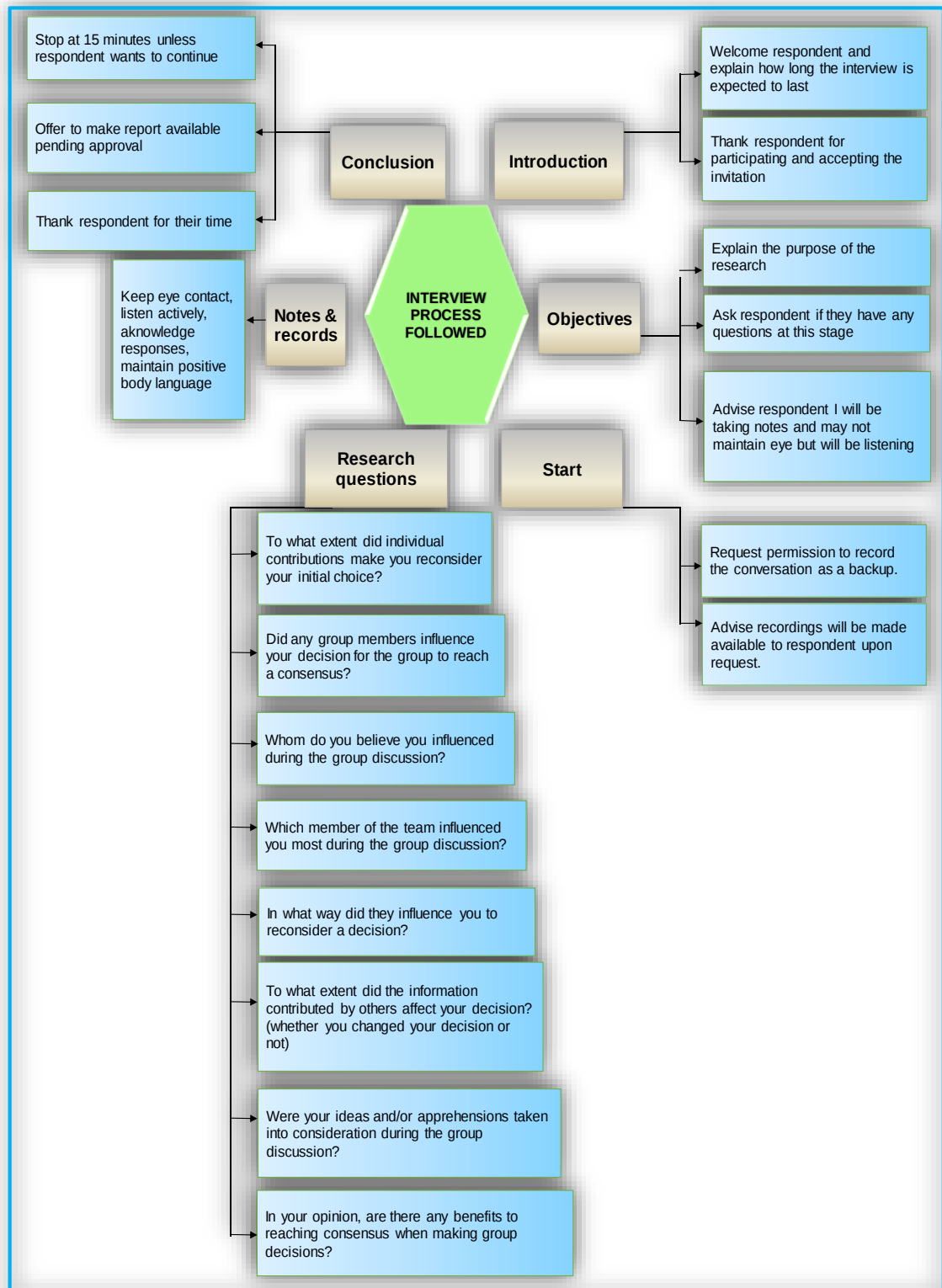
Characteristics of Choice Shift Scenarios (Stacey, 2002)

Scenario	Individual Power	Object Influence Profile	Number of extrinsic elements *	Eigen-values	Comment
Absence of choice shift	= 1	= I	0	Undefined	Baseline scenario; trivial case.
Simple choice shift	Generally $\neq 1$	$\neq I$	0	Exist	No extrinsic elements; converges to population mean if $ \lambda < 1$.
Generalised choice shift	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	Exist	Extrinsic elements exist.
Pure consensus	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	$ \lambda < 1$	Row vectors of the stability matrix are equal.
Cliques and sub-groups	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	Exist	Clustering of posterior data.
Instability	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	$ \lambda > 1$	Increasing polarisation.
Stability	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	$ \lambda < 1$	Polarisation and depolarisation can occur.
Groupthink	$\gg 1$ for leader; < 1 for others; ≈ 0 for extrinsic elements	$\neq I$ diagonals $\ll 1$ except leader	$\leq (n - m)$	Exist	Leader dominates; extrinsic elements insignificant.
Substantial extrinsic influence	Extrinsic elements' > group members'	$\neq I$	$\leq (n - m)$	$ \lambda \ll 1$	Converges relatively rapidly.
Vacillation	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	Complex eigenvalues dominate.	Stable for $ \lambda < 1$, unstable for $ \lambda > 1$.
Paucity of variables	-	-	$m > n$	-	Apply cluster analysis on anterior data, if justifiable.
Anterior data clustering	Some $\gg 1$	$\neq I$; some diagonals < 0	$\leq (n - m)$	Exist	Apply cluster analysis for multicollinearity.
Chaotic	Generally $\neq 1$	$\neq I$	$\leq (n - m)$	$ \lambda \approx 1$	Sensitive to small changes of influence and extrinsic elements.

* n = number of variables, m = number of group members.

APPENDIX D

Interview guide



APPENDIX E

Letter to respondents

Dear Respondent

I am a student at The University of Witwatersrand, Johannesburg completing my degree: Masters in Business Administration (MBA). The thesis that I have undertaken is on group decision making dynamics and how information sharing influences the decision making process before, during, and after group interactions. In order to gather the required data on group decision making I would appreciate if I can arrange to engage in two 20 minute meetings to interview you to better understand the decision making process in your department. I do understand that your time is extremely limited and therefore your willingness to participate in this study will be greatly appreciated.

The interview content will remain confidential throughout the research process and the final report will be for academic purposes only. The interview will be focused on your personal, and the collective decision outcome by weighting attributes to the decision alternatives. Hence all company specific information will remain strictly confidential. A non-disclosure agreement to this effect can be provided if required.

An element of the study will reflect on your own influence within a decision making context which gives rise to ethical considerations. In agreeing to participate you therefore provide consent to being informed and aware. Should this aspect of the research affect you in any way, a debriefing session will be arranged if you deem it necessary.

I will avail myself to meet with you in your location of choice and times that are convenient at all times.

Thank you for your time and assistance in this regard.

Sincerely

Riyaz Smith

WBS Student 515498

Contact details: Email: riyaz.smith@gmail.com; SA Mobile: +27 82 3144 863