Gordon Institute of Business Science
University of Pretoria

Leader Member Exchange in a matrix organisation:

Influence on needs, role ambiguity and job satisfaction

Kenneth Keith Sarman

15024254

A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration

9 November 2015

Abstract

Changes in the global economy require swift action by organisations to respond to new demands, as such the organisational design of choice within the last decade has been the matrix structure. Flaws with the matrix organisation design are widely cited, but the prolific adoption leads to a conclusion that the benefits must outweigh these flaws. This research focuses on the interpersonal challenges arising from the dual reporting structure which leads to unclear roles and responsibilities and ambiguous authority. Given that managers within the matrix structure have different goals, how do they influence project team members to execute project responsibilities which align with organisational goals? The objective of this research was to uncover how the dyadic relationships in a dual leader reporting structure, employed in a matrix organisation affect work attitudes.

The research conducted was quantitative and descriptive in design. The outcomes of the literature review were used as input into the questionnaire development which was aligned with the research objectives. Self-administered questionnaires were distributed to employees operating within matrix structures in a large multinational company operating within the energy and chemical industry. Quantitative data from 148 project personnel was collected and analysed.

Individual leader member relationships were strong predictors of certain work attitudes. A stronger quality of relationship between the project personnel and project manager showed a lower role ambiguity whereas a stronger quality of relationship with the functional manager leads to a greater fulfilment of basic psychological needs (competence, autonomy and relatedness) and higher job satisfaction. Furthermore the alignment and misalignment between perceived leader member exchanges between the two managers was able to explain variances in outcomes beyond that of a single leader member exchange. The alignment between project personnel and project manager, and project personnel and functional manager were associated with perceived basic psychological needs and job satisfaction such that these outcomes are higher when alignment is high rather than low. When alignment is high it can be shown that role ambiguity is the lowest.

Keywords

Leader member exchange; dual leader member exchange; self-determination theory; role ambiguity; job satisfaction; matrix-organisation

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research

_____

Kenneth Keith Sarman

9 November 2015

CONTENTS

LIST OF FIGURES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION TO THE RESEARCH PROBLEM

1.1 Introduction

Changes in the global economy require swift action by organisations; markets are becoming more global requiring a larger geographical footprint; rapid advances in information technology result in access to more information; and customer demands require individual tailoring (Clement, 2013; Hall, 2013; The Hay Group, 2009). As organisations respond to these changes more complex organisational designs are adopted.

Within the last decade organisations have increasingly adopted matrix organisational structures over the traditional pyramid or "command and control" organisational structure due to its ability to address demands of the current business environment (Anand, Vidyarthi, Erdogan, Liden, & Chaudhry, 2014; Galbraith, 2013; Hall, 2013). Matrix structures allow companies to be more responsive due to a more effective utilisation of resources but at the same time leverages functional economies of scale (Galbraith, 2013; Hall, 2013; Sy & D'Annunzio, 2005). Sy and D'Annunzio (2005) have stated that, "CEOs adopt the matrix because they believe that the strengths outweigh the flaws" (p. 40).

Matrix organisational structures can have multiple reporting lines, but in its simplest form, employees functioning within a matrix are subjected to a dual reporting structure. This often results in unclear roles and responsibilities and ambiguity of authority (Goold & Campbell, 2003; Sy & D'Annunzio, 2005). A common but unintended negative outcome from a matrix organisation is a misalignment of company goals due to the dual management structure (Sy & D'Annunzio, 2005).

Even though these problems with the matrix organisations are widely cited in literature (Dunn, 2001; Galbraith, 2013; Hall, 2013), Sy and Côté (2004) argue that academic research has primarily focused on structural issues and not interpersonal challenges that are present whereas focusing on the human side of the matrix organisation design can significantly improve its operability.

Given the increased use of matrix structures and the potential benefits from overcoming interpersonal challenges, the focal point of this research is to understand how stakeholders within the matrix organisation influence each other and work

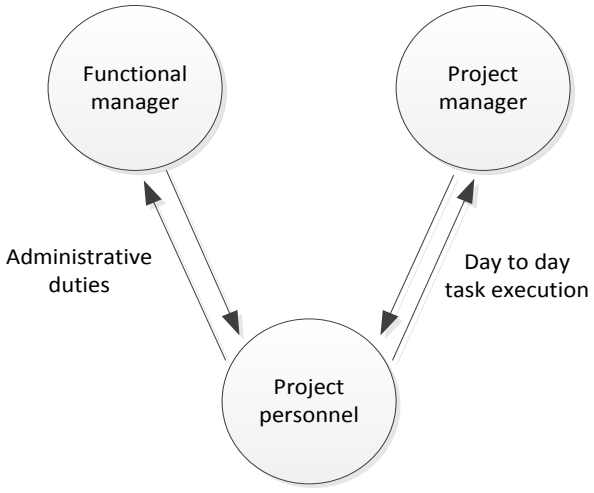
attitudes, such as fulfilment of basic psychological needs, role ambiguity and job satisfaction. The outcomes of this research will assist human resource practitioners understand how interaction of an employee with leaders in a dual reporting setting, specifically a matrix organisation, affects work attitudes.

1.2 Background of the research problem

A matrix organisational design can be described as a grid like structure which can constitute multiple business dimensions based on multiple business demands. In its simplest and most commonly used form the two dimensions would be formulated along a project and functional leg (Galbraith, 2013; Sy & Côté, 2004; Sy & D'Annunzio, 2005). Employees within a matrix organisational structure have dual reporting to a functional and project manager.

There are many dynamic relationships formed between stakeholders functioning in a matrix organisation, this research is focused on the dyadic relationship between project personnel, project manager, and functional manager. Figure 1 below shows the relationships of interest for this research.

Figure 1: Diagram depicting stakeholder relationships of interest in a matrix organisation



The functional manager is responsible for administrative duties such as technical specialities, career development, and promotional opportunities in a specific function, whereas project managers are focussed on the more day to day execution of tasks on projects and have little to no influence over project personnel who are responsible to help achieve project goals (Appelbaum, Nadeau & Cyr, 2008).

This problem was selected to evaluate how the project manager, functional manager, and project team member influences each other given the dynamic created from a dual

reporting structure as illustrated in Figure 1 above, and how the relationships formed influence work attitudes. The dual reporting structure results in unclear roles and responsibilities and ambiguity of authority between leaders (Goold & Campbell, 2003; Sy & D'Annunzio, 2005). Given differing managerial goals and ambiguity of authority (Sy & D'Annunzio, 2005), how does each manager influence project team members to execute project responsibilities?

Research by Anand et al. (2014) posit that using single leader member exchange theory to evaluate the quality of relationship between leader and follower when dual reporting structures are employed is flawed and can lead to biased results. Using relative deprivation theory Anand et al. (2014) have extended single leader member exchange to a dual context, called dual leader member exchange. Dual leader member exchange theory shows that when an employee has multiple managers they do not react to each leader in isolation. Instead they react to multiple leaders in context with the relationships they have with all leaders, such that one relationship is bench-marked against another relationship. In a dual reporting structure the quality of the relationships and more importantly the alignment between these relationships are also shown to be strong predictors of job attitudes (Anand et al., 2014).

In order to maximise leader effectiveness, a deeper understanding of how leader member relationships influence work attitudes is required (Graves & Luciano, 2010). Academic research has shown that there is a link between satisfaction of psychological needs and functioning and well-being in the workplace (Deci & Ryan, 2000; Graves & Luciano, 2010). Self Determination Theory (SDT) posits that individuals have innate tendencies toward growth and integration into larger social circles; the only way to achieve that growth and integration is to first fulfil the individuals psychological needs (Deci & Ryan, 2000; Graves & Luciano, 2010). Self Determination Theory is ideally formulated to evaluate the impact of employee innate psychological needs (competence, relatedness and autonomy) on job outcomes due to a dual reporting structure.

Lastly given that role ambiguity is a common theme in matrix structures specific focus was applied in this research. Research by Joyce (1986) has shown that the dual reporting structure in a matrix organisational design increases the role ambiguity of employees due to unclear roles and responsibilities. This leads to employees feeling dissatisfied with their role and increased anxiety (Rizzo, House, & Lirtzman, 1970), which influences job attitudes.

Given the increased adoption of matrix organisations within the changing business environment, this research integrated leadership and motivation theory to assess how the project manager, functional manager, and project team member influence each other given the dynamic created and how does that translate to work attitudes.

1.3 Research Objectives

This research focuses on the dynamic created in a matrix organisation due to dual reporting structures, which results in unclear roles and responsibilities and ambiguity of authority between leaders (Goold & Campbell, 2003; Sy & D'Annunzio, 2005). Given these differing managerial goals, how does each manager influence project team members to execute project responsibilities?

The goal of this research is to assess how the project manager, functional manager, and project team member influence each other given the dynamic created. These influences are measured as specific work attitudes.

The aim of this research is:

- To establish the quality of relationship, as measured by dual LMX, between the functional manager and project manager
- To establish the relationship strength between individual LMX and work attitudes, particularly if certain managers have larger influence over certain work attitudes
- To ascertain if alignment or misalignment in LMX with project and functional managers have an influence over work attitudes
- Establish the role of basic psychological needs and role ambiguity in explaining job satisfaction

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Pertinent academic literature that is required for this research is covered in this section. The increasing use of matrix organisations is discussed together with motivational theory, leadership theory, and work attitudes.

2.2 Matrix Organisations

2.2.1 History and need for the matrix organisational design

The matrix organisational structure was developed for the aerospace industry in the 1960's with the aim to obtain benefits from the functional and project organisation forms. By the 1970's the organisational design was adopted in other industries and has been consistently used ever since (Galbraith, 1971).

In the past decade the demands of the current business environment required organisations to support operations across countries, cultures, time zones, and technology and business complexity (Derven, 2010; Hall, 2013). Recent advances in information technology fuel this drive, which has led to the globalisation and increased business complexity of organisations (Galbraith, 2013).

Due to the ability to address the demands mentioned above, the traditional organisational design characterised by its vertical or pyramid structure is increasingly being replaced by the horizontal or matrix structure that can support the changing business environment (Galbraith, 2000; Sy & D'Annunzio, 2005).

The proliferation of the matrix organisational design can be found in different industries such as aerospace, automotive, banking, chemical, communications, computer, defence, electronics, financial, and energy (Davis & Lawrence, 1978; Galbraith, 2000).

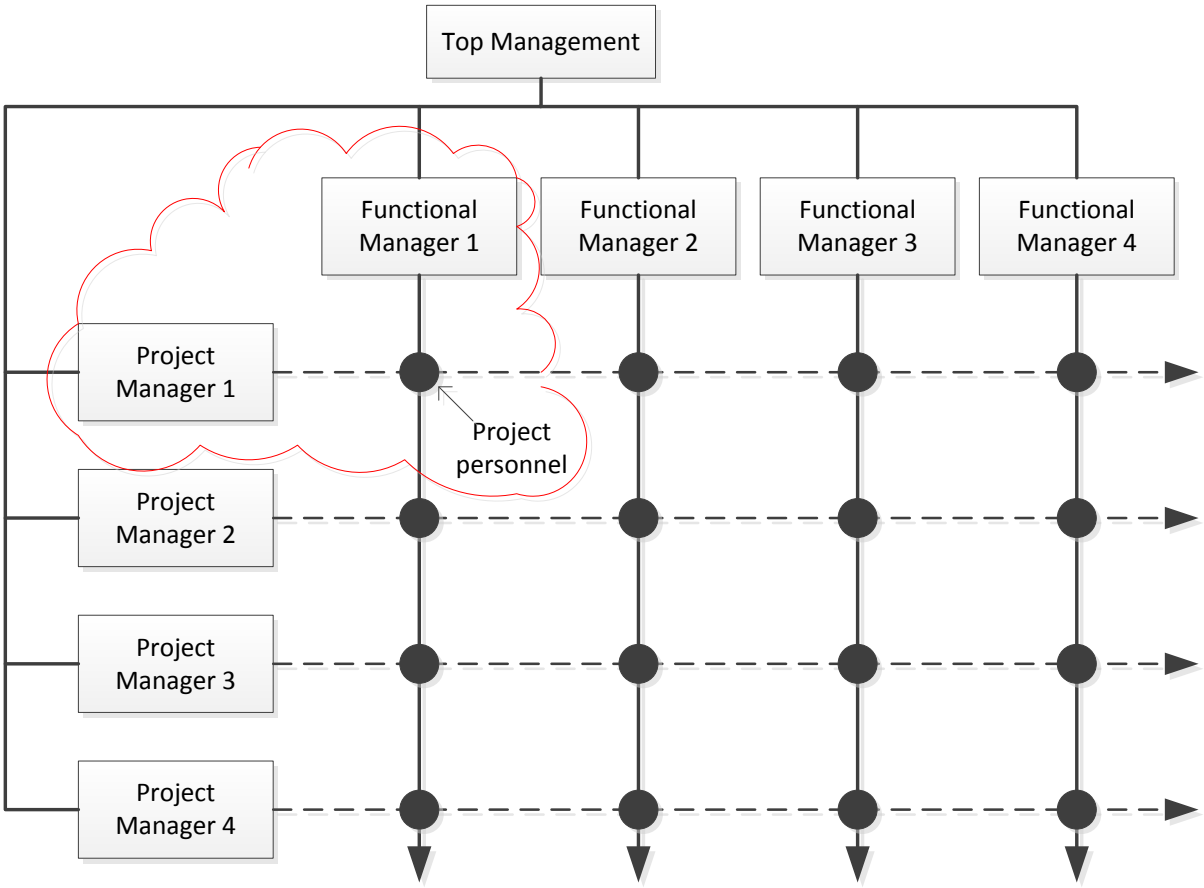
2.2.2 Structural makeup of the matrix organisational design

A matrix organisation is one that is structured along two dimensions. These dimensions may represent functional areas, product lines, specific projects or geographic locations (Davis & Lawrence, 1978; Galbraith, 2013; Galbraith, 1971). Depending on the need, the dimensions of the matrix may change.

The result is resources operating within the matrix organisation having two lines of direct management. “Hard line” management would be the functional manager and the “soft line” management would be the project manager (Sy & D’Annunzio, 2005).

For the purposes of this study the two line management dimensions of the matrix would be characterised as project and functional managers. The resources operating within the matrix organisation will be called project personnel. See Figure 2 below for a matrix organisational structure. A dual reporting structure is also highlighted in Figure 2 below.

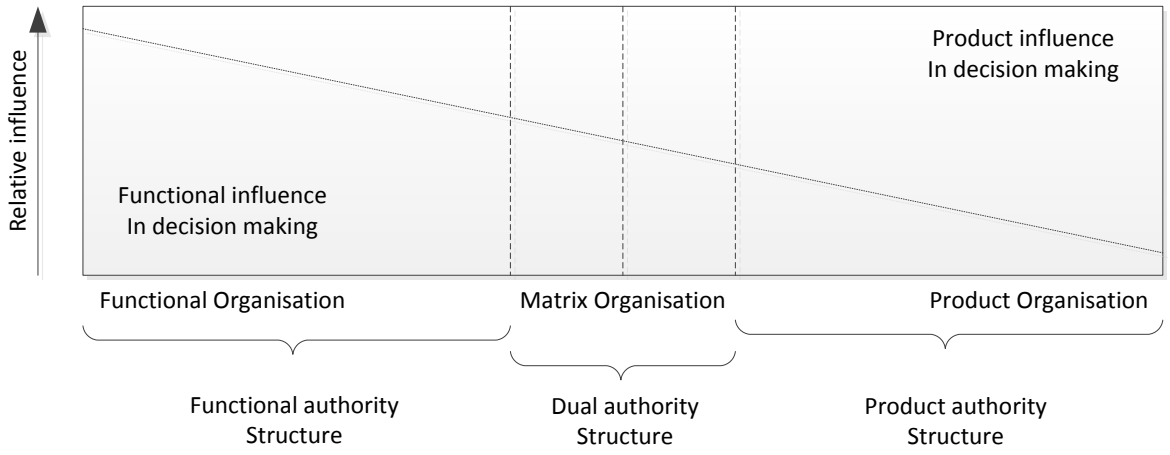
Figure 2: Matrix organisation structure



Source: Adapted from (Dunn, 2001).

Not all organisations operate with a pure matrix structure, depending on the need there may be more of a functional or product focus (Galbraith, 1971). See Figure 3 below.

Figure 3: Continuum between functional or product lead organisational design



Source: adapted from (Galbraith, 1971)

It can be argued that based on where an organisation fits in the continuum of being product or functional lead, the roles and responsibilities of the respective characters are different.

Although the matrix organisational design has many inherent flaws, the strengths of the design outweigh the weaknesses (Hall, 2013). Sy and D'Annunzio (2005) have stated that, "CEOs adopt the matrix because they believe that the strengths outweigh the flaws" (p. 40). Table 1 below shows the strengths and weaknesses of the matrix organisational structure as cited by academics.

Table 1: Matrix organisation strengths and weaknesses

Strengths	Weaknesses
• Leverages functional economies of scale by efficient use of resources • Focuses employees on multiple business goals • Leverages multiple resources in achieving innovative solutions to complex, technical problems • Allows for quick and easy transfer of resources that improves response time to market • Increases information flow through the creation of lateral communication channels • Enhances personal communication skills	• Ambiguity of authority for project personnel due to dual reporting structure which can lead to conflict • Unclear roles and responsibilities between project and functional manager which can lead to power struggles and misaligned goals for the team • Increased overhead costs due to need for additional management and administration • Silo focussed employees • Overutilization of scarce skills due to inherent matrix design

Source: (Davis & Lawrence, 1978; Galbraith, 1971, 2000, 2013; Knight, 1976; Sy & Côté, 2004; Sy & D'Annunzio, 2005)

2.2.3 Problems with the dual reporting structure

The central focus of this research is around the fundamental design of the matrix organisational design – the dual reporting structure. The flaw with a dual reporting structure is the resulting ambiguity of authority between the project and functional manager which leads to unclear roles and responsibilities for project personnel (Galbraith, 1971; Kolodny, 1979).

Even though the weaknesses (see Table 1) of the matrix organisational design is documented in literature, academic research has primarily focused on structural issues and not interpersonal challenges that is present (Sy & Côté, 2004). Sy and D'Annunzio (2005) believe that focusing on the human side of the matrix organisation design can significantly improve its operability.

A closer inspection of the roles of the functional and project managers operating in a matrix show that the functional manager is responsible for technical specialities, career development, and promotional opportunities in a specific function. Project managers

are however focussed on the execution of projects and have little to no influence on project personnel who are responsible to help achieve project goals (Appelbaum et al., 2008). Sy and D'Annunzio (2005) describe this phenomenon as follows, "In a matrix, leaders can have responsibility without the authority as a result of the dual reporting structure" (p. 44).

The focus of the research study is motivated by the inherent design of matrix organisations which utilise dual reporting which influences work attitudes and job outcomes.

2.3 Leadership Theory

2.3.1 Introduction

Leaders are in a position to make decisions around the strategy of organisations and have the ability to influence its employees, therefore they have a directly impact on its organisational outcomes and performance (Dinh, Lord, Gardener, Meuser, Linden & Hu, 2014; Kaiser, Hogan, & Craig, 2008). Leadership theories can be used to understand how micro and macro process influence leaders and follower outcomes. Micro processes encompass emotive and cognitive influences whereas macro processes focus on for example social-relational processes (Dinh et al., 2014).

This has led to the prolific interest in leadership research over the past decade, which initiated a critical review of the established and new and emerging theories (Dinh et al., 2014). The review by Dinh et al. (2014) showed that there are numerous leadership theories. Their research has attempted to collate leadership theories from leading journals and academics with the aim to categorise leadership theories for ease of reference and future academic work. This work showed that there were 23 main categories for leadership theories.

Research by Day (2001) have stated that even though leadership theory is not an exact science, organisations have also recognised that leadership is a source of competitive advantage and are investing on leadership development accordingly.

Since there is an array of leadership theories, the selection of a theory must be based on the ability to understand the mechanisms by which leaders influence organisational outcomes. Given the dyadic relationship between the project and functional manager with the member in a matrix organisation, a relational leadership theory is befitting to

evaluate the organisational outcomes as mediated by the above mentioned relationship (Dinh et al., 2014).

The following sections focus on relational leadership specifically around leader member exchange theory.

2.3.2 Relational leadership theory

Relational leadership theory, sometimes called social exchange, occurs through a social influence process. A literature review offers numerous nuances on the definition of relational leadership theory; Uhl-Bien (2006) offers the following definition, “relational leadership as a social influence process through which emergent coordination (*i.e.*, evolving social order) and change (*e.g.*, new values, attitudes, approaches, behaviors, and ideologies)”, (p. 655).

Relational leadership theories can be categorised as having either an entity or relational perspective. It is described as, “an *entity* perspective that focuses on identifying attributes of individuals as they engage in interpersonal relationships, and a *relational* perspective that views leadership as a *process of social construction* through which certain understandings of leadership come about and are given privileged ontology” (Uhl-Bien, 2006, p. 654).

Dinh et al. (2014) has found the following significant relational leadership theories: Vertical dyad linkage (VDL), leader member exchange (LMX), relational leadership, and individualised leadership. Leader member exchange however, is the most prominent theory used to describe dyadic relationships between a leader and follower (Dinh et al., 2014; Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012; Gerstner & Day, 1997; Uhl-Bien, 2006).

2.3.2.1 Leader member exchange theory

Leader member exchange theory was selected from the basket of social exchange/ relational leadership theories identified by Dinh et al. (2014) as it is the most widely used by academics and organisations alike to describe dyadic relationships between leaders and followers. In addition, with the focus being on improving the interpersonal challenges of matrix organisations, leader member exchange is well suited.

Evolution of leader member exchange and historical underpinnings

Leader member exchange theory as it is known today was first developed in the 1970’s (Dansereau, Graen, & Haga, 1975; Graen & Cashman, 1975). It has evolved over the

years, but its evolution can be described in four stages (Graen & Uhl-Bien, 1995). The initial work had a central focus on vertical dyad linkage. This theory posits that under a resource constrained situation a manager forms relationships with individuals that are trusted, so as to accomplish an organisational goal. Although the theory focused only on leader behaviour, the unit of analysis was on leader member dyads (Dulebohn et al., 2012; Graen & Uhl-Bien, 1995; Scandura, 1987).

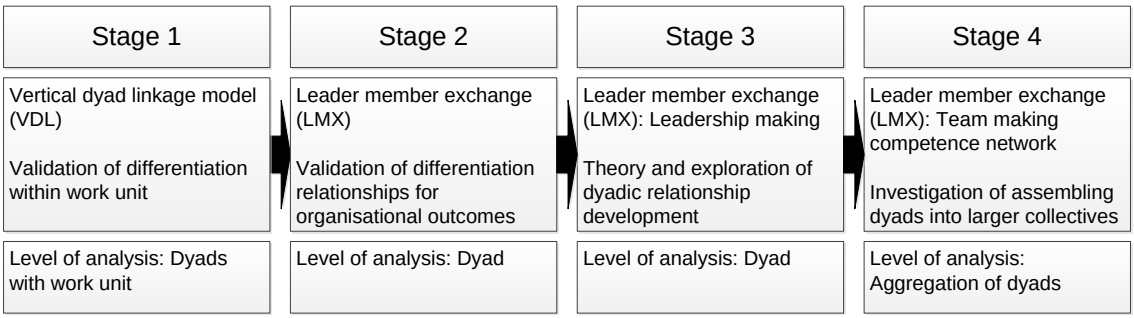
During the second stage vertical dyad linkage was extended from describing differentiated relationships to explaining how these leader member relationships develop and ultimately influence organisational outcomes. The extension of vertical dyad linkage was done using role theory and was called leader member exchange. One of the main outcomes from the research during this phase was that effective leadership resulted in high quality relationships between the leader and follower; this subsequently had a positive influence of job attitudes (Graen & Uhl-Bien, 1995). The unit of analysis at stage was the leader member dyad.

The third stage focused on how dyadic relationships between leaders and followers form regardless of any organisational influence. High quality leader member relationships are encouraged as these positively influence organisational outcomes. Managers in particular are encouraged to foster high quality relationships with all subordinates in the hope that the leader member relationship is reciprocated (Graen & Uhl-Bien, 1995).

Stage four makes a further extension of leader member exchange; this extension investigates dyadic relationships and its influence on direct job attitudes as well as the influence on the organisational structure within which it operates. Dynamics between multiple leader member relationships are investigated, such as how do individuals from a high quality leader member relationship interact with individuals from a low quality relationship in the same work group, and how does that influence the performance of the work group (Graen & Uhl-Bien, 1995). It should be noted that there is very little empirical evidence on stage four lead member exchange (Graen & Uhl-Bien, 1995).

It can be seen that since its inception in the 1970's leader member exchange has evolved and has become a bench mark for describing dyadic relationships as well as how it influences job attitudes among others. Figure 4 below shows the stages of evolution described above.

Figure 4: Stages of leader member exchange theory evolution



Adapted from (Graen & Uhl-Bien, 1995)

Current leader member exchange theory

Leader member exchange theorises that leadership is a process, with the central focus being the relationship between the leader and the follower (Graen & Scandura, 1987; Graves & Luciano, 2010). The relationship between the leader and the follower is defined by the perceived execution of given tasks from the leader by the member. Conversely the quality of the tasks given by the leader and the feedback of the execution of those tasks impact the LMX relationship (Lawrence & Kacmar, 2012). Therefore as stated by Dulebohn et al. (2012), “both members of the dyad form perceptions of their dyadic counterpart, which in turn influence leader and follower reactions to the relationship” (p. 1718).

A low quality LMX relationship is characterised by an expectation of lower quality of exchange between the leader and member. The follower’s deliverables are based only on the formal employment contract no additional expectation is imposed by the leader, as such the follower does not feel obligated to deliver anything outside this contract (Lawrence & Kacmar, 2012; Liden, Wayne, & Stilwell, 1993).

With a high quality LMX relationship the relationship is characterised by mutual trust, respect, and mutual obligation (Liden et al., 1993). Leaders assist followers in task execution by providing support in the form of additional resources which leads to their success and career growth. In turn followers feel obligated to complete their assigned tasks to their best ability to maintain the high LMX relationship (Lawrence & Kacmar, 2012).

Using the concepts of social exchange and reciprocity, both low and high quality leader member relationships drive certain behaviours that reinforce the type of relationship being experienced. Subordinates directly reciprocate the perceive benefits or lack of benefits in their work deliverables. Depending on whether managers perceive the

relationship being of a high or low quality they can offer voluntary help to assist the subordinate (Lawrence & Kacmar, 2012).

2.3.2.2 Extension of the single leader LMX model to a dual leadership model

Within the last decade organisations have increasingly adopted matrix organisational structures over the traditional pyramid or "command and control" organisational structure due to its ability to address demands of the current business environment. This has led to the adoption of more complex organisational structures that increases interpersonal challenges between leaders and followers (Anand et al., 2014; Galbraith, 2013; Hall, 2013; Sy & D'Annunzio, 2005).

Although certain organisational designs can have multiple managers for a single employee, the simplest form can be found in a matrix organisational design. A matrix organisation can be structured along two dimensions; these dimensions may represent functional areas, product lines, specific projects or geographic locations (Davis & Lawrence, 1978; Galbraith, 1971, 2013). Depending on the need, the dimensions of the matrix may change. The result is resources operating within the matrix organisation having two lines of direct management (Sy & D'Annunzio, 2005).

Anand et al. (2014) have argued that as organisations are changing to adapt to the current global demands, that are increasingly using dual leader models, the traditional leader member exchange theory is flawed. Recent publications confer with Anand et al. (2014) in that organisations are increasingly making use of matrix organisational structures to handle among other situations expatriates that have a foreign manager and home manager (Derven, 2010; Galbraith, 2013; Hall, 2013; Nguyen, Felfe, & Fooken, 2013).

Using singular leader member exchange theory to evaluate an organisation using a dual report structure may lead to biased results. In this situation how well does traditional leader member exchange theory predict individual outcomes considering that one half of the relationship is omitted (Anand et al., 2014)? Traditional leader member exchange theory is based on leader member differentiation and relative leader member exchange. Stage four leader member exchange (discussed in the previous section) recognises that dyadic relationships occurs within the context of other dyadic relationships and can impact individual as well a group outcomes (Graen & Uhl-Bien, 1995).

Anand et al. (2014) argue that when an employee reports to multiple managers, using social comparison, they are confronted with two leaders with similar or disparate views

and goals. In this scenario the follower must maintain these relationships simultaneously. It is stated that, “social comparison processes are likely to be activated when an employee reports to multiple leaders, because when reacting to two leaders employees are confronted with parallel and differences between these relationships that they have to maintain simultaneously” (Anand et al., 2014, p. 469).

Anand et al. (2014) propose a Dual Leader Member Exchange theory that shows that when an employee has multiple managers they do not react to each leader in isolation. Instead they react to multiple leaders in context with the relationships they have with all leaders, such that one relationship is bench-marked against another relationship.

Relative deprivation theory provides the underlying framework for the extension of a single leader member exchange to a dual context. “Relative deprivation theory centers around the proposition that the negative affect associated with judgments of one’s own status is not simply a function of one’s objective status Instead, resentment, anger, dissatisfaction and other deprivation-related emotions vary with the subjective assessment of one’s status” (Crosby, 1984, p. 442).

The research by Anand et al. (2014) has contributed to literature around leader member exchange theory in two important ways. First, the extension of the single leader member exchange theory to a dual context allows researchers to fully quantify relationship quality of individuals with two managers. In doing so they will be able to provide a complete picture of how leader member relationship quality influences work attitudes and outcomes.

Secondly, using dual leader member exchange theory to evaluate organisational design allows one to asses which leader has more influence on employee work attitudes and outcomes. Previous research by Green, Blank, and Liden (1983) has shown that employees identify with their preferred leader and the relationship that forms has a significant relationship to their outcomes. However, the relationship with the second leader (even though not the preferred one) could partially explain variance in outcomes. Another advantage of dual leader member exchange is that it allows the researcher to explore how alignment and misalignment between different leader member relationships influence outcomes (Anand et al., 2014).

Anand et al. (2014) have shown empirically that the extension of the single leader member exchange model to a dual leadership context using relative deprivation theory does indeed predict organisational outcomes such job satisfaction and voluntary turnover. The model makes significant contribution to literature as dyadic relationships

between employees and dual leaders can be assessed as a mediator for individual outcomes such as employee satisfaction and retention.

Among the main findings by Anand et al. (2014) was that the degree of alignment between two LMX's explained variances in outcomes beyond the singular leader member exchange relationship. Furthermore the results also showed that when one of the leader member relationship is stronger than the other this lead to asymmetric effects on outcomes. From these analyses one can determine which leader member relationship has the larger impact and influence on outcome variables. In a dual reporting structure the quality of the relationships and more importantly the alignment between these relationships are also shown to be strong predictors of job attitudes.

2.4 Motivation Theory

2.4.1 Introduction

"The concept of motivation refers to internal factors that impel action and to external factors that can act as inducements to action. The three aspects of action that motivation can affect are direction (choice), intensity (effort), and duration (persistence)" (Latham & Locke, 2004, p. 388).

Work motivation theories have been studied by organisational psychologists from at least the 1930's. During this period to present day a plethora of motivation theories have been developed and accepted by academics (Latham & Locke, 2004). The primary question motivational theory aims to answer is what factors influence individuals to increase performance. This question is relevant to all industries from health care to academia (Cerasoli, Nicklin, & Ford, 2014).

Lawler (2003) argues that as business become more competitive and complex, employees are becoming the primary source of competitive advantage. Employees directly determine the organisations health and ability to succeed. Since the fate of the organisation and the employees are intertwined this has, "lead to a virtuous spiral of higher and higher levels of performance and rewards" (Lawler, 2003, p. 2). A large part of the virtuous spiral is the ability of the organisation to motivate its employees.

When one evaluates a specific motivational theory, what is evident is that there are flaws and limitations and at times situational or organisation specific. Miner (2003) has attempted to rate organisational behaviour theories (motivational theories included) for rated importance, extent of recognition, validity, and usefulness. Results from this

research show that motivation theory holds a position of high significant. Miner (2003) states, “If one wishes to create a highly valid theory, which is also constructed with the purpose of enhanced usefulness in practice in mind, it would be best to look to motivation theories” (p. 259).

Contemporary motivational theory has its roots in classical theory; an overview of classical motivation theory is described below as well as a proposal of the contemporary motivational theory to be used in this research. Cerasoli et al. (2014) argue that motivation can be classified in two forces being either intrinsic or extrinsic.

“Extrinsically motivated behaviors are governed by the prospect of instrumental gain and loss (e.g., incentives), whereas intrinsically motivated behaviors are engaged for their very own sake (e.g., task enjoyment), not being instrumental toward some other outcome” (Cerasoli et al., 2014, p. 980).

There are strong proponents as to which type motivation (intrinsic or extrinsic) have a larger impact on individual performance, Cerasoli et al. (2014) has shown via a meta-analysis done over the past 40 years that both intrinsic and extrinsic motivation are predictors of performance, and based on the organisational design can be positively correlated.

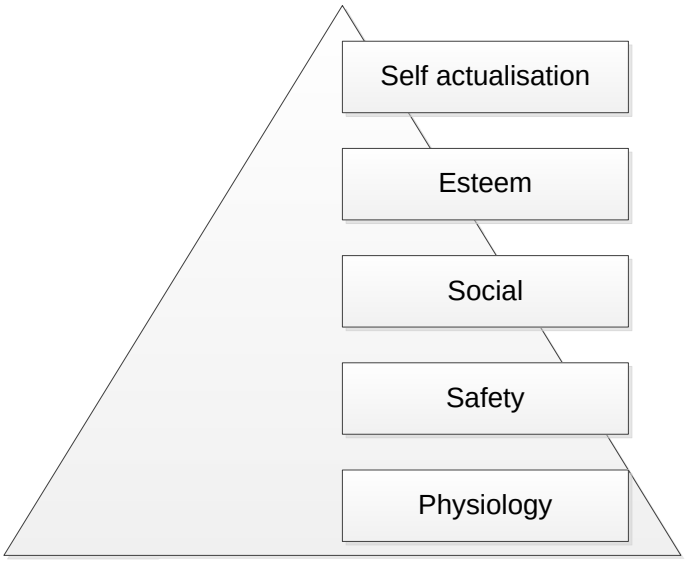
Classical and contemporary motivational theories are discussed next, with the focus being on contemporary theory which is used in this research.

2.4.2 Classical theories of motivation

2.4.2.1 Maslow’s hierarchy of needs

Abraham Maslow’s hierarchy of needs is one of the earliest theories of motivation. Maslow’s posits that every human being had five fundamental needs that followed a strict hierarchy (Robbins & Judge, 2013), these were:

Figure 5: Maslow's hierarchy of needs



Adapted from (Robbins & Judge, 2013)

Lower order needs would be categorised as physiological and safety, whereas social, esteem and self-actualization would be higher order needs (Gagné & Deci, 2005). The hierarchy of needs theory posits that individuals move through the hierarchy satisfying the lower order needs first then the higher order needs. Lower order needs are satisfied via extrinsic motivation and higher order needs are satisfied via intrinsic motivation. Due to its simplistic nature and ease of comprehension it has received wide recognition and is frequently used by many human resource practitioners (Robbins & Judge, 2013).

Unfortunately Maslow's hierarchy of needs do not have much empirical substantiation, the primary reason being that there is no evidence that the needs structure proposed is actually ordered in that way. Furthermore there is no evidence that the progressive satisfaction of needs is valid (Robbins & Judge, 2013).

Lawler and Suttle (1972) have conducted an empirical study to validate Maslow's hierarchy of needs theory by collecting longitudinal quantitative data. Lawler and Suttle, (1972) have stated the following, "The data from these analyses offered little support for the view set forth by Maslow and others that human needs are arranged in a multilevel hierarchy" (Lawler & Suttle, 1972, p. 265).

2.4.2.2 Alderfer's ERG theory of motivation

Based on the lack of empirical evidence and the growing criticism of Maslow's hierarchy of need theory Alderfer (1969) set out to develop a new theory. Alderfer's developed the ERG (existence, relatedness, and growth) theory of motivation built on Maslow's hierarchy of needs. Alderfer, (1969) proposed that humans have three main needs that they seek to fulfil, "they include obtaining his material *existence* needs, maintaining his interpersonal *relatedness* with significant other people, and seeking opportunities for his unique personal development and *growth*" (p. 150).

The need for existence includes various forms of material and physiological desires. The need for food, water, promotion at work, and preferable working conditions all fall under this category. Meaningful and significant relationships with other people fulfil the desire of relatedness. Forming relationships at work and outside of work all contribute to relatedness. "People are assumed to satisfy relatedness needs by mutually sharing their thoughts and feelings" (Alderfer, 1969, p. 146). Growth needs relate to activities that involve the advancement and improvement of oneself and the environment in which one operates. "A person experiences a greater sense of wholeness and fullness as a human being by satisfying growth needs" (Alderfer, 1969, p. 147).

There are three main differences between Alderfer's ERG theory and Maslow's need hierarchy. First, instead of progressing from a lower need to a higher need, Alderfer (1969) proposed that at any point of time any one of the ERG needs may be effective. Second, ERG theory allowed for movement from higher order needs to lower order needs. Lastly the core needs in the ERG theory is different from Maslow's hierarchy of needs and therefore facilitates different data (Alderfer, 1969).

Alderfer ERG theory is considered more flexible than Maslow, and is considered a more valid version of needs hierarchy which draws more support from researchers (Arnolds & Boshoff, 2002; Miner, 2003).

2.4.2.3 Herzberg motivation-hygiene theory

Herzberg motivation-hygiene theory was initially based on observing small groups of employees and has since become one of the most replicated studies in the field of job attitudes (Herzberg, 1968). The main observation was that factors influencing job satisfaction and dissatisfaction were different. This means that the opposite of satisfaction is not dissatisfaction but rather no satisfaction (Herzberg, 1968; Robbins & Judge, 2013).

Herzberg's developed two grouping of needs called hygiene and motivator factors. "The growth or *motivator factors* that are intrinsic to the job are: achievement, recognition for achievement, the work itself, responsibility, and growth or advancement. The dissatisfaction-avoidance or *hygiene factors* that are extrinsic to the job include: company policy and administration, supervision, interpersonal relationships, working conditions, salary, status, and security" (Herzberg, 1968, p. 57).

An important finding from analysing motivating and hygiene factors is that motivating factors were the primary cause of satisfaction and hygiene factors the primary cause for unhappiness at the work place (Herzberg, 1968). Figure 6 below shows the factors as measured affecting job attitudes.

Herzberg (1968) has likened hygiene factors to Maslow's lower level needs and motivators to Maslow's higher order needs.

Figure 6: Factor affecting job attitudes as measured by Herzberg's motivation and hygiene factors

Hygiene factors	Motivation factors
• Company policy and administration • Supervision • Relationship with supervisor • Work conditions • Salary • Relationship with peers • Personal life • Relationship with subordinates • Status • Security	• Achievement • Recognition • Work itself • Responsibility • Advancement • Growth

Adapted from (Herzberg, 1968)

2.4.2.4 A study of Herzberg motivation-hygiene theory in matrix organisations

Research by Dunn (2001) has used Herzberg motivation-hygiene to evaluate a matrix organisation with the aim to examine who has influence to impact job satisfaction or dissatisfaction. Matrix organisations can be structured along a functional and product line, which implies a dual reporting structure. Employees report to the project and functional manager.

Dunn (2001) has stated that role conflict and ambiguity are common issues in matrix organisations primarily due to opposing goals. In a matrix organisation, functional

managers would have formal authority for employees whereas day to day task execution would be controlled by the project manager.

Matrix organisational structures are complex by design, and motivating employees operating in them equally so. Dunn (2001) has used Herzberg motivation-hygiene theory to evaluate the how each manager influences outcomes. Dunn (2001) posit that the functional manager by nature of their authority within the organisational structure has an influence on hygiene factors and the project manager on motivational factors.

The research study included 222 individuals from 18 matrix organisations, and showed that project managers do indeed influence of motivational factors and functional managers have an influence on hygiene factors (Dunn, 2001).

2.4.3 Contemporary theories of motivation

2.4.3.1 Self Determination Theory

Sheldon, Turban, Brown, Barrick and Judge (2003) have argued that the self-determination theory, popularised by Edward Deci, provides a useful conceptual tool that can be used by academics and organisations alike to understand motivation in an organisational setting.

Sheldon et al. (2003) have stated that, “Self-determination theory is a macro-theory consisting of several mini-theories: Cognitive Evaluation Theory, Organismic Integration Theory, Causality Orientation Theory, and Basic Needs theory” (p. 359).

Self-determination theory (SDT) is widely considered the bench mark for investigating the nuances between intrinsic and extrinsic motivation (Deci & Ryan, 1985; Gagné & Deci, 2005; Miner, 2003).

The primary difference between SDT and other motivation theories is the relative strength of autonomous (intrinsic) versus controlled (extrinsic) motivation (Gagné & Deci, 2005). Deci and Ryan (2000) state that, “Self-determination theory maintains that an understanding of human motivation requires a consideration of innate psychological needs for *competence, autonomy and relatedness*” (p. 227).

The basic psychological needs can be further explained as follows (Sheldon et al., 2003):

- Competence: when an employee feels that he is effective is a position, and has the ability to master new skills
- Autonomy: when an employee feels that he has the ability to make his own choices. To be self-regulating
- Relatedness: when an employee feels a sense of connection and sympathy with others

SDT has made significant contribution to motivation theory in granulising the concept of motivation (Facer Jr, Galloway, Inoue, & Zigarmi, 2014). SDT posits a self-determination continuum, with the primary variable being motivation. There are three motives namely, amotivation, extrinsic motivation and intrinsic motivation (Deci & Ryan, 2000; Gagné & Deci, 2005):

- *Amotivation*: a lack in self-determination
- *Intrinsic motivation* comes from the self-interest of the individual, there is an inherent joy to executing an activity which in turn further motivates the individual (Van Nuland, Dusseldorp, Martens, & Boekaerts, 2010).
- *Extrinsic motivation* of the other hand relies on external rewards designed to motivate the individual to carry out a task (Deci & Ryan, 1985).

Table 2 below shows the continuum of self-determination theory as proposed by Deci and Ryan (2000).

Table 2: Self-determination continuum

	Amotivation	**Extrinsic motivation**				**Intrinsic motivation**
Type of regulation	Non regulation	External regulation	Introjected regulation	Identified regulation	Integrated regulation	Intrinsic regulation
Locus of causality	Impersonal	External	Somewhat external	Somewhat internal	Internal	Internal

Source: adapted from Deci and Ryan, (2000) and Gagné and Deci, (2005)

Application to this research

The SDT theory posits that individuals have innate tendencies toward growth and integration into larger social circles; the only way to achieve that growth and integration is to first fulfil the individuals psychological needs (Deci & Ryan, 2000; Graves & Luciano, 2010). Academic research has shown that there is a link between satisfaction of psychological needs and functioning and well-being in the workplace (Deci & Ryan, 2000; Graves & Luciano, 2010).

Furthermore unlike other motivation theories, there is a substantial amount of empirical research that validates the basis on which SDT is formulated (Gagné & Deci, 2005; Sheldon et al., 2003).

As mentioned in section 2.2.3 above, the central problem to the matrix organisational structure is the dual reporting structure that creates grounds for ambiguity of authority, role conflict and role ambiguity. These have the potential to influence work attitudes and hence individual and organisational outcomes. The self-determination theory is ideally formulated to evaluate the impact of employee innate psychological needs (competence, relatedness and autonomy) and hence job satisfaction whilst operating in matrix organisational structure.

2.5 Work Attitudes

2.5.1 Introduction

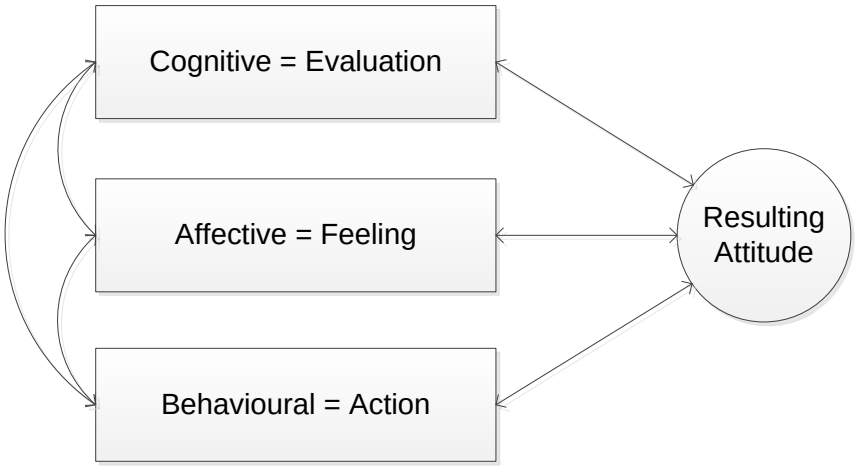
“Attitudes are evaluative statements – either favourable or unfavourable – about objects, people, or events. They reflect how we feel about something” (Robbins & Judge, 2013, p. 104)

The aim of this research is to uncover how the dyadic relationships in a dual leader reporting structure, employed in a matrix organisation affect work attitudes. Dual reporting structures create situations that result in unclear roles and responsibilities and ambiguous authority between leaders (Goold & Campbell, 2003; Sy & D’Annunzio, 2005). Given these differing managerial goals, how does each manager influence the work attitude of project team members to execute project responsibilities which are aligned with the organisational goals?

Work attitudes can be broadly categorised in three components: cognitive, affective, and behavioural. All three components are related and influence the resulting attitude. In an organisational setting the attitude of employees are important as they affect

organisational outcomes (Robbins & Judge, 2013). See Figure 7 below for the interaction between the components of an attitude.

Figure 7: Interactive nature of the components of an attitude



Source: adapted from (Robbins & Judge, 2013)

Robbins and Judge (2013) describe the cognitive component of an attitude as having a belief about a situation at hand. The affective component is related to the emotional or felling part of the attitude and finally the behavioural part is resulting action the person takes as a result of the cognitive and affective components.

Anand et al. (2014) have found that the presence of two leaders managing an employee has influence on work attitude and organisational outcome. For this research two work attitudes directly influenced by the matrix organisational design is chosen. These are role ambiguity and job satisfaction, and are discussed further below.

2.5.2 Role Ambiguity

Role ambiguity is the lack of necessary information required to complete a specific task. Using role theory, Rizzo et al. (1970) state that role ambiguity, “will result in coping behaviour by role incumbent, which may take the form of attempts to solve the problem to avoid the sources of stress, or to use defence mechanisms which distort the reality of the situation” (p. 151).

Joyce (1986) argues that adopting a matrix organisational structure increases role ambiguity of employees due to its inherent design. Increasing role ambiguity influences job outcomes, as employee feel dissatisfied with his role and experiences anxiety (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964; Rizzo et al., 1970).

2.5.3 Job satisfaction

Robbins and Judge (2013) describe job satisfaction as a positive feeling about a job resulting from an evaluation of its characteristics. The level of job satisfaction directly impacts the employee's feelings of the job. High or low levels of job satisfaction create either positive or negative feelings of work respectively.

Job satisfaction is widely studied by organisational behaviourally scientists due to its ability to predict other job outcomes. Robbins and Judge (2013) show that job satisfaction can be related empirically to the following job outcomes:

- Job Performance
- Organisational Citizenship Behaviour
- Customer Satisfaction
- Absenteeism
- Employee Turnover
- Workplace Deviance

2.6 Summary of Literature Review

In the past decade the demands of the current business environment have increased in complexity which has prompted the use of an equally complex organisational design – the matrix organisation (Derven, 2010; Galbraith, 2013; Hall, 2013). The central focus of this work is hinged on the dynamic created by matrix organisations – the dual reporting structure.

This type of organisational structure results in unclear roles and responsibilities, misaligned goals, and ambiguous authority among others (Goold & Campbell, 2003; Sy & D'Annunzio, 2005). Research by Joyce (1986) has shown that the dual reporting structure in a matrix organisational structure increases the role ambiguity of employees due to unclear roles and responsibilities. This leads to employees feeling dissatisfied with their role and increased anxiety (Rizzo et al., 1970), which influences job attitudes.

Considering this, Sy and Côté (2004) argue that academic research to date has primarily focused on structural issues and not interpersonal challenges that are present whereas focusing on the human side of the matrix organisation design can significantly improve its operability.

Research by Dulebohn et al. (2012 and Liden et al. (1993) show that job attitudes are largely influenced by the relationship developed between the immediate leader and employee. This relationship can be characterised by leader member exchange theory. The dual leader member exchange model developed by Anand et al. (2014) specifically focuses on the dyadic relationship between an employee and two leaders, and therefore ideal for use in a matrix organisation.

In addition, other academic research has shown that there are also strong links between satisfaction of innate psychological needs (competence, relatedness, and autonomy) and functioning and well-being in the workplace (Deci & Ryan, 2000; Graves & Luciano, 2010).

The research integrates leadership theory and motivation theory to assess the matrix organisational design. This was done by the use of self-determination theory to measure basic psychological needs and dual leader member exchange theory to measure dual leader member relationships strengths. Specific work attitudes measured was role ambiguity and job satisfaction. These were used to understand the effect of dual leaders on job outcomes within a matrix organisation.

CHAPTER 3: RESEARCH QUESTIONS

The following questions are supported by the literature review in chapter two and is in alignment with the objectives in chapter one.

The following acronyms are used in this chapter and chapters to follow:

LMX_{FM}	Leader member exchange between project personnel and functional manager
LMX_{PM}	Leader member exchange between project personnel and project manager
μ_{LMX-PM}	Mean leader member exchange related to project manager
μ_{LMX-FM}	Mean leader member exchange related to functional manager

3.1 Research Question One

Research question one compares relationships as measured by dual leader member theory between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}).

3.1.1 Research Question One: Hypothesis One

Compares leader member exchange between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM})

$H_{01}: \mu_{LMX-PM} - \mu_{LMX-FM} = 0$

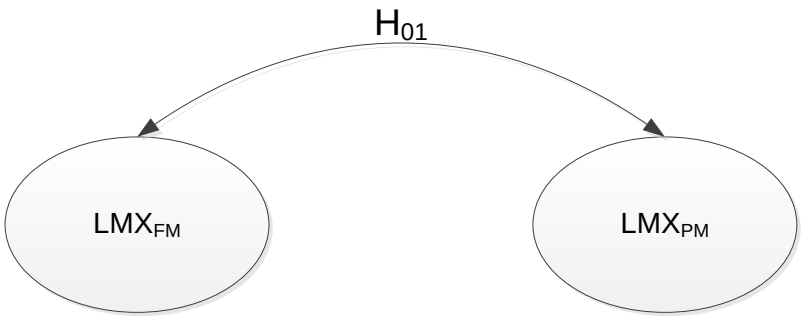
LMX_{PM} and LMX_{FM} as perceived by project personnel are the same

$H_{01A}: \mu_{LMX-PM} - \mu_{LMX-FM} \neq 0$

LMX_{PM} and LMX_{FM} as perceived by project personnel are not the same

Figure 8 below illustrates the hypothesis proposed.

Figure 8: Diagrammatic representation of hypothesis proposed between LMX_{PM} and LMX_{FM}

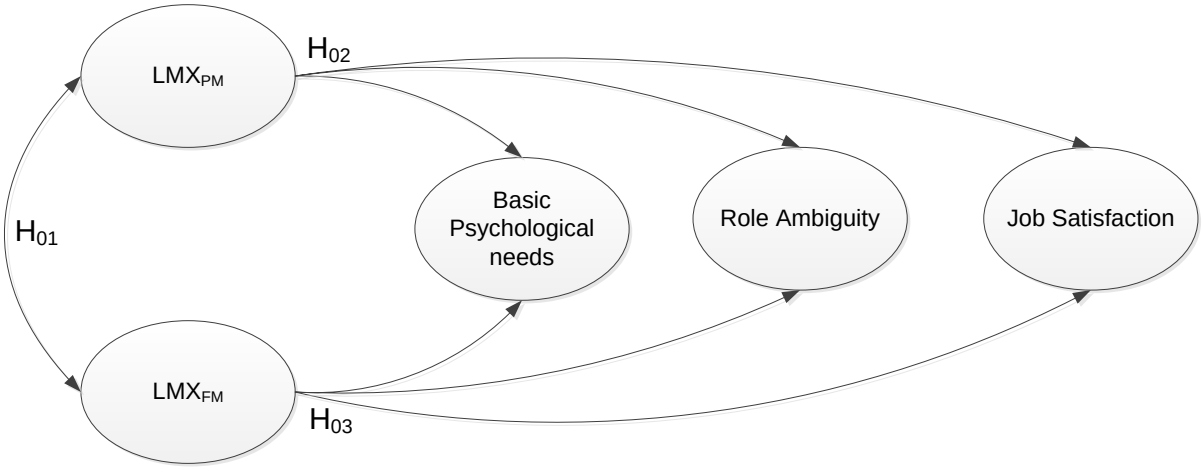


3.2 Research question two

This question investigates the individual leader member relationships to the perceived basic psychological needs, role ambiguity and job satisfaction.

Figure 9 below illustrates the hypothesis tested.

Figure 9: Diagrammatic representation of hypothesis between LMX_{PM} and LMX_{FM} with basic psychological needs, role ambiguity and job satisfaction



3.2.1 Research Question two: Hypothesis Two

Hypothesis two aims to establish if there are any significant relationships between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{02} : There is no relationship between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{02A} : There is a relationship between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

3.2.2 Research Question two: Hypothesis three

Hypothesis three aims to establish if there are any significant relationships between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{03} : There is no relationship between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{03A} : There is a relationship between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

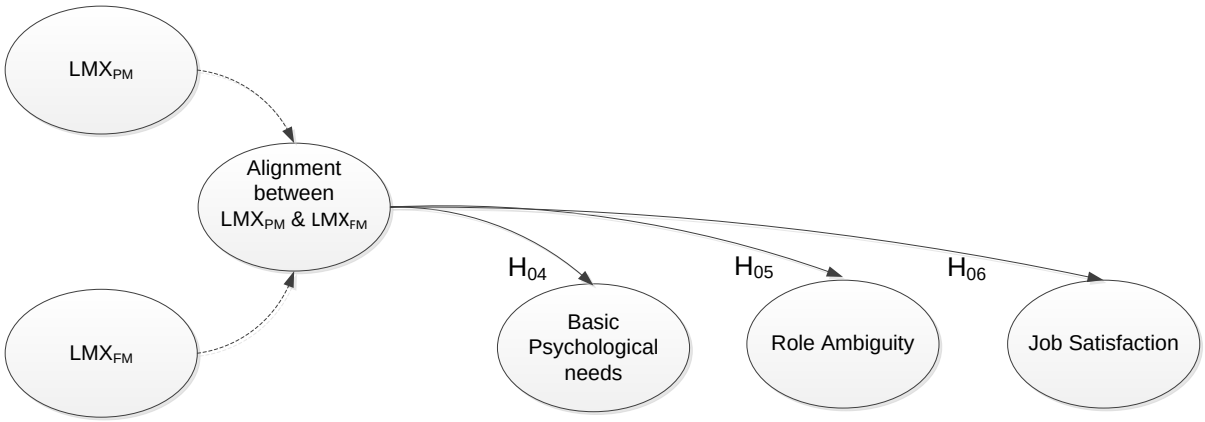
3.3 Research Question Three

Research question three compares alignment and misalignment of leader member exchange between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}) with perceived basic psychological needs, role ambiguity and job satisfaction.

This question tests if alignment in LMX_{PM} and LMX_{FM} is associated with perceived basic psychological needs and job satisfaction such that these outcomes are higher when alignment is high rather than low. It also tests if alignment in LMX_{PM} and LMX_{FM} is associated with role ambiguity such that this outcome is lower when alignment is high rather than low.

Figure 10 below illustrates the hypothesis tested.

Figure 10: Diagrammatic representation of hypothesis between alignment between LMX_{PM} and LMX_{FM} with basic psychological needs, role ambiguity and job satisfaction



3.3.1 Research Question Three: Hypothesis four

Hypothesis four aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived basic psychological needs.

H_{04} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{04A} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

3.3.2 Research Question Three: Hypothesis five

Hypothesis five aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived role ambiguity.

H_{05} : Perceived role ambiguity is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{05A} : Perceived role ambiguity s associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

3.3.3 Research Question Three: Hypothesis six

Hypothesis six aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived job satisfaction.

H_{06} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

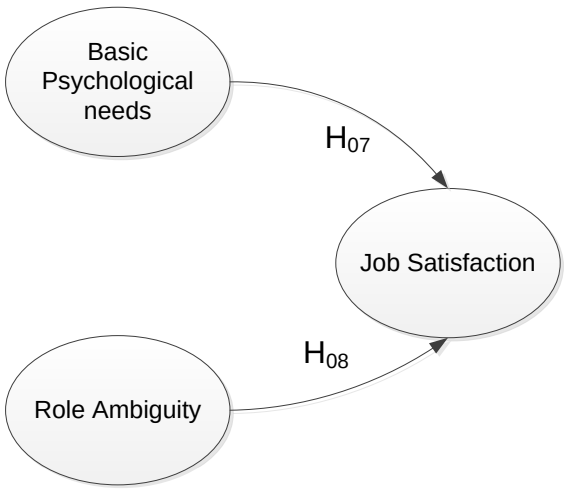
H_{06A} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

3.4 Research Question Four

Research question four tests if there are any influences of perceived basic psychological needs and role ambiguity on job satisfaction.

Figure 11 below illustrates the hypothesis tested.

Figure 11: Diagrammatic representation of hypothesis between perceived basic psychological needs and role ambiguity on job satisfaction



3.4.1 Research Question four: Hypothesis seven

Hypothesis seven aims to establish if there are any significant relationships between perceived basic psychological needs and job satisfaction

H_{07} : There is no relationship between perceived basic psychological needs and job satisfaction

H_{07A} : There is a relationship between perceived basic psychological needs and job satisfaction

3.4.2 Research Question four: Hypothesis eight

Hypothesis eight aims to establish if there are any significant relationships between perceived role ambiguity and job satisfaction

H_{08}: There is no relationship between perceived role ambiguity and job satisfaction

H_{08A} : There is a relationship between perceived role ambiguity and job satisfaction

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Research overview and setting

The research topic selected serves to address both an academic and business need. Using dual leader member exchange and self-determination theory the research draws relationships to work attitudes within a matrix organisational setting.

The research was conducted in a large multi-national company which operates in the energy and chemical industry. The survey was conducted in the technology division of the company which operates as a standalone business unit. This business unit is responsible for research and technology, technology innovation and management, engineering services, and capital project management. The technology division of the company operated both locally and internationally. Due to the focus on employees operating within matrix organisational structures, the capital project management and engineering services divisions were selected as the sample group. These two divisions comprised approximately 1000 employees.

The capital project management and engineering services divisions utilised a matrix organisational design. It was structured along a functional and project management leg. The functional leg is grouped by discipline, such as process engineering, mechanical engineering, electrical engineering, control engineering, cost control, document control, commercial and legal, safety and health, planning, etc. Functional managers provide discipline specific advice to project team members. The project team is comprised of project personnel from different disciplines and is led by the project manager. Within this organisational design project personnel need to report to both the project manager and functional manager.

This company was chosen as it made use of a matrix organisation design, furthermore signs of problems as highlighted in literature due to the dual reporting structure were being exhibited.

4.2 Research Method

The research method is quantitative and descriptive in design, as the research attempted to describe characteristics of the population or phenomenon (Saunders & Lewis, 2012).

The research was designed as a cross sectional study as the data was collected at a single point of time (Zikmund, Babin, Carr, & Griffin, 2012).

4.3 Population and unit of analysis

The population for the study consisted of only project personnel within the technology division of the company operating within the energy and chemicals industry. Permission from the company was granted on condition that the company name and individual names were kept confidential and only aggregated data could be used. The unit of analysis is the perceptions of project personnel.

4.4 Sampling

A questionnaire was developed based on the relevant theory bases and sent to the selected divisions within the company's technology divisions. Existing company email distribution lists were used which included a total of 908 individuals. Of the total email distribution list 522 individuals operated within a matrix organisational structure.

There were 198 responses of which 50 questionnaires were incompletely filled in and removed. The remaining 148 responses represented a response rate of 28%.

Table 3: Response rate summary

Sample	Questionnaires issued	Responses	Valid responses	Response rate
Project personnel	908	198	148	28%

4.5 Data collection tool

Self-adminstered questionnaires were used to obtain primary data to support the hypothessis made. The questionnaires were developed for project personnel only and no open ended questions were used.

4.5.1 Questionnaire development

The questionnaires were developed from the literature review in support of the hypothesis proposed. Table 4 below shows the variables measured and the source of the questionnaires used.

Table 4: Sources of questionnaire development

Variable	Source of questionnaire
Leader member exchange	The LMX-7 measurement scale by Graen and Uhl-Bien (1995) used to measure leader member exchange. *Note:* Questionnaire duplicated to address the functional and project manager.
Basic psychological needs	The questionnaire developed by Deci and Ryan (2000) was used to determine fulfilment of basic psychological needs.
Role ambibiguity	The questionnaire developed by Rizzo et al. (1970) was used to measure role ambiguity
Job satisfaction	A single Robbins question to measure job satisfaction was used as proposed by Judge (2013).

4.5.2 Questionnaire scales

All questions used a five point Likert scale. The Likert scale was used to measure the perceived attitude to the question and was measured as strongly disagree, disagree, neither agree or disagree, agree and strongly agree.

The data collected using a Likert scale is ordinal in nature. Zikmund et al. (2012) describe ordinal scales as, “ranking scales allowing things to be arranged based on how of some concept they possess”, (2012, p. 295). The scales used in all the questionnaire are described in Table 5 below. The final questionnaires are shown in Appendix A.

Table 5: Description of questionnaire scales

Variable	Source of questionnaire
Leader member exchange	Seven items, five point Likert scale
Basic psychological needs	21 item, five point Likert scale
Role ambibiguity	15 item, five point Likert scale
Job satisfaction	Single item, five point Likert scale

4.5.3 Questionnaire relevancy and accuracy

In order to answer the proposed hypothesis in this research paper the development of the questionnaire must meet the basic criteria of relevancy and accuracy (Zikmund et al., 2012).

Zikmund et al. (2012) describe relevancy as, “the extant that all information collected addresses a research question that will help the decision maker address the current business problem”.

Only relevant bibliographic data was collected to understand the sample distribution. Furthermore all other questions were modified from existing empirically tested questionnaires that address the hypothesis proposed.

Once the relevancy of the questionnaire is established, accuracy in terms of reliability and validity must be ensured (Zikmund et al., 2012). While questionnaires from previous researchers’ work was used, It was checked to ensure that the questions were simple, understandable, and unbiased (Saunders & Lewis, 2012; Zikmund et al., 2012).

4.5.4 Survey instrument

Questionnaires are widely used to collect data in a fairly inexpensive and quick manner. It can be used to access a large audience and provides flexibility in the collection process (Saunders & Lewis, 2012).

SurveyMonkey® was used to administer the questionnaires to project personnel. SurveyMonkey® is specifically designed for the administration of surveys and provides several features to ensure that data is accurately collected. The following features were used:

- The questionnaire was displayed in a paging format so that all questions could be viewed immediately.
- While the anonymity of the individual was ensured, the same computer could not complete the questionnaire twice. This was done by recording the computer IP address only.
- Warning messages alerted the individual if a question was skipped and ensured that two answers could not be entered for the same question. This ensured the integrity of the data set.
- A progress bar was added at the bottom of the page to indicate how far the questionnaire has been complete.

4.5.5 Pre testing the questionnaire

Once the questionnaire was programmed in SurveyMonkey® it was sent to eight individuals to test for language, grammar, and understanding. The pre-testing phase confirmed that the survey tool worked and that the data could be collected as intended. Minor grammatical changes were incorporated from the pre-testing phase and the final questionnaire was developed.

4.6 Data collection method

Data was collected from the online survey instrument SurveyMonkey®. The SurveyMonkey® link containing the unique survey was sent to the selected sample group via email. The email contained the purpose of the research, consent note and contact details if further clarification was required. Please see Appendix A for the email sent.

The questionnaire was sent out on 26th June 2015 and closed on 10th July 2015.

4.7 Data analysis

All raw data collected was exported from SurveyMonkey® in excel format. The raw data was coded as per Table 6 below.

Table 6: Coding of ordinal data

Likert scale	Coding
Strongly Disagree	1
Disagree	2
Neither Agree or Disagree	3
Agree	4
Strongly Agree	5

Excel and SPSS 23 were used to analyse the raw data. A level of significance of $\alpha = 0.05$ was used for all tests.

4.7.1 Descriptive statistics

Descriptive statistics is used to explore and understand the data collected, it describes the basic characteristics such as central tendency, distribution, and variability (Saunders & Lewis, 2012; Zikmund et al., 2012). As described above the data was coded, but prior to that screened by removing incomplete responses from the data set.

Two types of data were collected; the biographical data was nominal and all other data was collected using a Likert scale and were therefore ordinal in nature. Frequency distribution graphs were used to describe the biographical data and central tendency methods was used to describe data values (Zikmund et al., 2012).

A significance level of $\alpha = 0.05$ was used for all tests.

4.7.2 Non-parametric statistical tests

A non-parametric statistical test was required for hypothesis one. This hypothesis tests if there is any difference between the perceived leader member exchange between the project personnel and functional manager (LMX_{FM}) and project manager (LMX_{PM}). To test this, the Wilcoxon Signed Ranks Test was performed. The Wilcoxon Signed Ranks Test does not assume normality of data, and is used to compare two sets of data that originate from the same sample group (Bluman, 2009), therefore ideally suited to analyse hypothesis one.

Since the data is ordinal in nature, Spearman Rank Correlation is used to investigate relationship strength between two variables. This method is used when the populations from which the samples are obtained are not normally distributed (Bluman, 2009).

4.7.3 Polynomial regression analysis

In the field of psychology ordinal data is often collected using Likert type scales. This data is analysed using techniques for continuous data such as polynomial regression analysis (Lubke & Muthén, 2004). Using continuous normal theory on ordinal data can lead to incorrect results, however if the ordinal data in question is normally distributed then continuous normal theory would hold valid (Rhemtulla, Brosseau-Liard, & Savalei, 2012).

A study by Rhemtulla et al. (2012) has shown that the major factors influencing the performance of continuous methods on categorical data are the variable category threshold, model size, and the assumption of normality. The main finding of their study was that when the number of observed variables (number of points on Likert scale) is less than five, robust categorical methodology must be used to achieve accurate results. If the number of observed variables is more than five both categorical and continuous methods are acceptable.

Polynomial regression analysis was carried out on the ordinal data collected via this study to answer research question three. Five point Likert scales were used for all

theoretical frameworks. A significance level of α = 0.05 was used to test the overall regression model for statistical significance.

The regression coefficients from the regression model are then used to do a test for congruence, this is described in the section below.

4.7.4 A test of congruence

A test of congruence involves testing the fit, agreement, or alignment of two variables as a predictor of an outcome variable. This type of test is often encountered in organisational behaviour research and techniques involve collapsing two variables into one variable by the use of product terms and absolute or square differences commonly called congruence indices (Edwards, 1994; Edwards & Parry, 1993). Congruence indices have inherent methodical problems (Edwards, 1994; Edwards & Parry, 1993) and was thus not used in this research.

The use of polynomial regression analysis for testing congruence is proposed by Edwards (1994) and Edwards and Parry (1993) due to its advantage over congruence indices. First it has the ability to treat congruence as a continuous variable therefore it is able to maintain its interpretability of the original component measures. Second, polynomial regression analysis lends itself to hypothesis testing which reduces the risk of errors. Furthermore the directionality (alignment vs. misalignment) of congruence between two variables can be analysed and correlated to an outcome variable. Third, polynomial regression allows the granularity to analyse individual relationships between independent and dependant variables and the possibility of higher order relationships.

Anand et al. (2014) have shown that tests of congruence between two variables on outcome variables explains the variance in outcome variables beyond that explained by individual independent variables. Edwards and Parry's (1993) study also attested to the same notion. The use of polynomial regression has also shown effects of alignment and misalignment.

Consider two generic equations that relate two independent variables with a dependant variable (Edwards & Parry, 1993):

$$DV = b_0 + b_1X + b_2Y + e \quad (1)$$

$$DV = b_0 + b_1X + b_2Y + b_3X^2 + b_4XY + b_5Y^2 + e \quad (2)$$

Where X and Y are the independent variables and DV is the dependant variable, b_0 is the intercept, b_1 to b_5 are the coefficients of the independent variables and e represents

a random disturbance term. Equation 1 represents a linear relationship whilst equation 2 represents a second order relationship.

A test for alignment of independent variables

Equation 2 above forms a surface on a three dimensional plane. Edwards and Parry (1993) show that a test for alignment involves the assumption that the slope of the surface along the Y = X line is zero, which means that Z is the same along that plane. If we re-arrange equation 2 whilst making Y = X it yields the following:

$$DV = b_0 + (b_1 + b_2)X + (b_3 + b_4 + b_5)X^2 + e \quad (3)$$

The slope along the Y = X plane is given by the sum of $b_1 + b_2$ and the curvature is given by $b_3 + b_4 + b_5$. If either the slope or curvature is non zero along the Y = X plane the hypothesis that the surface is flat can be rejected.

A test for misalignment of independent variables

Edwards and Parry (1993) show that a test for misalignment involves the assumption that the slope of the surface along the Y = -X (perpendicular to the Y = X line) line is zero, which means that Z is the same along that plane. If we re-arrange equation 2 whilst making Y = -X it yields the following:

$$DV = b_0 + (b_1 - b_2)X + (b_3 - b_4 + b_5)X^2 + e \quad (4)$$

The slope along the Y = -X plane is given by $(b_1 - b_2)$ and the curvature is given by $(b_3 - b_4 + b_5)$. If the slope as identified above is zero the surface is flat along the Y = -X plane. If the curvature as identified above is positive the curvature is positive along the Y = -X plane.

4.8 Research limitations

The use of non-probability sampling implies that the sample was not statistically representative of the population. Only local generalisations could be made which could not be extended to the whole population (Saunders & Lewis, 2012).

The survey was conducted in a knowledge worker environment. The results from this research may not be applicable in other work environment, for example an environment made up largely of blue collar workers.

Non response bias could be introduced by the low response rate (Saunders & Lewis, 2012; Zikmund et al., 2012). This could lead to a type I error as the individuals who did

not respond could form part of group that has characteristics not represented in the sample.

CHAPTER 5: RESULTS

In Chapter three the results objectives and hypothesis was defined, following the research design and methodology in Chapter 4. This chapter is a presentation of the results.

5.1 Summary of bibliographical information

This section summarises the bibliographical information, according to the following data categories collected on the respondents:

- Age
- Level of seniority
- Years of experience

Table 7 below summarises the distribution across the three categories.

Table 7: Descriptive statistics of data collected

Sample characteristics			
	Category	**Total count**	**% Split**
Age	<25	1	1%
	26-30	39	26%
	31-40	54	36%
	41-50	29	20%
	51-60	19	13%
	>61	6	4%
Years of experience	<2	4	3%
	2-5	31	21%
	6-9	51	34%
	10-14	29	20%
	15-19	13	9%
	>20	20	14%
Level of seniority	Junior	32	22%
	Middle	88	59%
	Senior	28	19%

The frequency distributions are show on Figure 12 to Figure 14 below.

Figure 12: Frequency distribution of Age

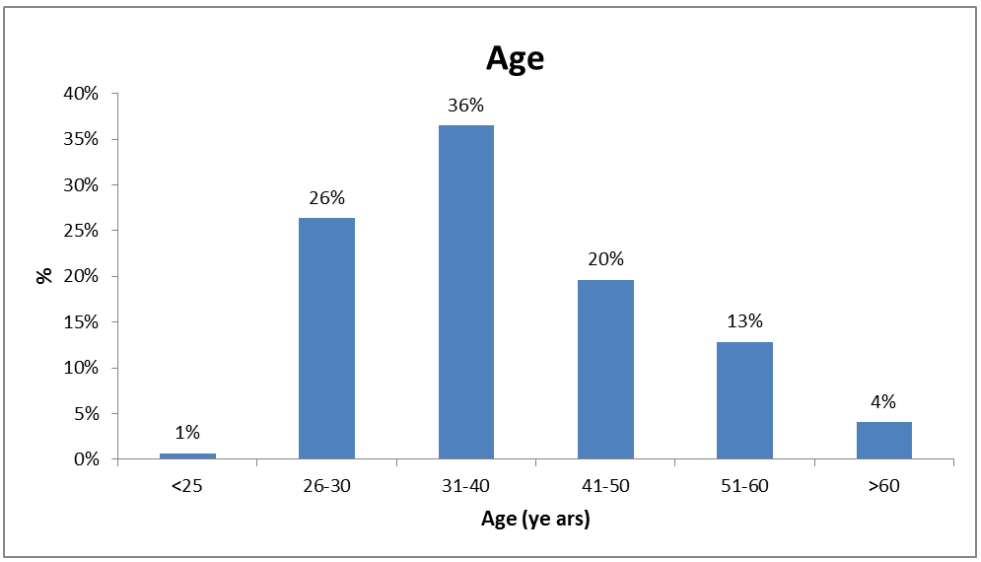


Figure 13: Frequency distribution of number of years of experience

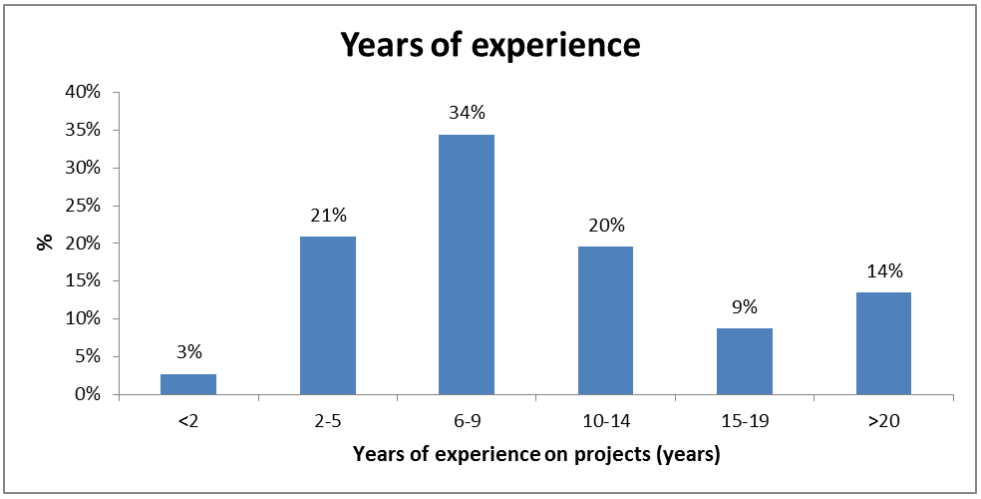
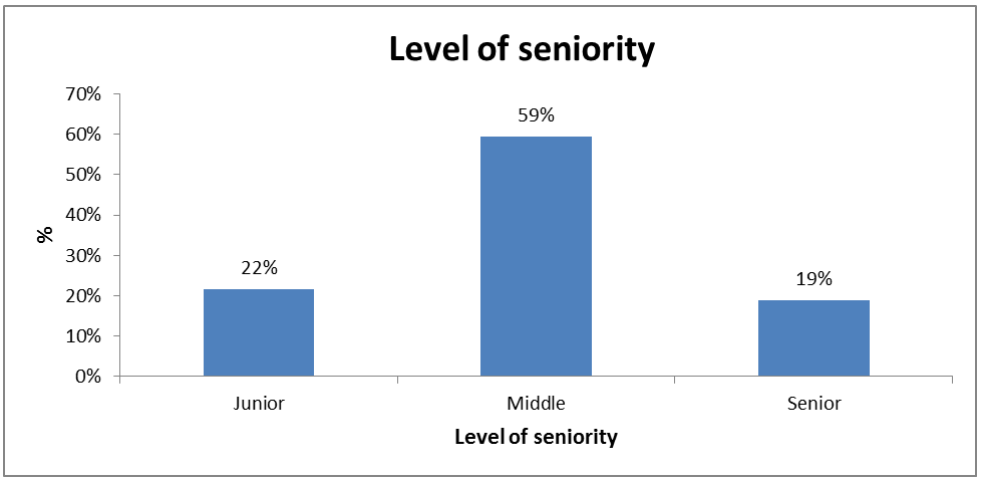


Figure 14: Frequency distribution of level of seniority



The majority of project personnel were between 26 – 50 years of age, had between 2 – 14 years of work experience and were classified as having a middle level of seniority. It should be noted that there was a significant group of project personnel who had more than 20 years of experience.

The bibliographical information shows that with the three categories chosen to describe the population, the respondents were well distributed.

5.2 Summary of survey data

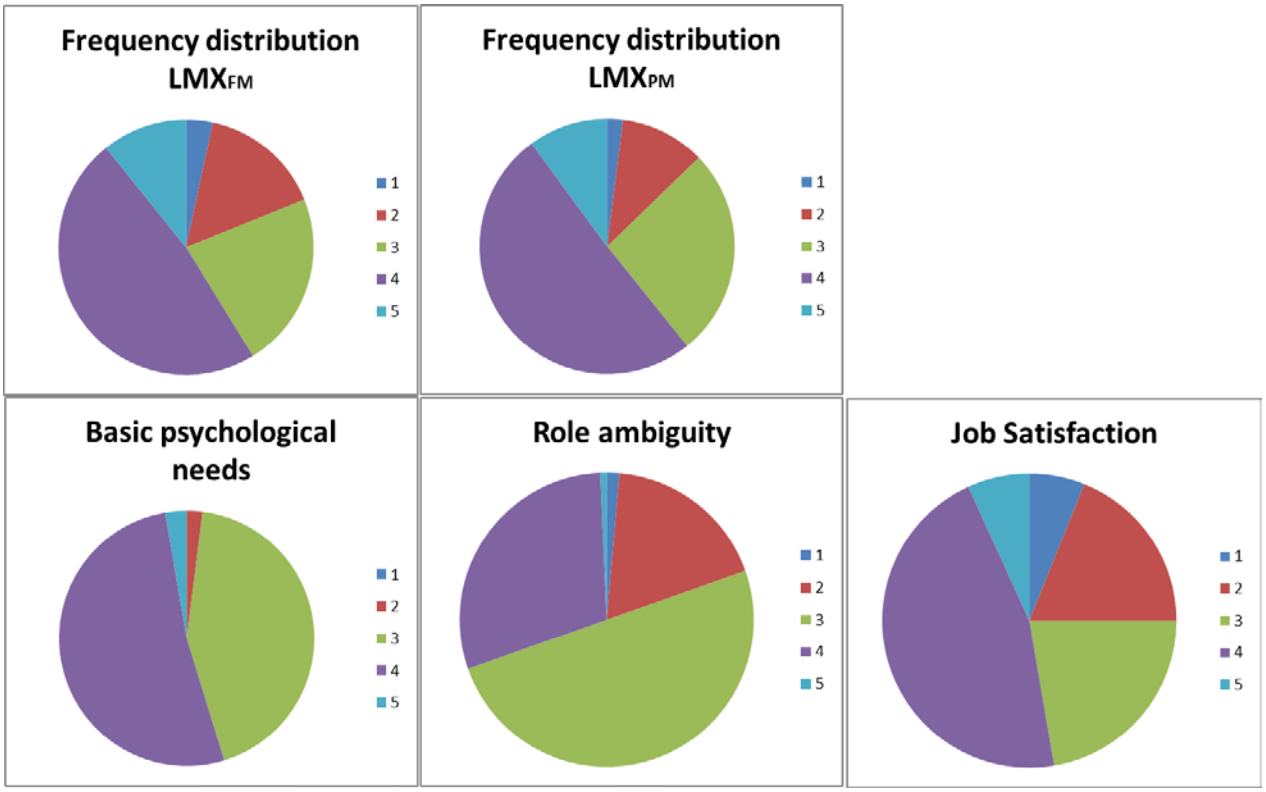
The survey results are presented in percentage format in Table 8 below.

Table 8: Frequency distribution of survey data

Perception of Project personnel	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Scale	**1**	**2**	**3**	**4**	**5**
N = 148					
LMX_{FM}	3.4%	15.5%	22.3%	48.0%	10.8%
LMX_{PM}	2.0%	10.8%	26.4%	50.7%	10.1%
Basic psychological needs	0.0%	2.0%	43.2%	52.0%	2.7%
Role ambiguity	1.4%	18.2%	50.0%	29.7%	0.7%
Job Satisfaction	6.1%	18.9%	22.3%	45.9%	6.8%

A graphical display of the data in Table 8 is shown in Figure 15 below.

Figure 15: Pie chart summarising frequency distribution of survey data

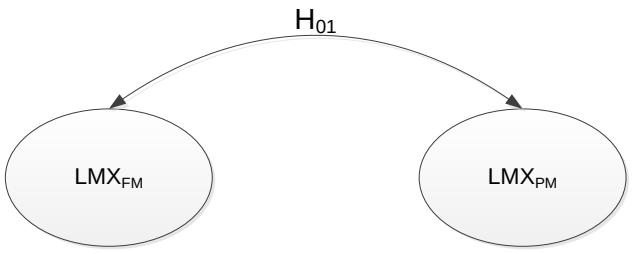


5.3 Research question one

Research question one compares relationship as measured by dual leader member theory between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}).

To summarise Figure 16 below illustrates the hypothesis tested.

Figure 16: Diagrammatic representation of hypothesis between LMX_{PM} and LMX_{FM}



5.3.1 Research question one: hypothesis one

Research question one compares leader member exchange that a project personnel experiences between project managers (LMX_{PM}) and functional managers (LMX_{FM}).

$H_{01}: \mu_{LMX-PM} - \mu_{LMX-FM} = 0$

LMX_{PM} and LMX_{FM} as perceived by project personnel are the same

$H_{01A}: \mu_{LMX-PM} - \mu_{LMX-FM} \neq 0$

LMX_{PM} and LMX_{FM} as perceived by project personnel are not the same

To test hypothesis one a Wilcoxon Signed Ranks Test was performed using data from Table 8. The results are shown in Table 9 and Table 10 below.

Table 9: Wilcoxon Signed Ranks Test Ranks

		N	Mean Rank	Sum of Ranks
LMX_{PM} - LMX_{FM}	Negative Ranks	46[a]	43.32	1992.50
	Positive Ranks	47[b]	50.61	2378.50
	Ties	55[c]		
	Total	148		

a. $LMX_{PM} < LMX_{FM}$

b. $LMX_{PM} > LMX_{FM}$

c. $LMX_{PM} = LMX_{FM}$

Table 10: Wilcoxon Signed Ranks Test statistic

	LMX_{PM} - LMX_{FM}
Z	-0.764
Asymp. Sig. (2-tailed)	0.445

The Wilcoxon Signed Ranks test indicated that there are no differences in the perceived leader member exchange between project personnel and functional managers and project personnel and project managers (Z_{stat} = - 0.76 and Z_{crit} = ± 1.96 @ α = 0.05).

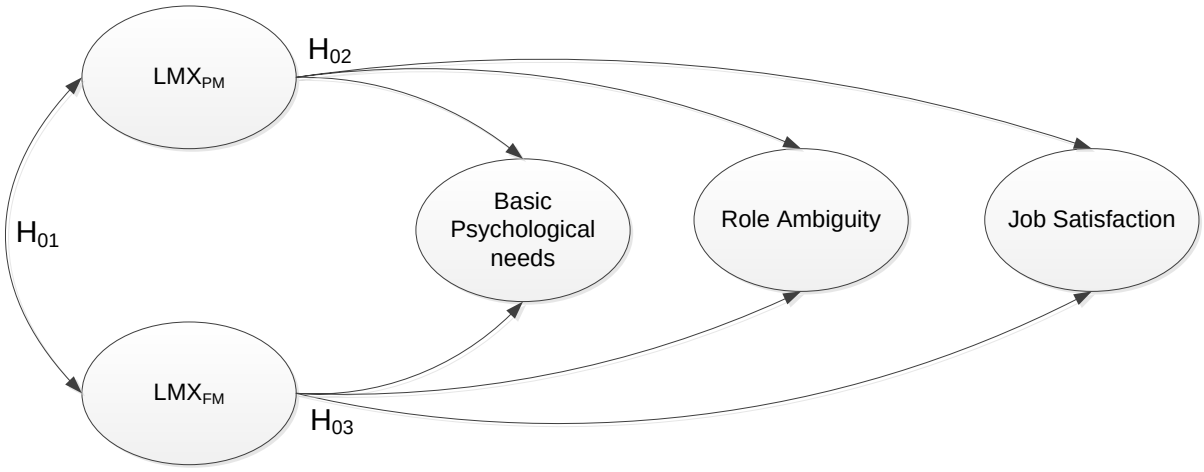
Therefore the null hypothesis one cannot be rejected.

5.4 Research question two

This question investigates the individual leader member relationship compared to the perceived basic psychological needs, role ambiguity and job satisfaction to test for relationships. The aim is to understand which leader (functional manager or project manager) has the most influence on work attitudes of employees surveyed.

Figure 17 below illustrates the hypothesis tested.

Figure 17: Diagrammatic representation of hypothesis between LMX_{PM} and LMX_{FM} with basic psychological needs, role ambiguity and job satisfaction



5.4.1 Research question two: hypothesis two

Hypothesis two aims to establish if there are any significant relationships between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{02} : There is no relationship between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{02A} : There is a relationship between LMX_{PM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

To test this hypothesis a Spearman coefficient of rank correlation test was conducted using data from Table 8. The results are shown in Table 11. A minimum significance level of α = 0.05 was used.

Table 11: Spearman's correlation coefficient for hypothesis two

			LMX_{PM}	Basic psychological needs	Role ambiguity	Job Satisfaction
Spearman's rho	LMX_{PM}	Correlation Coefficient	1.000	.246**	-.429**	.193*
		Sig. (2-tailed)	.	.003	.000	.019
		N	148	148	148	148
	Basic psychological needs	Correlation Coefficient	.246**	1.000	-.434**	.417**
		Sig. (2-tailed)	.003	.	.000	.000
		N	148	148	148	148
	Role ambiguity	Correlation Coefficient	-.429**	-.434**	1.000	-.551**
		Sig. (2-tailed)	.000	.000	.	.000
		N	148	148	148	148
	Job Satisfaction	Correlation Coefficient	.193*	.417**	-.551**	1.000
		Sig. (2-tailed)	.019	.000	.000	.
		N	148	148	148	148

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

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

Table 11 shows that at a minimum level of significance of α = 0.05 there is a statistical correlation between LMX_{PM} and basic psychological needs, role ambiguity and job satisfaction.

The correlation between LMX_{PM}, basic psychological needs and job satisfaction is positive whereas the correlation between LMX_{PM} and role ambiguity is negative.

Therefore the null hypothesis two cannot be rejected.

5.4.2 Research Question two: Hypothesis three

The purpose of hypothesis three is to establish if there are any significant relationships between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{03} : There is no relationship between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

H_{03A} : There is a relationship between LMX_{FM} and perceived basic psychological needs, role ambiguity and perceived job satisfaction

To test this hypothesis a Spearman coefficient of rank correlation test was conducted using data from Table 8. The results are shown in Table 12 below. A minimum significance level of α = 0.05 was used.

Table 12: Spearman's correlation coefficient for hypothesis three

			LMX_{FM}	Basic psychological needs	Role ambiguity	Job satisfaction
Spearman's rho	LMX_{FM}	Correlation Coefficient	1.000	.325**	-.392**	.411**
		Sig. (2-tailed)	.	.000	.000	.000
		N	148	148	148	148
	Basic psychological needs	Correlation Coefficient	.325**	1.000	-.434**	.417**
		Sig. (2-tailed)	.000	.	.000	.000
		N	148	148	148	148
	Role ambiguity	Correlation Coefficient	-.392**	-.434**	1.000	-.551**
		Sig. (2-tailed)	.000	.000	.	.000
		N	148	148	148	148
	Job satisfaction	Correlation Coefficient	.411**	.417**	-.551**	1.000
		Sig. (2-tailed)	.000	.000	.000	.
		N	148	148	148	148

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

Table 12 shows that at a minimum level of significance of α = 0.05 there is a statistical correlation between LMX_{FM} and basic psychological needs, role ambiguity and job satisfaction.

The correlation between LMX_{FM}, basic psychological needs and job satisfaction is positive whereas the correlation between LMX_{FM} and role ambiguity is negative.

Therefore the null hypothesis three cannot be rejected.

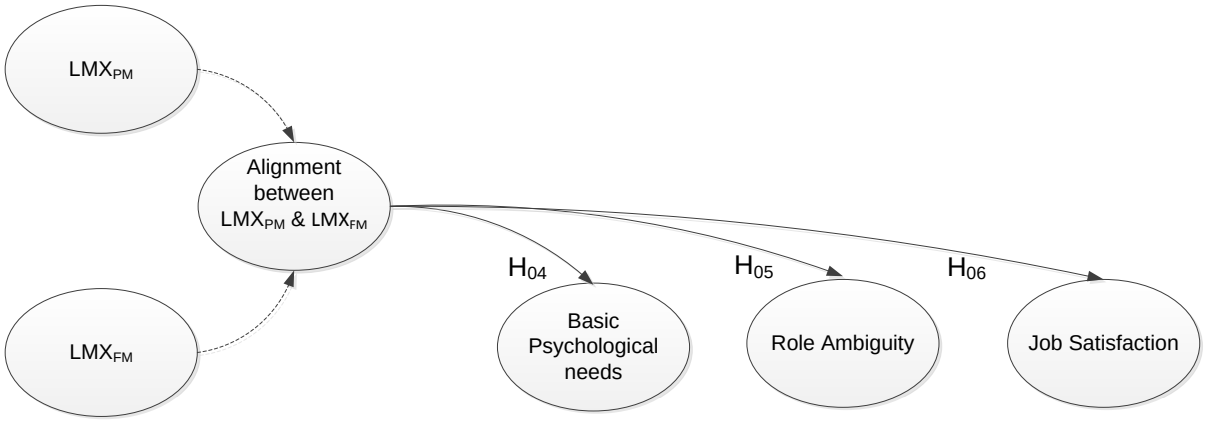
5.5 Research Question Three

Research question three compares alignment of leader member exchange between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}) with perceived basic psychological needs, role ambiguity and job satisfaction.

This question tested if alignment in LMX_{PM} and LMX_{FM} is associated with perceived basic psychological needs, role ambiguity and job satisfaction such that these outcomes are higher when alignment is high rather than low.

Figure 18 below illustrates the hypothesis tested.

Figure 18: Diagrammatic representation of hypothesis between alignment between LMX_{PM} and LMX_{FM} with basic psychological needs, role ambiguity and job satisfaction



The following regression equations were proposed and tested for significance.

$$DV = b_0 + b_1 LMX_{FM} + b_2 LMX_{PM} \quad (5)$$

$$DV = b_0 + b_1 LMX_{FM} + b_2 LMX_{PM} + b_3 LMX_{FM^2} + b_4 LMX_{PM} LMX_{FM} + b_5 LMX_{PM^2} \quad (6)$$

The dependant variable (DV) would be the job attitudes basic psychological needs, role ambiguity and job satisfaction. The intercept is b_0 and b_1 to b_5 are coefficients of the individual independent variables.

Equation five assumes that the relationship between independent and dependant variables is linear whereas equation 6 introduces squared and product terms (LMX_{FM^2}, LMX_{PM^2} and $LMX_{FM} \times LMX_{PM}$) to allow for detection of higher order interactions with alignment or misalignment in LMX and job attitudes.

5.5.1 Research Question Three: Hypothesis four

Hypothesis four aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived basic psychological needs.

H_{04} : Perceived basic psychological needs are associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived basic psychological need is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{04A} : Perceived basic psychological needs are associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived basic psychological need is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Perceived basic psychological needs, LMX_{PM} and LMX_{FM} were regressed on equation five and six above. Table 13 below shows the summary of the results, and Appendix B shows the full regression analysis output for both equation five and six.

Table 13: Regression results of relationship between perceived basic psychological needs, LMX_{FM}, and LMX_{PM}

Variable	Equation 5	Equation 6
Intercept, b_0	2.134	2.368**
LMX_{FM}, b_1	0.006	0.191**
LMX_{PM}, b_2	-0.176	0.135**
LMX_{FM}^2, b_3	0.061	-
LMX_{FM} x LMX_{PM}, b_4	0.030	-
LMX_{PM}^2, b_5	0.050	-
Slope along alignment in LMX_{PM} and LMX_{FM} $(b_1 + b_2)$	-0.170	0.326**
Curvature along the alignment in LMX_{PM} and LMX_{FM} $(b_3 + b_4 + b_5)$	0.141	-
Slope along misalignment in LMX_{PM} and LMX_{FM} $(b_1 - b_2)$	0.182	0.056**
Curvature along the alignment in LMX_{PM} and LMX_{FM} $(b_3 - b_4 + b_5)$	0.081	-
R^2	0.24	0.26
df	148	148

** $p < 0.01$, * $p < 0.05$

To determine if the overall regression models (based on equation five and six) was useful and capable to produce reliable estimates of the dependant variable, the following tests were done: analysis of the coefficient of determination (R^2), test the overall regression model for statistical significance, and test the individual regressors for significance (Wegner, 2012).

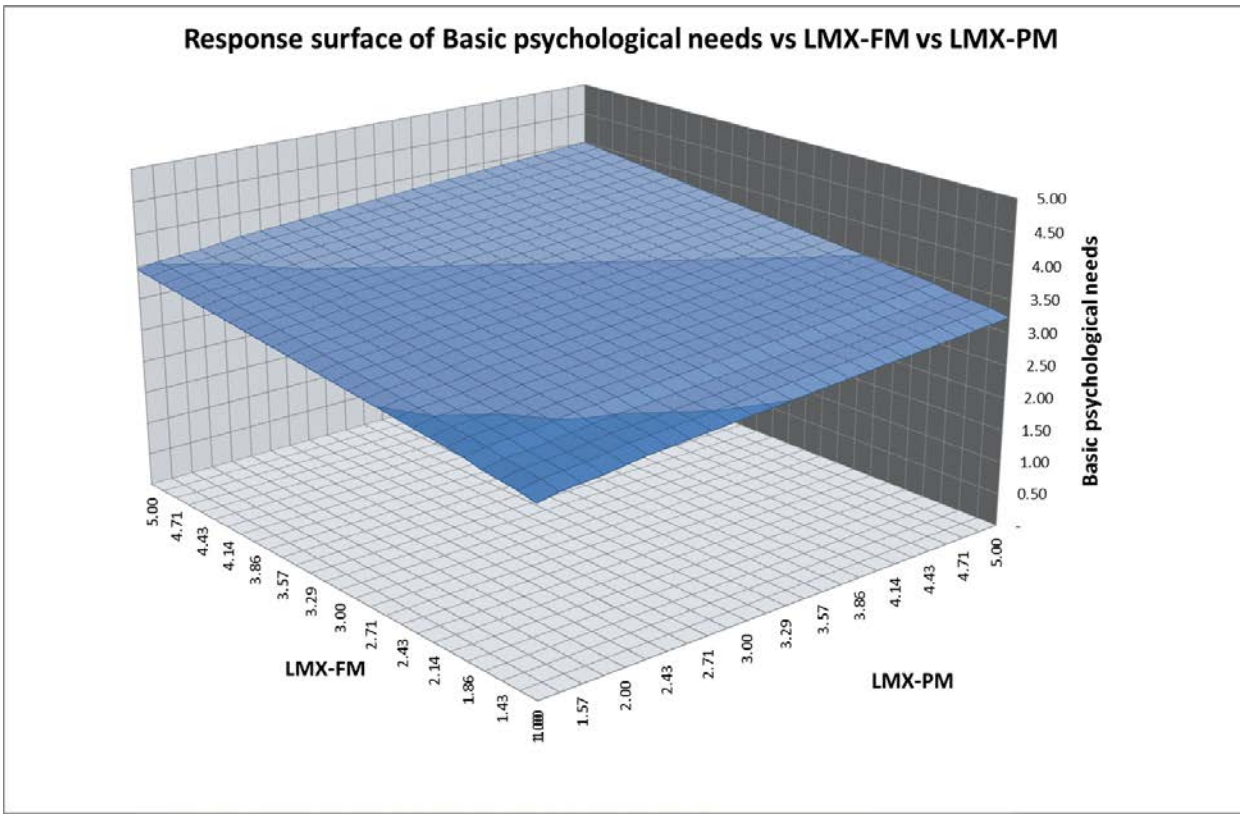
The coefficient of determination for both models proposed was similar (0.24 and 0.26). Testing the overall regression model for significance showed that at least one regressor was significant at $p < 0.01$. Inspection of the individual regressors showed that the individual regressor coefficients using equation five did not meet the minimum level of significance of $p < 0.05$ and was therefore rejected. Individual regressor coefficients of equation six did meet the minimum level of significance and was used for the test of congruence.

The response surface slope along the line of alignment ($LMX_{FM} = LMX_{PM}$) between LMXs was positive and significant ($b_1 + b_2 = 0.326$, $p < 0.01$), this suggests that there is a significant positive effect in basic psychological needs due to alignment in LMXs.

Figure 19 below shows the response surface (3D plot) between basic psychological needs, LMX_{FM}, and LMX_{PM}. This visual plot confirms the statistical conclusion that there is a positive slope along the line of alignment (front corner to back corner). Therefore basic psychological needs are higher when LMX_{FM} and LMX_{PM} are both high (back corner), compared to when both the LMXs are low (front corner).

Therefore the null hypothesis four cannot be rejected.

Figure 19: Response surface showing alignment in LMXs and basic psychological needs



5.5.2 Research Question Three: Hypothesis five

Hypothesis five aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived role ambiguity.

H_{05} : Perceived role ambiguity is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{05A} : Perceived role ambiguity is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Role ambiguity, LMX_{PM} and LMX_{FM} were regressed on equation five and six above. Table 14 below shows the summary of the results, and Appendix B shows the full regression analysis output for both equation five and six.

Table 14: Regression results of relationship between role ambiguity, LMX_{FM}, and LMX_{PM}

Variable	Equation 5	Equation 6
Intercept, b_0	3.396**	3.902**
LMX_{FM}, b_1	-0.330	-0.169**
LMX_{PM}, b_2	0.267	-0.173**
LMX_{FM}^2, b_3	0.051*	-
LMX_{FM} x LMX_{PM}, b_4	-0.049	-
LMX_{PM}^2, b_5	-0.041	-
Slope along alignment in LMX_{PM} and LMX_{FM} ($b_1 + b_2$)	-0.063	-0.342**
Curvature along the alignment in LMX_{PM} and LMX_{FM} ($b_3 + b_4 + b_5$)	-0.039	-
Slope along misalignment in LMX_{PM} and LMX_{FM} ($b_1 - b_2$)	-0.597	0.004**
Curvature along the alignment in LMX_{PM} and LMX_{FM} ($b_3 - b_4 + b_5$)	0.059	-
R^2	0.41	0.37
df	148	148

** $p < 0.01$, * $p < 0.05$

The coefficient of determination for both models proposed was similar (0.41 and 0.37). Testing the overall regression model for significance showed that at least one regressor was significant ($p < 0.01$). Inspection of the individual regressors showed that the individual regressor coefficients using equation five did not meet the minimum level of significance of $p < 0.05$ and was therefore rejected. Individual regressor coefficients of equation six did meet the minimum level of significance and was used for the test of congruence.

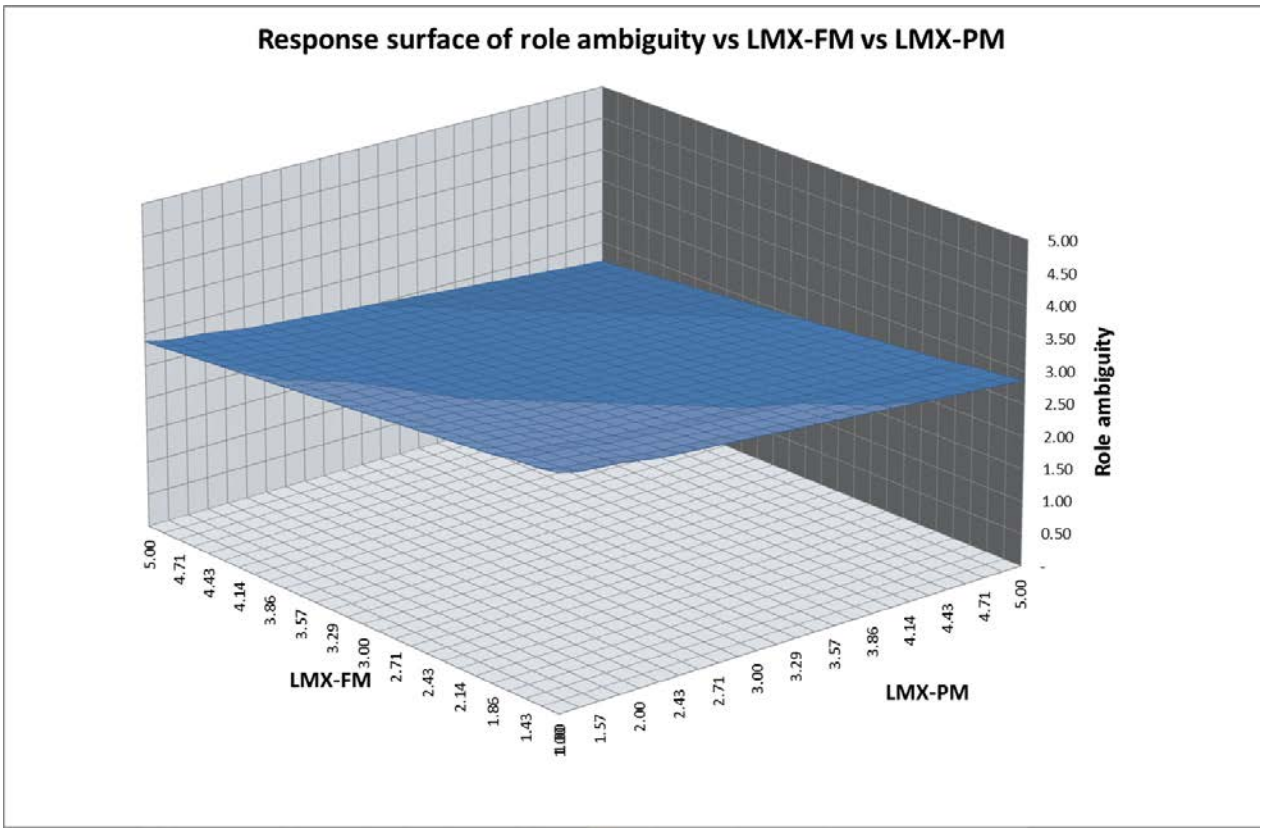
The response surface slope along the line of alignment ($LMX_{FM} = LMX_{PM}$) between LMXs was negative and significant ($b_1 + b_2 = -0.342$, $p < 0.01$), this suggests that there is a significant negative effect in role ambiguity due to alignment in LMXs.

Figure 20 below shows the response surface (3D plot) between role ambiguity, LMX_{FM}, and LMX_{PM}. This visual plot confirms the statistical conclusion that there is a negative slope along the line of alignment (front corner to back corner). Therefore role ambiguity

is lower when LMX_{FM} and LMX_{PM} are both high (back corner), compared to when both the LMXs are low (from corner).

Therefore the null hypothesis five is rejected.

Figure 20: Response surface showing alignment in LMXs and role ambiguity



5.5.3 Research Question Three: Hypothesis six

Hypothesis six aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived job satisfaction.

H_{06} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{06A} : Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Job satisfaction, LMX_{PM} and LMX_{FM} were regressed on equation five and six above. Table 15 below shows the summary of the results, and Appendix B shows the full regression analysis output for both equation five and six.

Table 15: Regression results of relationship between job satisfaction, LMX_{FM}, and LMX_{PM}

Variable	Equation 5	Equation 6
Intercept, b_0	2.134	0.652
LMX_{FM}, b_1	0.006	0.566**
LMX_{PM}, b_2	-0.167	0.198*
LMX_{FM}^2, b_3	0.061	-
LMX_{FM} x LMX_{PM}, b_4	0.050	-
LMX_{PM}^2, b_5	0.030	-
Slope along alignment in LMX_{PM} and LMX_{FM} $(b_1 + b_2)$	-0.161	0.764*
Curvature along the alignment in LMX_{PM} and LMX_{FM} $(b_3 + b_4 + b_5)$	0.141	-
Slope along misalignment in LMX_{PM} and LMX_{FM} $(b_1 - b_2)$	0.173	0.368*
Curvature along the alignment in LMX_{PM} and LMX_{FM} $(b_3 - b_4 + b_5)$	0.041	-
R^2	0.24	0.24
df	148	148

** $p < 0.01$, * $p < 0.05$

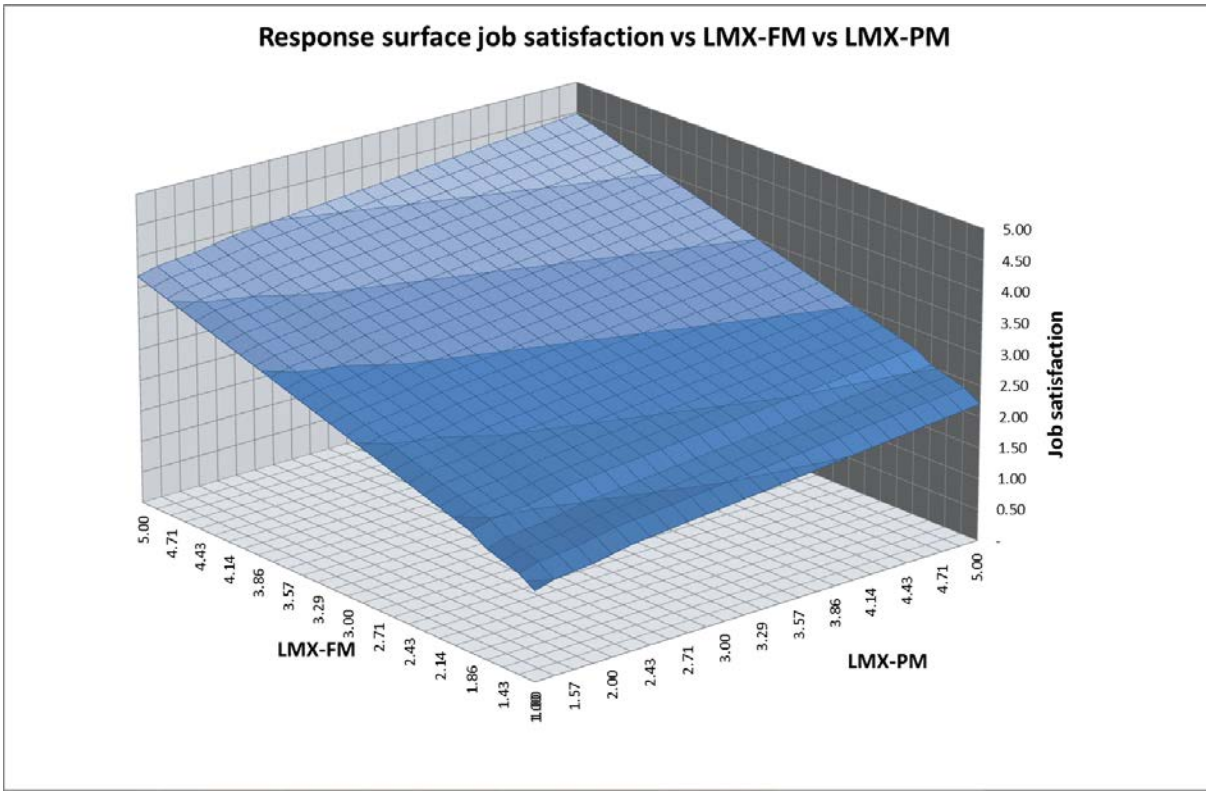
The coefficient of determination for both models proposed was similar (0.24 and 0.24). Testing the overall regression model for significance showed that at least one regressor was significant ($p < 0.01$). Inspection of the individual regressors showed that the individual regressor coefficients using equation five did not meet the minimum level of significance of $p < 0.05$ and was therefore rejected. Individual regressor coefficients of equation six did meet the minimum level of significance and was used for the test of congruence.

The response surface slope along the line of alignment ($LMX_{FM} = LMX_{PM}$) between LMXs was positive and significant ($b_1 + b_2 = 0.764$, $p < 0.05$), this suggests that there is a significant positive effect in job satisfaction due to alignment in LMXs.

Figure 21 below shows the response surface (3D plot) between job satisfaction, LMX_{FM}, and LMX_{PM}. This visual plot confirms the statistical conclusion that there is a positive slope along the line of alignment (front corner to back corner). Therefore job satisfaction is higher when LMX_{FM} and LMX_{PM} are both high (back corner), compared to when both the LMXs are low (front corner).

Therefore the null hypothesis six cannot be rejected.

Figure 21: Response surface showing alignment in LMXs and job satisfaction

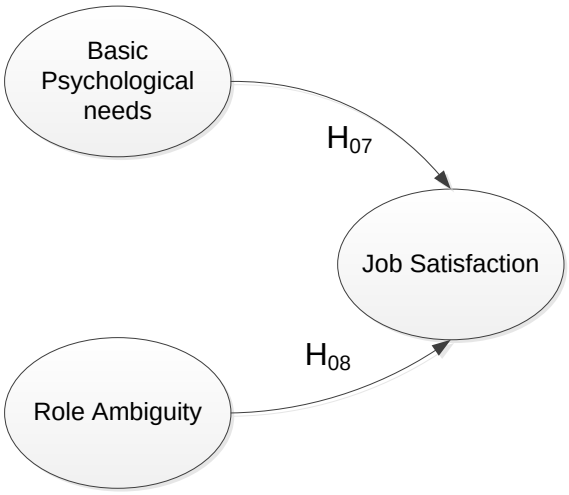


5.6 Research Question Four

Research question four tests if there are any influences of perceived basic psychological needs and role ambiguity on job satisfaction.

Figure 22 below illustrates the hypothesis tested.

Figure 22: Diagrammatic representation of hypothesis between perceived basic psychological needs and role ambiguity on job satisfaction



5.6.1 Research Question four: Hypothesis seven

Hypothesis seven aims to establish if there are any significant relationships between perceived basic psychological needs and job satisfaction

H_{07} : There is no relationship between perceived basic psychological needs and job satisfaction

H_{07A} : There is a relationship between perceived basic psychological needs and job satisfaction

To test this hypothesis a Spearman coefficient of rank correlation test was conducted using data from Table 8. The results are shown in Table 16. A minimum significance level of α = 0.05 was used.

Table 16: Spearman's correlation coefficient for hypothesis seven

			Basic psychological needs	Job satisfaction
Spearman's rho	Basic psychological needs	Correlation Coefficient	1.000	.417**
		Sig. (2-tailed)	.	.000
		N	148	148
	Job satisfaction	Correlation Coefficient	.417**	1.000
		Sig. (2-tailed)	.000	.
		N	148	148

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

Table 16 above shows that at a minimum level of significance of α = 0.05 there is a statistical correlation between basic psychological needs and job satisfaction. Basic psychological needs are positively correlated to job satisfaction.

Therefore the null hypothesis seven cannot be rejected.

5.6.2 Research Question four: Hypothesis eight

Hypothesis eight aims to establish if there are any significant relationships between perceived role ambiguity and job satisfaction

H_{08} : There is no relationship between perceived role ambiguity and job satisfaction

H_{08A} : There is a relationship between perceived role ambiguity and job satisfaction

To test this hypothesis a Spearman coefficient of rank correlation test was conducted using data from Table 8. The results are shown in Table 17. A minimum significance level of α = 0.05 was used.

Table 17: Spearman's correlation coefficient for hypothesis eight

			Job satisfaction	Role ambiguity
Spearman's rho	Job satisfaction	Correlation Coefficient	1.000	-.551**
		Sig. (2-tailed)	.	.000
		N	148	148
	Role ambiguity	Correlation Coefficient	-.551**	1.000
		Sig. (2-tailed)	.000	.
		N	148	148

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

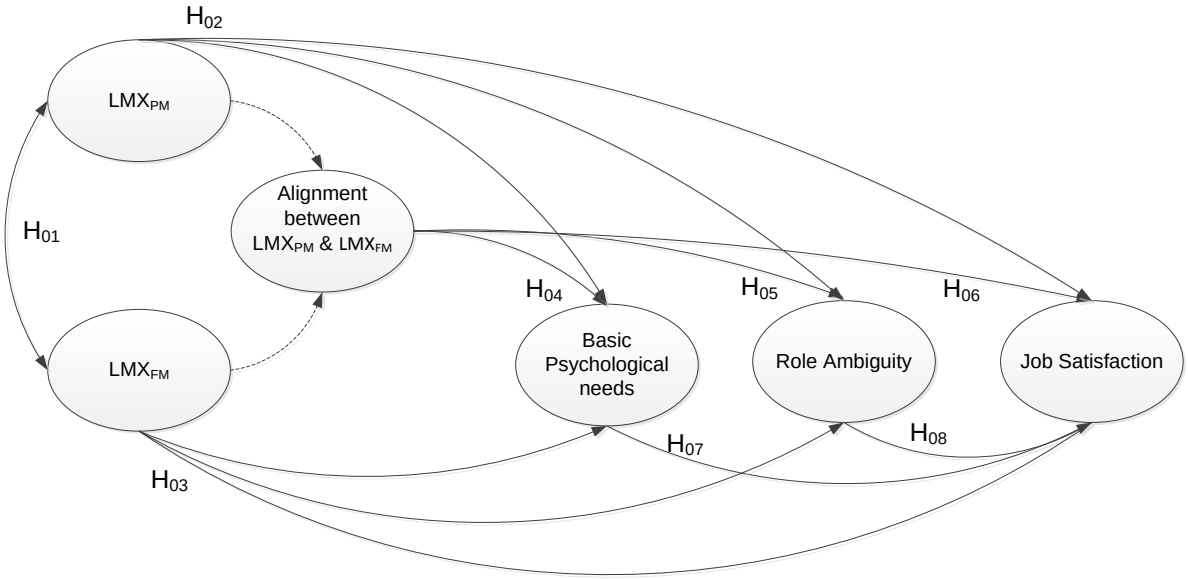
Table 17 shows that at a minimum level of significance of α = 0.05 there is a statistical correlation between role ambiguity and job satisfaction. Role ambiguity is negatively correlated to job satisfaction.

Therefore the null hypothesis eight cannot be rejected.

CHAPTER 6: DISCUSSION OF RESULTS

Chapter six is a discussion and interpretation of the results in Chapter five by answering the hypothesis proposed in Chapter three. The literature review in Chapter two was used as a basis on which the interpretation was done. Figure 23 below summarises all hypothesis tested.

Figure 23: Overview of key relationships studied



The following research limitations should be noted:

The use of non-probability sampling implies that the sample was not statistically representative of the population. Only local generalisations could be made which could not be extended to the whole population (Saunders & Lewis, 2012).

The survey was conducted in a knowledge worker environment. And the results from this research may not be applicable in other work environment, for example an environment made up largely of blue collar workers.

Non response bias could be introduced by the low response rate (Saunders & Lewis, 2012; Zikmund et al., 2012). This could lead to a type I error as the individuals who did not respond could form part of group that has characteristics not represented in the sample.

6.1 Research question one: comparison of perceived LMX between project manager and functional manager

Research question one compares relationship as measured by dual leader member theory between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}).

Previous LMX studies were focused mainly around single leader member relationships and its correlates such as job attitudes. Two meta-analytic reviews of the LMX studies conducted over the past 40 years (Dulebohn et al., 2012; Gerstner & Day, 1997) do not show that leader member exchange in a dual context was compared.

Anand et al. (2014) proposed using relative deprivation theory that employees working in a dual leader environment do not react to their experiences in isolation. The dyadic relationship formed in a dual leader context is evaluated in comparison with each other. This is relevant in a matrix organisational design which is inherently designed around two lines of reporting for the individual working within the matrix.

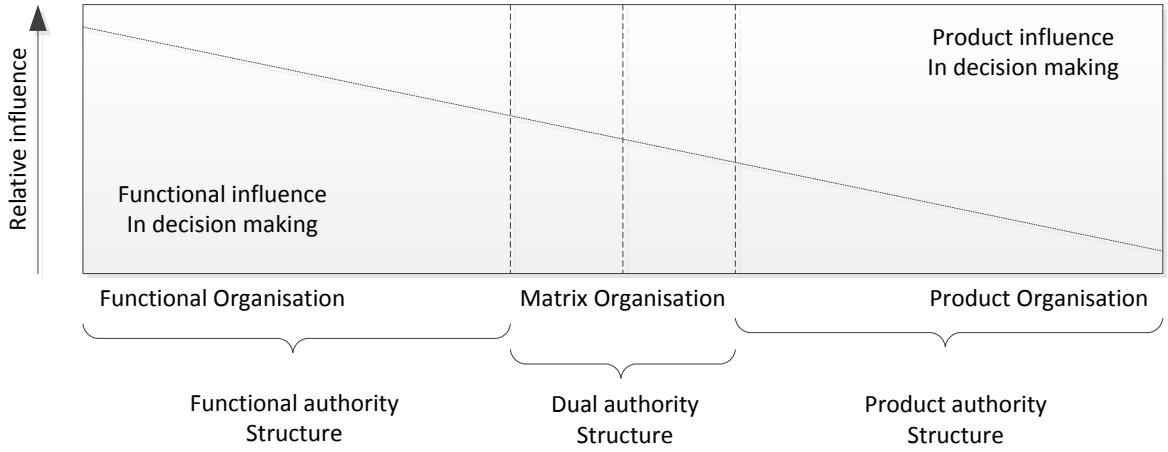
Hypothesis one tests if these two LMX relationships formed by project personnel are statistically similar. Using a non-parametric test it can be shown that the perceived LMX relationship between the project personnel and the two leaders are statistically similar. This shows that there are no perceived differences in LMX relationship between project personnel, project manager, and functional manager.

Conclusion of question one

Hypothesis one shows that project personnel perceive a similar quality of relationship with the functional manager and project manager. Based on Figure 24 below, Galbraith (1971) postulates that depending on whether an organisation is project or functional lead the influence of the respective leader follows a continuum.

The result of hypothesis one leads to a conclusion that since the LMX between project manager and functional manager is similar, the matrix organisational design is equally balanced in that both project and functional considerations are important. This is interpreted within the context of Figure 24 below.

Figure 24: Continuum between functional or product lead organisational design



Source: adapted from (Galbraith, 1971)

6.2 Research question two: comparison of LMX between PM and FM as a mediator to job attitudes

Research question two investigates the individual leader member relationship compared to the perceived basic psychological needs, role ambiguity and job satisfaction to test for relationships. Hypothesis two and three was used to understand the strength of these relationships using correlational analysis.

Leader member exchange theory posits that leadership is a process, with the central focus being the relationship between the leader and the follower (Graen & Scandura, 1987; Graves & Luciano, 2010). The LMX relationship between the leader and the member is defined by the perceived execution of given tasks from the leader by the member. Conversely the quality of the tasks given by the leader and the feedback of the execution of those tasks impact the LMX relationship (Lawrence & Kacmar, 2012). Therefore as stated by Dulebohn et al. (2012), “both members of the dyad form perceptions of their dyadic counterpart, which in turn influence leader and follower reactions to the relationship” (p. 1718).

A low quality LMX relationship is characterised by an expectation of lower quality of exchange between the leader and member. The follower’s deliverables are based only on the formal employment contract no additional expectation is imposed by the leader (Lawrence & Kacmar, 2012).

With a high quality LMX relationship the relationship is characterised by mutual trust, respect, and mutual obligation (Liden et al., 1993). Leaders assist followers in task execution by providing support in the form of additional resources which leads to their success and career growth. In turn followers feel obligated to complete their assigned tasks to their best ability to maintain the high LMX relationship (Lawrence & Kacmar, 2012).

Based on this theory hypothesis two and three was developed to test if a high vs low LMX relationship has positive or negative relations to specific job attitudes selected for this study. Research done through meta-analytic studies state that high quality LMX relationships have a strong positive correlation with job satisfaction and a negative correlation with role ambiguity (Dulebohn et al., 2012; Martin, Guillaume, Thomas, Lee, & Epitropaki, 2015). Research by Joyce (1986) has shown that the dual reporting structure in a matrix organisational design increases the role ambiguity of employees due to unclear roles and responsibilities. This leads to employees feeling dissatisfied with their role and increased anxiety (Rizzo et al., 1970), which influences work attitudes.

Graves and Luciano (2010) posit that basic psychological needs are in itself a mediator between LMX and job outcomes. Outcomes of their research have shown that a high quality relationship between the leader and follower was positively related to the basic psychological needs of competence, autonomy, and relatedness. Other studies have echoed these findings and show that the fulfilment of basic psychological needs are positively related to employee functioning and wellbeing at work part of which includes job satisfaction (Deci & Ryan, 2000).

The results from this research confirm past research (Dulebohn et al., 2012; Gerstner & Day, 1997), in that both LMXs are positively correlated to basic psychological needs and job satisfaction. At the same time there is a negative correlation between both LMXs and role ambiguity. This implies that when the LMX relationship quality is high, the project personnel perceives that basic psychological needs are met and experiences job satisfaction, while the perception around role ambiguity is low. Table 18 below shows a summary of the correlation analysis comparing the relationship of LMX_{PM} and LMX_{FM} and basic psychological needs, role ambiguity and job satisfaction.

Table 18: Summary of spearman's correlation coefficients for question two

	LMX_{PM}	LMX_{FM}	Result
Basic psychological needs	0.246**	0.325**	$LMX_{FM} > LMX_{PM}$
Role ambiguity	-0.429**	-0.392**	$LMX_{PM} > LMX_{FM}$
Job Satisfaction	0.193*	0.411**	$LMX_{FM} >> LMX_{PM}$

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

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

The additional benefit of analysing LMX from a dual leader perspective is that one can get an appreciation of which leader influences specific job attitudes more than the other. To understand how these two LMX relationships influence job attitudes, it is important to understand the role of the functional and project manager. The functional manager is responsible for technical specialities, career development, and promotional opportunities in a specific function, whereas project managers are focussed on the execution of projects and have little to no influence on project personnel who are responsible to help achieve project goals (Appelbaum et al., 2008).

With this in mind, Table 18 above shows that the functional manager influences the perceived basic psychological needs of project personnel more than project managers. Since functional managers play a direct and larger role in influencing project personnel's competence and relatedness this conclusion is supported.

Role ambiguity has a stronger negative correlation with the project manager than the functional manager. This implies that the stronger the LMX relationship with the project manager the lower the role ambiguity of the project personnel. Since the project manager is responsible for the coordination of the day to day tasks and deliverables of the project he would have a better grasp of the execution of tasks than the functional manager. Therefore the project manager can provide better guidance to project personnel on day to day tasks thereby reducing the project personnel perceived role ambiguity.

Table 18 above shows that the functional manager influences job satisfaction more than project managers. It would seem that the manager who plays more of an administrative role and has influence over career development and promotional opportunities has more of an influence on project personnel job satisfaction. Anand et al. (2014) found similar results in an information technology firm. Their finding supported the conclusion that leaders who are responsible for administrative decisions rather than day to day activities have a larger ability to influence and shape employee attitudes and job outcomes.

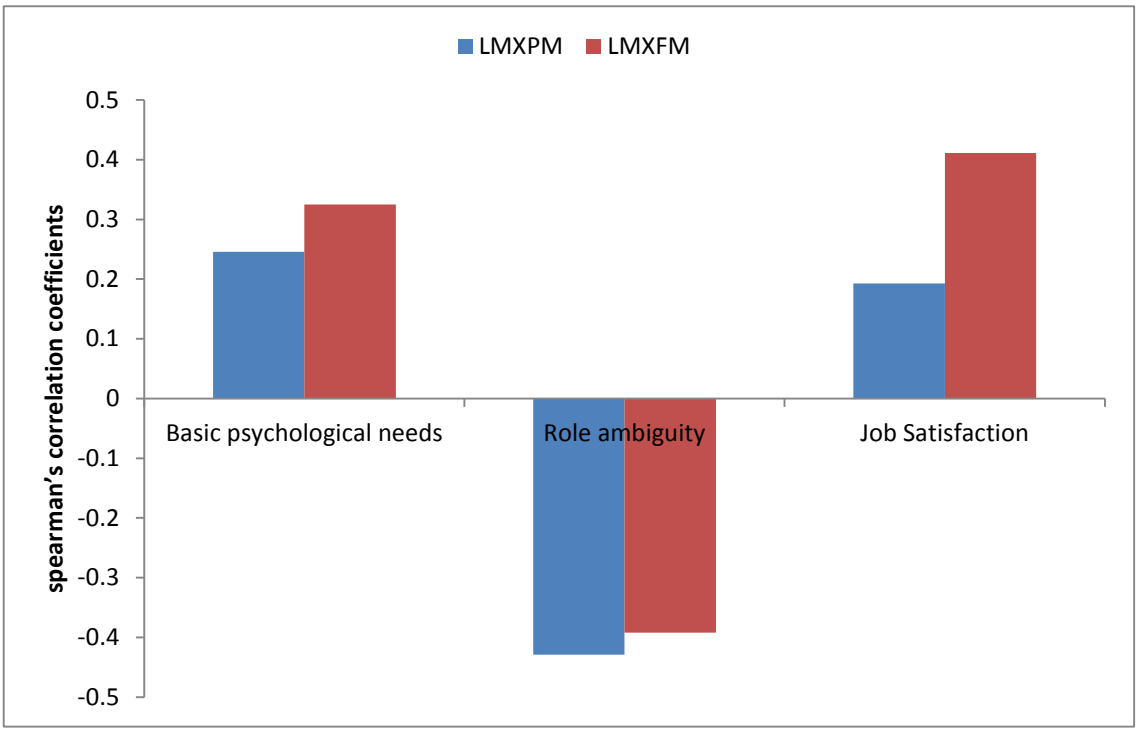
Conclusion of question two

Hypothesis two and three has confirmed that there are significant relationships between LMX_{FM} and LMX_{PM} and job attitudes. Directionally these relationships are consistent with findings from past research that investigated single leader member relationships and numerous correlates. Figure 25 below shows relationship between the two LMXs and basic psychological needs, role ambiguity, job satisfaction.

Analysing dual leader member exchange allows one to get an appreciation of which leader influences job attitudes more than the other. From the research data a strong LMX with the project managers reduces role ambiguity whereas a strong LMX with the functional manager leads to a greater fulfilment of basic psychological needs (competence, autonomy and relatedness) and higher job satisfaction.

Dual leader member exchange contributes to literature and has important consequences for human resource practitioners when designing leader roles and responsibilities within matrix organisational designs. Desired organisational goals can be structured around how each leader influences followers/subordinates.

Figure 25: Summary of spearman's correlation coefficients for question two



6.3 Research question three: How does alignment and misalignment in LMX between PM and FM affect job attitudes

Research question three compares alignment of leader member exchange between project personnel and project managers (LMX_{PM}) and project personnel and functional managers (LMX_{FM}) with perceived basic psychological needs, role ambiguity and job satisfaction.

Previous research has focused solely on the dyadic relationship formed between a single leader and follower. Given the increasingly adoption of matrix organisational structures over the traditional pyramid or “command and control” organisational structure, employees are having to report to two managers (Anand et al., 2014; Galbraith, 2013; Hall, 2013).

Anand et al. (2014) developed a dual leadership model using LMX theory which is based on social comparison processes. It is stated that, “social comparison processes are likely to be activated when an employee reports to multiple leaders, because when reacting to two leaders employees are confronted with parallel and differences between these relationships that they have to maintain simultaneously” (p. 469).

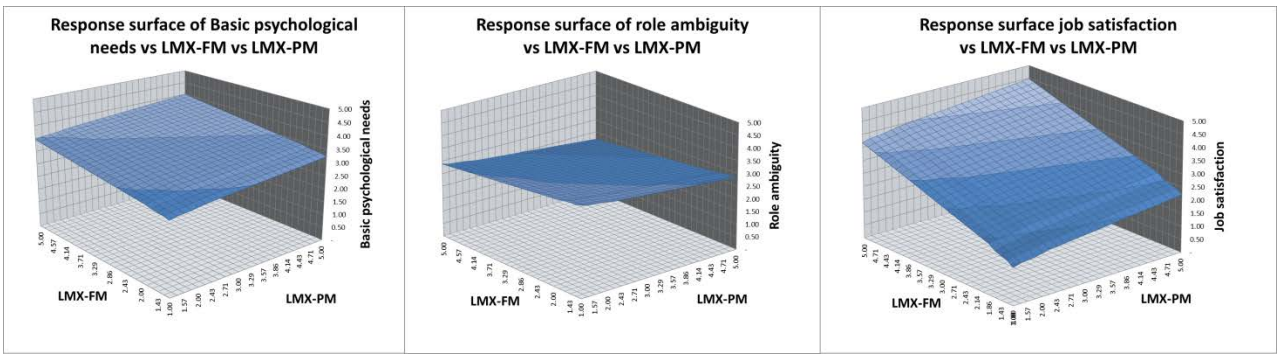
Results from the research done by Anand et al. (2014) have shown empirically that the extension of the single leader LMX model to a dual leadership model using deprivation theory does indeed predict organisational outcomes such job satisfaction and voluntary turnover. The dual LMX model allows one to test the effect of alignment and misalignment on job outcomes. It was found the degree of alignment between the LMXs explained variance in outcomes beyond that explained by the individual LMX.

Hypothesis four, five and six tests if alignment in LMX_{PM} and LMX_{FM} is associated with perceived basic psychological needs, role ambiguity and job satisfaction such that these outcomes are higher when alignment is high rather than low. Figure 26 below shows the response surface (3D plot) between LMX_{FM}, and LMX_{PM} and basic psychological needs, role ambiguity, and job satisfaction.

This visual plot shows the effect of alignment and misalignment between LMXs and job attitudes. Reading the first graph in Figure 26; when LMX_{FM} and LMX_{PM} are both low (front corner of graph) basic psychological needs is the lowest. On the other hand when LMX_{FM} and LMX_{PM} are both high (back corner of graph) basic psychological needs is the highest. A similar interpretation of the remaining graphs in Figure 26

shows that a high alignment in LMXs results in higher job satisfaction and lower role ambiguity.

Figure 26: Response surface showing alignment in LMXs and basic psychological needs, role ambiguity, and job satisfaction

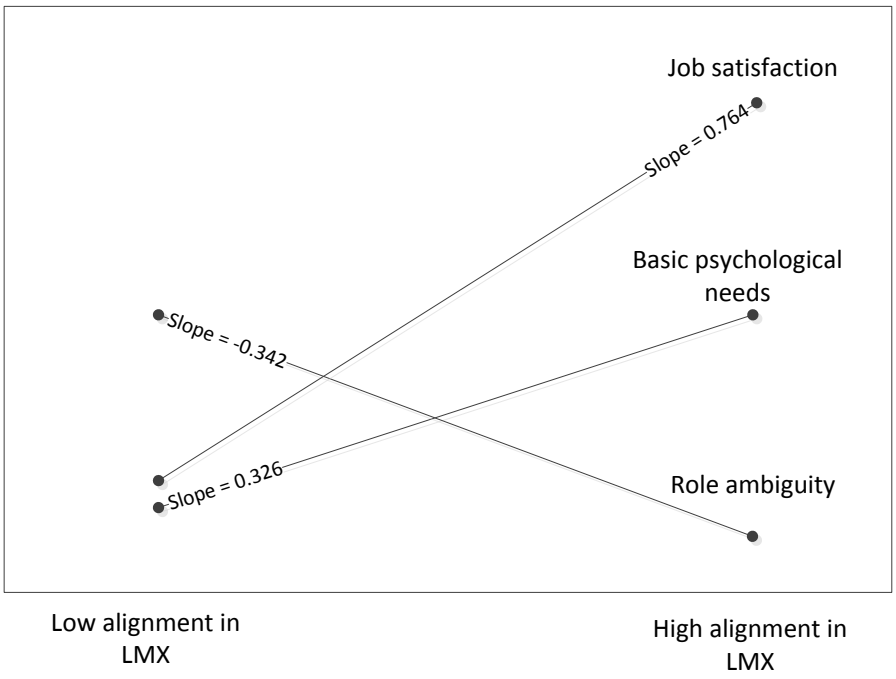


Conclusion of question three

Hypothesis four, five and six have confirmed that alignment in LMX_{PM} and LMX_{FM} is associated with perceived basic psychological needs and job satisfaction such that these outcomes are higher when alignment is high rather than low. When alignment is high it can be shown that role ambiguity is low. Figure 27 below summarises these finding graphically.

Dual leader member exchange contributes to literature and has important consequences for human resource practitioners when designing leader roles and responsibilities within matrix organisational designs. Desired organisational goals can be structured around how synchronous each leader's roles and responsibilities are with each other.

Figure 27: Graphical representation of high vs low alignment in LMXs and basic psychological needs, role ambiguity and job satisfaction.



6.4 Research Question Four: is basic psychological needs and role ambiguity a mediator to job satisfaction

Research question four tests if there are any influences of perceived basic psychological needs and role ambiguity on job satisfaction.

Graves and Luciano (2010) posit that basic psychological needs are in itself a mediator between LMX and job outcomes. Outcomes of their research have shown that a high quality relationship between the leader and follower was positively related to the basic psychological needs of competence, autonomy, and relatedness. Other studies have echoed these findings and shown that the fulfilment of basic psychological needs are positively related to employee functioning and wellbeing at work part of which includes job satisfaction (Deci & Ryan, 2000).

Research by Joyce (1986) has shown that the dual reporting structure in a matrix organisational design increases the role ambiguity of employees due to unclear roles and responsibilities. This leads to employees feeling dissatisfied with their role and increased anxiety (Rizzo et al., 1970), which influences work attitudes.

Hypothesis seven and eight confirms past research in that the fulfilment of basic psychological needs are positively correlated to job satisfaction. Role ambiguity is negatively correlated to job satisfaction, so that as role ambiguity is lower job satisfaction is higher.

Table 19 below summaries the correlation analysis conducted for question four.

Table 19: Summary of spearman's correlation coefficients for question four

	Job satisfaction
Basic psychological needs	0.417**
Role ambiguity	-0.551**

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

Conclusion of question four

Hypothesis seven and eight have confirmed that fulfilment of basic psychological needs and role ambiguity is a mediator to job satisfaction. However the dynamic created in a matrix organisation by using a dual reporting structure is complex, and fulfilment of basic psychological needs and role ambiguity are not the only mediators to job satisfaction.

From research question two we can also show that LMX is also a mediator to job satisfaction. Dulebohn et al. (2012) show via a meta-analytic study that there are numerous antecedents to job satisfaction.

CHAPTER 7: CONCLUSION

7.1 Introduction

Changes in the global economy require swift action by organisations to respond to new demands, as such the organisational design of choice within the last decade has been the matrix structure. Flaws with the matrix organisation design are widely cited, but the prolific adoption leads to a conclusion that the benefits must outweigh these flaws. This research focuses on the interpersonal challenges arising from the dual reporting structure which leads to unclear roles and responsibilities and ambiguous authority. Given that managers within the matrix structure have different goals, how do they influence project team members to execute project responsibilities? The objective of this research was to uncover how the dyadic relationships in a dual leader reporting structure, employed in a matrix organisation affect work attitudes.

7.2 Major findings

The perceived quality of relationship between the project personnel, project manager, and functional manager were the same. This is contrary to the theoretical underpinning of leader member exchange which assumes that each follower forms a unique relationship with the leader. This shows that the perceived level of power and influence between the functional and project manager is balanced.

Directionally, single leader member exchange revealed that a higher quality of relationship leads to a higher fulfilment of basic psychological needs and job satisfaction and a lower role ambiguity. Furthermore fulfilment of basic psychological needs and role ambiguity is a mediator to job satisfaction; however they are not the only mediators to job satisfaction. Application of dual leader member exchange theory allows for the comparison of LMX strength between managers as a predictor for work attitudes. This revealed more complex relationships.

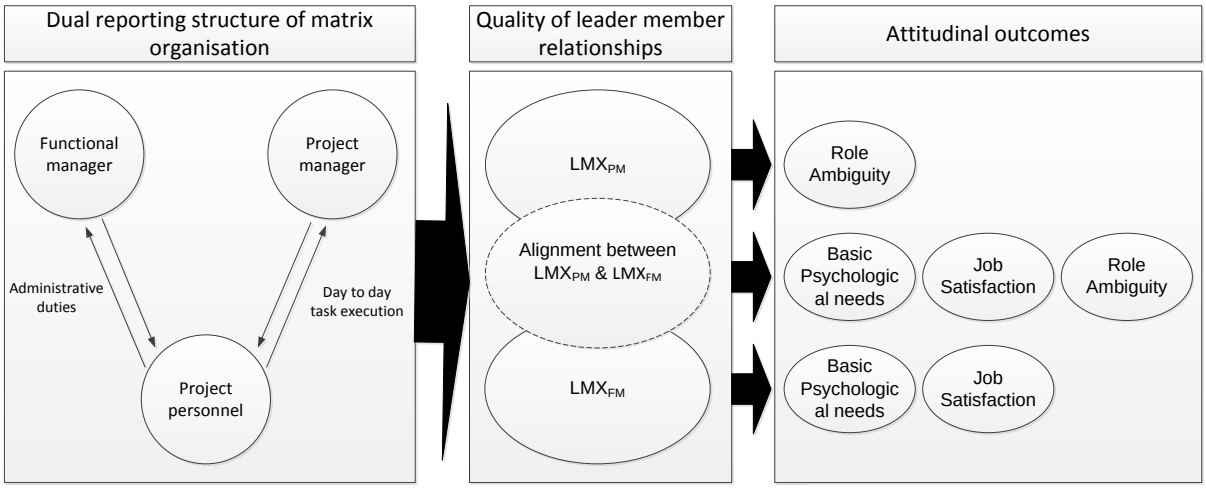
Even though the perceived LMX between the two managers were similar, this result was deceiving in that individual LMXs were strong predictors of certain work attitudes. A strong quality of relationship between the project personnel and project manager showed a lower role ambiguity whereas a strong quality of relationship with the functional manager leads to a greater fulfilment of basic psychological needs (competence, autonomy and relatedness) and higher job satisfaction.

This finding is important in that it shows that a stronger relationship with the leader that is responsible for administrative duties has larger influence to the fulfilment of basic psychological needs and job satisfaction.

A noteworthy finding relates to the alignment and misalignment between perceived leader member exchanges between the two managers. Using dual leader member exchange theory to evaluate a matrix organisation explains variances in outcomes beyond that of single leader member exchange. The alignment in LMX_{PM} (project personnel and project manager) and LMX_{FM} (project personnel and functional manager) is associated with perceived basic psychological needs and job satisfaction such that these outcomes are higher when alignment is high rather than low. On the other hand when alignment between LMX_{PM} and LMX_{FM} is high it can be shown that project personnel role ambiguity is low.

A model that shows the relationship between LMX_{PM} and LMX_{FM} and the resulting work attitudes of project personnel is shown in Figure 28 below. Based on the outcomes of this research, this model shows the influences of individual managers as well as the alignment between managers on attitudinal outcomes.

Figure 28: Relationship between dual leader member exchange and attitudinal outcomes



7.3 Recommendations for organisations

Results from single leader member exchange theory have confirmed that issues theorised in literature are indeed real challenges. Dual leader member exchange allows a deeper level granularity, so that architects of matrix organisations can capitalise on the fact that different managers have larger or smaller influences on certain work attitudes.

A recommendation for organisations would be to use the influence level of individual managers to drive organisational goals. Managers should be afforded the opportunity to strengthen interpersonal skills, and in doing so, gain a better understanding of the influence mechanisms at their disposal to drive project personnel job satisfaction and performance. Practices must be established such that both relationships with functional manager and project manager are nurtured and strengthened. Finally methods to aligned project and functional managers must be considered, since performance management systems are frequently used, this could be used as a vehicle to ensure aligned goals to drive organisational performance.

7.4 Recommendations for project personnel

Project personnel are the heart of the matrix organisation and can directly influence organisational success. They operate in the dual reporting structure that sometimes can be driving different intermediate goals. A recommendation for project personnel is to strengthen their emotional intelligence so that they can handle ambiguous situations. Further they should align their goals with the success of the organisation and test those goals with individual managers for consistency. Where possible work assignments should be agreed, as far as reasonable possible with both managers to avoid silo mentality and personal work agendas.

7.5 Recommendations for managers

Both managers have roles to play in achieving organisational success. Individually they have the ability to influence certain work attitudes by nature of their particular position, but since project personnel do not react to each leader in isolation the combined effort and alignment between managers achieves higher success. A recommendation for managers is that they are aligned with divisional and organisational goals to prevent silo thinking mentality. Functional managers have a strong influence on fulfilment of basic psychological needs and job satisfaction. They should use this as an opportunity

to equip themselves with the adequate level of skills to further enhance project personnel work attitudes.

7.6 Recommendations for future research

The perceived leader member exchange between both managers was statistically similar. This research was conducted in a specific industry on knowledge workers, and therefore a recommendation would be to conduct this test on another industry.

This research was based on a dual leader member context. With the rapid adoption of more complex organisational structures employees are being subjected to multiple managers. A study extending leader member exchange beyond dual leader context may help understand perceived relationships between managers and work attitudes. This knowledge can help human resource practitioners improve organisational designs and hence performance.

7.7 Conclusion

As organisations are forced to react to changes in the global economy and demands of customers of the 21st century, more complex organisational structures are adopted. Multiple managers are assigned to specialise in certain deliverables/areas, but they all have a common resource pool to execute a task. To avoid ambiguity of authority and misaligned organisational goals, managers must be aware that their individual relationship with employees as well as in context of other relationships, impact employee outcomes.

REFERENCE LIST

Alderfer, C. P. (1969). An empirical test of a new theory of human needs. *Organizational Behavior and Human Performance*, *4*(2), 142–175.

Anand, S., Vidyarthi, P. R., Erdogan, B., Liden, R. C., & Chaudhry, A. (2014). One Member, Two Leaders: Extending Leader-Member Exchange Theory to a Dual Leadership Context. *Journal of Applied Psychology*, *99*(3), 468–483.

Appelbaum, S. H., Nadeau, D., & Cyr, M. (2008). Performance evaluation in a matrix organization: a case study (Part One). *Industrial and Commercial Training*, *40*(5), 236–241.

Arnolds, C., & Boshoff, C. (2002). Compensation, esteem valence and job performance: an empirical assessment of Alderfer's ERG theory. *International Journal of Human Resource Management*, *13*(4), 697–719.

Bluman, A. G. (2009). *Elementary statistics* (7th ed.). New York. McGraw Hill.

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980 - 1008

Clement, S. T. (2013). Matrix Organizational Work. *People & Strategy*, *36*(1), 8–9.

Crosby, F. (1984). Relative deprivation in organizational settings. *Research in Organizational Behavior*.

Dansereau, F., Graen, G., & Haga, W. J. (1975). A vertical dyad linkage approach to leadership within formal organizations: A longitudinal investigation of the role making process. *Organizational Behavior and Human Performance*, *13*(1), 46–78.

Davis, S. M., & Lawrence, P. R. (1978). Problems of matrix organizations. *Harvard Business Review*, *56*(3), 131–142.

Day, D. V. (2001). Leadership development:: A review in context. *The Leadership Quarterly*, *11*(4), 581–613.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York. Springer Science & Business Media

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268.

Derven, M. (2010). THE NEW NORMAL. *T+D*, *64*(7), 42–47.

Dinh, J. E., Lord, R. G., Gardner, W. L., Meuser, J. D., Liden, R. C., & Hu, J. (2014). Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives. *The Leadership Quarterly*, *25*(1), 36–62.

Dulebohn, J. H., Bommer, W. H., Liden, R. C., Brouer, R. L., & Ferris, G. R. (2012). A Meta-Analysis of Antecedents and Consequences of Leader-Member Exchange: Integrating the Past With an Eye Toward the Future. *Journal of Management*, *38*(6), 1715–1759.

Dunn, S. C. (2001). Motivation by project and functional managers in matrix organizations. *ENGINEERING MANAGEMENT JOURNAL-ROLLA-*, *13*(2), 3–10.

Edwards, J. R. (1994). The study of congruence in organizational behavior research: Critique and a proposed alternative. *Organizational Behavior and Human Decision Processes*, *58*(1), 51–100.

Edwards, J. R., & Parry, M. E. (1993). On the use of polynomial regression equations as an alternative to difference scores in organizational research. *Academy of Management Journal*, *36*(6), 1577–1613.

Facer Jr, D. C., Galloway, F., Inoue, N., & Zigarmi, D. (2014). Creation and Initial Validation of the Motivation Beliefs Inventory: Measuring Leaders' Beliefs about Employee Motivation Using Four Motivation Theories. *Journal of Business Administration Research*, *3*(1). 1-1

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362.

Galbraith, J. R. (1971). Matrix organization designs How to combine functional and project forms. *Business Horizons*, *14*(1), 29–40.

Galbraith, J. R. (2000). *Designing the Global Corporation*. Jossey-Bass

Galbraith, J. R. (2013). Matrix Management: Structure is the Easy Part. *People & Strategy*, *36*(1), 6–6.

Gerstner, C. R., & Day, D. V. (1997). Meta-Analytic review of leader–member exchange theory: Correlates and construct issues. *Journal of Applied Psychology*, *82*(6), 827.

Goold, M., & Campbell, A. (2003). Making Matrix Structures Work:: Creating Clarity on Unit Roles and Responsibility. *European Management Journal*, *21*(3), 351–363.

Graen, G. B., & Cashman, J. F. (1975). A role-making model of leadership in formal organizations: A developmental approach. *Leadership Frontiers*, *143*, 165.

Graen, G. B., & Scandura, T. A. (1987). Toward a psychology of dyadic organizing. *Research in Organizational Behavior*.

Graen, G. B., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *The Leadership Quarterly*, *6*(2), 219–247.

Graves, L. M., & Luciano, M. M. (2010). effects of LMX on employee attitudes: the role of need satisfaction and autonomous motivation. *Academy of Management Annual Meeting Proceedings*, *2010*(1), 1–6.

Green, S. G., Blank, W., & Liden, R. C. (1983). Market and organizational influences on bank employees' work attitudes and behaviors. *Journal of Applied Psychology*, *68*(2), 298.

Hall, K. (2013). Revisiting the Matrix Structure. *Peolpe and Strategy*, *36*(1), 4 – 5.

Herzberg, F. (1968). One more time: How do you motivate employees? *Harvard Business Review*, *46*(1), 53–62.

Joyce, W. F. (1986). Matrix organization: A social experiment. *Academy of Management Journal*, *29*(3), 536–561.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity.* Oxford, England: John Wiley.

Kaiser, R. B., Hogan, R., & Craig, S. B. (2008). Leadership and the fate of organizations. *American Psychologist*, *63*(2), 96.

Knight, K. (1976). Matrix organization: a review. *Journal of Management Studies*, *13*(2), 111–130.

Kolodny, H. F. (1979). Evolution to a matrix organization. *Academy of Management Review*, *4*(4), 543–553.

Latham, G., & Locke, E. (2004). What should we do about motivation theory? *Six Recommendations for the Twenty-First Century" In: Academy of Management Review*, *29*(0), 3.

Lawler, E. E. (2003). What it means to treat people right. *Ivey Business Journal*, *68*(2), 1.

Lawler, E. E., & Suttle, J. L. (1972). A causal correlational test of the need hierarchy concept. *Organizational Behavior and Human Performance*, *7*(2), 265–287.

Lawrence, E. R., & Kacmar, M. K. (2012). Leader-Member Exchange and Stress: The Mediating Role of Job Involvement and Role Conflict. *Journal of Behavioral & Applied Management*, *14*(1), 39–52.

Liden, R. C., Wayne, S. J., & Stilwell, D. (1993). A Longitudinal Study on the Early Development of Leader -- Member Exchanges. *Journal of Applied Psychology*, *78*(4), 662–674.

Lubke, G. H., & Muthén, B. O. (2004). Applying multigroup confirmatory factor models for continuous outcomes to Likert scale data complicates meaningful group comparisons. *Structural Equation Modeling*, *11*(4), 514–534.

Martin, R., Guillaume, Y., Thomas, G., Lee, A., & Epitropaki, O. (2015). Leader–Member Exchange (LMX) and Performance: A Meta-Analytic Review. *Personnel Psychology*.

Miner, J. B. (2003). The rated importance, scientific validity, and practical usefulness of organizational behavior theories: A quantitative review. *Academy of Management Learning & Education*, *2*(3), 250–268.

Nguyen, P., Felfe, J., & Fooken, I. (2013). Antecedents of commitment to a parent company and to a local operation: empirical evidence from western employees working for multinational companies in Vietnam. *International Journal of Human Resource Management*, *24*(7), 1346–1375.

Rhemtulla, M., Brosseau-Liard, P. E., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological Methods*, *17*(3), 354.

Rizzo, J. R., House, R. J., & Lirtzman, S. I. (1970). Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly*, 150–163.

Robbins, S., & Judge, T. A. (2013). *Organisational behaviour* (15th ed.). Edinburgh Gate: Pearson Higher Education AU.

Saunders, M., & Lewis, P. (2012). *Doing research in business and management: An essential guide to planning your project*. Edinburgh Gate: Pearson Education Limited.

Scandura, T. A. (1987). TOWARD A PSYCHOLOGY OF DYADIC ORGANIZING. *Research in Organizational Behavior*, *9*, 175.

Sheldon, K. M., Turban, D. B., Brown, K. G., Barrick, M. R., & Judge, T. A. (2003). Applying self-determination theory to organizational research. *Research in Personnel and Human Resources Management*, *22*, 357–394.

Sy, T., & Côté, S. (2004). Emotional intelligence: A key ability to succeed in the matrix organization. *Journal of Management Development*, *23*(5), 437–455.

Sy, T., & D'Annunzio, L. S. (2005). Challenges and Strategies of Matrix Organizations: Top-Level and Mid-Level Managers' Perspectives. *Human Resources Planning*, *28*(1), 39 – 48.

The Hay Group. (2009). *Cracking the matrix code*. Retrieved from http://www.haygroup.com/en/our-library/whitepapers/cracking-the-matrix-code/

Uhl-Bien, M. (2006). Relational leadership theory: Exploring the social processes of leadership and organizing. *The Leadership Quarterly*, *17*(6), 654–676.

Van Nuland, H. J., Dusseldorp, E., Martens, R. L., & Boekaerts, M. (2010). Exploring the motivation jungle: Predicting performance on a novel task by investigating constructs from different motivation perspectives in tandem. *International Journal of Psychology*, *45*(4), 250–259.

Wegner, T. (2012). *Applied business statistics: Methods and Excel-based applications* (3rd ed.). Cape Town: Juta and Company Ltd.

Zikmund, W., Babin, B., Carr, J., & Griffin, M. (2012). *Business research methods* (8th ed.). Cengage Learning.

APPENDIX A: QUESTIONNAIRE

Cover email

Good Day Colleagues,

The necessary permission was obtained to send this email

I am a GIBS MBA student conducting research on dual reporting structures in a matrix organisation and the influence on role ambiguity and job satisfaction. This is a short online questionnaire and will take you approximately 10 minutes to complete. I would sincerely appreciate if you would provide me with your valuable input. I would appreciate feedback by the **10th July 2015**.

This is a survey for individuals who form part of project teams and have a dual reporting line. ***Only*** project team members are allowed to participate. This survey ***excludes*** project managers, engineering managers and functional managers.

A project team member can be classified as an individual responsible for a specific discipline such as Process, Mechanical, Control, Electrical, Civil, Costing, Document Control, Commercial, etc.

All information gathered will be kept completely confidential. Neither the company name nor the individual's name will be recorded. Furthermore your participation is voluntary and you can withdraw at any time with no penalty.

Please click on the following link to continue with the survey:

https://www.surveymonkey.com/s/Ken_Sarman

If you have any questions please contact the following persons:

Researcher	Ken Sarman	082 858 8573	ken.sarman@sasol.com
Research supervisor	Dr. Tumo Kele	011 771 4000	kelet@gibs.co.za

Kind Regards,

Ken Sarman

MBA Research - Project Team Members

Biographical Information

* 1. What is your age?

- <25
- 25-30
- 30-40
- 40-50
- 50-60
- >60

* 2. How many years of experience do you have working on projects?

- <2
- 2-5
- 6-9
- 10-14
- 15-19
- >20

* 3. What is seniority level in the organisation?

- Junior
- Middle
- Senior

MBA Research - Project Team Members

Questions related to the functional manager

A functional manager can be explained as any manager that is responsible for a single discipline eg. Process, Mechanical, Electrical, Civil, Control, Cost Engineering, Cost Control, etc.

* 4. These questions are related to your interaction with your functional manager

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Do you know where you stand with your functional manager? Do you usually know how satisfied your functional manager is with what you do?	○	○	○	○	○
Does your functional manager understand your job problems and needs?	○	○	○	○	○
Does your functional manager recognize your potential?	○	○	○	○	○
Regardless of how much formal authority your functional manager has built into his/ her position, would you agree that he/ she would use their power to help you solve problems in your work?	○	○	○	○	○
Again, regardless of the amount of formal authority your functional manager has, would you agree that he/she would "bail you out," at his/ her expense?	○	○	○	○	○
I have enough confidence in my functional manager that I would defend and justify his/ her decision if he/she were not present to do so?	○	○	○	○	○
Would you characterize your working relationship with your functional manager as effective?	○	○	○	○	○

MBA Research - Project Team Members

Questions related to the project manager

The project manager is responsible for the execution of projects. He/She may have multiple disciplines reporting to them. If you report to multiple project managers please answer these questions relating to the project manager that requires most of your attention.

These questions are the same as above but relate to the project manager.

* 5. These questions are related to your interaction with your project manager

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Do you know where you stand with your project manager? Do you usually know how satisfied your project manager is with what you do?	○	○	○	○	○
Does your project manager understand your job problems and needs?	○	○	○	○	○
Does your project manager recognize your potential?	○	○	○	○	○
Regardless of how much formal authority your project manager has built into his/ her position, would you agree that he/ she would use their power to help you solve problems in your work?	○	○	○	○	○
Again, regardless of the amount of formal authority your project manager has, would you agree that he/she would “bail you out,” at his/ her expense?	○	○	○	○	○
I have enough confidence in my project manager that I would defend and justify his/ her decision if he/she were not present to do so?	○	○	○	○	○
Would you characterize your working relationship with your project manager as effective?	○	○	○	○	○

MBA Research - Project Team Members

Basic needs at work - Project Team Members

* 6. The following questions relate to your feelings about your job during the last year. (If you have been on this job
for less than a year, this concerns the entire time you have been at this job.) Please indicate how true each of the
following statement is for you given your experiences on this job.

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
I feel like I can make a lot of inputs to deciding how my job gets done	○	○	○	○	○
I really like the people I work with	○	○	○	○	○
I do not feel very competent when I am at work	○	○	○	○	○
People at work tell me I am good at what I do	○	○	○	○	○
I feel pressured at work	○	○	○	○	○
I get along with people at work	○	○	○	○	○
I pretty much keep to myself when I am at work	○	○	○	○	○
I am free to express my ideas and opinions on the job	○	○	○	○	○
I consider the people I work with to be my friends	○	○	○	○	○
I have been able to learn interesting new skills on my job	○	○	○	○	○
When I am at work, I have to do what I am told	○	○	○	○	○
Most days I feel a sense of accomplishment from working	○	○	○	○	○
My feelings are taken into consideration at work	○	○	○	○	○
On my job I do not get much of a chance to show how capable I am	○	○	○	○	○
People at work care about me	○	○	○	○	○
There are not many people at work that I am close to	○	○	○	○	○
I feel like I can pretty much be myself at work	○	○	○	○	○
The people I work with do not seem to like me much	○	○	○	○	○
When I am working I often do not feel very capable	○	○	○	○	○
There is not much opportunity for me to decide for myself how to go about my work	○	○	○	○	○
People at work are pretty friendly towards me	○	○	○	○	○

MBA Research - Project Team Members

Role Ambiguity and Job Satisfaction at Work - Project Team Members

* 7. The following questions relate to your certainty of duty, authority, allocation of time, and relationships with others at work

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
I feel certain about how much authority I have	○	○	○	○	○
I have clear, planned goals and objectives for my job	○	○	○	○	○
Lack of policies and guidelines help me	○	○	○	○	○
I am corrected or rewarded when I really don't expect it (while doing my standard duties)	○	○	○	○	○
I know that I have divided my time properly	○	○	○	○	○
I know what my responsibilities are	○	○	○	○	○
I have to "feel my way" in performing my duties	○	○	○	○	○
I feel certain how I will be evaluated for a raise or promotion	○	○	○	○	○
I know exactly what is expected of me	○	○	○	○	○
I am uncertain as to how my job is linked	○	○	○	○	○
I am told how well I am doing my job	○	○	○	○	○
Explanation is clear of what has to be done	○	○	○	○	○
I have to work under vague directives or orders	○	○	○	○	○
I do not know if my work will be acceptable to my boss	○	○	○	○	○

* 8. The following question relates to your overall job satisfaction

	Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
All things considered, are you satisfied with your job?	○	○	○	○	○

APPENDIX B: REGRESSION ANALYSIS OUTPUT DATA

This appendix provides backup statistical output from SPSS 23 for results on research question three.

Research Question three: hypothesis four

Hypothesis four aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived basic psychological needs.

H_{04}: Perceived basic psychological needs are associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived basic psychological need is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{04A}: Perceived basic psychological needs are associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived basic psychological need is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Table 20: Regression analysis of relationship between perceived basic psychological needs, LMX_{FM}, and LMX_{PM} for equation five

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.51
R Square	0.26
Adjusted R Square	0.25
Standard Error	0.33
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2.00	5.63	2.82	25.47	0.000
Residual	145.00	16.03	0.11		
Total	147.00	21.66			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.37	0.16	14.40	0.0000	2.04	2.69	2.04	2.69
Average LMX-FM	0.19	0.03	5.84	0.0000	0.13	0.26	0.13	0.26
Average LMX-PM	0.13	0.04	3.80	0.0002	0.06	0.20	0.06	0.20

Table 21: Regression analysis of relationship between perceived basic psychological needs, LMX_{FM}, and LMX_{PM} for equation six

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.49
R Square	0.24
Adjusted R Square	0.22
Standard Error	0.92
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5.00	38.85	7.77	9.10	0.000
Residual	142.00	121.23	0.85		
Total	147.00	160.08			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.134	1.546	1.380	0.1697	(0.923)	5.190	(0.923)	5.190
Average LMX-FM	0.006	0.665	0.008	0.9934	(1.310)	1.321	(1.310)	1.321
Average LMX-PM	(0.176)	0.730	(0.240)	0.8104	(1.619)	1.268	(1.619)	1.268
LMX-FM^2	0.061	0.092	0.663	0.5081	(0.120)	0.242	(0.120)	0.242
LMX-PM^2	0.030	0.102	0.298	0.7658	(0.171)	0.232	(0.171)	0.232
LMX-FM x LMX-PM	0.050	0.097	0.513	0.6088	(0.142)	0.241	(0.142)	0.241

Research Question Three: Hypothesis five

Hypothesis five aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived role ambiguity.

H_{05}: Perceived role ambiguity is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{05A}: Perceived role ambiguity is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived role ambiguity is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Table 22: Regression analysis of relationship between perceived role ambiguity, LMX_{FM}, and LMX_{PM} for equation six

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.64
R Square	0.41
Adjusted R Square	0.39
Standard Error	0.26
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	6.45	1.29	19.59	0.000
Residual	142	9.35	0.07		
Total	147	15.79			

	Coefficients	*Standard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3.396	0.429	7.910	0.0000	2.547	4.244	2.547	4.244
Average LMX-FM	(0.330)	0.185	(1.785)	0.0764	(0.695)	0.035	(0.695)	0.035
Average LMX-PM	0.267	0.203	1.319	0.1893	(0.133)	0.668	(0.133)	0.668
LMX-FM2	0.051	0.025	1.996	0.0478	0.000	0.101	0.000	0.101
LMX-PM2	(0.041)	0.028	(1.449)	0.1494	(0.097)	0.015	(0.097)	0.015
LMX-FMxLMX-PM	(0.049)	0.027	(1.817)	0.0714	(0.102)	0.004	(0.102)	0.004

Table 23: Regression analysis of relationship between perceived role ambiguity, LMX_{FM}, and LMX_{PM} for equation five

Regression Statistics	
Multiple R	0.61
R Square	0.37
Adjusted R Square	0.36
Standard Error	0.26
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	5.90	2.95	43.23	0.000
Residual	145	9.89	0.07		
Total	147	15.79			

	Coefficients	*Standard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3.902	0.129	30.189	0.0000	3.646	4.157	3.646	4.157
Average LMX-FM	(0.169)	0.026	(6.606)	0.0000	(0.220)	(0.119)	(0.220)	(0.119)
Average LMX-PM	(0.173)	0.028	(6.209)	0.0000	(0.227)	(0.118)	(0.227)	(0.118)

Research Question Three: Hypothesis six

Hypothesis six aims to establish if there are any significant relationships between the alignment and misalignment between LMX_{PM} and LMX_{FM} and perceived job satisfaction.

H_{06}: Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is higher when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

H_{06A}: Perceived job satisfaction is associated with alignment between LMX_{PM} and LMX_{FM} beyond the influence of individual relationships, such that perceived job satisfaction is lower when alignment between LMX_{PM} and LMX_{FM} is high rather than low.

Table 24: Regression analysis of relationship between perceived job satisfaction, LMX_{FM}, and LMX_{PM} for equation six

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.49
R Square	0.24
Adjusted R Square	0.22
Standard Error	0.92
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	38.85	7.77	9.10	0.000
Residual	142	121.23	0.85		
Total	147	160.08			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.134	1.546	1.380	0.1697	(0.923)	5.190	(0.923)	5.190
Average LMX-FM	0.006	0.665	0.008	0.9934	(1.310)	1.321	(1.310)	1.321
Average LMX-PM	(0.176)	0.730	(0.240)	0.8104	(1.619)	1.268	(1.619)	1.268
LMX-FM2	0.061	0.092	0.663	0.5081	(0.120)	0.242	(0.120)	0.242
LMX-PM2	0.030	0.102	0.298	0.7658	(0.171)	0.232	(0.171)	0.232
LMX-FMxLMX-PM	0.050	0.097	0.513	0.6088	(0.142)	0.241	(0.142)	0.241

Table 25: Regression analysis of relationship between perceived job satisfaction, LMX_{FM}, and LMX_{PM} for equation five

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.49
R Square	0.24
Adjusted R Square	0.23
Standard Error	0.92
Observations	148.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	37.89	18.95	22.48	0.000
Residual	145	122.19	0.84		
Total	147	160.08			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.652	0.454	1.436	0.1532	(0.246)	1.550	(0.246)	1.550
Average LMX-FM	0.566	0.090	6.284	0.0000	0.388	0.744	0.388	0.744
Average LMX-PM	0.198	0.098	2.027	0.0445	0.005	0.391	0.005	0.391