Mini Business Activities, Team Performance, Job Satisfaction and Team Innovation in Manufacturing: A South African Perspective

by

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DECLARATION

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ABSTRACT

The Quality Circle (QC) originated in Japan and is described as a small group of manufacturing employees who are in the same work area, and who meet regularly and voluntarily to identify, study and solve problems pertaining to quality. Many organisations implement different variations of QC programmes in a variety of industries to solve a wider range of problems, and these programmes often go by various different names. A number of South African organisations are implementing a variation of QCs called a Mini Business Activity (MBA). Providing for the fact that each country has a unique culture, language(s), and quality of education, it cannot be assumed that the effects of QCs in other countries are applicable to South Africa. Similarly, it cannot be assumed that findings on the outcomes of QCs in their original form will be identical for variations of QCs, such as MBAs. The aim of this empirical study is to determine whether MBAs in South African manufacturing organisations have the same effect that QCs have in Japanese and North American organisations.

This study is classified as non-experimental, hypothesis-testing research and the effect of MBAs on three outcome variables, namely team effectiveness, team innovation and job satisfaction, is investigated while employee engagement is modelled as a mediator between MBAs and job satisfaction. A questionnaire is used to collect data from a total of 390 respondents from five South African manufacturing organisations that are implementing MBAs. A linear regression analysis is used to analyse team effectiveness and team innovation, while job satisfaction is analysed as a multilevel mediation model using the multilevel structural equation modelling (MSEM) framework. The results indicate that in South African manufacturing organisations, MBAs have a significant positive effect on team effectiveness and team innovation that is similar to the effect of QCs in both American and Japanese manufacturing organisations, but that MBAs have no direct or indirect effect through employee engagement on job satisfaction—which differs from past findings for QCs.

This research helps to fill a gap that exists in literature regarding the impact of MBAs in South African manufacturing organisations. In addition to the theoretical contribution, the research also has practical value, enabling local organisations to make more informed decisions on whether to devote resources to the implementation of MBAs or not. A few key conclusions are that, if organisations wish to improve team effectiveness and team innovation, MBAs could be a useful tool to achieve this. However, MBAs were found not to have an impact on job satisfaction and therefore are not recommended as an effective mechanism for improving this outcome.

OPSOMMING

Kwaliteit-sirkels het ontstaan in Japan en word beskryf as ‘n klein groepie werknemers in ‘n vervaardigings-onderneming wat in dieselfde werksarea is en gereeld op ‘n vrywillige basis ontmoet om probleme wat verband hou met kwaliteit te identifiseer, bestudeer en op te los. Menigte ondernemings implementeer variasies van Kwaliteit-sirkels in ‘n verskeidenheid industriële om ‘n wyer veskeidenheid van probleme op te los en hierdie programme word dikwels anders genoem. ‘n Aantal Suid-Afrikaanse ondernemings implementeer tans ‘n variasie van Kwaliteit-sirkels genaamd ‘n Mini Besigheid Aktiwiteit (MBA). Elke land het ‘n unieke kultuur, politieke klimaat, taal en kwaliteit van onderwys, en daarom kan daar nie aangeneem word dat die uitkoms van Kwaliteit-sirkels wat in ander lande gevind is, van toepassing is op Suid-Afrika nie. Net so kan daar ook nie aangeneem word dat die effek van Kwaliteit-sirkels in hul oorspronklike vorm dieselfde sal wees vir variasies van Kwaliteit-sirkels, soos MBAs, nie. Die doel van hierdie empiriese studie is om te bepaal of MBA’s in Suid-Afrikaanse vervaardingings-ondernemings dieselfde effek het as Kwaliteit-sirkels in Japanese en Noord-Amerikaanse ondernemings.

Die studie word geklassifiseer as nie-eksperimentele hipotese toetsing en die effek van MBAs op drie uitkomstes, naamlik span-effektiwiteit, span-innovasie en werksbevrediging, is ondersoek. Werknemer betrokkenheid is ook gemodelleer as ‘n mediator tussen MBA’s en werksbevrediging. ‘n Vraelys is gebruik om data in te samel by 390 deelnemers uit 5 Suid-Afrikaanse vervaardigings-ondernemings wat tans MBA’s implementeer. ‘n Linieêre regressie analise is gebruik om span-effektiwiteit en span-innovasie te analiseer, en werksbevrediging is ontleed deur gebruik te maak van ‘n ‘multilevel structural equation modelling (MSEM)’ raamwerk. Die resultate toon dat MBAs ‘n beduidende positiewe effek het op span-effektiwiteit en -innovasie wat soortgelyk is aan díe van Kwaliteit-sirkels, maar dat MBAs nie ‘n direkte of indirekte effek deur middel van werknemer betrokkenheid op werksbevrediging het nie—wat nie soortgelyk is aan Kwaliteit-sirkels nie.

Hierdie navorsing dra by tot die vul van ‘n gaping in die literatuur rakende die impak van MBAs in Suid-Afrikaanse vervaardigings-ondernemings. Bykomend tot die teoretiese bydrae van die studie, het die navorsing ook praktiese waarde deur organisasies in staat te stel om ‘n meer ingeligte besluit te maak wanneer daar bepaal word of dit die moeite werd is om tyd en hulpbronne aan die implementerig van MBAs te wy.

MBAs word aanbeveel as ‘n moontlike hulpmiddel wat kan help om span-effektiwiteit en span-innovasie te verbeter in organisasies. MBAs word egter nie aanbeveel indien organisasies probeer om werksbevrediging onder werknemers te bevorder nie.

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"I will give thanks to you, LORD, with all my heart; I will tell of all your wonderful deeds."

Psalm 9:1 NIV

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CONTENTS

CONTENTS

CONTENTS

LIST OF FIGURES

LIST OF TABLES

NOMENCLATURE

ANOVA:	Analysis of Variance
CGM:	Centring at the Grand Mean
CWC:	Centring Within Cluster
FLM:	First Line Manager
GDP:	Gross Domestic Product
IRA:	Interrater Agreement
IRR:	Interrater Reliability
JES:	Job Engagement Scale
MBA:	Mini Business Activity
MLM:	Multilevel Model
MSEM:	Multilevel Structural Equation Modelling
OECD:	Organisation for Economic Co-operation and Development
PDCA:	Plan, Do, Check, Act
PDSA:	Plan, Do, Study, Act
QASCO	Qatar Steel Company
QC:	Quality Circle
QWL:	Quality of Work Life
SGA:	Small Group Activity
UWES:	Utrecht Work Engagement Scale
WEF:	World Economic Forum

CHAPTER 1: INTRODUCTION

1.1. Introduction

The purpose of this study is to investigate the effect of initiatives that are based on the principle of Quality Circles (QCs) on various outcome variables in South African manufacturing organisations. Two examples of initiatives that are based on the principle of QCs and that are implemented in a number of local organisations are Small Group Activities (SGAs) and Mini Business Activities (MBAs).

This chapter serves as an introduction to the study. It provides background on the topic of QCs, SGAs and MBAs; provides a rationale for the study by defining a problem statement, aim and objectives; describes the research design and methodology and outlines the structure of the document.

1.2. Background

The Quality Circle (also known as the Quality Control Circle) concept is a popular form of participative management that originated in manufacturing organisations in Japan (Ledford, Lawler & Mohrman, 1994). A Quality Circle can be described as a small group of employees (mostly first-line employees) who are in the same work area, who meet regularly and voluntarily to identify, study and solve problems that affect them and the organisation (Munchus, 1983).

QCs were initially aimed at solving problems pertaining to the quality of manufactured goods in a manufacturing environment, but the use of QCs has subsequently expanded to different industries and QCs are now also used to solve a variety of problems that are experienced in the workplace – not only those pertaining to quality. A QC typically consists of 6 to 12 members and each circle has a facilitator that assists with the training of the participants and who ensures that the QC operates efficiently.

Traditionally, QCs used to meet in their own free time, but present-day industries allow their members to meet during the company's time (Lawler & Mohrman, 1985). Typically, there are no financial rewards for QC participation, but circle members may get recognition for their contribution (Lawler & Mohrman, 1985). Organisations often modify the design and details of their QCs according to their specific needs (Lawler & Mohrman, 1985; Marks, Mirvis, Hackett & Grady, 1986). The amount of training provided, number of circles, number of members in a circle and who acts as the facilitator are among the factors that differ from one organisation to another.

Many previous studies have indicated that QCs can have a variety of positive outcomes which include, but are not limited to, the following: improved quality (Hunt, 1984; Shobharani, 2009; Jin & Doolen, 2014); improved teamwork (Jin & Doolen, 2014); improved communication (Elvins, 1985); better employee engagement (Jin & Doolen, 2014); higher employee involvement (Hunt, 1984); financial savings (Hunt, 1984; Manson & Dale, 1989; Shobharani, 2009); increased productivity (Marks et al., 1986; Jin & Doolen, 2014); a reduction in absenteeism and turnover (Hunt, 1984; Marks et al., 1986; Buch, 1987); increased job satisfaction (Shores, 1984; Mohr & Zoghi, 2008; Hosseinabadi, Karampourian, Beiranvand & Pournia, 2013); increased quality of work life perceptions (Marks et al., 1986); increased motivation (Jin & Doolen, 2014); etc.

Research has indicated that many organisations implement redesigned QC programmes and that these programmes go by various different names. Therefore, although an organisation might not specifically call their activities 'Quality Circles', these activities operate according to similar principles as QCs (O'Donnel & O'Donnel, 1984; Graban, 2014). Some alternative names that appear in literature that are used for QCs include: participation teams, employee involvement programmes, excel teams, 'qualitivity' teams, performance circles, employee participation groups and productivity teams (O'Donnell & O'Donnell, 1984). Other names also include small group activities (Gyani, 1995), quality improvement teams (Gyani, 1995), shop floor improvement teams (Grütter, Field & Faull, 2002) and quality control circles (Blair & Ramsing, 1983; Abrahamson & Fairchild, 1999; Schonberger, 2007; Salaheldin, 2009; Hosseinabadi, et al., 2013; Blaga & Jozsef, 2014; Jin & Doolen, 2014).

A number of South African organisations are implementing management techniques that are based on the same principles that underpin QCs. Small Group Activities (SGAs) and Mini Business Activities (MBAs) are two such techniques that are being implemented in combination with each other in the South African context.

Although the SGAs and MBAs that have been observed during site visits to South African organisations are similar in structure to QCs, the QC concept has been modified to suit the needs of the specific organisations and the SGAs and MBAs therefore do not perfectly resemble a QC.

The SGAs and MBAs that are in place in these organisations originated from the implementation of a framework called '20 Keys to Workplace Improvement' or, in short, '20 Keys'. The 20 Keys framework was created and published by Professor Iwao Kobayashi in a book called *20 Keys to Workplace Improvement* (Kobayashi, 1995). This book is a practical guide to workplace improvement that consists of 20 focus areas in an organisation's daily operations that can be improved in order to result in an overall improvement within the organisation. The framework also identifies four keys, called foundation keys, that need to be implemented first in order to form a strong base for the rest of the keys. One of these foundation keys is called 'Key 3: Improvement Team Activities'. This key emphasises the importance of team activities as a tool to improve the quality of manufactured goods and to rejuvenate morale in the workplace (Kobayashi, 1995).

The term 'Improvement Team Activities' that is used for Key 3 is a collective name for many different team activities that can be implemented by an organisation in order to bring about improvements. QCs, SGAs and MBAs are three examples of different Improvement Team Activities that can be implemented; however QCs are regarded as the original activity that gave rise to SGAs and MBAs. Figure 1 illustrates how QCs, SGAs and MBAs fall under the same category of activities.

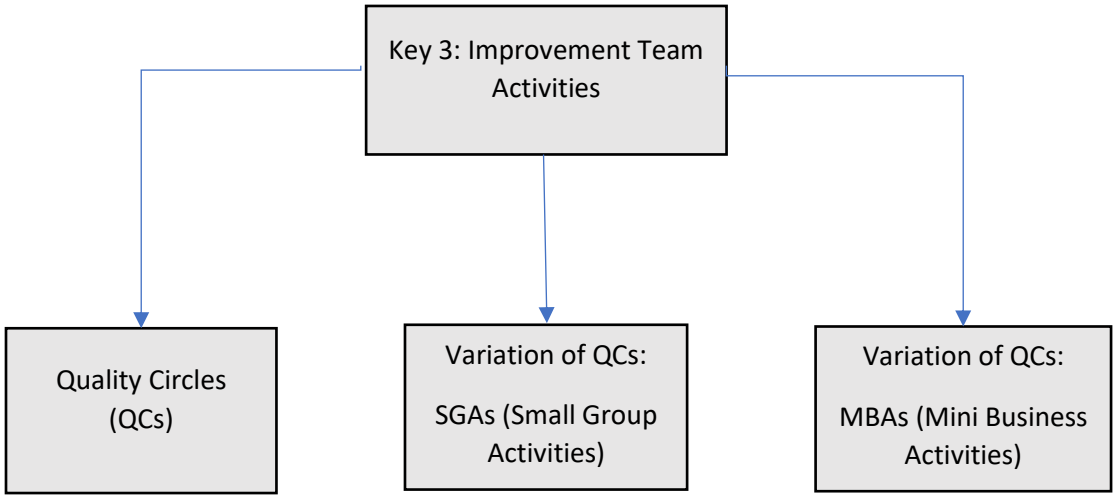

Figure 1: Illustration of three different types of Improvement Team Activities. SGAs and MBAs were found in South African organisations and are believed to have originated from QCs

The MBAs observed during site visits in the South African manufacturing environment consist mostly of a team of employees who work together on the same production line and on the same organisational level. The name of this activity (Mini Business Activity) was created based on the principle that the team is part of a value chain in the factory and that they have their own suppliers and customers within that value chain – almost as if they were a miniature business inside of the organisation as a whole. With this principle in mind, an MBA team's suppliers would typically be regarded as the activity that directly preceded the team's activity in the value chain. In the same way, the customers of a specific MBA would be the employees working on the activity that follows that MBA in the value chain.

Most of the teams observed during site visits held their MBA meetings during the first 10 minutes of their shift. The teams whose work conditions did not allow them to meet during the first 10 minutes of the shift held their meetings at another convenient time during the day. Topics of discussion in the MBA centred around five themes; namely quality, cost, delivery, safety and morale. These discussions typically included conversations about the previous day's production, the number of defects that were produced on the previous day, the targets for the current day, bonuses earned, as well as problems, suggestions, and ideas for improvement.

Each team member is required to come up with a specific number of suggestions each year in order to encourage employees to be forward-thinking and innovative. The reason why new suggestions are compulsory for each team member was described by one of the senior managers as follows: "The process of making suggestions compulsory for each team member in the MBA can be compared to the process of mining for diamonds. You have to go through a lot of rock and earth, but eventually you will reach a diamond. The same principle applies when it comes to ideas. You have to go through plenty of ideas that might not be very useful, but eventually someone will come up with a great idea that is valuable like a diamond. By making suggestions compulsory in MBAs, we are cultivating a forward-thinking workforce that is mindful of the way they do their work".

Whenever an MBA team failed to reach a target, they would discuss the reasons for failing to meet the target and discuss possible ways in which this could be avoided in future. Graphs and other information were also placed on the walls so that the whole team could get a good idea of what their performance looked like over time. The meetings were usually facilitated by the first line manager (FLM), but they often rotated so that the team members took turns to facilitate the meetings.

SGAs, on the other hand, were typically only formed when there was a specific problem that needed to be solved or when an improvement theme needed to be implemented. The members of the SGA were not limited to specific work teams (MBAs), organisational levels or functional departments, instead, employees from different MBAs (or work teams), organisational levels and/or departments could be part of the same SGA. The only criteria for an employee to be part of an SGA was that they had to have the necessary experience, knowledge or skills to help solve the problem or implement the improvement theme around which the SGA was centred, or they had to be involved or affected by the problem which enabled them to provide important insights.

The members of an MBA could also form their own SGA, in which case the members of the SGA would resemble those of the MBA. An SGA was a temporary group that disbanded as soon as the problem was solved or the team that took over longer-term responsibility for the problem has implemented an improvement theme. Although the SGA could essentially consist of anyone in the organisation, it was generally found that the SGAs in industry consisted primarily of the first-line workers.

Although problems were also addressed during MBA meetings, the problems that were addressed during an SGA were typically problems that could not be solved by the MBA team during an MBA meeting due to the short duration of these meetings, the complexity of the problem, or perhaps the fact that it was necessary to involve someone from outside of the MBA team in order to solve the problem.

A comparison of the key characteristics of QCs, SGAs and MBAs is shown in Table 1. The characteristics that SGAs or MBAs had in common with QCs were shaded in order to clearly indicate the similarities and differences between them.

Table 1: Comparison of a QC, SGA and MBA (continues on the next page)

No.	Characteristic	Quality Circles (QCs)	Group activities found in industry	
			Small Group Activities (SGAs)	Mini Business Activities (also called 'Work Teams' by some of the teams)
1	Participation (voluntary or compulsory?)	Voluntary or compulsory – it depends on the organisation.	Voluntary	Compulsory
2	Purpose of Group	Solving problems and driving improvement. Originally, these problems were mainly related to quality, productivity and cost saving, but the variety of problems that are addressed by QCs has increased.	Solving problems (these problems can be related to any aspect that is deemed to impact the workplace) and implementing improvement themes.	Daily management of group's activities and an opportunity to communicate. The work team has a set of Key Performance Indicators that it is responsible for. Also, an opportunity for solving problems, making suggestions, asking questions and resolving conflict.
3	Group formation	Team members are from the same work group/department/area and work together every day.	Members can be from the same or different work groups/departments/ organisational level. Group is defined by the improvement theme or problem at hand.	Members are from the same work group/ department/ area and work together every day.
4	Decision-making power.	Group can give suggestions but doesn't have the power to make decisions.	Group can give suggestions but doesn't have the power to make decisions.	Group has decision making power to a certain extent. In cases where management has the decision-making power, the group is allowed to make suggestions.
5	Success	The success of a QC relies on suggestions that are made by the team.	The success of an SGA relies on suggestions that are made by the team.	The success of an MBA is primarily measured by how well they manage daily activities. Suggestions that are made and problems that are solved are secondary measures of success.
6	Permanence	Quality circles are permanent groups. Group members consist of the employees in a specific working area/department.	SGAs are not permanent. The group disbands as soon as the problem is solved or as soon as the improvement theme has been implemented.	Groups are permanent and meetings are ongoing. Group members consist of the employees in a specific working area/department.

Table 1: Comparison of a QC, SGA and MBA (continued from the previous page)

No.	Characteristic	Quality Circles (QCs)	Group activities found in industry	
			Small Group Activities (SGAs)	Mini Business Activities (also called 'Work Teams' by some of the teams)
7	Meetings	Meetings are ongoing and take place during company time. Traditionally an hour-long meeting per week, or a two-hour long meeting once every two weeks.	Frequency and duration of meetings are decided by the group depending on the necessity of meetings. They take place during company time.	Meetings are ongoing and take place during company time. For example: Meeting for 10 minutes at the start of the shift. Meetings happen frequently.
8	Training	Members are trained to use problem-solving techniques and, in some cases, statistical quality control.	No training takes place. Group members are selected based on the knowledge and skills that are needed to solve the problem that they already possess. Group members can also be selected based on factors such as whether they have experience with a certain problem or work with the problem every day. Employees can also volunteer to be part of the group.	Some training takes place. Topics for training include the creation and interpretation of graphs, decision-making, brainstorming, and planning.
9	Facilitation and leadership	Initially, specially trained staff are hired to assist with the training and facilitation of meetings. Group members take over the facilitation of the meetings as soon as they know the ropes.	The group appoints their own leader. The chosen leader is then responsible for leading the group and facilitating meetings for the duration of the SGA.	The FLM is the leader of the group and is mainly in charge of facilitating the meetings. Other members may also take turns to facilitate the meetings.
10	Rewards	No financial rewards are offered. Emphasis is placed on recognition rewards (such as trophies or photos on the wall).	No financial rewards are offered. Members might receive recognition for their contribution.	Sometimes financial incentives such as production bonuses are offered, but not always. Members may also receive recognition rewards (such as trophies, photos on the wall, a half-day off, etc.).

From Table 1 it can be seen that neither SGAs nor MBAs are identical to QCs, but that both have a number of characteristics in common with QCs. Due to the fact that both QCs and MBAs are permanent teams (the team members remain constant over time), this study focused on empirically investigating whether MBAs had similar effects on organisations as QCs do. Since SGAs are not permanent teams (the SGA disbands as soon as a project is completed and members constantly change), they were not included in the empirical study. They have, however, been included as part of the background of the research in order to portray a complete picture of the variations of QCs that have been observed in South African manufacturing organisations.

A large volume of empirical research has been conducted on the outcomes and effectiveness of QCs across the world, especially in Japan (where QCs were originally popularised (Marks et al., 1986)) and the United States. Very little research has however been done on the impact and outcomes of QCs, or variations of QCs such as SGAs and MBAs, in the South African environment. Providing for the fact that each country has a specific culture, language(s) and quality of education, it cannot necessarily be assumed that the results that were obtained from previous studies on the effects and outcomes of QCs in other countries will be applicable to South Africa. Similarly, it cannot be assumed that findings on the outcomes of QCs in their original form will be identical for variations of QCs, such as SGAs or MBAs. Currently, there is no published research on the outcomes and effects of QCs or variations of QCs in a South African manufacturing environment.

1.3. Rationale of the study

This section discusses the rationale of the study by providing a problem statement, the aim and objectives, and discussing the ethical implications of this study.

1.3.1. Problem statement

The implementation of variations of QCs in South African organisations and the lack of existing literature surrounding their implementation leads to the following question: Do MBAs in South African manufacturing organisations have the same effect that QCs have in Japanese and North American organisations?

Due to the fact that SGA groups are not permanent (as mentioned, the group disperses as soon as the problem is solved), and that the members of SGAs are also not necessarily from the same group, department, or organisational level, as stated in Table 1, it is difficult, or possibly infeasible, to study their medium- to long-term impact on a work group. Therefore, SGAs will not be investigated in this study. In contrast, as stated in Table 1, MBAs are executed by individuals from the same work group, department, or area, and as the groups are permanent the membership of these groups is relatively stable, making it feasible to study the impact of MBAs on a group or team over the medium to long term.

Outcomes that could potentially be impacted by MBAs include team effectiveness, job satisfaction, innovation, and employee engagement. Gaining knowledge on this topic would fill a gap that exists in literature regarding the impact of MBAs in South African manufacturing organisations. In addition to the theoretical contribution, such research would also have practical value, enabling local organisations to make more informed decisions on whether to devote resources to the implementation of MBAs.

1.3.2. Aim and objectives

The aim of this study is to contribute to the body of knowledge by determining what effect MBAs have on South African manufacturing organisations by investigating selected outcome variables.

In order to reach the aim, the following research objectives have been identified for this study:

1. Perform an extensive literature review on QCs and their variations, including: the presence of QCs in South Africa and factors that contribute to the successful implementation of QCs.

2. Determine which potential outcomes of MBAs will be measured in South African manufacturing organisations in this study, construct a model that can be tested in an empirical study and develop hypotheses to test according to this model.

3. Design the empirical study by:
    a. Defining the scope of the study by developing a set of criteria that can be used to determine whether an organisation and a workgroup are suitable for inclusion in the study;
    b. Determining whether each outcome variable should be measured qualitatively or quantitatively;
    c. For each outcome variable that is to be measured qualitatively, determining the appropriate group of individuals to gather data from;
    d. For each outcome variable that is to be measured qualitatively, selecting an appropriate measurement scale from literature, or composing a customised scale, with due consideration to the group of individuals from whom the data on the outcome variable will be gathered;
    e. Developing a questionnaire in a suitable format and incorporating suitable terminology, for each group of individuals from whom data will be gathered; and
    f. For each outcome variable that is to be measured quantitatively, determining what metrics will be gathered to represent the outcome variable.

4. Identify suitable organisations for participation in the empirical study and collect data from the set of organisations that are willing to participate.

5. Perform statistical analyses to evaluate the hypotheses that were formulated as part of Objective 2 by:
    a. Determining which statistical analysis techniques are suitable for the analysis of each of the outcome variables in the model being investigated;
    b. Determining what assumptions are applicable to each of the statistical analysis techniques selected, and confirming whether these assumptions are met; and
    c. Applying the statistical analysis techniques to assess the relationship between MBAs and each of the outcome variables in the model being investigated.

6. Make recommendations regarding the effect of MBAs and their implementation in South African manufacturing organisations and provide suggestions for further research in this field.

1.3.3. Ethical implications of the research

This research relied on a survey that had to be completed by employees at the participating organisations and accordingly, ethical aspects needed to be taken into consideration. Ethical clearance for the research was obtained from the Research Ethics Committee (REC): Humanities at Stellenbosch University. In addition to obtaining the ethical clearance, every care was taken to ensure that the research was conducted in an ethically responsible manner.

It was a priority to ensure the anonymity of participants, and participants who decided to partake in the study were asked to sign a written consent form in order to confirm that they understood what the research was about and that they were participating willingly.

It was made clear to respondents that participation in the study was completely voluntary and that they were free to withdraw from the study at any time if they felt uncomfortable for any reason whatsoever. It was further explained to participants that they would not receive payment or a reward for choosing to participate in the study, and that they would also not suffer any negative consequences if they decided not to participate in the study. It was also explained to them that participating in the study would not hold any risk for them or cause them any harm, discomfort, inconvenience, psychological stress, or stigmatisation.

A more detailed description of the steps that were taken to ensure that the research was conducted in an ethical manner can be found in Section 4.4.

1.4. Research design

This study is classified as non-experimental, hypothesis-testing research. It was conducted as a field study by collaborating with partnering organisations that were implementing MBAs in South Africa. By following a correlational design, measurements were only taken once.

It is acknowledged that a correlation between two variables does not necessarily prove causation between them and that this is a weak point of research that applies correlational designs. Despite being associated with this specific weak point, correlational designs are widely used in published research on the impact of QCs. In line with the best practice that is generally documented in correlational research published in management literature, relationships between variables are only studied if the existence of such a relationship can be motivated based on existing theory. This approach seeks to limit the likelihood of erroneously inferring causation from this research. Section 3.3 theorises about each relationship between the variables, and a detailed description of the model that was tested empirically can be found in Section 3.2. Various statistical techniques were used to test the hypotheses.

1.5. Research methodology

As defined in the objectives of this research study (Section 1.3.2) either qualitative or quantitative data can be used to measure the variables in this empirical study. A survey mechanism is the most appropriate mechanism to gather qualitative data for the outcome variables being investigated in this research. If an outcome variable is to be measured using quantitative data, the appropriate approach is to identify a suitable data source for the specific construct.[1] The feasibility of including outcome variables that can only be accurately measured using quantitative data in this research, is determined by the availability of suitable data. This constraint also represents a scope limitation of the research.

[1] Welman, Kruger and Mitchell (2005) defines a construct as follow: “A construct is an abstract concept that is deliberately created to represent a collection of concrete forms of behaviour. The concrete behaviours thus qualify as indicators of the construct.” Examples constructs in research include attitudes, socio-economic status, management style, etc. The variables in this study (for example, job satisfaction) are referred to as constructs.

1.6. Research scope

The geographic region of the study is the Republic of South Africa and the industry that is investigated is the manufacturing industry. Although it is recognised that many different variations of QCs exist, this study focuses specifically on the MBA variation of QCs.

Due to the paucity of information that is available on MBAs, however, both QCs and SGAs are included in the literature review that contextualises the research. Data gathering is executed only at organisations that implement MBAs. The participants in the study include the employees at the lowest level of the organisation that are involved in the manufacturing of goods at the participating organisations (first-line workers) as well as their managers and senior managers.

A specific set of outcome variables is selected to be measured in this study seeing as not all the possible outcomes of MBAs could feasibly be studied within the available time. Furthermore, as discussed in the preceding section, the unavailability of specific quantitative data at the partnering organisations also precluded some outcome variables that may have been of interest from being included in the study.

1.7. Structure of the report

Chapter 2 comprises a comprehensive overview of QCs and related concepts to contextualise the research. As mentioned previously in this chapter, there is a paucity of information in academic literature on MBAs and their implementation, therefore, though the empirical study conducted in this research is specifically concerned with MBAs, the introductory overview also includes a description of QCs in their original form and of the SGA variant of QCs.

Chapter 3 describes how the model that was tested in this study was developed by explaining the motives behind the selected measurement variables, illustrating how the model was constructed with the help of previous studies and providing a set of hypotheses that were to be tested. The chapter then briefly touches on the demographic variables that were measured for the study before concluding.

Chapter 4 provides details about the study design. These details include the type of study that was conducted, the characteristics of the data, the research instruments that were used, the ethical considerations, the limitations of the study and the assumptions.

Chapter 5 presents the analyses that were conducted and the results that were obtained. The chapter also describes the sample that was used in the study, and provides the descriptive statistics of the study. Furthermore, Chapter 5 draws a comparison between the different ratings that were provided by the different groups that participated in the study.

Chapter 6 provides a summary of the research findings by evaluating each hypothesis and comparing the results obtained in the study with results that were obtained in previous studies regarding QCs. It also discusses the implications of the results and provides recommendations.

Chapter 7 provides a concluding overview of the research and a summary of the document. It discusses the contributions of this research and provides suggestions for future research.

1.8. Conclusion: Introduction

This chapter introduced the research by briefly providing background and a comparison of three different Improvement Team Activities, namely QCs and two variations of QCs that were found in South African organisations, called SGAs and MBAs. The chapter then proceeded to describe the rationale of the study by providing a problem statement, aim, objectives and briefly considering the ethical implications of the study. Then the research design, methodology and scope were outlined.

The next chapter investigates the origin of SGAs and MBAs by taking an in-depth look at QCs. The chapter addresses the following subjects: the emergence of QCs, different variations of QCs (which include SGAs and MBAs), past successes and failures in their implementation, factors that can contribute to the successful implementation of QCs, the presence of QCs in South Africa and previous empirical studies regarding QCs.

CHAPTER 2: QUALITY CIRCLES

This chapter contains a review of the literature on topics related to the first type of improvement team activity that existed, namely QCs. The goal of this chapter is to provide the reader with a clear understanding of the start of improvement team activities in the form of QCs, how they evolved into different variations of QCs and which variations can be found in South Africa. The review starts by explaining the history of QCs. Then it takes a look at the different variations of QCs that were found in different organisations and countries in the literature and it also gives special attention to the two countries that are well known for their implementation of QCs—Japan and the US. Thereafter, an investigation is made into the notion that QCs are a fad and then a counterargument is made by providing examples of literature that report on the successful implementation of QCs. The factors that can contribute to the successful implementation of QCs are explored thereafter. This is followed by an investigation into QCs and QC variations that were specifically found in the South African organisations that participated in this study. The next subsection then provides a summary of previous empirical studies of QCs. The chapter concludes by discussing the findings of the literature review. Lastly, a chapter summary is given.

2.1. Literature analysis methodology

The literature search consisted of a structured and systematic search of an online database named ‘Scopus’. All searches were performed in the Scopus database because it is the biggest existing citation and abstract database with peer reviewed literature (Elsevier, n.d.). Sources that were considered for the literature analysis could either be a peer-reviewed journal article or conference proceedings that were indexed in the Scopus database.

Stellenbosch University’s library recommends the use of one or more of three different search strategies (Stellenbosch University Library, 2017). The first strategy is called the ‘Quick and Easy’ method. It is a very broad search strategy that aims to allow the researcher to get an overall sense of the type and amount of literature that is available on the topic.

The second search strategy, called the 'Building Blocks' method, allows the researcher to search in more depth by making use of Boolean operators and synonyms for the various keywords in the search terms. The third strategy is referred to as the 'Snowballing' method (a.k.a. the 'Pearl Growing' method) and is used when a researcher finds that the references in a specific source could also contribute to their study. The researcher then tracks down and uses the sources that are referenced by the current source at hand. This literature search utilised all three strategies to a certain extent.

The Scopus database was only used to search for terms in the title, abstract and keywords of documents. After each search, the abstracts of the resulting documents were scanned to identify the documents that could possibly be relevant to the study at hand. It is necessary for the researcher to use personal discretion when deciding whether a document is relevant to the study or not (Cooper, 1984). According to Cooper (1984), the factors that influence a researcher's judgement include the researcher's objectivity and level of proficiency in the field, the amount of time that the researcher has to make the decisions and the manner in which research is documented in the database.

The steps that were followed for the literature search are detailed in the rest of this section.

2.1.1. Quick and Easy search strategy

The Quick and Easy search method was used as a way of getting a sense of the type and amount of literature that was available regarding QCs, SGAs and MBAs (similar to a preliminary literature search). The first search that was performed for QCs, SGAs and MBAs was limited to only provide results that were published from the year 2000 and onwards in order to get the most recent articles. All the searches that were performed in Scopus with the Quick and Easy method are documented in Table 2.

After finding no valuable results for SGAs and MBAs by using the filter for the publication date, it was decided to remove it and to allow documents that were published in any year to be produced as results. Removing the filters for SGAs and MBAs proved to be successful because valuable results were produced after removing them. The publication date filter was not removed for the QCs search as the number of results that were uncovered using this filter were deemed sufficient for the purpose of getting a broad sense of the type of literature that is available on the topic.

Table 2: Searches that were performed with the Quick and Easy method

No.	Aim of search	Search term used	No. of document results	No. of potentially useful documents	No. of potentially useful documents that could be retrieved[2]	Filters used
1	**QCs:** Get a sense of the amount of recent literature available about QCs in any manufacturing environment.	(*"Quality circle*"* AND (*"manufacture*"* OR *"produce*"*)) AND PUBYEAR > *1999*	32	5	4	Must be published later than 1999.
2	**SGAs:** Get a sense of the amount of recent literature available about SGAs in any manufacturing environment.	("small group activity*" AND ("manufacture*" OR "produce*")) AND PUBYEAR > 1999	9	0	N/A	Must be published later than 1999.
3	**SGAS:** After no potentially useful documents were found in the preceding search, this search was performed to get a sense of the amount of any old or new literature available about SGAs in any manufacturing environment.	(*"small group activity*"*) AND (*"manufacture*"* OR *"produce*"*))	15	4	2	None
4	**MBAS:** Get a sense of the amount of recent literature available about MBAs in any manufacturing environment.	("mini business*") AND ("manufacture*" OR "produce*") AND PUBYEAR > 1999	0	N/A	N/A	Must be published later than 1999.
5	**MBAS:** After no potentially useful documents were found in the preceding search, this search was performed to get a sense of the amount of any old or new literature available about MBAs in any manufacturing environment.	("mini business*" AND ("manufacture*" OR "produce*")	2	1	1	None

[2] After searching in the repositories of Scopus, Stellenbosch University, Google Scholar and ResearchGate, some documents could still not be retrieved.

2.1.2. Building Blocks search strategy

After conducting the Quick and Easy search strategy as a preliminary search, it was decided to not only search for recent documents (articles that were published from the year 2000 and onwards), but to search for all articles published in Scopus until now. Thus, the filter that limited the publication dates of articles was removed in order to obtain as much literature as possible. Literature that was published earlier (such as in the ’80s and ’90s) had the possibility of being more valuable than more recent literature because when the concept of QCs was first introduced in general management literature in the ’80s, the concept was viewed as novel and a great deal of research was conducted on QCs. After the ’90s, the number of published research papers relating to QCs dwindled.

The Building Blocks search strategy entailed the use of synonyms for the key words in the search. First, a Building Blocks search was performed for QCs and SGAs. Since MBAs are the main focus of this study, a separate search was conducted for MBAs. Table 3 shows the various synonyms that were used for the key terms in the search pertaining to QCs and SGAs.

Table 3: Synonyms that were used for key words during the literature search pertaining to QCs and SGAs

Basic concepts of research question:	• Quality Circles • Small Group Activities	Manufacturing	South Africa
Synonyms:		• Producing • Assembling	Southern Africa[3]

The details of the searches that were performed with the Building Blocks method for QCs and SGAs are presented in Table 4.

[3] Although South Africa and Southern Africa are geographically different and therefore not exact synonyms, it was decided to include the term Southern Africa in the search because studies of the implementation of QCs or SGAs in Southern African countries could potentially provide an understanding of what the typical QC or SGA experience would be in South Africa to a certain extent. It is worth mentioning, however, that no literature discussing the implementation of QCs or SGAs in other Southern African countries was found among the results.

Table 4: Details of all the searches that were performed to find literature about QCs and SGAs using the Building Blocks method

No.	Aim of search	Search term used	No. of document results	No. of potentially useful documents	No. of potentially useful documents that could be retrieved[2]	Filters used
1	To find articles about QCs/SGAs in a South African manufacturing environment.	((*"quality circle*"* OR *"small group activity*")* AND (*manufacture** OR *produce** OR *assemble**) AND (*"South Africa"* OR *"Southern Africa"*))	8	0	N/A	None
2	To find articles about QCs/SGAs in any South African environment.	((*"quality circle*"* OR *"small group activity*"*) AND (*"South Africa"* OR *"Southern Africa"*))	1	1	1	None
3	To find articles about QCs/SGAs in any manufacturing environment.	((*"quality circle*"* OR *"small group activity*")* AND (*manufacture** OR *produce** OR *assemble**))	120	48	16	None

The single piece of literature that resulted from the second Building Blocks search for literature in Table 4 that is applied to the local context deals with the application of QCs in a hospital in the Eastern Cape province of South Africa (Mbovane, Mavundla & Roos, 2007). Although this study was conducted in a service industry, it appears to be the only published study of QCs in South Africa.

Pertaining to the literature search for MBAs: In some of the organisations where MBAs were implemented, a few employees referred to their MBAs as ‘work teams’, so it was decided to include the term ‘work teams’ as a synonym for MBAs in the literature search.

After performing the third search, however, it was discovered that most of the resulting articles were about self-directed work teams. Self-directed work teams and MBAs are different concepts and therefore self-directed work teams were excluded from this study. The primary difference between an SDWT and MBA is the fact that a SDWT does not have an appointed supervisor because the employees take over the responsibilities of the former supervisor, while an MBA team still has a supervisor. Therefore, the search was modified to exclude articles about self-directed work teams. Table 5 shows the synonyms that were used in the search for literature about MBAs and Table 6 shows the details of all the searches that were performed for MBAs by using the Building Blocks method.

Table 5: Synonyms that were used for key words during the literature search pertaining to MBAs

Basic concepts of research question:	Mini Business Activities	Manufacturing	South Africa
Synonyms:	Work Teams	• Producing • Assembling	Southern Africa

Table 6: Details of all the searches that were performed to find literature about MBAs using the Building Blocks method

No.	Aim of search	Search term used	No. of document results	No. of poten-tially useful docu-ments	No. of potentially useful documents that could be retrieved[2]	Filters used
1	To find articles about Work teams/MBAs in a South African manufacturing environment.	*(("work team*" OR "mini business activity*")* AND *(manufacture** OR *produce** OR *assemble*)* AND *("South Africa"* OR *"Southern Africa"))*	0	N/A	N/A	None
2	To find articles about Work teams/MBAs in any South African environment.	*(("work team*" OR "mini business activity*")* AND *("South Africa"* OR *"Southern Africa"))*	5	2	N/A	None
3	To find articles about Work teams/MBAs in any manufacturing environment.	*(("work team*" OR "mini business activity*")* AND *("manufacture*" OR "produce*" OR " assemble*"))*	183	See search No. 4 below	N/A	None
4	After noticing that most articles in the preceding search were about self-directed work teams (which is not what this study focuses on), the search was modified to exclude articles about self-directed work teams.	*(("work team*" OR "mini business activity*")* *AND* *("manufacture*" OR "produce*" OR " assemble*")* *AND NOT* *("self-directed work team*" OR "self-managed work team*"))*	143	2	N/A	None

2.1.3. Snowballing and serendipitous discovery

Additional articles that proved to be useful were discovered through snowballing and serendipitous discovery. Snowballing occurred when one article referenced another article that seemed to be useful. Serendipitous discovery occurred through two databases: Emerald Insight and ResearchGate. When an article was being retrieved from one of the two databases (Scopus redirects researchers to these databases when articles should be retrieved from them), the database would recommend other articles that were similar to the one being retrieved and that could possibly be useful. This recommendation was based on articles that were retrieved by other researchers in conjunction with the current article that was being retrieved. These recommendations were evaluated and when an article appeared to be potentially useful based on its abstract or title, it was retrieved as well. Some of the documents that were found through serendipitous discovery also included a limited number of theses and dissertations of other researchers. A total of 19 articles were discovered in this manner.

2.2. History of QCs

The concept of a QC was first created by Prof Kaoru Ishikawa in Japan in 1962 and in the same year, the first QC was created at a company named Nippon Wireless and Telegraph Company (Shireen, 2014). Prof Ishikawa shared this idea in the *Japanese Union of Scientist and Engineers journal* in 1962. According to Shireen (2014), the concept of QCs was implemented in 130 different countries between 1984 and 2014 and QCs are well established in Asian countries such as Japan, China, Taiwan and South Korea. India has also embraced the concept of QCs on a relatively large scale and the Quality Circle Forum of India was formed in 1982 and is encouraging QC activities throughout India (Shireen, 2014).During the 1970s Japan distributed products of a high quality to US markets which led to US organisations embracing QCs as a way to become as competitive as Japan. The first US organisation to implement a QC in 1974 was called Lockheed Corporation (Shireen, 2014).

The implementation of QCs in Japan and the US differed quite significantly (Lawler & Mohrman, 1985). In Japan, the employees usually met in their own time and a greater importance was associated to statistical quality control than in the United States. Further, all employees received some form of financial reward if the organisation performed well. In the US, however, employees met in the company's time and the type of activities that the QCs performed was expanded.

Table 1 provides a comparison between QCs, SGAs and MBAs. It is also necessary to take an in-depth look at the first type of improvement team activity that existed, namely QCs. Although each organisation implements QCs in a different way according to their needs and goals, the basic format of a QC is as follows (Marks et al., 1986; Shobharani, 2009):

1. Group size:
   A QC consists of a small group of employees. Researchers and experts differ slightly on the number of members that should be in a QC. Arumugham and Krishnaraj (2015) recommend anything from 5 to 10 members. According to Shobharani (2009), 8 to 10 members is the ideal number for a QC. Lawler and Mohrman (1985) suggest that a QC should typically have 6 to 12 members. The exact number of members is not of critical concern – as long as the groups are small enough so that everyone in the circle gets an opportunity to participate.

2. Membership:
   As mentioned in Table 1, the members of a QC do similar work or come from the same work area.

3. Goal:
   The original goal of a QC was to solve problems related to quality and productivity. This originated from Japan where the concept of QCs was invented and where 90% of Japanese QCs were focusing on quality, cost and productivity (Ledford et al., 1994).

4. Meetings:
   QCs meet on a regular basis. The number and length of meetings also varies from one organisation to another. Some groups meet every week for an hour (Marks et al., 1986; Shobharani, 2009; Arumugham & Krishnaraj, 2015), other QCs meet for two hours biweekly (Marks et al., 1986) and others will meet for a total of four hours at any time during a month (Lawler & Mohrman, 1985). Each organisation schedules its meeting times according to its own needs.

5. Participation:

   As mentioned in Table 1, participation in QCs is on a voluntary basis (Marks et al., 1986; Ledford et al., 1994; Arumugham & Krishnaraj, 2015).

6. Decision-making power:

   The authority to make decisions still lies with management. Management does not intervene in QC meetings although the members of the QC can decide to involve managers if they are struggling to find a solution to a specific problem. The suggested solutions are then presented to management who have the opportunity to either implement, modify or reject the proposed solutions (Arumugham & Krishnaraj, 2015).

7. Training:

   The members of a QC usually receive training in basic problem-solving techniques to assist them with the task of identifying, analysing and finding solutions to problems (Munchus, 1983; Arumugham & Krishnaraj, 2015). Some of these techniques include brainstorming, data gathering, creation of histograms, the generation of control charts (statistical quality control) and performing a Pareto analysis (Munchus, 1983, Arumugham & Krishnaraj, 2015).

8. Rewards and Compensation:

   Typically, there are no financial rewards, but circle members may get recognition for their contribution (Lawler & Mohrman, 1985). Employees are motivated to participate in QCs by the fact that QCs provide an opportunity for their voices to be heard (Kpakol & Okpu, 2018).

9. Extent to which information is shared:

   Usually, circle members do not have information about their organisation's long-term plans, costs or performance (Ledford et al., 1994).

2.3. Variations of QCs

Many organisations apply QC programmes (or something similar to QCs) and these programmes go by various different names. So, although an organisation might not specifically call their activities ‘Quality Circles’, these activities operate with more or less the same principles as QCs (O'Donnel & O'Donnel, 1984; Graban, 2014).

Some of the other names that are used for QCs include participation teams, employee involvement programmes, excel teams, ‘qualitivity’ teams, performance circles, employee participation groups and productivity teams (O’Donnell & O’Donnell, 1984). Other names include small group activities (Gyani, 1995), quality improvement teams (Gyani, 1995), shop floor improvement teams (Grütter, et al., 2002) and quality control circles (Blair & Ramsing, 1983; Abrahamson & Fairchild, 1999; Schonberger, 2007; Salaheldin, 2009; Hosseinabadi, et al., 2013; Blaga & Jozsef, 2014; Jin & Doolen, 2014).

According to Graban (2014), organisations in the US and other countries implement a programme called ‘A3 Problem Solving’ which is associated with a thought process that is equivalent to the thought process used in QCs. Graban (2014), and Namešanská and Markulik (2015) also describe QCs as operating similarly to the PDCA Cycle on a high level. PDCA stands for Plan, Do, Check, Act, and is an iterative cycle that assists its users with gaining more information in order to continuously improve a process or a product (The W. Edwards Deming Institute, 2016). This cycle is alternatively known as the PDSA cycle (Plan, Do, Study, Adjust), the Deming Wheel or the Deming Cycle (The W. Edwards Deming Institute, 2016). Some organisations deliberately let the members of their QCs use the PDCA cycle while other QCs do it automatically without labelling it as the PDCA cycle.

Many organisations made use of different names and acronyms for their variations of QCs (O’Donnell & O’Donnell, 1984). According to O’Donnel and O’Donnel (1984) two possible reasons for why organisations would deliberately implement QCs under a different name are:

1. The organisations want to create another name that would encompass additional goals of the programme instead of stressing quality considerations as the only goal.
2. The organisations prefer to distance the name of the programme from the Japanese origin.

Some researchers go so far as to suggest that organisations should not implement QCs in a classical, inflexible manner because that can limit the growth and development of the QC and its members. Instead, the suggestion is that each organisation should adjust and develop the QC philosophy according to its own needs (Dale & Lees, 1987).

As mentioned in Section 1.2, a number of industry visits in South Africa have indicated that some manufacturers in South Africa implemented different variations of QCs and that these variations were also given other names. Two of the prominent variations were called Small Group Activities (SGAs) and Mini Businesses (MBAs). These two variations also made use of the PDCA cycle, among other techniques, to guide their thought processes and activities. Although the improvement of quality was one of their goals, they focused on other goals and problems as well. Section 2.7 describes the two variations that were found in South Africa in more detail.

2.4. Are QCs a fad?

A number of authors refer to QCs as a fad that became a popular management technique only to die down later (Ledford et al., 1994; Dale, Elkjaer, van der Wiele & Williams, 2001; Gibson & Tesone, 2001). Dale et al. (2001) examined 36 literature articles dealing with QCs and found that 11% of the articles saw QCs as a fad. The rest of the papers viewed QCs as being on the boundary of a fad and a fashion. Dale et al. (2001) describe a fad as an idea that is normally new and that evolved in a vague and previously unspecified area. The proponents of the idea are enthusiastic about it at first, although they can lose interest quickly if the end results are not as successful as they had initially expected them to be. A fashion on the other hand, is described by Dale et al. (2001) as something that is new with little knowledge about it. The cost implications are much higher when implementing a fashion as opposed to the implementation of a fad. Implementing a fashion takes time, money and a significant amount of effort which means that a company will typically try a pilot study before implementing it throughout the whole organisation.

Lawler and Mohrmann (1985) suggested potential reasons for why QCs became so popular. Firstly, QCs were accessible, which made them convenient. Secondly, managers could easily implement a pilot programme to test the effectiveness of a QC programme. Seeing as it was not necessary for all employees in the organisation to be a part of the QC, there was relatively little risk attached to its implementation.

The pilot programme would then, as an example, entail the application of QCs in only one department of the organisation to see the effects before implementing QCs throughout the entire organisation. Thirdly, managers did not have to sacrifice their control seeing as the members of QCs did not have the authority to make decisions—only to make suggestions. This meant that managers could also easily terminate the programme if desired. Lastly, QCs could simply have been a way for management to demonstrate that they were taking part in modern participative management. The decision to implement QCs was also greatly affected by items in the popular press such as newspaper articles and television programmes.

A possible answer provided by the literature regarding the reason why QCs were not as successful in the US as in Japan (and why they were passed off as a fad as a result), was that they weren't correctly implemented in the US.

According to (Graban, 2014), QCs are still being successfully implemented in Japanese organisations and these organisations have managed to create a workplace where continuous improvement formed an integral part of the organisational culture and where quality is an activity for everyone to participate in—not just management or a quality department. The main priority of the Japanese organisations that were visited by Graban (2014), was to develop employees by teaching them problem-solving skills through QC activities. Financial results were only a second priority in Japanese organisations whereas US organisations' QC focus was mainly based on financial benefits, which could possibly be part of the reason why QCs were not that successful in the US.

Guthrie (1987) specifically investigated the causes of the failure of QCs at the Ford Motor Company in the US during the early 1980s and identified three main causes for their failure.

Firstly, trade unions opposed the QC programme because top management did not consult them before starting with implementation. The unions worried that QCs would interfere with existing structures and practices and that the QCs would eventually lead to job losses due to higher productivity of the workforce. The unions also suspected that management only implemented QCs for their own benefit and not the benefit of the workforce – this suspicion was enforced by management's decision to implement the QC programme during the economic recession which meant that employees were more likely to cooperate in the programme out of a fear of losing their jobs, rather than due to intrinsically motivated reasons, such as an interest in solving problems in their work areas.

Secondly, problems with middle and lower managers also proved to be an obstacle to the successful implementation of QCs (Guthrie, 1987). Middle and lower management felt like they were forced to implement QCs after being trained for only two days. This threatened the existing hierarchies and the control that they had over the workforce. There was also a fear of having their decisions criticised within the QC discussions. In some cases, this led to a lack of support for the programme and managers were reluctant to implement new ideas that sprouted from the QCs. This in turn caused employees to lose faith in the programme because little progress was being made. Some managers also thought that employees would use QCs as an excuse to waste time and that the employees weren't able to make valuable contributions.

Lastly, the workforce also disliked QCs due to the fact that management insisted that minutes needed to be taken at every meeting. They saw this as a sign of distrust from top management and they were therefore hesitant to be critical—something which reduced the effectiveness of QCs. Some of the employees found problem-solving concepts difficult to understand and also found communication difficult because the majority of them did not necessarily speak English as a first language. The workforce in the US was also considerably older than the workforce in Japan (the average age of a Japanese employee was 27 while the average age of an American employee was 40). Guthrie (1987) proposes that this difference in mean workforce age at least partly explained the hesitance of US employees to embrace the changes.

The Ford Motor Company case study provides an example of the typical problems that can be experienced by other organisations that are trying to implement QCs. According to Guthrie (1987), the failure of QCs at the Ford Motor Company was most likely due to a rudimentary misunderstanding of the essence and uses of QCs by top management.

Although some literature has passed QCs off as a fad, the basic principles of QCs still prove to provide a mechanism for making a significant contribution to an organisation. Other literature has shown that QCs are still being implemented today, even if they are named differently or have a slightly different design than QCs in their original form. As the next section will discuss, despite the criticism directed at QCs, it is still concluded that they can prove to be an effective way to increase employees' participation at the lowest level of the organisation and that QCs might make a significant contribution to organisations if implemented correctly. The successful implementation of QCs will be discussed next.

2.5. Previous successful implementation of QCs

As a counter-argument to the argument made in Section 2.4 stating that QCs are a fad, there are a number of studies in the literature that illustrate the successful implementation of QCs. This section shows that previous studies that found QCs to be successful were accurate with no bias present, and provides examples of the successful implementation of QCs.

2.5.1. Lack of a positive-findings bias

A study done by Barrick and Alexander (1987) to determine whether a positive-findings bias existed within the literature about QCs concluded that no such bias existed as long as only academic intervention research articles were considered and not articles from the 'popular press'. This is an indication that the reported positive outcomes of QCs were indeed proved in these studies without being affected by bias. It is therefore reasonable to conclude that the implementation of QCs can be valuable.

Barrick and Alexander (1987) further explain that the time period over which QCs are implemented as well as the unique attributes of the employees that voluntarily participate in the programme are factors that have a large influence on the successful implementation of QCs. The study found that the perceived gains only outweighed the perceived costs of implementing a QC after approximately four to eight months and it was recommended that managers use a long-term approach when implementing a QC programme (Barrick & Alexander, 1987).

2.5.2. A study of the overall success of QCs

The number of published articles that show that QCs can be implemented successfully outnumber the articles that argue that QCs are a fad.

A study done by O'Donnel and O'Donnel (1984) measured the effectiveness of QC programmes amongst 417 respondents from a variety of organisations (note that these programmes might have been given different names by the respondents).

The results indicated that 20% of respondents regarded their QC programmes to be extremely successful while 43% of respondents regarded the programme to be moderately successful. 7% of respondents felt that the effectiveness of their QC programmes was average, 2% felt that the effectiveness was poor and 4% felt that QCs were a failure. A total of 24% of respondents felt that it was too early to know whether their programmes were effective—this echoes Barrick and Alexander's (1987) findings on the time required before an organisation is likely to reap the benefits from implementing QCs.

Seeing as the majority of the responses from this study were positive (63% of respondents felt that their QCs were either moderately or extremely successful), there is merit in the conclusion that QCs can be efficient and successful if implemented correctly.

QASCO (Qatar Steel Company) is an integrated steel plant that was established in the Arabian Gulf in 1974 and employs approximately 1 250 employees (Salaheldin, 2009). It launched its first QCs in 1980 and has successfully implemented them for more than 30 years (Pollitt, 2010).

Since the initial implementation, QASCO has also gone the extra mile by hosting annual QC conferences to give recognition to the best-performing QCs and to prepare for the following year's QC implementation. QASCO has been an example of the successful implementation of QCs for decades—proving that QCs can be successful over the long term if they are implemented correctly.

A survey that was conducted by Salaheldin (2009) at QASCO revealed that the most important success factor for QCs is the support and dedication of top management. Commitment from the entire organisation is also highlighted as an important factor that can influence the success of QCs. Participants in the survey further agreed that a lack of training and education regarding QCs were the main reasons why QC projects failed—which is why QASCO was committed to training employees in order to improve quality. Overall, QCs have created a collaborative environment within QASCO and brought about plenty of positive outcomes such as increased productivity, higher quality, and improved management styles (Salaheldin, 2009).

QASCO is based in Qatar, which is an independent emirate in the Gulf region. Seeing as Qatar is a developing country in the Middle East, Salaheldin (2009) therefore concludes that the success of QCs is not only limited to developed countries, but that they can be successful in developing countries too.

Generally, there seems to be an agreement among various practitioners and academics that QC implementation can lead to a variety of positive outcomes. Some of the broad categories of the outcomes include an improvement in quality (Hunt, 1984; Shobharani, 2009; Jin & Doolen, 2014); an improvement in teamwork (Elvins, 1985; Jin & Doolen, 2014); an increase in employee involvement/engagement (Hunt, 1984; Manson & Dale, 1989; Jin & Doolen, 2014); employee growth (Manson & Dale, 1989; Jin & Doolen, 2014); financial savings (Hunt, 1984; Manson & Dale, 1989; Shobharani, 2009); increased problem-solving (Hunt, 1984; Manson & Dale, 1989); an increase in productivity (Marks et al., 1986; Buch, 1987; Shobharani, 2009; Jin & Doolen, 2014); improvement in attendance (Hunt, 1984; Marks et al., 1986; Buch, 1987); an improvement in turnover (Hunt, 1984; Buch, 1987); and an improvement in quality of work-life (QWL) as well as job satisfaction (Hunt, 1984; Elvins, 1985; Marks et al. 1986; Buch, 1987; Manson & Dale, 1989; Abrahamson & Eisenman, 2008; Jin & Doolen, 2014). A more detailed description of previous empirically measured outcomes of QCs is produced in Table 7 in Section 2.8.

In summary, sufficient evidence is presented in the literature to conclude that QCs can be effective as long as they are implemented correctly.

2.6. Factors that contribute to the success of QCs

According to Shireen (2014), the successful implementation of QCs depends greatly on the organisation's support and dedication toward the QC programme as well as on whether the organisation has sufficient knowledge about the implementation of QCs. Shireen (2014) also emphasises the fact that QCs have been effective in involving lower-level employees in the decision-making process—thereby increasing the productivity of an organisation as well as the employees' level of motivation.

O'Donnel and O'Donnel (1984) also make suggestions regarding the implementation of QCs:

1. Management's dedication to the programme and management style play a significant role in the success of QCs. Not only should the programme be supported by top management, it should also be supported by middle managers (in some cases middle managers withheld support from QCs because they felt intimidated).
2. Management on all levels should be thoroughly oriented with regards to QCs before implementation starts.

3. It is imperative that all parties involved in QCs should be trained effectively and thoroughly. This includes the training of the coordinator, the facilitators, the leaders of the groups, and the participants.

4. In order to embed QCs into the organisation's culture, the programme should be given enough time to run its course. Instant results should not be expected and a long-term mindset should be adopted.

As mentioned in Section 2.4, Guthrie (1987) suggested that the failure of QCs at the Ford Motor Company was most likely due to a rudimentary misunderstanding of the essence and uses of QCs by top management. Therefore, it is reasonable to suggest that top management should ensure that they have a complete understanding of QCs before attempting to implement them, and this coincides with the second suggestion made by O'Donnel and O'Donnel (1984) above.

2.7. QCs in a South African context

The amount of literature regarding the application of QCs in a South African environment is limited. As mentioned previously, the only piece of literature that related to South Africa that could be found discusses the application of QCs in a public hospital in the Eastern Cape province (Mbovane et al., 2007). Thus, only a single piece of evidence of the application of QCs in South Africa could be found and this implementation was in the service industry, which is not the industry that this study focuses on.

In the Mbovane et al. (2007) study, the effectiveness of QCs was measured and the results showed that involving employees in solving problems, as the QC programme had done, resulted in higher quality patient care in a public hospital in the Eastern Cape province of South Africa.

The reported benefits of QCs in the Mbovane et al. (2007) study were as follows: staff empowerment, improved teamwork, better problem-solving, improved relations between different departments, and an improvement of the maintenance of standards by nurses. Some challenges that were experienced with the implementation of QCs were the initial doubtfulness of the nurses, participants who perceived QCs to be a waste of time, a lack of collaboration regarding the dates and times that meetings should take place and a loss of focus during meetings. The article also concludes that a bottom-up approach should be taken to the quality improvement endeavour.

A review of the literature established that there were no other recorded instances of QC applications in South Africa. Therefore, it had to be established whether South African organisations implemented any other type of team improvement activity or programme that could be viewed as a variation of QCs.

As mentioned in the background of this study in Section 1.2., the two types of team improvement activities that were observed in a number of South African manufacturing organisations were called SGAs and MBAs. As discussed in Chapter 1, SGAs and MBAs are both variations of QCs which means that they have characteristics that are similar to those of QCs, but they are not identical to QCs. It was also found that, in some instances, the organisations implemented the SGAs and MBAs in combination with each other. A comparison of the characteristics of QCs, SGAs and MBAs was provided in Table 1 in Section 1.2.

The researcher acknowledges the fact that other types of team improvement activities could exist in South African organisations, but they were not included in the scope of this study because the researcher was able to identify a number of organisations who implemented MBAs in a similar way and that were willing to participate in the research. This directed the focus of the empirical study towards MBAs as an operationalisation of the QC concept that is found in a number of organisations operating in the South African manufacturing industry. The unsuitability of SGAs for inclusion in the empirical study was motivated in Section 1.3.1.

The literature does not specifically refer to SGAs and MBAs in the same manner in which they were found to be defined in the South African organisations that were visited as part of this research (and therefore for the purpose of this study), and synonyms for the terms SGAs and MBAs could also not be found in the literature.

2.8. Previous empirical studies of QCs

Previous empirical studies that were done on the outcomes of a QC programme have measured a large number of benefits that can be derived from the implementation of QCs. A summary of some of the empirical findings on the outcomes of QCs that are described in literature is provided in Table 7.

As seen in Table 7, a broad variety of potential outcomes of QCs have been studied empirically. Some of the organisationally relevant outcomes include improved quality, financial savings, and productivity. Outcomes that are particularly meaningful to employees include job satisfaction, opportunities for career advancement, and communication among employees. Some salient observations, based on the information presented in Table 7 include:

1. Various studies have found that QCs improve quality.
2. A number of studies have focused on the impact of QCs on various aspects of productivity, with most of the studies concluding that QCs improved productivity and the remaining studies finding mixed results. These studies operationalised productivity in a variety of ways: documentation outputs, production outputs, process outputs, material flow and a reduction in cycle time are all measures that were used to measure productivity in the various studies.
3. The impact of QCs on various aspects of quality of work-life such as job satisfaction and motivation has been investigated, with findings that were either positive or neutral.
4. A number of studies found that QCs could increase employee engagement and involvement.
5. A number of studies have measured the impact of QCs on employees' innovation (proactive thinking) and problem-solving abilities (reactive thinking). It was found that QCs can lead to innovation among participants. With regards to problem-solving, one study found that QCs increased problem-solving capabilities, while another study obtained neutral results.

Table 7: Previous empirically measured outcomes of QCs

Broad Category:	Outcome that was measured:	Sources:	Finding
Quality	Improved Quality	1. (Jin & Doolen, 2014) 2. (Shobharani, 2009) 3. (Hunt, 1984) 4. (Shobharani, 2009)	1. QCs improved quality. 2. QCs improved quality. 3. QCs improved quality. 4. QCs reduced number of customer complaints (thus increased quality).
Teamwork	Teamwork	(Jin & Doolen, 2014)	QCs improved teamwork.
	Relationships and cooperation	(Jin & Doolen, 2014)	QCs improved relationships and cooperation among team members.
	Gender interactions	(Buch, 1987)	QCs had no significant influence on gender interactions.
	Communication	(Elvins, 1985)	QCs increased intergroup and intragroup communication.
Employee Involvement/ Engagement	Employee Involvement and engagement	1. (Hunt, 1984) 2. (Jin & Doolen, 2014) 3. (Kpakol & Okpu, 2018)	1. QCs improved involvement. 2. QCs improved engagement. 3. QCs improved engagement.
Employee growth	Opportunities for advancement	(Elvins, 1985)	No correlation between QCs and advancement opportunities—mixed results on opportunity were found.
	Increased Knowledge	(Jin & Doolen, 2014)	QCs increased employees' knowledge.
Attendance	Absenteeism	1. (Marks et al., 1986) 2. (Buch, 1987) 3. (Hunt, 1984)	1. QCs decreased absenteeism significantly. 2. No correlation could be found. 3. No correlation could be found.
	Turnover	1. (Buch, 1987) 2. (Hunt, 1984)	1. QCs reduced turnover intent. 2. QCs reduced turnover/attrition.
Problem-solving and Innovation	Problem-solving	1. (Manson & Dale, 1989) 2. (Hunt, 1984)	1. QCs had no significant effect on problem-solving. 2. QCs increased problem-solving capabilities.
	Innovation	(Prester & Bozac, 2012)	QCs significantly lead to innovation.
Productivity	Productivity	1. (Marks et al., 1986) 2. (Buch, 1987) 3. (Jin & Doolen, 2014)	1. QCs increased productivity significantly. 2. The overall results obtained for productivity were varied. 3. QCs improved productivity.
	Documentation Outputs	(Jin & Doolen, 2014)	QCs improved and increased documentation outputs.
	Process Outputs	(Jin & Doolen, 2014)	QCs increased and improved process outputs.
	Material Flow	(Jin & Doolen, 2014)	QCs improved material flow in some instances.
	Reduction in cycle time	(Shobharani, 2009)	QCs caused a reduction in cycle time.
Quality of Work life and Job satisfaction	Motivation & morale	(Jin & Doolen, 2014)	QCs increased motivation.
	Grievances	1. (Buch, 1987) 2. (Hunt,1984)	1. QCs reduced number of grievances. 2. No correlation could be found.
	Job satisfaction	1. (Mohr & Zoghi, 2008) 2. (Shores, 1984) 3. (Hosseinabadi, et al., 2013) 4. (Marks et al., 1986)	1. QCs improved job satisfaction significantly. 2. QCs improved job satisfaction. 3. QCs improved job satisfaction significantly. 4. QCs did not necessarily lead to an increase in job satisfaction, but QCs could possibly have prevented a decrease in job satisfaction.
	Perceived individual power	(Elvins, 1985)	QC participation produced mixed results on perceived individual power and influence.
	Feelings of belonging	(Elvins, 1985)	No correlation—mixed results on feelings of belonging were found.
	Quality of Work Life perceptions	(Marks, et al., 1986)	QCs increased Quality of Work Life (QWL) overall (or at least prevented a decrease in QWL for participants).
Financial savings	Reduced Cost	1. (Shobharani, 2009) 2. (Hunt, 1984)	1. QCs reduced cost. 2. QCs reduced cost/ showed a very good Return on Investment (ROI).

2.9. Discussion of the literature

From the information provided in this paper, it was established that although some researchers and practitioners argue that QCs are a fad, there is a large amount of research that proves that QCs can have a multitude of positive outcomes if implemented correctly. It is also clear from the review that there are various different ways in which QCs can be applied and that organisations implement different variations of QCs under different names. Studies of the effects and outcomes of QCs in a South African context have been extremely limited with only one example being uncovered via the literature searches documented in this chapter. As mentioned in Section 1.2, providing for the fact that each country has a specific culture, languages and quality of education, it cannot necessarily be assumed that the results that were obtained from previous empirical studies on the effects of QCs in other countries will be applicable to a South African manufacturing context.

The fact that the US deviated from the traditional Japanese method of implementing QCs (Lawler & Mohrman, 1985), is an indication that the implementation of QCs is adapted according to the needs and environment of the specific country that the QCs are being applied in. Therefore, researchers and practitioners should be cautious when it comes to generalising the results that were obtained in one specific country to another country. To provide examples of contextual factors that may influence the impact of QCs in a specific environment, South Africa is compared to the two countries that are best known for their application of QCs—the US and Japan—in terms of a selected number of factors.

Although the US has no official language at the federal level, the language that is predominantly spoken in the US is English. Four out of every five Americans speak English as a first language and most people know how to speak English, albeit not their first language (American Academy of Arts and Sciences, 2016; CultureGrams, 2016). The fact that English is spoken as a first language by the majority of American citizens means that communication in the workplace is less likely to be an obstacle. Japanese is Japan's only official language (University of Queensland Australia, 2011), and nearly 99% of people in Japan speak Japanese as their first language (EU Business School, n.d.). Thus, is accurate to say that communication in Japanese work environments is fairly simple seeing as almost everyone speaks Japanese as their first language.

South Africa, on the other hand, has 11 official languages (Currie, 1998). Contrary to the situation in the US and Japan, there isn't a single language that is spoken by the majority of citizens as a first language. Zulu is the language that is spoken as a first language by the most households in South Africa, but it is only the home language to 22.7% of South Africa's population (Statistics South Africa, 2012).

Although only 9.6% of South Africa's citizens speak English as a first language, (Statistics South Africa, 2012), English dominates the South African education system (Davis, 2013). Davis (2013) reports that according to the 2012 South Africa Survey done by SAIRR's (South African Institute of Race Relations), 64% of South African school pupils (approximately 7.6 million out of 12.2 million pupils) opt to be taught in English despite the fact that only 7% (approximately 850 000) of them speak English as a first language. According to Thuthukani Ndebele, one of the SAIRR's researchers, this is an unsurprising trend in the South African public schooling system since it reflects a global trend in the preference of English as a language (Davis, 2013).

Davis (2013) further notes that English is also the 'language of power' in South Africa. English is the preferred language when carrying out parliamentary proceedings and the published record of parliament proceedings, called Hansard, is also published in English. Furthermore, addresses like the annual Budget Speech and State of the Nation Address that are of national importance are all delivered in English. A fluency in English (or sometimes, a fluency in English and Afrikaans) is also necessary in order to be able to participate in South Africa's formal economy and business (Davis, 2013). This also echoes global trends where English is the language of global corporatism (Davis, 2013).

Since most South African citizens communicate with each other in English—which is a language other than their home language—in the workplace, opportunities for miscommunication and misunderstandings arise. This means that the working environment in South African manufacturing organisations might differ significantly from the environments in Japan and the US seeing as the large variety of languages that are spoken in South Africa can potentially prove to be a meaningful obstacle.

Regarding the cultural environment, Blair and Ramsing (1983) warn against the application of QCs as a pure Japanese concept without considering the successful implementation of QCs in a different cultural environment. Blair and Ramsing (1983) warn that the US's workforce and culture differ from those of Japan and that this might cause QCs to be unsuccessful if they are not adapted to suit the American culture.

This echoes the findings of the study done by Guthrie (1987) that investigated the reasons why QCs failed at the Ford Motor Company in the US during the early 1980s. The same can be said for the implementation of QCs in South Africa, whose culture also differs greatly from the cultures in the US and Japan. Due to this cultural difference, it is also necessary to measure the effects of QCs in a South African environment to see whether the outcomes differ from the outcomes in the US and Japan.

The third reason why there is an interest in studying QCs (or a variation of QCs) in a South African manufacturing environment has to do with the different levels of the quality of education in South Africa, the U.S. and Japan. According to the World Economic Forum's (WEF) Global Competitiveness Report of 2016–2017, the quality of South Africa's primary schooling system is ranked as 126th out of 138 countries in the world, while the US and Japan's primary schooling systems are ranked at positions number 24 and 11 respectively (World Economic Forum, 2016). Further, the WEF ranks South Africa's secondary and tertiary education system as 134th out of 138 countries while the secondary and tertiary education systems of Japan and the US are ranked at 37th and 21st out of 138 respectively. Another fact to note is that South Africa's quality of math and science education was ranked to be the worst in all of the 138 countries that were included in the ranking.

The results obtained by the WEF show that the quality of South Africa's education system is significantly lower than those of the US and Japan—rendering South African employees with a lower level of education than their American and Japanese counterparts. In the absence of more detailed information on the quality of education in the manufacturing sector of each of these three countries, the quality of education in the population in general is taken as indicative of the quality of education amongst employees in the manufacturing sector specifically. Anecdotal evidence gathered during industry visits also revealed that some South African employees at manufacturing organisations have not had any formal education and therefore cannot read or write. This presents significant challenges with the implementation of QCs, especially when more advanced techniques such as statistical quality control has to be applied. These challenges limit the type and difficulty of problem-solving techniques that can be used in South African QCs and provides a possible reason for the fact that the implementation of QCs would differ between South Africa, Japan and the US. Therefore, results of previous empirical studies that were conducted in other countries might not be generalisable to South Africa.

2.10. Conclusion: Quality Circles

The objective of this literature review was to provide background information on the history and potential of successful implementation of QCs. From the background of QCs, it can be seen that QCs were first developed in Japan, and then spread to the US and later to the rest of the world. Most published articles deal with the implementation of QCs in either Japan or the US and there are a number of articles that argue that the QC concept is just a fad that will excite management at the onset but will eventually fade away. On the other side of the spectrum, there are articles that argue that QCs can lead to a large variety of benefits if implemented correctly. Some case studies also indicate that QCs can be successful over the long term if they are managed correctly over time.

The chapter also illustrated that organisations are implementing different variations of QCs. These variations were adapted to suit the needs of each individual organisation. The variations of QCs are also known by different names other than ‘Quality Circles’.

Further, this chapter aimed to investigate previous empirical studies that were conducted on QCs and the results of such studies. From the literature, it can be seen that a large variety of outcomes of QCs have been measured empirically. These outcomes were categorised by the researcher into seven main categories, namely: productivity, quality, teamwork, employee involvement/engagement, financial savings, quality of work-life/job satisfaction, attendance and problem-solving.

Research on the outcomes of QCs in a South African context is sparse. Due to cultural, language and educational differences between countries, it cannot necessarily be assumed that the results that were obtained in a specific country will be applicable to South Africa. In the next chapter, a model is developed that can be used to conduct empirical research on the impact of one of the variations of QCs that were observed in a South African manufacturing environment, namely MBAs, on a selected number of outcomes.

CHAPTER 3: MODEL DEVELOPMENT

The aim of this chapter is to provide a detailed description of the outcome variables that are selected to be measured in this study and a comprehensive motivation for their selection. Thereafter, a description of the model that is developed for the empirical study is provided. The chapter continues by theorising about the model and motivates why the independent variable is predicted to have an impact on the dependent variables. A set of hypotheses that are based on the model are presented during the theorising. Furthermore, the chapter briefly touches on the demographic variables that are measured and then concludes with a summary.

3.1. Variables selected for measurement

The outcome variables that are selected for measurement in this study are: team effectiveness, job satisfaction and innovation. Employee engagement is selected as a mediator between the independent variable, MBAs, and the outcome variable, job satisfaction.

Table 7 in Section 2.8 provides a summary of previous studies that were observed in the literature that measured the outcomes of QCs. The outcomes that were measured in previous studies were broadly categorised into seven categories, namely: quality, teamwork, employee involvement and engagement, employee growth, attendance, problem-solving, productivity, quality of work-life and job satisfaction, and financial savings.

As seen in Table 7, one of the selected outcome variables for this study—job satisfaction—has been empirically measured in previous literature (Shores, 1984; Marks et al., 1986; Mohr & Zoghi, 2008; Hosseinabadi et al., 2013). Empirical studies that measured the other outcome variables in this study, namely team effectiveness and innovation, could not be found in literature.

In Table 7 it can also be observed that the mediator in this study, namely employee engagement, has also been included in previous empirical studies relating to QCs (Jin & Doolen, 2014; Kpakol & Okpu, 2018), although those studies included team effectiveness as an outcome variable instead of a mediator. A comprehensive motivation for the selection of each variable to be measured in this study is provided in the remainder of this section.

3.1.1. Team effectiveness

Labour productivity is described by the Organisation for Economic Co-operation and Development (OECD) as an important aspect of economic performance and is also a significant influencer when it comes to changing living standards (OECD, 2018). Data provided by the OECD indicated that, comparatively, the South African workforce is underperforming in terms of productivity (OECD, 2018) and it is therefore reasonable to conclude that there is room for improvement for the South African workforce in terms of their performance.

Although there is a lack of an established set of outcome measures when it comes to productivity research (Wheelan, Murphy, Tsumura & Kline, 1998) one frequently used quantitative measure of the productivity of labour is to measure the GDP (Gross Domestic Product) per hour worked (OECD, 2018).

Figure 2 shows a comparison of the typical GDP per hour worked for a selection of countries. It is an indication of how efficient the combination between labour input and various other factors of production are, and of how well labour is utilised within the production process. The labour input that was used to calculate this indicator consisted of the total number of hours worked by all the individuals who are involved in production. The presence or utilisation of other inputs can, of course, also affect the ratio between the production output and the labour input. Examples of such additional inputs include economies of scale, capital, technical, organisational and efficiency change and intermediate inputs such as energy and materials (OECD,2018). The currency that was used to measure the indicator in Figure 2 is United States Dollars.

Figure 2 shows that South Africa had a GDP of $101 per hour worked in 2014 and that it fell into the lower-performing section of the graph when compared to other countries. Note that data for 2014 was used since it is the newest data that was available for South Africa specifically.

As summarised in Table 7, previous studies have shown that QCs can improve team performance by improving productivity in an organisation (Marks et al., 1986; Jin & Doolen, 2014). Since productivity is an area of concern in South Africa, it would be valuable to determine whether MBAs that are implemented in South African organisations have the same positive impact on team performance as QCs have been shown to have in previous studies conducted outside of South Africa.

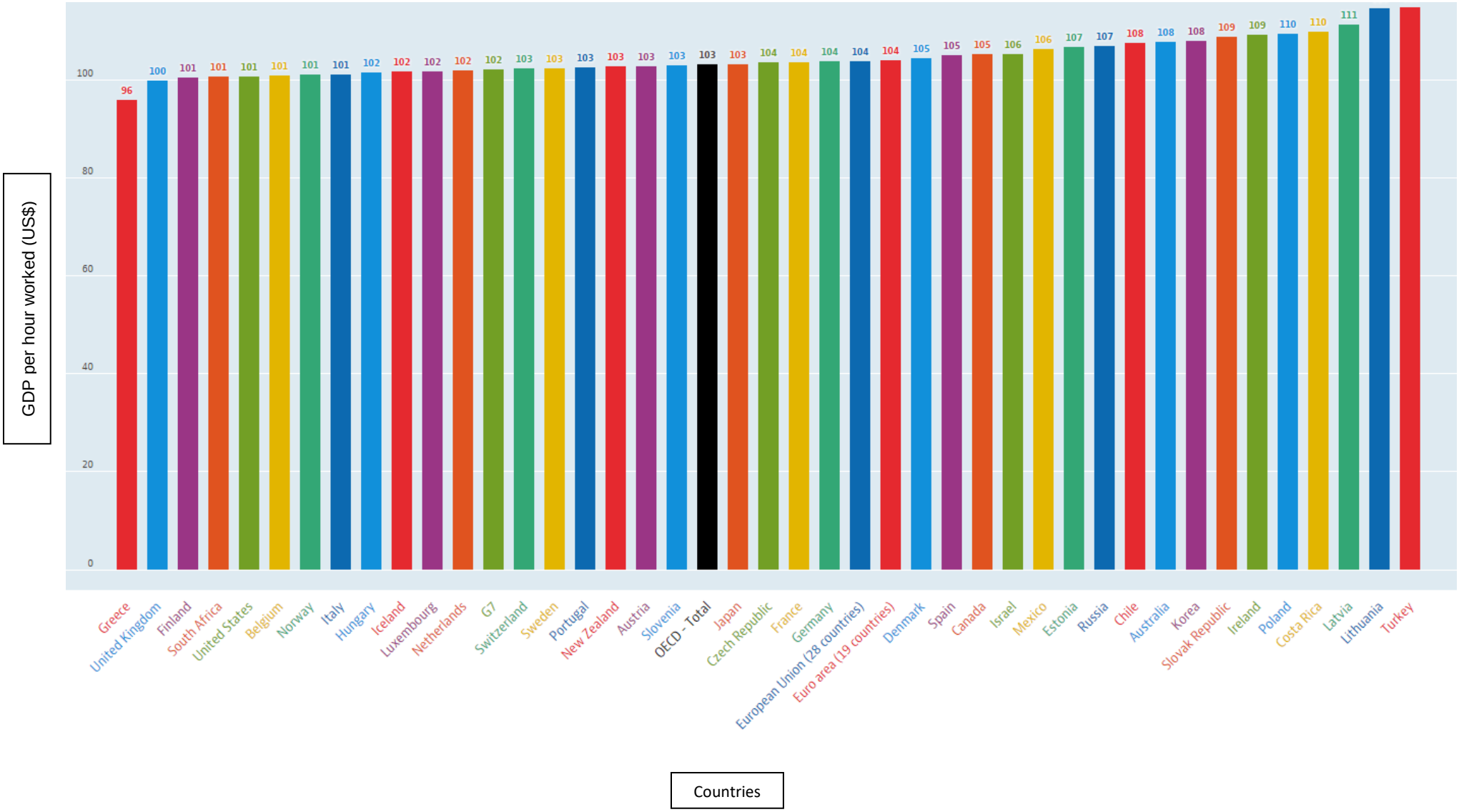

Figure 2: GDP per hour worked per country for 2014. (Source: OECD, 2018.)

In this study, however, the use of a single quantitative measure for productivity among the observed organisations could possibly lead to an inaccurate representation of their performance. For example, one of the organisations that participated in the study has a regular shortage of the parts that are required to produce their products. This causes the teams to be idle while they are waiting for the parts to arrive from external suppliers. The problem is so severe that sometimes, the teams will wait for parts for several days. A comment that was observed at this specific organisation was as follows: "We did not have any work to do today because we are still waiting for parts." It would therefore be inaccurate to attempt to establish whether MBAs have an impact on productivity at this organisation by merely measuring the extent to which MBAs are utilised in each team and correlating this to the productivity of each team, as the unavailability of spare parts would effectively block any productivity at all and this cause of low productivity is presumably out of the team's control.[4]

Other factors such as the differing nature of the products that are manufactured (including their economic value) and the different production processes at the various organisations also add complexity. Some of the organisations included in this study manufacture products with a short lead time, while others manufacture products that could, in some instances, have a lengthy lead time of up to two years due to the specialised nature of the products that they produce. Thus, to define the GDP that is produced per hour of labour as the productivity measure to be used in this research to determine team performance would generate results that could not accurately be compared between the different organisations that are included in the research. Wheelan et al. (1998) propose the use of a qualitative measure of team performance and productivity as an acceptable alternative to a quantitative measure in cases where a quantitative measure will not suffice.

Therefore, in order to measure the performance of the teams in such a way so that all teams would be measured with the same scale, it was decided to use a qualitative measure instead of a quantitative measure. By following the example of Campion, Papper and Medsker (1996), Barrick, Stewart, Neubert and Mount (1998), Doolen, Hacker and Van Aken (2003), Hoegl, Parboteeah and Gemuenden (2003), and Lim and Klein (2006), team effectiveness was selected as a qualitative measure of the teams' performance in this study. Thus, team effectiveness was selected as the first outcome to be measured in this study.

[4] One may argue that the unavailability of parts is a good example of an issue that a QC or MBA may address; however, given the number of teams that are included in this research, it is not feasible to establish the veracity of a statement such as this on a team-by-team basis.

3.1.2. Job satisfaction

The Labour Market Intelligence Partnership is a partnership that was established between a national research consortium and the South African Government. It aims to create a trustworthy institutional structure to aid with skills planning in South Africa (Labour Market Intelligence Partnership, 2012).

In a recent study, the Labour Market Intelligence Partnership reported that a large proportion of low-wage workers in South Africa were dissatisfied with their jobs (Mncwango, 2016). Similarly, a case study done by Mapadimeng (2006) also reported high levels of discontent among workers in South African factories.

Thus, there is evidence of challenges related to job satisfaction in South Africa—especially in the low-wage worker category. Various previous studies have indicated that QCs could lead to some form of increased job satisfaction or an improvement in the perceived quality of work (Marks, et al., 1986; Lees & Dale, 1988; Gibson & Tesone, 2001; Arumugham & Krishnaraj, 2015). It is reasonable to suspect that variations of QCs (such as MBAs) will also have an influence on the job satisfaction of low-wage workers.

An investigation of the research topics of the journal articles that were recently published in South African management journals[5] (between 2015 and 2017) was performed to identify which of the research topics relate to those that appear in Table 7 are the most salient in recent local research.

It was found that job satisfaction was the topic that occurred third-most of all the possible topics that were related to this study. This affirms that job satisfaction is a salient topic in Southern African management research, and therefore, job satisfaction was included as a variable in this study.

[5] The South African journals that were taken into consideration are: *SA Journal of Human Resource Management, The Southern African Journal of Entrepreneurship and Small Business Management, South African Journal of Economic and Management Sciences, South African Journal of Business Management, Journal of Contemporary Management*, and the *South African Journal of Labour Relations.*

3.1.3. Innovation

According to a report released by the World Bank called the South Africa Economic Update, South Africa is falling behind its market peers and other international technological and knowledge frontrunners when it comes to innovation (Dessus, Goddard & Hanusch, 2017). According to Dessus et al. (2017), the lack of innovation efforts by private firms are a crucial factor that contributed to a reduction in South Africa's economic growth in 2017. Dessus et al. (2017) further argue that in order for South Africa to remain economically competitive and to reduce poverty, the country's untapped potential for innovation should be utilised.

During exploratory conversations on the use of MBAs, the participating organisations in this study expressed their goal that the MBAs would cultivate a forward-thinking and innovative workforce by making it compulsory for team members to make a specific number of suggestions per year. Measuring whether MBAs do indeed encourage proactive thinking (through innovation) instead of only reactive thinking (through problem-solving) could provide some valuable and interesting findings, and therefore, team innovation was selected as the third outcome variable to be tested in this study.

3.1.4. Employee engagement

An investigation of the research topics of articles that were recently published in South African management journals[5] that related to the topics of previous studies regarding the outcomes of QCs found that employee engagement was the most-researched topic of all. This is a good indication that employee engagement is a topic of interest and concern in South African management research.

Results from the *State of Employee Engagement in South Africa* survey that was conducted by Public Display Technologies indicated that there was a decrease in the employee engagement of the South African workforce (Public Display Technologies , 2015). The survey also indicated that at least 42% of employees were not motivated to bring about any change in their workplace.

A previous study on the outcomes of QCs has indicated that QCs can increase employee engagement (Jin & Doolen, 2014). Therefore, this study sought to empirically determine whether MBAs can accomplish the same in a South African manufacturing environment.

3.2. Model that was studied

To measure the implementation and effects of MBAs in a South African manufacturing environment, a model was constructed to be tested empirically. This model can be seen in Figure 3. The model consists of one antecedent (the maturity levels of MBAs), three outcomes (team effectiveness, job satisfaction and innovation), and one mediator (employee engagement).

Three aspects of team effectiveness (team performance, quality of group experience and team viability) as well as three aspects of employee engagement (vigour, dedication and absorption), were measured. Only one score was obtained for each of the remaining variables in the model (MBAs, job satisfaction and team innovation). The measurement of each variable in the model is discussed in more detail in Chapter 4.

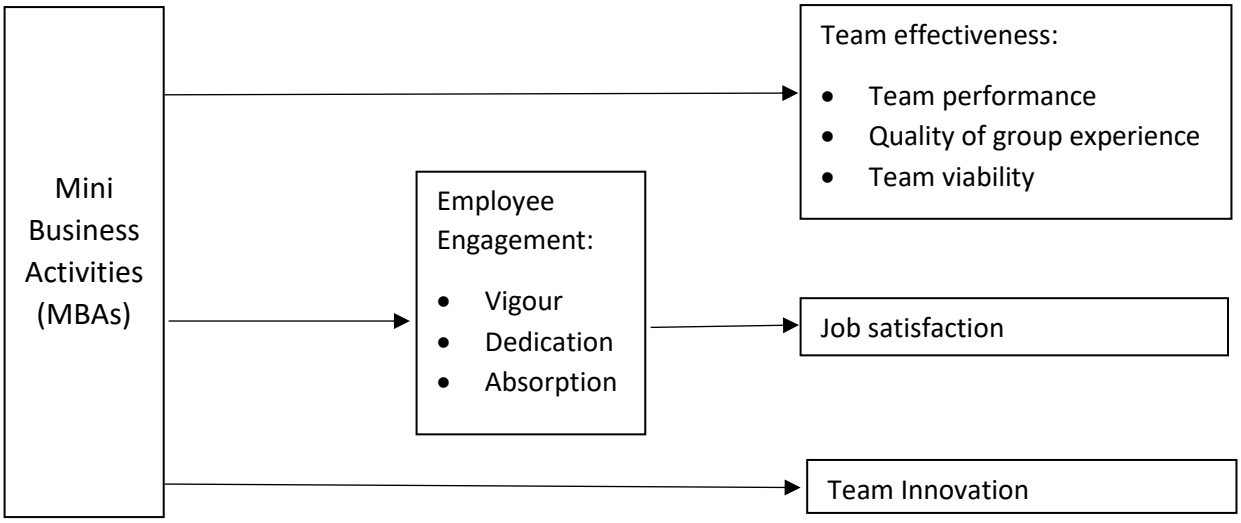

Figure 3: Model that that was used in the empirical study to test the impact of MBAs

3.3. Theorising and hypotheses

The rationale for selecting the outcomes to be tested was presented in Section 3.1 and the model that is to be tested is presented in Section 3.2. This section provides the hypotheses that will be tested in order to evaluate the model presented in Figure 3. The rationale for the structuring of each segment of the model in Figure 3 is presented in Sections 3.3.1 – 3.3.3 by motivating from theory why specific correlations are expected. The hypotheses that will be tested as part of this study are presented as part of the discussion of each segment of the model.

3.3.1. Outcome 1: Team effectiveness

MBAs are expected to have a positive impact on team effectiveness. Aubé and Rousseau (2005) described team effectiveness as consisting of three different elements, namely:

- team performance;
- quality of group experience; and
- team viability.

The first element of team effectiveness, team performance, is defined as reaching assigned goals, producing good quality work, and attaining high levels of productivity (Aubé & Rousseau, 2005). When considering each of these elements of team performance separately, MBAs are expected to contribute to the successful attainment of each of them.

MBAs are expected to contribute to the attainment of goals seeing as the MBA meetings provide an opportunity for employees to clarify goals, discuss obstacles that prevent goal attainment and to reflect on past goals in order to learn from previous mistakes or successes.

MBAs are also expected to assist teams in producing good quality work since matters pertaining to quality are discussed during MBA meetings. In some instances, posters with instructions on how to perform specific tasks in order to ensure better quality are also put up on the MBA meeting room's wall, which also contributes to the production of good quality products.

Furthermore, MBAs are expected to improve productivity because the MBA meetings provide an opportunity for employees to discuss problems relating to productivity and to make suggestions for improvements. MBAs also contribute to productivity as teams get feedback on their previous day's levels of production during MBA meetings. This makes employees conscious of increases or decreases in productivity. Thus, MBAs are expected to have an overall positive impact on team performance, one of the elements of team effectiveness, by positively impacting goal attainment, quality of work and productivity of teams. Previous studies regarding the implementation of QCs have found that QCs contributed to an increase in productivity (Marks et al., 1986; Shobharani, 2009; Jin & Doolen, 2014), and since MBAs is a variation of QCs, it is reasonable to expect MBAs to have a similar positive effect on productivity.

The second element of team effectiveness, namely quality of group experience, is defined as the extent to which the social climate is positive within the team (Aubé & Rousseau, 2005). A study done by Jin and Doolen (2014) indicated that the implementation of QCs had the potential to improve the social climate within a team by improving the rating of relationships between team members by 72% and by improving the rating of cooperation between team members by 68%. In the same way that QCs were able to improve the social climate in the Jin and Doolen study (2014), MBAs as a variation of QCs, are expected to have a positive impact on the social climate within a team and therefore the quality of the group experience.

It was further observed that the MBA meetings at the participating organisations provided an opportunity for employees to resolve any conflict amongst themselves. During conflict resolution discussions, the FLM acts as a mediator between the two conflicting parties. Sometimes, if an FLM and the team struggle to effectively resolve conflict, the senior manager is invited to attend the MBA meeting in order to act as a mediator between the two parties. Through conflict resolution amongst team members, MBAs contribute to a positive social climate within the team and are therefore expected to have a positive impact on the quality of the group experience.

The third element of team effectiveness, team viability, is defined as the team's ability to adapt to external and internal changes and the likelihood that team members will continue to work together in the future (Aubé & Rousseau, 2005). MBAs are likely to increase a team's viability since they provide a platform for team members to ask questions and to communicate any concerns regarding changes within the organisation or team.

A study was done by Marks et al. (1986) on the impact of QCs at an organisation that was undergoing significant restructuring. This restructuring was a surprise to employees and there was a feeling of concern and doubtfulness, because employees felt that the consequences of the restructuring had not been properly communicated. During that time, QCs provided emotional, social and informational support to QC participants. A study done by Jin and Doolen (2014) also reported an increase in solidarity among team members in a QC.

In the same way that QCs provided a support system to participants in the study done by Marks et al. (1986) and increased a sense of solidarity among team members in the study done by Jin and Doolen (2014), MBAs also have the potential to provide a support system to employees in the face of changes and increase solidarity among employees by being a source of information and emotional support. The emotional and informational support that MBAs provide also have the potential to make it easier for employees to work together as a team in the future.

Thus, by impacting the three elements of team effectiveness (team performance, quality of group experience and team viability) as defined by Aubé and Rousseau (2005), MBAs are likely to impact team effectiveness as a whole.

The scale that was used to measure team effectiveness is discussed in Section 4.3.4. On the team managers' and employees' questionnaires, team effectiveness is measured with a scale which divides team effectiveness into the three elements namely: team performance, quality of group experience, and team viability (Aubé & Rousseau, 2005). On the other hand, team effectiveness is measured with a global scale on the senior manager questionnaire which does not divide team effectiveness into three elements but instead provides a holistic evaluation of team effectiveness.

The senior managers' responses will be used to evaluate the hypothesis in order to reduce the influence of common method bias caused by social desirability (which is discussed in Section 4.3.2). The team managers' and employees' responses will merely be compared to the senior managers' responses as an interesting addition to the study. Since the senior manager responses will amount to a single evaluation of team effectiveness, a single hypothesis was constructed:

H1: The implementation of MBAs improves team effectiveness.

3.3.2. Outcome 2: Job satisfaction

From the summary of previous empirical studies that investigated the relationship between the implementation of QCs and job satisfaction in Table 7, it can be seen that a theoretical basis for investigating the implementation of QCs as an antecedent for job satisfaction is well established.

Since it was difficult to understand how QCs (and therefore MBAs) could directly lead to an increase in job satisfaction, elements that could possibly act as a mediator between QCs and job satisfaction were investigated.

One such possibility for a mediator between QCs and job satisfaction is employee engagement. A number of previous studies have investigated the effect of employee engagement on job satisfaction. One particular study that investigated the mediating role of employee engagement between job satisfaction and other antecedents found that employee engagement had a significantly positive influence on job satisfaction, thereby confirming that employee engagement can have a mediating effect on job satisfaction (Biswas & Bhatnagar, 2013). Biswas and Bhatnagar (2013) suggest possible reasons for this positive relationship: employees find their work more motivating and satisfying when they experience a specific level of engagement, and this causes them to see their work and workplace as something enjoyable. As a consequence, they experience more satisfaction with their job. Other studies also found that employee engagement had a positive and significant impact on job satisfaction (Saks, 2006; Kamalanabhan, Prakash Sai & Mayuri, 2009).

In order for employee engagement to play a mediating role between QCs and job satisfaction, it had to be proved that QCs have an effect on employee engagement. A study done by Jin and Doolen (2014) found that QCs can have a positive effect on employee engagement. Another study found that QCs had a significant and positive relationship with employee engagement (Kpakol & Okpu, 2018). Kpakol and Okpu (2018) suggest that QCs improved employee engagement because QCs provided employees with an opportunity to be involved in the decision-making process, created feelings of belonging, and acted as a motivating factor to employees because they experience a sense of being valued and being heard.

In a similar fashion, MBAs also encourage employee involvement in the decision-making process by providing employees with an opportunity to make suggestions and implement them. MBAs can also possibly contribute to a sense of belonging within the team, because each MBA has its own team name, its own designated meeting area, and the names and photos of all of the members of the MBA are placed on posters inside the MBA meeting area. Similar to QCs, MBAs can also be a source of motivation to employees. This is achieved by providing a platform where team members can raise concerns, make suggestions, ask questions and solve problems.

Thus, given that the antecedent (QCs) in previous studies was expected to increase employee engagement and engagement has been found to predict job satisfaction, it is possible that employee engagement mediates the relationship between QCs and job satisfaction. Therefore, for this present study, the impact of MBAs was modelled to be similar to that of QCs: MBAs were modelled as the antecedent, employee engagement as the mediator and job satisfaction as the outcome. This positioning can be seen in Figure 3.

Schaufeli and Salanova (2007) opine that engagement consists of three facets, namely:

- Vigour;
- Dedication; and
- Absorption.

Each of these elements of engagement is assessed individually in this study. Thus, a separate hypothesis was constructed for each facet, and each of the facets is measured individually in the measurement scale. The measurement scale that was selected for engagement is discussed in Section 4.3.6.

The following hypotheses were formulated:

H2a: The implementation of MBAs improves overall job satisfaction within the team.

H2b: Vigour (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

H2c: Dedication (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

H2d: Absorption (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

3.3.3. Outcome 3: Team innovation

A study done by Prester and Bozac (2012) found that QCs can lead to innovation and the launching of new products within organisations. Prester and Bozac (2012) postulate that the innovation that is caused by QCs is due to the team being focused on a specific task and motivated to complete the task successfully.

Since MBAs are a variation of QCs, it is reasonable to expect that MBAs will lead to innovation among employees in the same way that QCs can lead to innovation.

Innovation is defined by West and Farr (1989) as “the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit role performance, the group, the organization or the wider society.”

As mentioned in Section 1.2, MBAs require each of the team members to come up with a specific number of improvement ideas each year. The reasoning behind this requirement is the fact that management hopes that it will cultivate MBA members who are constantly coming up with innovative ideas. When team members in an MBA are expected to intentionally think creatively and innovatively, it is reasonable to expect that MBAs will lead to an increase in team innovation.

Measuring whether MBAs are successful in encouraging proactive thinking through innovation could provide some valuable and interesting findings. Modelling MBAs as antecedents to team innovation will contribute to the limited understanding of the relationship between MBAs and team innovation.

This leads to the following hypothesis for the effect of MBAs on team innovation:

H3: The implementation of MBAs improves team innovation.

3.4. Demographic variables

In order to provide a typical profile of the respondents that participated in the study, the following demographic variables are measured:

1. Age;
2. Gender;
3. Level of education;
4. Home language;
5. Duration of employment at current workplace;
6. Duration of membership of current team; and
7. Duration of dyadic relationship (in other words, for how long has the team manager been managing the team).

3.5. Conclusion: Model development

This chapter provided an explanation of all the outcome variables that are selected for measurement in the study and the motives behind their selection. Thereafter, the model that is to be tested in this study was presented in Figure 3. The chapter then continued to explain the construction of the model. MBAs are positioned as the antecedent. Team effectiveness, job satisfaction and team innovation are positioned as outcomes. Employee engagement is positioned as the mediator between the antecedent and job satisfaction and it is the only mediator in the model. No moderators were included in the model. The chapter concludes by listing the demographic variables that are measured in order to provide a typical profile of the respondents that participated in the study.

The next chapter discusses the details of the study design: the type of study, data characteristics, how each variable was measured, the research instruments that were used, how data was stored, ethical considerations, and the limitations of the study.

CHAPTER 4: STUDY DESIGN

This chapter discusses the study design in detail. It starts by identifying the classification of this type of study and by identifying the characteristics of the data that was used in the study. Then, the research instruments that were used in the study are discussed. A discussion of the measurement scales that were used for each variable is included in this discussion. The administration of the questionnaire and the ethical considerations are also touched upon. Thereafter, the limitations, delimitations and assumptions of the study are discussed.

4.1. Type of study (Research Design)

As discussed in Chapter 1, this study is classified as non-experimental, hypothesis-testing research. It was conducted as a field study by collaborating with partnering manufacturing organisations that were implementing MBAs in South Africa. A notable weak point of correlational designs as well as the approach that is followed in this research in order to mitigate the weak point was discussed Section 1.4.

4.2. Data characteristics

Qualitative data was used in this empirical study.[6] A survey was used to gather the qualitative data for the outcome variables by distributing a questionnaire to employees, their team managers (in a manufacturing context, the FLMs were regarded as the team managers) and their senior managers (the person whom the FLM reported to was regarded as the senior manager).

[6] In the aim and objectives defined in Section 1.3.2, it was noted that the constructs in the empirical study could be measured using either qualitative or quantitative data. All of the constructs that are included in the empirical model described in Chapter 3 can, however, be appropriately measured using qualitative data.

The data for the predictor variable (MBAs) was acquired directly from the organisations that participated in the study. A representative of each organisation scored the MBAs with a rubric. More detail regarding the survey design can be found in Section 4.3.1 and the administration of the questionnaire is discussed in Section 4.3.8.

4.3. Research Instruments

A rubric was used to measure the independent variable, namely MBAs. A questionnaire was used to measure the outcome variables and the mediator. These two research instruments are discussed in the rest of this section.

4.3.1. Questionnaire design

This study used a survey mechanism to collect data for each outcome variable. Table 8 provides a summary of how the constructs were measured in this study by indicating the source of the measurement scale that was used and the different groups of respondents that were surveyed for each construct.

Table 8: Construct measurement: Scale source and data source

Construct	Scale source	Parties that were surveyed		
		Employee	Team manager	Senior manager
Model Variables				
Team effectiveness	(Aubé & Rousseau, 2005); (Campion, Papper & Medsker, 1996)	x	x	x
Job satisfaction	(Brayfield & Rothe, 1951)	x		
Employee engagement	(Schaufeli, Bakker & Salanova, 2006)	x		
Team innovation	(De Dreu & West, 2001)		x	x
Control Variables (Demographic variables)				
Age	Not applicable.	x	x	x
Gender		x	x	x
Level of education		x	x	x
Home language		x	x	x
Duration of employment.		x	x	x
Duration of membership in team.		x		
Duration of dyadic relationship.			x	x

In order to be confident in the credibility of the findings obtained from the questionnaires, the reliability of the selected measurement scales had to be determined (Welman, et al., 2005). According to Welman et al. (2005), the reliability of a measurement scale refers to the "extent to which the obtained scores may be generalised to different measuring occasions, measurement/test forms, and measurement/test administrators."

The internal consistency method was used to test the reliability of the measurement scales selected for this study by calculating a Cronbach's alpha coefficient value for each scale. Internal consistency refers to the degree of generalisability across the different questions (items) in a measurement scale (Welman, et al., 2005).

Thus, if a participant provides high scores for a few of the items on a measurement scale, there is a good chance that the participant will provide high scores for the remaining items on the scale as well.

If the internal consistency of a measurement scale is high, it implies that there is a high degree of generalisability. According to Tavakol and Dennick (2011), the internal consistency "describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test."

The Cronbach's alpha coefficients (α) were calculated by using the SPSS software package's built-in function for calculating Cronbach's alpha. Cronbach's alpha is a calculated number between 0 and 1 and a higher number represents a higher internal consistency. Sources differ on what constitutes a good value for α, but generally, sources recommend a value of 0.7 or higher (Altman & Bland 1997; DeVellis, 2003; Kline, 2005). In Section 4.3.4 to Section 4.3.7, each measurement scale that was selected is presented and the Cronbach's alpha coefficient value that was calculated for each measurement scale is reported during the discussion of the measurement scale at hand. The complete questionnaires are included in Appendix A.

4.3.2. Common method bias

Common method bias (also referred to as common method variance) is the variance in the data that can be ascribed to the way in which the construct was measured, instead of the construct itself (Podsakoff, Mackenzie, Lee & Podsakoff, 2003). Common method bias can potentially be problematic in behavioural research, since it could produce misleading conclusions if not accounted for in the study (Podsakoff et al., 2003). Podsakoff et al. (2003) assert that the elimination of all forms of common method bias may be impossible, but recommend that researchers should aim to limit the possibility of common method bias as far as possible.

There are various types of common method bias that can occur, but one of the most important types of common method bias is when the measure of the predictor variable (antecedent) and the outcome variables are obtained from the same party (Podsakoff et al., 2003). This type of common method bias is referred to by Podsakoff et al. (2003) as 'common rater effects'. Methodological separation (different data sources) was used in order to keep the risk of common rater effects to a minimum in this study by collecting data for the antecedent and outcome variables from different parties.

Data for the outcome variables were obtained from three different types of sources namely: the members of the teams (also referred to as the first-line workers or employees), their team managers (also referred to as the FLMs) and the persons to whom the team managers report (senior managers or supervisors).

The scores that were collected for the predictor variable, the MBAs, were obtained from individuals who were not a first-line worker, a team manager or a senior manager. The individuals who were responsible for providing the scores for the MBAs were typically those who were responsible for the implementation of 20 Keys within the organisation (such as the 20 Keys Officer) or who were responsible for driving general improvement initiatives within the organisation. Although the MBA raters worked closely with the teams, the team managers and the senior managers, they did not form part of any one of those three groups. Therefore, the measures of the predictor variable and the outcome variables were obtained from different sources, which eliminates the variance of common rater effects.

Another type of common method bias that was accounted for in this study, is called 'social desirability' (Podsakoff et al., 2003). Podsakoff et al. (2003) describe social desirability as the phenomenon where respondents attempt to portray themselves favourably, regardless of how they truly feel about a question. In this study, for example, this could be problematic if the employees are asked to measure two of the constructs, effectiveness and innovation, for their team. There is a possibility that a team member might want to portray his or her team in a good light, because they fear that if a team is shown to be underperforming, that their individual performance within the team might be questioned as well. This type of common method bias can cause employees to provide inaccurate answers to survey questions and ultimately lead to inaccurate conclusions in this study.

To mitigate the effect of common method bias that is caused by social desirability, only the responses that were provided by the senior managers are used to draw conclusions in this study for team effectiveness and team innovation. The responses that were provided by employees and team managers regarding these two constructs are compared with the responses provided by the senior manager for interest's sake, but ultimately the senior managers' responses will be used since they have the ability to provide the most objective answers regarding team effectiveness and team innovation. This is similar to the approach used by Ashworth (2007), where the responses provided by the external managers were used for drawing conclusions and the responses provided by their subordinates were only used for comparison.

It is unlikely, however, that external parties such as supervisors would be able to provide accurate measures for the remaining two constructs in this study (employee engagement and job satisfaction) since these are, to a great extent, related to each individual team member's attitude. An individual's behaviour does not always reflect the individual's attitude (Podsakoff et al., 2003), and therefore it is more appropriate for the employees to provide self-reports of their engagement and job satisfaction levels.

To further reduce the influence of common method bias caused by social desirability, the recommendations of Podsakoff et al. (2003) were followed by reassuring respondents that their answers will remain anonymous, that there are no correct or incorrect answers and encouraging them to answer as truthfully as possible.

4.3.3. Measurement scale for MBAs

All of the participating organisations used a rubric to measure the maturity of their MBAs. This rubric was provided by a consulting organisation called Organisation Development International (ODI, 2018).[7] The fact that all of the organisations used this same rubric meant that the maturity of the MBAs could be compared with each other from one organisation to the next.

During normal operations, organisations would typically use this rubric to measure the maturity of each MBA at specific time intervals. Some organisations measured their MBAs monthly while others measured them twice a year. The latest MBA scores at the time that the qualitative data was collected were used for the purpose of this study. Since the outcome variables were all measured on a Likert scale from one to five (1 to 5), the MBA scores were also converted into scores out of five. The rubric can be seen in Table 9.

[7] This rubric is subject to copyright. Expressed permission was obtained to use the rubric in this document.

Table 9: Rubric used to measure maturity of MBAs (continues on next page). (Source: ODI, 2018)

NR	COACHING ITEM	Needs improvement	Required Standard	Good
		1	**3**	**5**
1	**Mini-Business Area**			
1.1	The mini-business area is neat and in good physical condition.			
1.2	Display boards for visual management displays (white boards, flip charts etc.) are available and are not dirty.			
1.3	Graphs and other information are neatly pinned. There are no unneeded items in the area.			
2	**Visual Displays.** The standard list of visual displays is in place. This includes at least the following:			
2.1	Mini-business name			
2.2	Quality, Cost, Delivery, Safety and Morale (at least one graph with a heading for each category and includes a time Management Chart)			
2.3	List of suppliers and customers			
2.4	Suggestions List			
2.5	Action Plans			
3	**Key Performance Indicators**.			
3.1	The mini-business has identified measurable Key Performance Indicators (KPIs) for Quality, Cost, Delivery, Safety and Morale. These KPIs are measured at a frequency appropriate to the team's level (daily, weekly, monthly).			
3.2	KPI graphs contain actual figures and targets indicated by lines and all graphs are updated with the latest information.			
3.3	The graphs are clearly understood by all and the team members can align their KPI's with that of the company.			
4	**Mini-Business Meetings.**			
4.1	The team meets regularly appropriate to the team's level (daily or weekly) and they start on time.			
4.2	A set agenda is followed (Yesterday/Previous shift, Today/This shift, Performance Measures, problems & solutions)			
4.3	The meetings have a set time limit which is not exceeded (for example daily – 10 minutes & monthly – 30 minutes)			
5	**Action Planning.**			
5.1	Action plans are available with corrective actions and improvements based on addressing gaps in performance and issues in the team.			
5.2	All tasks on the action plan have specific people allocated to it and target dates for completion.			
5.3	Action plans and due dates are respected and achieved.			

Table 9: Rubric used to measure maturity of MBAs (continued from previous page). (Source: ODI, 2018)

6	**Mini-Business Management.**			
6.1	The supervisor has a good understanding of the value of the mini-business and shows real support to keep it going effectively.			
6.2	This is evident from the quality of visual displays, management of suppliers and customers, addressing any deviations, action plans and participation by team members (the items above are in place)			
6.3	Chairmanship is rotated and updating of information is shared between team members.			
7	**Involvement of managers**.			
7.1	The supervisor is coached and developed by his/her manager so that they can effectively facilitate meetings and apply the CAPDo cycle based on regular progress reviews and action plans.			
7.2	The manager has a good understanding of the value of the mini-business and shows active support (e.g. attends some meetings, gives recognition, writes comments on graphs, etc.)			
8	**Team members.**			
8.1	Team members feel that the mini-business area and team meetings are helping their team to work and perform better.			
8.2	All team members understand and can explain all the measurements and visual displays and participate in action planning.			
8.3	Various team members are responsible for updating the information displayed. It is indicated on the graphs/charts.			
9	**Monthly meetings.**			
9.1	The team has started with a monthly goal alignment meeting to discuss the past month's performance and to identify improvement actions.			
9.2	The manager of the department conducts a weekly and monthly management meeting where all the Mini Business leaders attend.			
10	**Empowerment.**			
10.1	Various team members have started chairing the meetings and are being coached by the supervisor.			
10.2	The meeting atmosphere and climate is conducive to participation and involvement.			
10.3	Team members spontaneously contribute to problem solving and idea generation for continuously improving the performance of the team.			
	TOTAL SCORE OUT OF 150			**%**

4.3.4. Measurement scale for team effectiveness

As mentioned in Section 3.1.1, team effectiveness is used as an operationalisation of team performance. According to Mathieu, Maynard, Rapp and Gilson (2008), indications of performance are usually unique to each organisation and very specific. Therefore, due to the variety of organisations that participated in this study, the measurement scale that was used to measure team effectiveness in this study had to be generic to such an extent that the questions could relate to different teams doing various types of work in any organisational environment.

The scale that was selected to measure team effectiveness for this study was developed by Aubé and Rousseau (2005) who developed questions according to an analysis of the construct domain of the three facets of team effectiveness, namely:

- Team performance;
- Quality of group experience; and
- Team viability.

Table 10 shows the questions that were used to measure the different facets of team effectiveness. It can be seen from the three elements of the scale and the individual questions that the scale is general enough so that it can be used for a variety of teams that do a variety of work in different organisational circumstances. For example, if a team member has to answer the following question: *"The team is productive"*, the team member can answer the question by considering how productivity is defined for their team in their specific organisation, and is not necessarily limited to a general definition of productivity—such as the GDP per hour worked that was mentioned in Section 3.1.1.

The scale was developed by using the subject matter expert method. Two professors and three PhD candidates were used to develop the questions (Aubé & Rousseau, 2005) and therefore, the researcher has confidence in the scale since individuals with a high level of expertise contributed to its development.

The questions were answered by rating them on a Likert scale from 1 to 5 where 1= 'Not true at all' and 5 = 'Totally true'. The Cronbach coefficient alpha was 0.711 for team performance, 0.742 for quality of group experience and 0.717 for team viability which indicates that the scale had an acceptable level of internal consistency.

Table 10: Scale that was used to measure the three elements of team effectiveness on the employee and team manager questionnaires. (Source: Aubé and Rousseau, 2005)

Facet of Team Effectiveness that was measured	Question	Likert Scale				
		Not True at all (1)	Usually not true (2)	Sometimes true (3)	Usually true (4)	Totally True (5)
Team performance	The members of this team attain their assigned performance goals.					
	The members of this team produce quality work.					
	This team is productive.					
Quality of group experience	The social climate in our work team is good.					
	In our team, relationships are harmonious.					
	In our team, we get along with each other.					
Team viability	Team members adjust to the changes that happen in their work environment.					
	When a problem occurs, the members of this team manage to solve it.					
	The new members are easily integrated into this team.					
	The members of this team could work a long time together.					

Welman et al. (2005) recommends that the command of language of the respondents should be taken into consideration when formulating questions. Since English was most of the survey respondents' second language, there was a possibility that they could misunderstand some of the words and phrases in the scale, thereby impacting on the integrity of the data that was gathered via the questionnaire. To counteract this, some of the questions on the measurement scale were adapted slightly to make the wording and sentence structure simpler and easier to understand.

These are minor alterations, however, and the essence of the questions was not affected in any way. For example, instead of using the phrase: "*The members of this team attain their assigned performance goals."* it was edited to read: "*The members of this team reach their goals.*" From the aforementioned example it can be seen that the essence of the question still remains the same, although the wording was simplified. Appendix B can be consulted for full details of the alterations that were made to the rest of the scale.

The scale that was developed by Aubé and Rousseau (2005) was used in two of the three questionnaires: the employee questionnaire and the team manager questionnaire. Thus, a different scale to measure team effectiveness was used on the senior managers' questionnaire. This is similar to the approach used by Edmondson (2006), where different sets of questions were used for 'observers' of the team and team members respectively.

In this case, the senior managers would be regarded as observers of the teams because the senior managers do not participate in the teams' daily activities like the team managers do. The senior managers are thus further removed from the teams and this could limit their ability to provide answers to questions that would typically only be known by someone with an intimate knowledge of the team. For example, a phrase such as *"In our team, we get along with each other"* that appears on the scale developed by Aubé and Rousseau (2005) could be difficult for a senior manager to answer, because the senior manager might not be familiar with the social climate within the team seeing as they do not participate in the team's daily activities.

Similarly, the senior manager could find it difficult to answer other questions on the scale developed by Aubé and Rousseau (2005) due to a lack of intimate familiarity with the team, such as: *"The social climate in our work team is good"; "In our team, relationships are harmonious"; and "The members of this team could work a long time together."* Therefore, it was deemed inappropriate to use the scale developed by Aubé and Rousseau (2005) for the senior manager questionnaire, and another scale that does not require high levels of familiarity with the team was used on the senior manager questionnaire instead.

The measurement scale that was developed by Campion et al. (1996) was used to measure team effectiveness on the senior manager questionnaire. This scale was chosen due to the more general nature of the questions relating to the team.

The scale also appears in an influential research article published by Campion et al. (1996), which had a total of 986 citations on Google Scholar and a total of 414 citations on Scopus. This large number of citations contributes to the perception that this research is regarded as credible, and that the measurement scale for team innovation used in this study can therefore also be regarded as credible.

The nine items that the scale consists of can be seen in Table 11. The five-point Likert scale that was used as rating method ranged from 1 = 'Poor' to 5 = 'Excellent'. The Cronbach's alpha coefficient for this scale was 0.913 which indicates a high level of internal consistency.

Table 11:Scale that was used to measure team effectiveness on the senior manager questionnaire. (Source: Campion et al., 1996)

	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
Quality of work done.					
Customer service provided.					
Productivity (i.e. quantity of work completed).					
Job satisfaction of the members.					
Completing work on time.					
Completing work within budget.					
Providing innovative products or services.					
Responding quickly to problems or opportunities.					
Overall performance					

Since all the senior managers were proficient in English, it was not deemed necessary to adapt the questions seeing as the risk of respondents misunderstanding the questions was considered to be significantly lower than in the case of the employees. For all three of the questionnaires, the level of analysis for team effectiveness was the team level. Questions were also phrased in such a way so that participants understood that the questions were related to the team. As mentioned in Section 4.3.2, in order to limit the effect of common method bias caused by common raters, the responses of the senior managers are used to draw the final conclusions in this study while the responses provided by their subordinates are merely used for comparison.

4.3.5. Measurement scale for job satisfaction

In order to locate a suitable measurement scale for job satisfaction, two widely recognised and commended journals were used for the search, namely:

1. *Journal of Applied Psychology* (a peer-reviewed academic journal that is published monthly by the American Psychological Association.)
2. *Academy of Management Journal* (a peer-reviewed journal that is published six times per year by the Academy of Management.)

A literature search was performed within these two journals to find publications that measured job satisfaction as part of their research. A filter was applied to show the most-cited articles and the articles that were published most recently (between 2015 and 2017). After reading through their abstracts, the most relevant articles were selected and a summary was made of the measurement scales that they used to measure job satisfaction. It is necessary for the researcher to use personal discretion when deciding whether a document was relevant to the study or not (Cooper, 1984). In the case of this study, the researcher also used personal discretion to determine whether a document was relevant to this particular study or not.

Factors that influenced the decision about whether a publication was relevant or not included: (1) whether the study measured job satisfaction empirically, and (2) whether a validated measurement scale for job satisfaction was used. The *Journal of Applied Psychology* produced a total of 16 useful articles and the *Academy of Management Journal* produced 6 useful articles. Thus, 22 articles were investigated in total.

It was discovered that the two most widely used methods for measuring job satisfaction in organisations (Russell, Spitzmüller, Lin, Stanton, Smith & Ironson, 2004) are facet surveys and global surveys. Facet surveys regard job satisfaction as a multi-faceted construct and allow several of these facets to be measured individually (for example: satisfaction with supervision or satisfaction with remuneration). Examples of facet surveys include the Job Descriptive Index (JDI; Smith, Kendall, & Hulin, 1969), and the Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967). Global measures determine an overall satisfaction with one's job and are useful in research and practical situations where an overall evaluation of job satisfaction is of interest. Examples of global surveys are the Faces Scale (Kunin, 1995) and the Job in General scale (JIG) (Stanton, et al., 2001).

If surveys are too lengthy, participants can feel 'oversurveyed' and unwilling to complete the survey. This can increase the possibility of a non-response (Rogelberg & Luong, 1998). Therefore, it was decided that a global measure of job satisfaction would be appropriate for this study in order to keep the survey as short and concise as possible. With this aim in mind, scales that were very lengthy were eliminated from the list of potential scales to use for the study.

Within the 22 articles that were investigated, a wide variety of scales were used to measure job satisfaction. The scale that was used most often, however, was the five-item version of the Brayfield-Rothe measure (Brayfield & Rothe, 1951).This is a widely used scale and was identified as an appropriate scale to measure job satisfaction for this study for three reasons. Firstly, it was the most widely used scale in the articles that were investigated. Secondly, it contains only five items which makes it short enough so that it takes less time to complete, and therefore has a decreased chance of causing fatigue among respondents and occupies less space on surveys. Thirdly, all items in the five-item Brayfield-Rothe scale could be measured by using a five-point Likert scale. Since the other constructs were also measured with a five-point Likert scale, the questionnaire as a whole would be uniform. This was more preferable as opposed to, for example, an answering format of 'Yes', 'No' and '?'.

The five measurement items in the Brayfield-Rothe scale can be seen in Table 12. The Likert scale ranged from 1 = 'Strongly Disagree' to 5 = 'Strongly agree'. There were some questions that measured the inverse (in other words, 5 = 'Strongly disagree' and 1 = 'Strongly agree'). The questions that measure the inverse are clearly indicated in Table 12.

Table 12: Scale that was used to measure job satisfaction on the employee questionnaire. (Source: Brayfield & Rothe,1951)

	Strongly Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly Agree (5)
Right now, I feel fairly satisfied with my present job.					
Most days I am enthusiastic about my work.					
I find real enjoyment in my work.					
I consider my job to be rather unpleasant. *	(5)	(4)	(3)	(2)	(1)
Each day of work seems like it will never end. *	(5)	(4)	(3)	(2)	(1)

**This is an inverse question.*

The questions related to job satisfaction were completed by respondents who do not necessarily speak English at a first language level and some minor adjustments had to be made to some of the questions to simplify them. An example of such an adjustment, was to change the phrase "*I find real enjoyment in my work*" to *"I enjoy my work".* These minor adjustments made the statements easier to understand without causing the essence of the phrase to become lost. The adjustments that were made to the rest of the scale can be seen in Appendix B. As opposed to other constructs in the model that measure the variable on a team level (such as team effectiveness), job satisfaction was measured on an individual level. As determined by a Cronbach's alpha of 0.709, the scale had an acceptable level of internal consistency.

4.3.6. Measurement scale for employee engagement

Employee engagement was modelled as the mediator between MBAs (discussed in Section 4.3.3) and the outcome variable called job satisfaction (discussed in Section 4.3.5). Since the questions relating to job satisfaction only appeared on the employee questionnaire, questions relating to employee engagement also only appeared on the employee questionnaire. Since job satisfaction was measured on an individual level, employee engagement was similarly measured on an individual level.

There are two theoretically well-established measurement scales for work engagement, namely the Job Engagement Scale (JES) (Rich, Lepine & Crawford, 2010) and the Utrecht Work Engagement Scale (UWES) (Schaufeli & Salanova, 2007). Each of these scales is underpinned respectively by one of the two dominant theories regarding work engagement (Drake, 2012).

JES represents the theory that work engagement consists of three components, namely, (1) physical engagement, (2) cognitive engagement and (3) emotional engagement (Kahn, 1990). The JES is an 18-item scale that measures each of the three components individually (six of the items measure physical engagement, six of the items measure cognitive engagement and six of the items measure emotional engagement).

The theory that underpins the UWES, on the other hand, also models engagement to consist of three different components, but these components differ from those of the JES. The theory proposes that engagement consists of, (1) vigour, (2) dedication, and (3) absorption (Maslach, Schaufeli & Leiter, 2001).

This scale consisted of 17 items (six of those items measure vigour, five of those items measure dedication, and six of those items measure absorption). The 17-item UWES is referred to as UWES-17. Later, however, the UWES-17 was shortened into a 9-item scale that was referred to as the UWES-9 (Schaufeli et al., 2006). The construct validity and internal reliability estimates for the 9-UWES have been established and found to be satisfactory (Schaufeli et al., 2006), thus, the UWES-9 was also a sufficient measurement scale for engagement.

A comparison of the JES and the UWES by Drake (2012) showed that both measures showed a good fit to the data that was used in the study done by Drake (2012), but that they described different criteria to an extent. Therefore, it was up to the researcher to use personal discretion to decide which scale to use.

The UWES-9 was selected as the measurement scale for this study for three reasons. Firstly, the UWES-9 was a popular scale that has been used in various other published research papers. Secondly, the UWES-9 was the shortest scale of the options considered and therefore would have the smallest chance of causing fatigue among respondents and would occupy less space on the survey. Thirdly, when a comparison was drawn between the wording of the questions in the JES and the UWES-9, the UWES-9 seemed like the more appropriate scale. The reason for this is that the wording of the questions in the JES may potentially have come across as if it was trying to assess the *performance or actions* of the employees (for example: "*I devote a lot of energy to my job.*"), whereas the wording of the questions in the UWES-9 came across as if it were trying to assess the *feelings* of the employees (for example: *"At my work, I feel bursting with energy."*).

It was feared that if the JES scale was used, that employees would provide the answers that they thought the researcher wanted to hear (for example, they would answer to make it sound like they are working hard at their jobs in order to create a good impression) instead of answering truthfully by simply letting the researcher know how they feel.

The nine items that the UWES-9 scale consists of can be seen in Table 13. Table 13 also indicates which of the items are measuring which specific facet of engagement. Each item in the scale could be measured by using a five-point Likert scale that ranged from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree'.

It is necessary to note that the wording of some of the questions was altered slightly in order to make the questions more understandable for employees whose first language was not English. For example, the question: "*At my work, I feel bursting with energy*." was modified to be: "*At my work, I feel like I have a lot of energy*.". All of the minor alterations that were made can be seen in Appendix B. The scale had a high level of internal consistency with a Cronbach's alpha of 0.854.

Table 13:The UWES-9 scale that was used to measure engagement on the employee questionnaire. (Source: Schaufeli et al., 2006)

Facet of Employee Engagement that was measured	**Questions**	**Likert Scale**				
		Strongly Disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly Agree (5)
Vigour	At my work, I feel bursting with energy.					
	At my job, I feel strong and vigorous.					
	When I get up in the morning, I feel like going to work.					
Dedication	I am enthusiastic about my job.					
	My job inspires me.					
	I am proud of the work that I do.					
Absorption	I am immersed in my work.					
	I get carried away when I'm working.					
	I feel happy when I am working intensely.					

4.3.7. Measurement scale for team innovation

De Dreu and West conducted a study to investigate team innovation in 2001. This study measured team innovation by using four items on a questionnaire that was adapted from previous research done by Anderson and West (1998). The study asked team managers to evaluate the team's innovation. As discussed in Section 4.3.2, team managers are able to evaluate a team's innovation more objectively than the employees themselves.

At the time that the journal article by De Dreu and West (2001) was retrieved from the online database Scopus, the article had 535 citations. This large number of citations contributes to the perception that this research is regarded as credible, and that the measurement scale for team innovation used in this study can therefore also be regarded as credible.

In accordance with the research done by De Dreu and West (2001), the current study also asked the team managers to answer questions related to their team's innovation. The senior managers were also asked to provide responses for this scale, since they were able to evaluate the team's innovation objectively. This current study used the same four items that were used in the study done by De Dreu and West (2001) to measure team innovation.

The questions had to be rated on a Likert scale from one to five where 1 = 'Strongly disagree' and 5 = 'Strongly agree'. Table 14 shows the four items that the scale consists of. One of the questions is the inverse of the others (in other words, a rating of 5 = 'Strongly disagree' and a rating of 1 = 'Strongly agree'). This inverse question is also clearly indicated in Table 14.

The level of analysis of this scale is the team level. Since the team managers and senior managers that participated in the study were all proficient in English, it was not deemed necessary to adapt the wording of any of the questions in order to avoid misunderstandings. The scale had a high level of internal consistency as determined by a Cronbach's alpha of 0.805.

Table 14:Scale that was used to measure team innovation on the team manager and senior manager questionnaire. (Source: De Dreu & West, 2001)

	Strongly disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Strongly agree (5)
Team members often implement new ideas to improve the quality of our products and services.					
This team gives little consideration to new and alternative methods and procedures for doing their work. *	(5)	(4)	(3)	(2)	(1)
Team members often produce new services, methods or procedures.					
This is an innovative team.					

** This is an inverse question.*

4.3.8. Questionnaire administration

Due to the fact that the majority of the respondents of the questionnaire were employees at the lowest organisational level, they did not have access to computers in order to complete an online survey. Thus, hard copies of the survey were used. Some employees completed the questionnaire by themselves; however, many of them did not have sufficient command of English to enable them to do so. In order to assist these individuals, the questionnaire was administrated in an interview format. When the interview format was used, the questions were read out to each participant individually and their responses were recorded on a hard copy of the questionnaire by the researcher. This also provided respondents with an opportunity to ask questions if the participant did not understand certain terminology or if they needed clarification about a question.

In order to guarantee the anonymity of respondents and to ensure that they answered as truthfully as possible, the researcher was the only person who interviewed the employees. If employees opted to complete the questionnaire on their own without the help of an interviewer, the researcher was present and on standby to answer any questions that might arise.

No one else from the partnering organisations was involved in the administration process. This was to avoid the possibility of employees refraining from answering truthfully due to a fear of negative consequences if they did so. An advantage of completing the questionnaires manually is that respondents were only able to complete the questionnaire once, thus the researcher can be assured that no duplicate answers were present in the data.

4.3.9. Anonymity

In order to ensure that the respondents remained anonymous, no questions of a personal nature (such as name, surname, contact details, etc.) were included in the questionnaire. Participants were also asked to refrain from writing their name on their questionnaires. A unique team identifier was assigned to each team in order to ensure that the answers provided by a respondent could not be traced back to a specific team without access to the team identifier codes. The researcher kept these codes confidential.

4.4. Ethics

In order to be able to perform this research, ethical clearance was obtained from the Research Ethics Committee (REC): Humanities, at Stellenbosch University. In addition to obtaining the ethical clearance, every care was taken to ensure that the research was conducted in an ethically responsible manner.

Before commencing with the completion of the questionnaire, the nature of the study was explained to each participant and they were given an opportunity to ask questions. It was made clear to respondents that participation in the study was completely voluntary and that they were free to withdraw from the study at any time if they felt uncomfortable for any reason whatsoever. If they chose not to continue with their participation, their partially completed questionnaires were destroyed immediately in order to ensure that they could feel completely at ease that their anonymity was safeguarded. If a participant did not know the answer to a question or did not want to answer a specific question, they were allowed to leave it blank.

It was explained to participants that they would not receive payment or a reward for choosing to participate in the study, but that they would also not suffer any negative consequences if they decided not to participate in the study. It was also explained to them that participating in the study would not hold any risk for them or cause them any harm, discomfort, inconvenience, psychological stress, or stigmatisation.

As mentioned in Section 4.3.9, it was a priority to ensure the anonymity of participants, and this was ensured by refraining from asking questions of a personal nature (such as a person's name, surname or contact details) and by refraining from writing participants' names on their questionnaires. Participants who decided to partake in the study were asked to sign a written consent form in order to confirm that they understood what the research was about and that they were participating willingly.

4.5. Limitations and Assumptions

Before the results of this study are presented, it is necessary to acknowledge the limitations, delimitations and assumptions of this study that relate specifically to the elements of the study design which have been described in this chapter as well as in Chapter 3.

4.5.1. Limitations

For some constructs in the model, the level of analysis is the team (for example when team effectiveness and innovation is measured), whilst for other constructs in the model, the level of analysis is the individual (for example when employee engagement and job satisfaction are measured). For the constructs that were analysed on the team level, data was collected per team, and not per individual. Measuring data on a team level instead of an individual level makes the sample size significantly smaller than a sample on the individual level. Although analysing data on the team level drastically limited the sample size, a sufficient number of teams participated in the study to be able to make statistically valid conclusions, as indicated in the following chapter.

Although it was important that participation in the study was voluntary, this posed another limitation to the study by reducing the number of data points that could be gathered as not all potential respondents were willing to participate in the research. In some cases, a team's data had to be omitted from the analysis because only one member of the team was willing to participate in the study.

Language and literacy were also limitations in this study. For the majority of the participants in the study, English was not their first language. Participants had varying levels of English proficiency and literacy. Seeing as they mostly communicated in English while they were at work, the questionnaires were also in English.

The researcher attempted to remove language limitations as much as possible by ensuring that the questions that were obtained from the measurement scales were phrased in a straightforward manner. This was done by replacing potentially difficult words with simpler words and reconstructing a question to make it easier to understand without losing the essence of the question. The language limitation was also reduced by doing interviews with as many of the participants as possible. The interviews provided an opportunity for participants to ask questions if they were unsure about the meaning of a question or of the terminology used.

Since this study was dependent on a correlational design where data was collected only during one assessment without manipulating the variables, it is important to note that the study is limited in its ability to provide evidence of causal links between MBAs and the outcome variables. As discussed previously, this limitation was addressed by incorporating the theorising in Chapter 3. A positive result in this study would provide sufficient grounds for experimental and longitudinal research to be conducted in future in order to establish more conclusive findings about the direction of causality.

4.5.2. Delimitations

It is worth mentioning the delimitations of the study as well. The delimitations are the aspects that are within the researcher's control and the delimitations determine the scope and boundaries of the study (Simon, n.d.). The choice of the outcome variables to be investigated and the population that was sampled are the most notable delimitations that relate to the study design.

4.5.3. Assumptions

The following assumptions were made with regards to the study:

1. It was assumed that the participants of the survey would answer the survey questions truthfully. An honest response to survey questions was encouraged by ensuring participants that their identity would remain anonymous and that their answers would remain confidential.

2. It was assumed that all information provided by organisations was accurate and true.

3. The team managers (FLMs) work with their teams on a daily basis and are familiar enough with the team to be able to answer questions about the team. Even though the senior managers do not work as closely with the teams as the team managers do, it was assumed that the senior managers were at least sufficiently familiar with the teams to be able to answer questions about them. It was assumed that a senior manager would refuse to answer questions about a team if they felt that they weren't familiar enough with the team's activities to be able to answer truthfully.[8]

4.6. Conclusion: Study design

The chapter commenced by describing the characteristics of the data obtained in the study: the data for all the constructs were obtained qualitatively. The chapter continued by explaining that questionnaires and a rubric were the appropriate research instruments to collect the data required for this empirical study. A motivation for the selection of an appropriate questionnaire for each variable was provided, and thereafter an explanation of the administration of the questionnaires, the steps taken to protect the anonymity of the participants, and the ethical considerations were also provided. Furthermore, the limitations and assumptions of the study were discussed. The next chapter will lay out the results of the statistical analyses by firstly providing an overview of the sample used and then discussing each analysis individually.

[8] As a matter of interest, none of the senior managers refused to answer questions about the teams.

CHAPTER 5: ANALYSIS AND RESULTS

This chapter describes the steps that were taken to analyse the data. The chapter starts off by describing the sample that was used in this study in detail and by providing the demographic variables that were measured in order to provide a typical profile of the participants in the study. Thereafter, the descriptive statistics for the data are provided. Before the data analysis is presented, the responses that were provided by the different groups of respondents for the team effectiveness and team innovation constructs are compared with each other in order to show how the view of these constructs differed between the senior managers, the team managers and the employees. This comparison is done using a one-way repeated measures ANOVA (Analysis of Variance).

The chapter then continues to discuss the analysis of each outcome variable separately. Two of the outcome variables, namely team effectiveness and team innovation, are analysed by performing a linear regression analysis. The last outcome variable, namely job satisfaction, is analysed by performing a multilevel analysis. Employee engagement, the mediator between the MBA scores and job satisfaction, is included in the multilevel analysis. The chapter concludes by providing a brief summary of the outcomes of the analysis.

5.1. Sample used in study

For this study, self-selection sampling was used. This refers to the method of asking potential participants to take part or making the need for participants public, and allowing them to indicate their desire to participate (Welman, et al., 2005). In this study, the organisations that implement MBAs were asked to participate and were given an opportunity to indicate if they wished to take part in the study. A total of five manufacturing organisations participated in the study. The first organisation manufactures parts that are mostly used in the aviation industry. The second and third organisations produce agricultural feed for animals, and the fourth and fifth organisations produce aluminium extrusions.

An organisation was considered to be eligible to participate if it was a South African manufacturing organisation that implemented MBAs. The same implementation framework was used at all five of the participating organisations to implement the MBAs. This framework accompanied the larger 20 Keys framework, and it ensured that the implementation of MBAs was similar between organisations so that they could be compared from one organisation to another.

An MBA team was considered eligible to participate in the study if the MBA portrayed the characteristics of MBAs that are shown in Table 1. In summary, this includes the fact that the members of the MBA had to be from the same work area and work together on a daily basis, the MBA had to conduct ongoing meetings, the discussions had to centre around quality, cost, delivery, safety, morale and problem solving, and the group had to be permanent. An individual was considered to be eligible to participate in the study if the individual was part of an MBA team (except for the senior managers), was able to speak English and was willing to participate voluntarily.

All eligible teams and individuals at the organisations were asked to participate in the study and therefore, no sampling method was used to select the participating teams or individuals. If only one member of a team decided to participate in the study, that team's data was not used for the study since one individual's responses could not be accepted as representative of the entire team's opinion. Table 15 provides an indication of the number of teams from which data was collected at each organisation and how many teams' data could be used for the final analysis.

Table 15: Data that was collected at each organisation

Organisation	Number of teams that data was collected from:	Number of teams whose data could be used for the study:
Organisation 1	14	11
Organisation 2	12	11
Organisation 3	8	8
Organisation 4	15	15
Organisation 5	8	7
Total	57	50

From Table 15 it can be seen that data was collected from a total of 57 teams and that data from 50 of those teams could be used in the study. The average team size was 6.36 members per team excluding the team manager and senior manager.

Although most of the teams were directly involved with the production process, a few of the teams were not directly involved and played a supporting role to the production process instead. These supporting roles included admin, orders and sales. Of the teams in the study, 8% were in supporting roles and the rest were directly involved in manufacturing. All of the teams implemented MBAs, however, regardless of their function in the organisation.

A total of 390 respondents whose data could be used participated in the study. Out of those respondents, 21 of them were senior managers (some of them supervised more than one team), 50 of them were team managers (each of them was responsible for only one team) and 319 of them were employees.

As discussed in Section 4.3.4 to Section 4.3.7, the questions that were used to measure each of the outcome variables in this study were measured with a five-point Likert scale, which means that the responses are categorised as ordinal data.[9]

However, more than one question was used to measure each outcome variable. For example, innovation was measured with a set of four questions (this set is called a scale). In order to obtain a single measured value for each variable, the answers to the questions in each scale were averaged. Calculating the average causes the ordinal values to become continuous values and therefore, all of the outcome variables were continuous variables.[10]

As discussed in Section 4.3.3, the MBAs, the predictor variable, were scored by allocating them a score out of 150 on a rubric. This score was normalised so that a maximum score of 5 could be achieved. The normalisation of this score resulted in the MBA scores also being continuous variables.

5.2. Demographic variables

In order to provide a typical profile of the respondents that participated in the study, the following demographic variables were measured:

1. Age;
2. Gender;
3. Level of education;
4. Home language;
5. Duration of employment at current workplace;
6. Duration of membership of current team, and
7. Duration of dyadic relationship (in other words, for how long has the team manager been managing the team.)

[9] Ordinal data is defined as data that reflect the difference and rank order among individuals in the variable that is measured. Cases that are given a higher order are assumed to demonstrate higher levels of a particular attribute than those that are given lower orders (Welman, et al., 2005).

[10] A continuous variable is measured with continuous data. It is described by Welman et al. (2005) as a variable that has the potential to assume any value within a specific range, including fractional values. In this study, the range for the values of the continuous outcome variables was between 1 and 5.

Figure 4 provides an indication of the age of each participant in the study. From Figure 4, it can be seen that the category containing the most participants is the 35–44 years category.

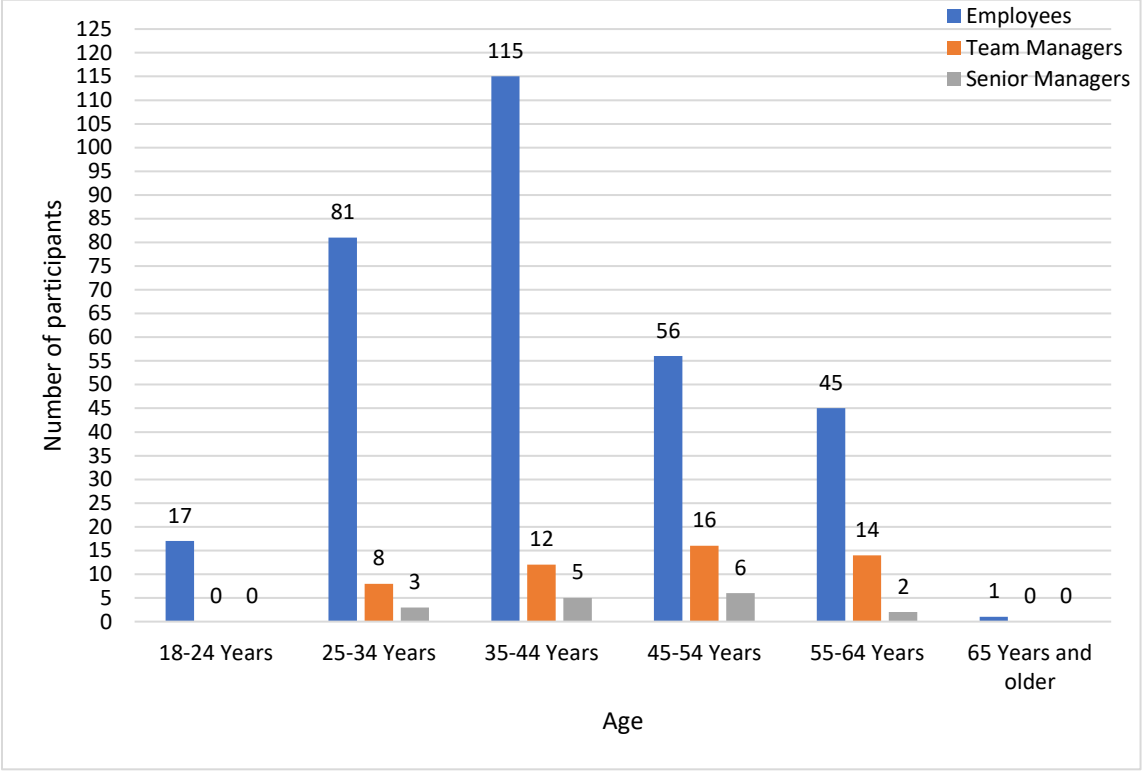

Figure 4: Age of study participants

Figure 5 shows the gender of the study participants. It can be seen that there are significantly more males than females in the employee and team manager categories. The number of males and females in the senior manager category are approximately the same.

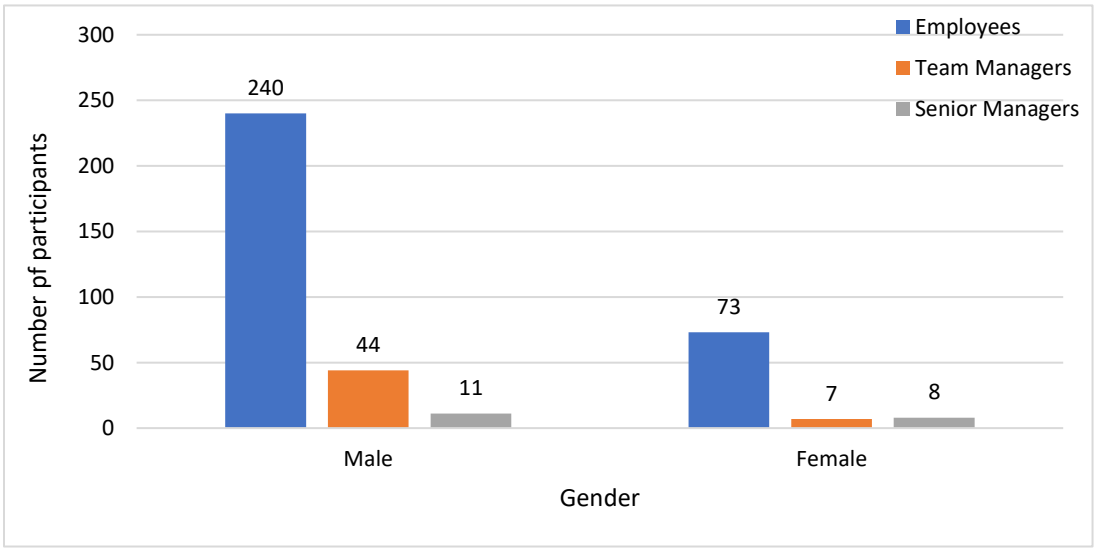

Figure 5: Gender of study participants

Figure 6 provides an indication of the level of education of participants. Some of the employees have not completed any schooling or have only completed high school, and as mentioned earlier, this could increase the risk of respondents not understanding the survey questions accurately. As mentioned in Section 4.3.4 to Section 4.3.7, the wording of the survey questions was adjusted where deemed necessary, in an attempt to minimise this risk.

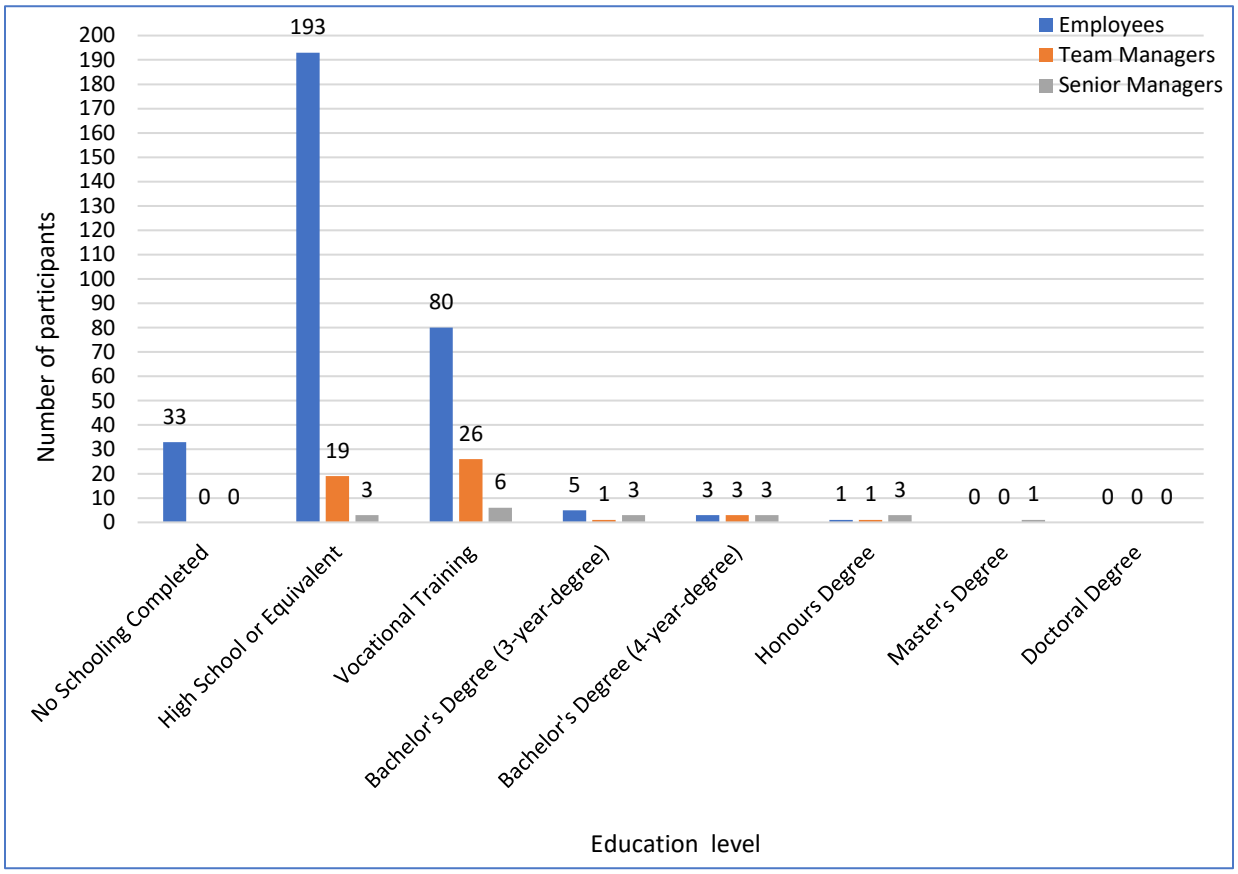

Figure 6: Education level of study participants

Figure 7 shows the first language of the participants. Although the majority of the respondents do not speak English as a first language, all business activities at the participating organisations are conducted in English. Therefore, the survey questions were also in English. There were two employees who were not able to speak English fluently, and therefore they were not eligible to participate in the study. Since these two employees did not participate in the study, their details are not reflected in the demographic variables.

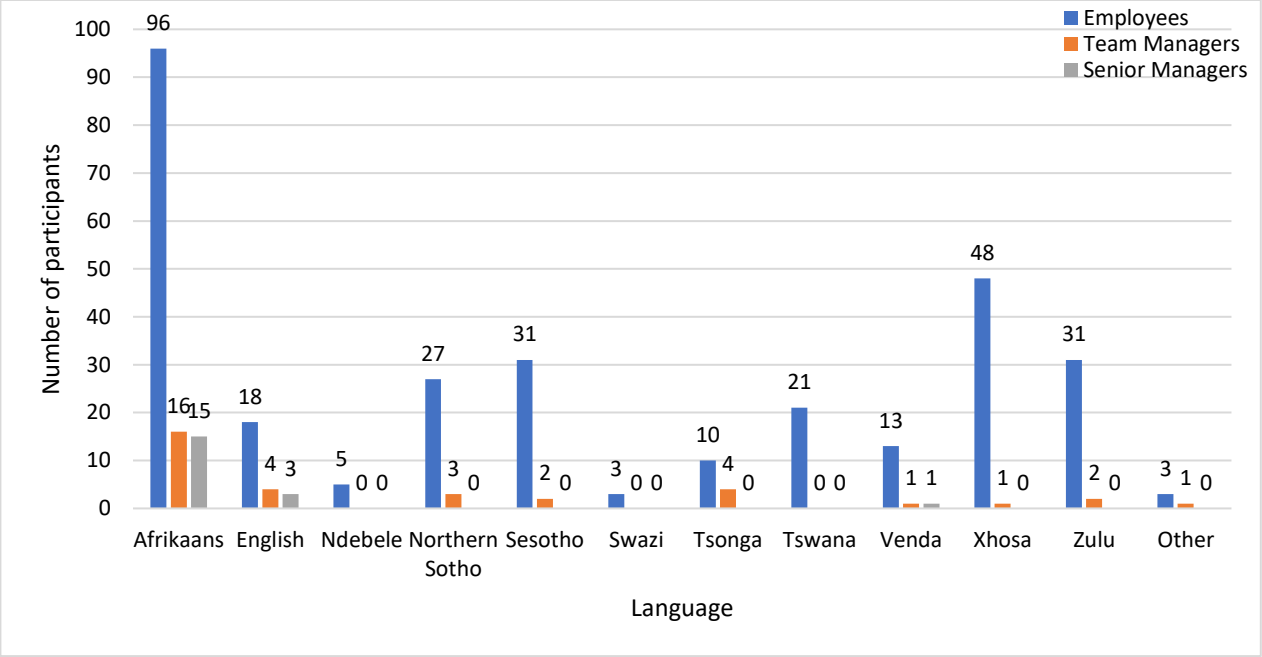

Figure 7: First language of study participants

Figure 8 shows the duration of employment of each participant at his or her respective organisation. It can be seen that most of the employees and managers have been employed at their organisations for a year or longer, which is an indication that they have had sufficient time to get to know the MBA teams in order to be able to answer questions about them.

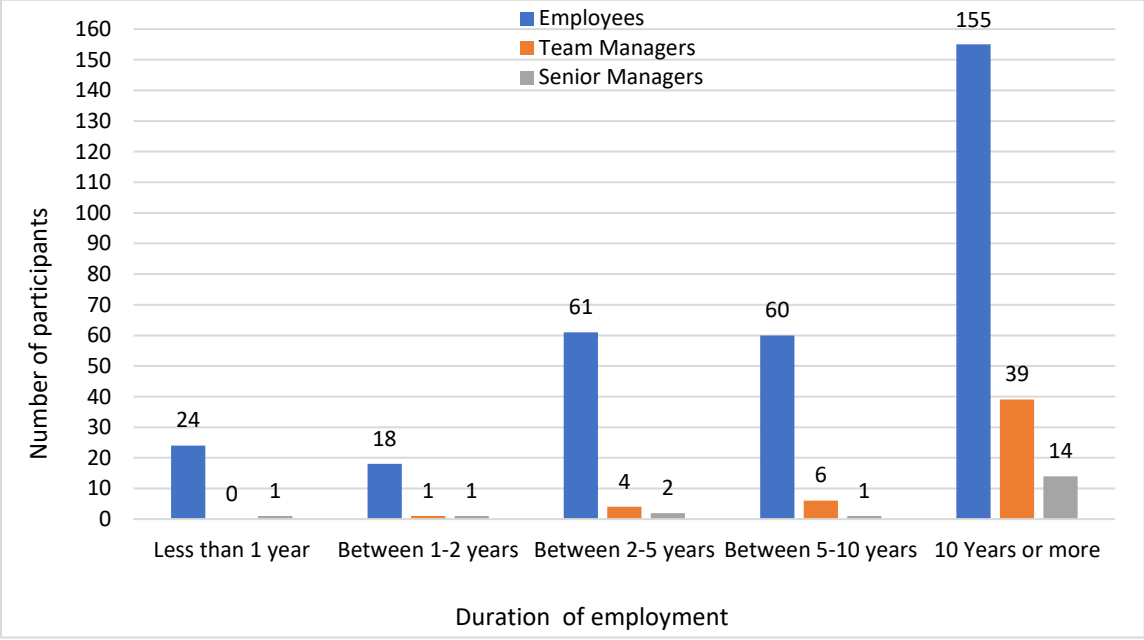

Figure 8: Duration of employment at organisation

Figure 9 shows the age of the participating MBAs. From Figure 9 it can be seen that the majority of MBAs have existed for at least a year or longer—which is considered a sufficient length of time for MBAs to be able to be operating smoothly, as discussed in Section 2.5.1.

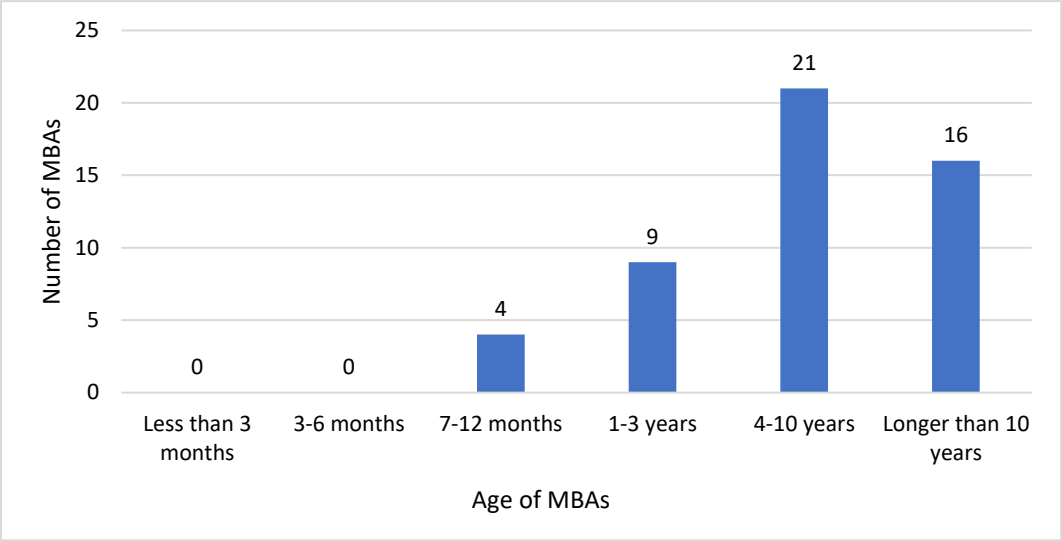

Figure 9: Age of the participating MBAs

Figure 10 shows the duration of employees' membership of their MBA team. It can be seen that 86% of employees have been part of their current MBA team for at least a year or longer. It is assumed that the longer an employee has been a part of the MBA team, the more familiar they will be with the MBA team and the more accurately they will be able to answer the questions regarding the MBA team. Therefore, it is advantageous that the majority of participants have been part of an MBA team for a year or longer.

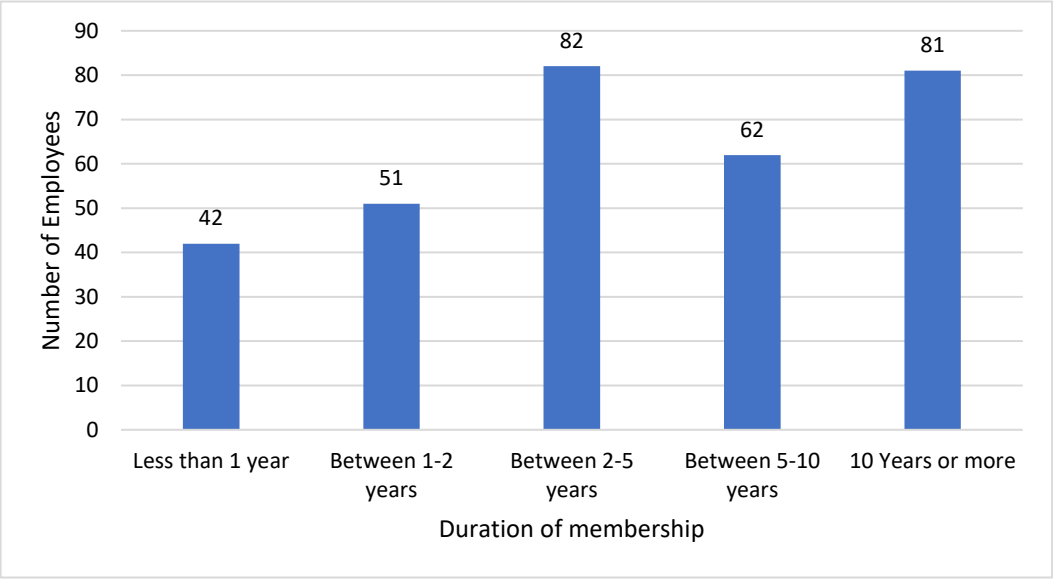

Figure 10: Duration of MBA team membership for all employees

Lastly, Figure 11 provides an indication of the duration of the dyadic relationship, which refers to the length of time that the team manager or the senior manager has been managing the MBA team. Whilst the majority of the managers have been managing their teams for a year or longer, a small number of managers have not. This is, however, not viewed as a noteworthy cause for concern as this represents only a small portion of the total team manager and senior manager samples; and as mentioned previously, it was assumed that these managers would decline to provide data on a specific team if they felt they were not sufficiently familiar with the team to do so.

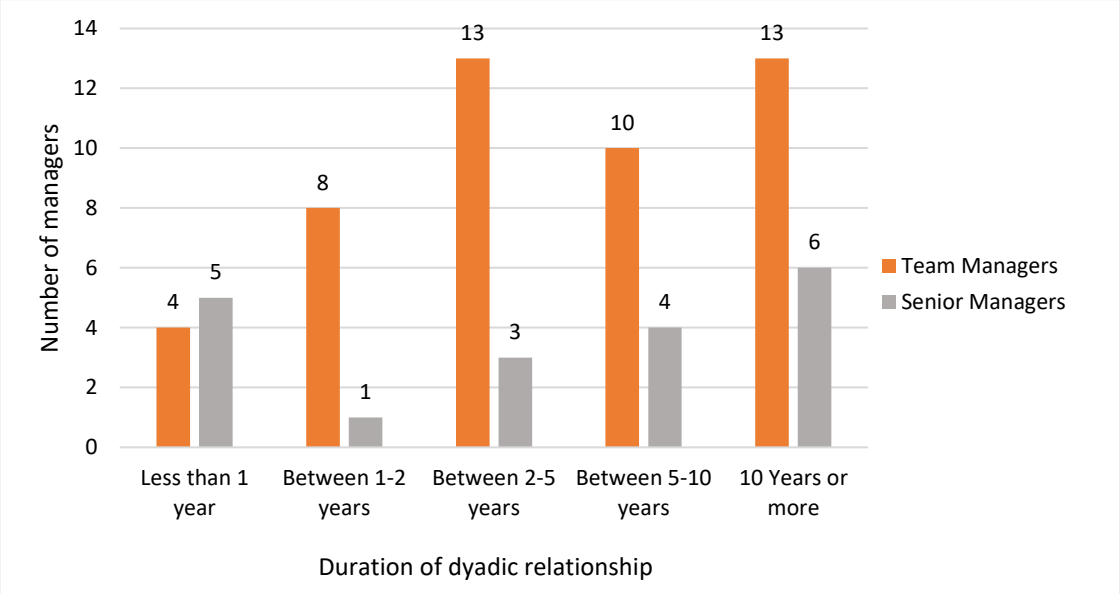

Figure 11: Duration of the dyadic relationship between the managers and their MBA teams

5.3. Descriptive statistics

The descriptive statistics of the constructs are reported separately for the senior managers, team managers and employees. The descriptive statistics for the senior managers' responses can be seen in Table 16. Table 17 shows the descriptive statistics for the team managers' responses and Table 18 shows the descriptive statistics for the employees' responses. As discussed previously, all constructs, with the exception of MBAs, were measured on a five-point Likert scale where 5 is the maximum score that could be achieved. Furthermore, the score for the extent to which an MBA has been operationalised in each team was also normalised so that a maximum score of 5 could be achieved. Although the MBAs were not scored by any of the three participating groups, the descriptive statistics for MBAs were included in all three of the groups' tables seeing as the MBA scores formed a part of the analyses that were performed with the data from the responses.

Table 16: Descriptive statistics for the responses provided by the senior managers

Construct	N	Minimum	Maximum	Mean	Standard Deviation
MBAs	50	1.350	5	3.516	1.123
Team Effectiveness	50	1.667	4.667	3.193	0.620
Team Innovation	50	2.500	5	3.510	0.589

Table 17: Descriptive statistics for the responses provided by the team managers

Construct	N	Minimum	Maximum	Mean	Standard Deviation
MBAs	50	1.350	5	3.516	1.123
Team Effectiveness: Team Performance	50	2.250	5	3.825	0.537
Team Effectiveness: Quality of Group Experience	50	3	5	4.240	0.504
Team Effectiveness: Team Viability	50	2.667	5	4.273	0.578
Team Innovation	50	3	5	4.265	0.501

Table 18: Descriptive statistics for the responses provided by the employees

Construct	N	Minimum	Maximum	Mean	Standard Deviation
MBAs	50	1.350	5	3.516	1.123
Team Effectiveness: Team Performance	48	3.524	5	4.206	0.377
Team Effectiveness: Quality of Group Experience	40	3.037	5	3.966	0.431
Team Effectiveness: Team Viability	46	3.571	5	4.113	0.366
Employee Engagement: Vigour	317	1	5	3.882	0.848
Employee Engagement: Dedication	317	1	5	4.045	0.839
Employee Engagement: Absorption	318	1	5	3.963	0.701
Job Satisfaction	318	1.4	5	3.753	0.681

5.4. Comparison of responses provided by different groups of respondents

As mentioned, three groups of respondents participated in this study: the senior managers, team managers, and the employees. As discussed previously, in order to mitigate the risk of common method bias, only the senior managers' responses were used for the linear regression analysis of team effectiveness and team innovation that are discussed in Section 5.5.

The researcher is confident in the objectivity of the scores provided by the senior managers, because although the senior managers were ultimately responsible for the teams, they were not primarily responsible for the implementation of the MBAs (the 20 Keys Officer or Improvement Officer was responsible for this) and it is therefore likely that they would not hesitate to score the teams badly if they felt that they were underperforming. The following comment that supports the notion of their objectivity was made by a senior manager: "I'm a hard scorer because I know there is always room for improvement and the MBAs still have a long way to go." Thus, it is reasonable to conclude that the responses provided by the senior managers were not influenced by the social desirability aspect of common method variance and that their responses can be used for the linear regression analyses.

As an interesting addition to the study, however, responses were also collected from the team managers for team effectiveness and team innovation and from the employees for team effectiveness in order to compare how these groups of respondents' views of the teams' effectiveness and innovation differ.

5.4.1. Aggregation of employee responses

In order to compare the responses of the three groups, all of the responses needed to be on the same level of analysis, which is the team level. The employees each provided an individual response for their team when they had to rate team effectiveness, and these individual responses were aggregated to obtain a single team-rated value for the three facets of team effectiveness.

Before the values could be aggregated, however, it was necessary to establish whether the responses received from the various members of each team were sufficiently similar so that it would be valid to aggregate these responses to generate a single value for each team. There are two measures to quantify the interrater similarity of responses: The first is called interrater agreement (IRA), and the second is called interrater reliability (IRR) (LeBreton & Senter, 2008). Both of these are concerned with determining to what extent ratings provided by one respondent are similar to those provided by one or more of the other respondents in the same group (LeBreton & Senter, 2008).

According to LeBrenton and Senter (2008) IRA refers to "the absolute consensus in scores furnished by multiple judges for one or more targets". In other words, it refers to the degree to which raters provide the same ratings for variables (Guarana, 2018). IRR, on the other hand, is defined by LeBrenton and Senter (2008) as "the relative consistency in ratings provided by multiple judges of multiple targets." Or in other words, IRR refers to the consistency of responses among raters (Guarana, 2018). The only difference between IRA and IRR is the way in which they define interrater similarity (LeBreton & Senter, 2008).

According to LeBreton and Senter (2008), if a single target (outcome variable) is assessed during a study, it is acceptable to obtain empirical support to justify the aggregation of individual responses by using IRA indices such as the r_{WG}, which is a representation of the observed variance in the responses as compared to the variance of a theoretical distribution that represents no agreement among respondents (James, Demaree & Wolf, 1984). Although other types of IRA measurements do exist, r_{WG} is arguably the most researched agreement statistic (O'Neill, 2017) and therefore it was selected for use in this study.

The r_{WG} indicates agreement by demonstrating that the variance of the observed ratings (which are the ratings that were provided by the employees in this case) is sufficiently less than the expected variance when there is no agreement among them. In order to obtain an expected variance for circumstances when there is not agreement, a 'null distribution' needs to be selected to represent no agreement. Once a null distribution has been selected, the observed variance of the data can be compared to the null distribution's variance by calculating r_{WG}. A value of 1.0 for an individual r_{WG} value indicates complete agreement among team members, while a value of 0 indicates agreement that is equal to the null distribution that is selected for the study (O'Neill, 2017). In other words, if $r_{WG} = 0$ for a team, it represents circumstances of no agreement among the team members, and these circumstances are similar to circumstances of agreement for the null distribution. Since r_{WG} is a number that aims to show that the level of agreement within the team is sufficiently better than that of the null distribution, a value of $r_{WG} = 1$ is the most desirable since it represents complete agreement among team members, and a value of $r_{WG} = 0$ is the least desirable since it represents no agreement among team members.

R_{WG} for a single item (a single question that is used for measurement), is calculated as follow:

$$r_{WG} = 1 - (s^2/\sigma^2), \quad (1)$$

where s^2 represents the observed variance in ratings for the item and σ^2 represents the variance of the selected null distribution that is selected by the researcher. A higher value indicates a higher level of agreement among raters.

R_{WG} for a scale with *j* number of items or for multiple *j* parallel items, is referred to as $r_{WG(j)}$ and is calculated as follows:

$$r_{WG(j)} = \frac{J[1-(\bar{s}^2/\sigma^2)]}{J\left[1-\left(\bar{s}^2/\sigma^2\right)\right]+\bar{s}^2/\sigma^2} . \quad (2)$$

Since the facets of team effectiveness were measured on a scale comprising a number of questions per facet of team effectiveness in this study, (2) was used to calculate the IRA level for each team within each facet. Note that in order to calculate r_{WG}, a null distribution needs to be selected that represents no agreement in order to compare the observed variance to the null distribution's variance. Therefore, researchers need to select a value to substitute for σ^2 into (2) (Smith-Crowe, Burke, Cohe & Doveh, 2014).

A commonly observed approach is to use the uniform distribution (also referred to as the rectangular distribution) as the null distribution, which indicates an assumption that each response category is equally likely to be selected by a respondent. When the uniform distribution is used as the null distribution, it is assumed that there is no response bias (Smith-Crowe et al., 2014). In this study, however, a response bias was expected to be present due to social desirability (discussed in Section 4.3.2). According to Smith-Crowe et al. (2014), the skewed distribution is a more appropriate distribution to use as the null distribution in studies where a response bias due to social desirability is expected. Therefore, it was decided to use a slightly skewed distribution as the null distribution. For a slightly skewed distribution with a five-point scale, a σ^2 value of 1.34 is recommended (LeBreton & Senter, 2008).

The standard approach in research is to calculate the average IRA (denoted by R_{WG}) for the construct by calculating the average of all of the individual r_{WG} values and to test whether $R_{WG} > 0.70$ (Liu, Amini, Babakus & Stafford, 2011; Guarana, 2018). If R_{WG} is higher than 0.70, it is acceptable to use all of the aggregated values that were calculated for all of the teams. If $R_{WG} < 0.70$, only those teams whose individual r_{WG} values are higher than 0.70 can be used. This approach has come under criticism, however, since researchers argue that in some cases where $R_{WG} > 0.70$, samples whose individual r_{WG} values do not justify inclusion in the study are in fact included (LeBreton & Senter, 2008; Liu et al., 2011; Smith-Crowe et al., 2014).

To address this concern, Smith-Crowe et al. (2014) suggested alternative values for 0.70 that can be used as the cut-off value based on five elements of a study, namely the type of null distribution used (for example the uniform distribution), the number of items on the scale (for example three questions), the number of response categories (for example a five-point Likert scale), the size of the sample (for example, five members in a team) and the average correlation among items. For the purpose of this study, however, this approach could not be followed since it allows only specific team sizes to be used (5, 10 or 30 members), whereas the present study had teams of various sizes that did not necessarily fit any of the proposed moulds.

LeBreton and Senter (2008) proposed a set of guidelines for interpreting agreement that is more inclusive. This set of guidelines divides the r_{WG} values obtained into five categories. The first category represents a lack of agreement if the r_{WG} value is between 0.00 and 0.30. The second category represents weak agreement if the r_{WG} value is between 0.31 and 0.50. The third category represents moderate agreement if the r_{WG} value is between 0.51 and 0.70. The fourth category represents strong agreement if the r_{WG} value is between 0.70 and 0.90. Lastly, the fifth category represents very strong agreement if the r_{WG} value is between 0.90 and 1.00. LeBreton and Senter (2008) describe these guidelines as a heuristic and urge researchers to consider the intensity of the decisions that will be made based on the measures of the aggregated data before using the heuristic. For example, they recommend a high cut-off value of > 0.90 for decisions that will seriously affect specific individuals such as the hiring or firing of a person. Thus, it is up to each researcher to decide which cut-off value is appropriate for their study.

For this specific study, it was decided that a moderate to very strong level of agreement would be acceptable since the study is not expected to have any dire consequences for any specific individuals that would necessitate the use of a very strict cut-off value. Therefore, an r_{WG} value was accepted if it was within a range of 0.50 – 1.00. Another motivation for the use of a lower cut-off value than the usual 0.70 is the fact that the less raters there are, the lower the r_{WG} value will be (LeBreton & Senter, 2008). Thus, when more raters (or team members in this case) are added to the sample, the r_{WG} value tends to increase. Various researchers recommended the use of at least 10 raters per sample (LeBreton & Senter, 2008), but since the teams that were surveyed in this study varied in size with an average team size of 6.36 members per team, this was not attainable. Therefore, allowance needed to be made for the fact that a small number of raters were present in some of the samples which would lead to smaller r_{WG} values.

The employees' responses for team effectiveness are the only responses that had to be aggregated. As discussed, the aggregated employee data was necessary in order to be able to compare the employees' responses with the senior managers' and team managers' responses. This aggregated team data was, however, not used during the evaluation of the hypothesis being tested in this research for team effectiveness.

For team performance, the first facet of team effectiveness, it was found that 96% of the samples had r_{WG} values within the acceptable range of 0.50 – 1.00 and could therefore be used in the study. For quality of group experience, 80% of the samples could be used in the study and for team viability, 92% of samples could be used in the study.

This approach was compared to the standard approach of calculating the R_{WG} (average) and measuring whether $R_{WG} > .70$. It was found that the standard approach would have allowed all of the values to be included in the study. Since some of the r_{WG} values were as low as 0.12, this standard approach may have been problematic.

Thus, for the samples that had an r_{WG} value between 0.50 and 1.00, it was acceptable to aggregate the ratings of the employees into a single rating per team for the three facets of team effectiveness. This allowed the responses that were provided by the senior managers, team managers and employees to be compared since all of the measures were now measured on the same level of analysis (the team level).

5.4.2. Assumptions for a one-way repeated measures ANOVA

In order to compare the responses that were provided by the different groups for team effectiveness and team innovation, a one-way repeated measures ANOVA was performed. A one-way repeated measures ANOVA is used to determine if there are any statistically significant differences between the means of different levels of a within-subjects factor (Lund & Lund, 2018). The within-subjects factor is another term for the independent variable (the MBA teams). In this study, 'within-subjects' refers to the fact that the measurement of the dependent variables took place under a number of different conditions (Huynh & Mandeville, 1979). The three 'conditions' under which team effectiveness was measured for each MBA refers to the fact that three different groups provided scores for team effectiveness: the senior managers, the team managers and the employees. Team innovation for the MBAs was measured only under two conditions, since scores were provided by the senior managers and the team managers but not the employees. The 'one-way' part of the analysis refers to the fact that there is only one independent variable.

Thus, the within-subjects factor is another name for the MBAs in a one-way repeated measures ANOVA where the same MBA teams are measured on the same dependent variable (effectiveness and then innovation) on multiple conditions (the senior, team and employee are the three levels of the conditions).

Before the analysis could be performed, three assumptions had to be valid (Huynh & Mandeville, 1979):

1. There should be no extreme outliers.
2. The residuals of the regression line of the dependent variable should be approximately normally distributed for each level of the within-subjects factor.
3. The variances of the differences between all combinations of levels of the within-subjects factor must be equal. This is known as sphericity.

The assumptions were checked and the analyses were run using a software program called SPSS.

In the case of a repeated measures ANOVA, Assumption 1 is assessed by creating a boxplot for each measured level of the dependent variable. SPSS marks the extreme outliers with an asterisk (*) on the box plot. If there are no extreme outliers, Assumption 1 is valid.

Assumption 2 states that the residuals of the regression line of the dependent variable should be approximately normally distributed for each level of the within-subjects factor. There are two main categories of methods with which the normality of data can be established, namely graphical methods and numerical methods (Lund & Lund, 2015). According to Lund and Lund (2015), numerical methods enable researchers to make objective judgements regarding the normality of data. The disadvantage of numerical methods, however, is that at times they are not sufficiently sensitive when small samples are used and they are overly sensitive when large samples are used. Graphical methods, on the other hand, allow researchers to use their own judgement to determine whether data is normally distributed, but there is a risk that the judgement may not be objective.

In order to be thorough, it is recommended to use both numerical and graphical methods according to an assessment plan to determine normality (Lund & Lund, 2015). The assessment plan determines when the data can be accepted to have a normal (or approximately normal) distribution, or when the assumption of normality should be rejected instead. Samuel and Marshall (2017) echo the recommendation of Lund and Lund (2015) by recommending that graphical tests for normality should be used in conjunction with numerical tests for larger samples. According to Clewer and Scarisbrick (2001), however, graphical tests for normality are sufficient seeing as only serious deviations from normality will invalidate the tests. These serious deviations are easy to detect visually.

In order to be thorough, six normality assessments are performed. Two of the assessments are graphical assessments which include the assessment of a histogram of the standardised residuals and a P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities. The other four assessments are numerical assessments and include an evaluation of skewness, kurtosis, the Kolmogorov-Smirnov test and the Shapiro-Wilk test. Since no recommendation regarding an assessment plan could be found in academic literature, the recommendation provided by Lund and Lund (2015) that was found in grey literature is used. In accordance with the recommendation by Lund and Lund (2015), the assessment plan for this study will accept that the data is normally (or approximately normally) distributed if the data passes four out of the six normality assessments.

The first graphical test that is used to test for normality of the data, is a histogram of the regression standardised residuals. According to Clewer and Scarisbrick (2001) the histogram should be visually inspected to determine whether the data appears to be approximately normally distributed. Additionally, the mean and standard deviation that are provided alongside the histogram on SPSS can also be evaluated. If the data is normally distributed, the mean will be approximately equal to zero and the standard deviation will be approximately equal to one.

The second graphical test to assess the distribution of the data for this study is the inspection of the P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities. In order for the residuals to be normally distributed, the points on the plot have to be in line with the diagonal line on the plot (Clewer & Scarisbrick, 2001).

The first two numerical tests for normality require an assessment of the z-scores of the skewness and kurtosis of the data. By using a conservative statistical significance level of 0.01, the data is normally distributed if the z-score is within a range of ±2.58 (Lund & Lund, 2015). The z-scores for skewness are calculated by dividing the skewness statistic by its standard deviation score (Lund & Lund, 2015). Similarly, the z-score for kurtosis is also calculated by dividing the kurtosis statistic by its standard deviation score (Lund & Lund, 2015).

The third and fourth numerical tests that were used in this study are called the Kolmogorov-Smirnov test with the Lilliefors correction and the Shapiro-Wilk test. The null hypothesis for these two tests is that the data's distribution is equal to a normal distribution. If the p-values for these tests are less than 0.05, the assumption of normality has been violated. If the p-values for these tests are larger than 0.05, the assumption of normality has not been violated (Lund & Lund, 2015).

Assumption 3 is valid if sphericity is met. Mauchly's test can be used to test for sphericity. If the p-value for Mauchly's test is less than 0.05 ($p < 0.05$), sphericity is violated. If Mauchly's test indicates that sphericity is violated, a correction can be done by changing the degrees of freedom that are used for the p-value. The correction is called epsilon (ε). Maxwell and Delaney (2004) suggest the use of a correction called the Greenhouse-Geisser correction.

In practice, however, the assumption of sphericity is considered easy to violate (e.g. Weinfurt, 2000) and Mauchly's test is considered to be an insufficient method to discover violations of sphericity since it often fails to detect deviations from sphericity in small samples and often over-detects them in large samples (Keselman, Rogan, Mendoza & Breen, 1980). Therefore, it is recommended that the unadjusted values are never used and that the result of Mauchly's test be ignored by simply interpreting the result of the Greenhouse-Geisser correction regardless (Maxwell & Delaney, 2004). Huynh and Mandeville (1979) also recommend discarding Mauchly's test and adjusting the degrees of freedom instead. Thus, the recommendations of Maxwell and Delaney (2004) were followed in this study and the Greenhouse-Geisser correction was used, therefore the test for sphericity was not conducted.

Since it was no longer necessary to check for Assumption 3, only Assumption 1 and Assumption 2 were assessed. In order to avoid repetitive text in the content of this document, the assessment of the assumptions for each level of the dependent variables are discussed in Appendix C. The assumptions were valid for all of the levels of the dependent variables and therefore, it was possible to conduct a one-way repeated measures ANOVA in order to compare the responses provided by the different groups.

5.4.3. Comparison of responses provided for team innovation

Figure 12 shows a simple line graph of the means for the responses provided for team innovation with 95% confidence intervals. It shows the responses provided by both the senior managers and team managers for team innovation, and it can be seen that the team managers rated team innovation considerably higher than the senior managers.[11] Epsilon (ε) was 1.0, as calculated according to Greenhouse & Geisser (1959), and was used to correct the one-way repeated measures ANOVA. The measures for team innovation were statistically significantly different for the senior managers and the team managers, $F(14.251, 11.093) = 62.947$, $p < 0.0005$.

[11] As discussed previously, all of the scales were rated on a five-point Likert scale.

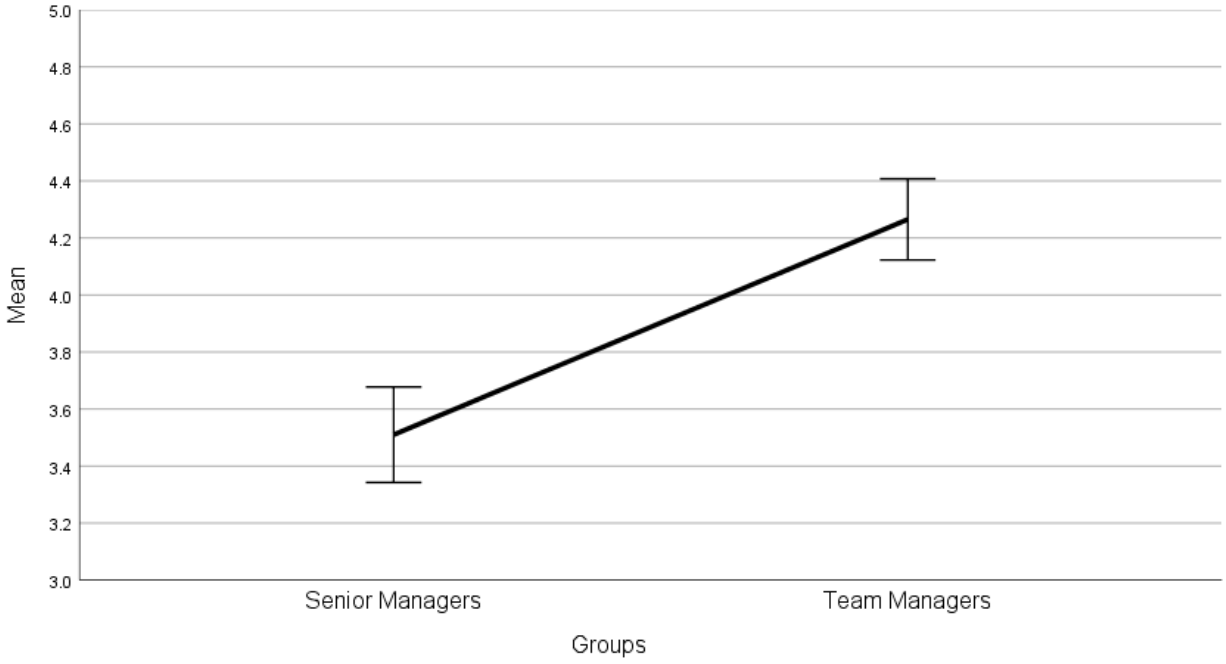

Figure 12:Comparison of the means of the senior manager and team manager responses for team innovation

5.4.4. Comparison of responses provided for team effectiveness

The responses for team effectiveness were also compared between the three groups after removing the responses of the teams whose r_{WG} values did not allow for their responses to be aggregated. As discussed in Section 4.3.4, the scale that measured team effectiveness on the senior managers' questionnaire differed from the scale used on the team managers' and employees' questionnaires. However, the team managers and employees had the same scale. The senior managers' scale provides a single measure for team effectiveness, while the team managers' and employees' scale divides team effectiveness into three facets, namely: team performance, quality of group experience, and team viability. The single measure for team effectiveness that was obtained from the senior managers' questionnaires was compared to each of the three facets of team effectiveness that were obtained from the other two questionnaires.[12]

[12] As discussed previously, all of the scales were rated on a five-point Likert scale.

For the first facet of team effectiveness, namely performance, the responses of the three groups were compared by plotting them onto a simple line graph of the means with a 95% confidence interval which can be seen in Figure 13. The graph shows the difference in the means of the responses of the three groups.

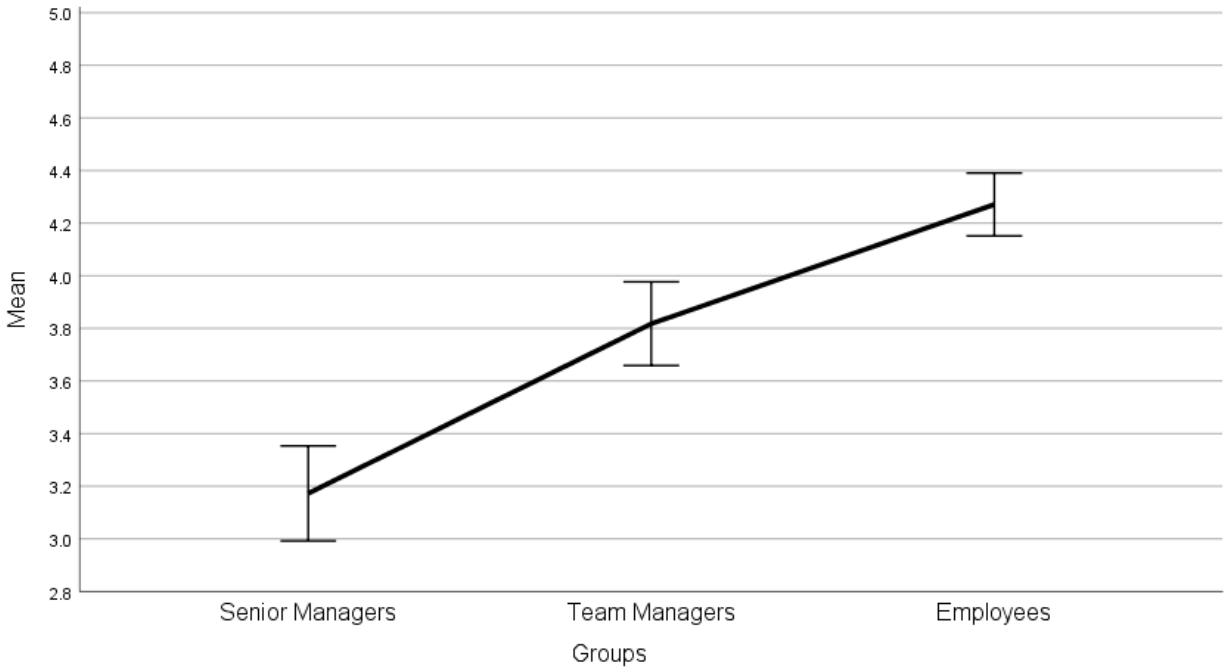

Figure 13:Comparison of the means of the responses provided by the three groups of respondents for team effectiveness (performance)

For team performance, it can be seen in Figure 13 that the team managers and the employees rated their teams' performance significantly higher than the senior managers. A p-value smaller than 0.05 ($p < 0.05$) indicated that there is a statistically significant difference between the ratings provided by the three groups.

Epsilon (ε) was 0.987, as calculated according to Greenhouse & Geisser (1959), and was used to correct the one-way repeated measures ANOVA. The measures for team effectiveness (performance) were statistically significantly different between the three groups, $F(1.974,92.780) = 14.807$, $p < 0.0005$.[13]

[13] SPSS does not report the exact estimates of the p-values if they are significantly small, but merely reports that they are smaller than 0.0005. Therefore, an exact value for the p-value cannot be provided when p< 0.0005. This, however, is not problematic since the p-value is demonstrably smaller than 0.05.

Since there were more than two groups involved in this comparison, the Bonferroni post hoc test was used to determine which groups' means differed significantly from each of the others' by looking at all of the possible pairwise combinations of the levels of the within-subjects factor. In other words, each group's responses are compared to each of the other groups' responses in pairs in order to determine whether the difference between the means of each pair of groups is statistically significant. The use of the Bonferroni test is recommended by Maxwell & Delaney (2004) and it provides the statistical significance level (the p-value) for each pairwise comparison and the confidence intervals for the mean difference of each pairwise comparison.

The test indicated that the mean ratings that were provided by the team managers and the employees were significantly higher than that of the senior managers and that this was statistically significant ($p < 0.0005$). The mean ratings provided by the team managers were on average 0.645 higher than the mean ratings provided by the senior managers, and the mean ratings of the employees were on average 1.098 higher than the mean ratings provided by the senior managers. The mean of the employees' responses was, on average, 0.453 higher than the mean of the team managers.

For the second facet of team effectiveness, the responses of the three groups were compared by plotting them onto a simple line graph of the means with a 95% confidence interval which can be seen in Figure 14. The graph shows the difference in the means of the responses of the three groups. Similar to performance, it can be seen that the team managers' and employees' ratings were significantly higher than those provided by the senior managers.

Epsilon (ε) was 0.922, as calculated according to Greenhouse & Geisser (1959), and was used to correct the one-way repeated measures ANOVA. A p-value smaller than 0.0005 was reported for the ANOVA test which indicated that the means of the three groups were not equal. The means for quality of group experience were statistically significantly different, $F(1.844,71.908) = 54.864$, $p < 0.0005$.

The p-value for the ANOVA test only indicates that the means were different, but does not show which of the means differ from each other, and therefore a post hoc Bonferroni test was done to determine which of the means differed from each other. The mean of the ratings that were provided by the team managers were on average 1.056 higher than the mean of the ratings provided by the senior managers, and the mean of the ratings of the employees were on average 0.859 higher than the mean of the ratings provided by the senior managers. These differences that were obtained from the Bonferroni test were statistically significant since the p-value for all three of the comparisons was $p < 0.0005$. The difference between the means of the team managers' and employees' ratings were not statistically different seeing as $p = 0.106$ and thus $p > 0.05$.

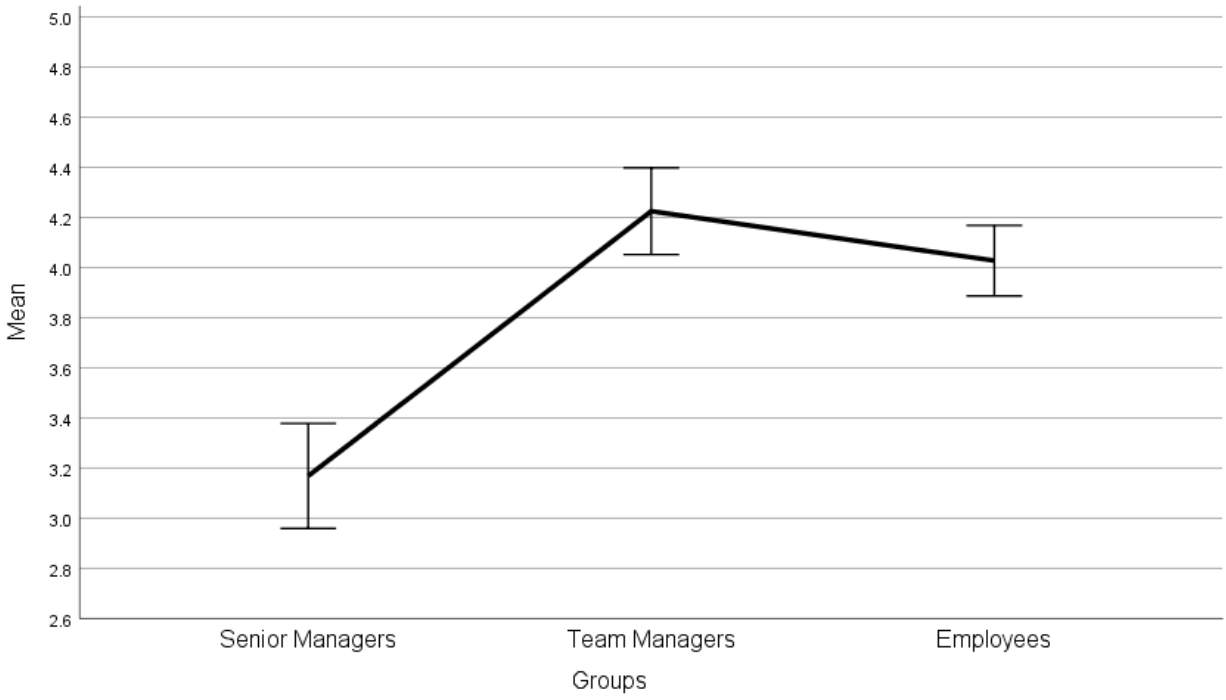

Figure 14: Comparison of the means of the responses provided by the three groups of Respondents for team effectiveness (quality of group experience)

For the last facet of team effectiveness, namely team viability, the responses of the three groups were compared by plotting them onto a simple line graph of the means with a 95% confidence interval which can be seen in Figure 15. The graph shows the difference in the means of the responses of the three groups. Similar to performance and quality of group experience, it can be seen that the team managers' and employees' ratings were significantly higher than those provided by the senior managers.

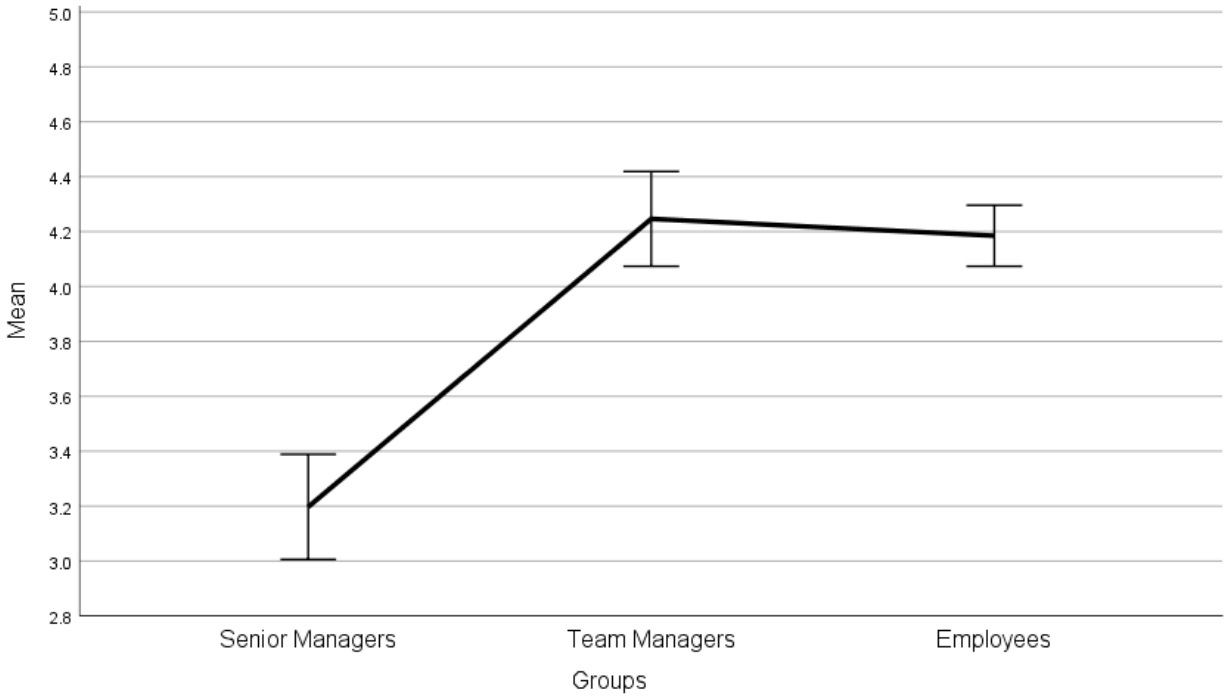

Figure 15: Comparison of the means of the responses provided by the three groups of respondents for team effectiveness (team viability)

Epsilon (ε) was 0.942, as calculated according to Greenhouse & Geisser (1959), and was used to correct the one-way repeated measures ANOVA. A p-value smaller than 0.0005 was reported for the ANOVA test which indicated that the means were not equal. The means for team viability were statistically significantly different, $F(1.885,84.823) = 69.121$, $p < 0.0005$.

The p-value for the ANOVA test only indicates that the means were different, but does not show which of the means differ from each other, and therefore a post hoc Bonferroni test was done to determine which of the means differed from each other. The mean of the ratings provided by the team managers were on average 1.049 higher than the mean of the ratings provided by the senior managers, and the mean of the ratings provided by the employees were on average 0.987 higher than the mean of the ratings provided by the senior managers.

These differences are statistically significant since the p-value for all three of the comparisons were $p < 0.0005$. The difference between the mean of the team managers and the mean of the employees' ratings were not statistically different seeing as $p = 1.00$ and thus $p > 0.05$.

5.4.5. Conclusion: Comparison of responses from different groups of participants

To conclude the comparison, it can be seen that in all four of the comparisons, the senior managers' ratings were lower than those provided by their subordinates, and that these differences were statistically significant. For team innovation, the team managers provided overall higher ratings than the senior managers and this is likely due to the fact that the team managers were subject to common method bias that is caused by social desirability. Thus, it is suspected that the team managers provided higher scores out of a desire to make their team look good and to make themselves look good. This notion is echoed by Smith-Crowe et al. (2014), who found that sometimes, team leaders or supervisors might report the performance of their subordinates positively because of a desire to look good themselves or to be supportive. The researcher's confidence in the objectivity of the senior managers has been discussed, and therefore, the findings presented by Smith-Crowe et al. (2014) are suspected to only be applicable to the team managers.

For all three measures of team effectiveness, the subordinates (team managers and employees) once again provided overall higher scores than the senior managers. In the case of team effectiveness, there are three possible reasons for the significant difference in their responses. The first reason could be the fact that team effectiveness was measured on a different scale for the senior managers than for the team managers and employees. This difference in scales could possibly have resulted in a difference in the means of the ratings. The second reason could be due to the fact that the subordinates were subject to common method bias caused by social desirability which is similar to the case for team innovation. Thirdly, there is a possibility that the differences in the means were caused by a combination of the different scales and common method bias. For team effectiveness, the chances that the difference in responses was caused by social desirability are high, because social desirability was posited as the only reason for the difference in the responses for innovation (since the same measurement scale was used to measure innovation among all groups) and the difference in responses between innovation and effectiveness seem to be similar since the senior managers' ratings are significantly lower than their subordinates' ratings in all of the comparisons.

5.5. Linear Regression Analyses

Linear regression is a suitable method of analysis when the aim is to explain the variation in a response variable (dependent variable) that can be attributed to variation in a predictor variable (independent variable). Linear regression analysis can be used to determine whether there is a linear relationship between two continuous variables and what the strength of the relationship between them is (Freedman, 2001).

Regarding the team effectiveness and team innovation outcome variables in this study, the goal is to determine whether MBAs have a linear relationship with each of them respectively, and if so, what the strength of that relationship is.

As discussed in Section 5.1, all of the variables are continuous variables, therefore a linear regression analysis is a fitting tool to analyse the effect of MBAs on team effectiveness and team innovation.

A linear regression analysis was performed for the team effectiveness and team innovation constructs to assess the relationship between the independent variable, namely the MBA scores, and the dependent variables. The linear regressions were performed using a software program called SPSS.

5.5.1. Assumptions for a linear regression analysis

In order to be able to perform a linear regression analysis, a set of assumptions need to be met. These assumptions are as follows (Clewer & Scarisbrick, 2001):

1. There is only one independent variable present and it is measured at the continuous level.
2. There is only one dependent variable present and it is measured at the continuous level.
3. There should be a linear relationship between the independent and dependent variables.
4. The residuals of the observations should be independent.
5. There shouldn't be any significant outliers.
6. The data conforms to homoscedasticity (this is when the variances along the best line of fit remain similar as one moves up and down the line).
7. The residuals (also referred to as the errors) of the regression line are approximately normally distributed.

When tests for statistical significance were performed, a confidence interval of 95% was used, unless stated otherwise.

As discussed in Section 5.1, all of the variables are continuous variables, and therefore Assumptions 1 and 2 are valid for all of the constructs in the study. Assumption 3 is evaluated by plotting a scatterplot of the dependent and independent variables and visually examining whether there is a linear relationship between the two variables (Clewer & Scarisbrick, 2001).

Assumption 4 is analysed by generating and assessing the Durbin-Watson statistic (which is denoted as 'd'). The Durbin-Watson statistic determines if the residuals of the observations are independent. If the residuals are independent, it means that one residual cannot contribute any information about another residual and that the responses were not influenced by the order in which the respondents provided them (Dunn & Clark, 1987).

The Durbin-Watson statistic ranges from 0 to 4. A value of 2 indicates that there is no correlation between residuals and that the observations are independent, therefore a value of approximately 2 is desired. If the Durbin-Watson statistic is not approximately 2, the value is compared to the lower bound (d_L) and upper bound (d_U) of the Durbin-Watson tables (Evans, 2018): The Durbin-Watson statistic is then analysed as follows (Evans, 2018):

To test for positive autocorrelation:

- If $d < d_L$, then there is statistical evidence that the error terms have a positive autocorrelation.
- If $d > d_U$, then there is no statistical evidence that the error terms have a positive autocorrelation.
- If $d_L < d < d_U$, it means that the test is inconclusive.

To test for negative autocorrelation:

- If $(4-d) < d_L$, then there is statistical evidence that the error terms have a negative autocorrelation.
- If $(4-d) > d_U$, then there is no statistical evidence that the error terms have a negative autocorrelation.
- If $d_L < (d- 4) < d_U$, it means that the test is inconclusive.

Assumption 5 is evaluated by visually assessing a scatterplot of the dependent and independent variable (Clewer & Scarisbrick, 2001) and accompanying output that is given by SPSS. SPSS provides a table that shows the values that are considered to be outliers. If SPSS does not provide such a table, it means that there are no outliers. The scatterplot is also visually inspected for any outliers.

In order to assess for homoscedasticity (also referred to as homogeneity of variance) and to determine whether Assumption 6 is valid, a plot of the standardised residuals versus the standardised predicted values is inspected. There is homoscedasticity if the points on the plot appear to be approximately constantly spread without any sign of a pattern (Clewer & Scarisbrick, 2001). If there is homoscedasticity, Assumption 6 is valid.

The last assumption, Assumption 7, states that the residuals of the regression line are approximately normally distributed. It should be noted; non-normality does not have a problematic effect on a linear regression analysis if the sample size is 15 or higher (Minitab 17, 2014).

Since the sample size for both team effectiveness and team innovation is higher than 15, the sample size is large enough in order for approximately normally distributed data not to be problematic. For the sake of completeness, however, the data is tested for normality. Normality was determined with the same tests that were used to determine normality in Section 5.4.2.

In order to avoid repetitive text in this document, the assessment of the assumptions for the linear regression analyses can be found in Appendix D.

5.5.2. Team effectiveness

A linear regression was performed to assess the relationship between the independent variable, namely the MBA scores, and the dependent variable, namely team effectiveness. As mentioned in Section 4.3.4, the senior managers' responses were used for the analysis seeing as they were considered to be the most objective and their responses were the least likely to be affected by common method bias that is caused by social desirability. All of the assumptions for the data were valid and therefore it was deemed appropriate to perform a linear regression analysis on the data for team effectiveness.

A linear regression was run to evaluate the relationship between MBA scores and team effectiveness, and it was found that there is a statistically significant positive relationship between the two variables with $F(1,48) = 37.515$, $p < 0.0005$. The impact of MBAs on team effectiveness accounts for 43.9% of the variation in team effectiveness with an adjusted R^2 value of 42.7%, which is regarded as a medium-size effect according to Cohen (1988). A scatter plot of MBA scores and team effectiveness ratings with a linear regression line fitted to the data can be seen in Figure 16.

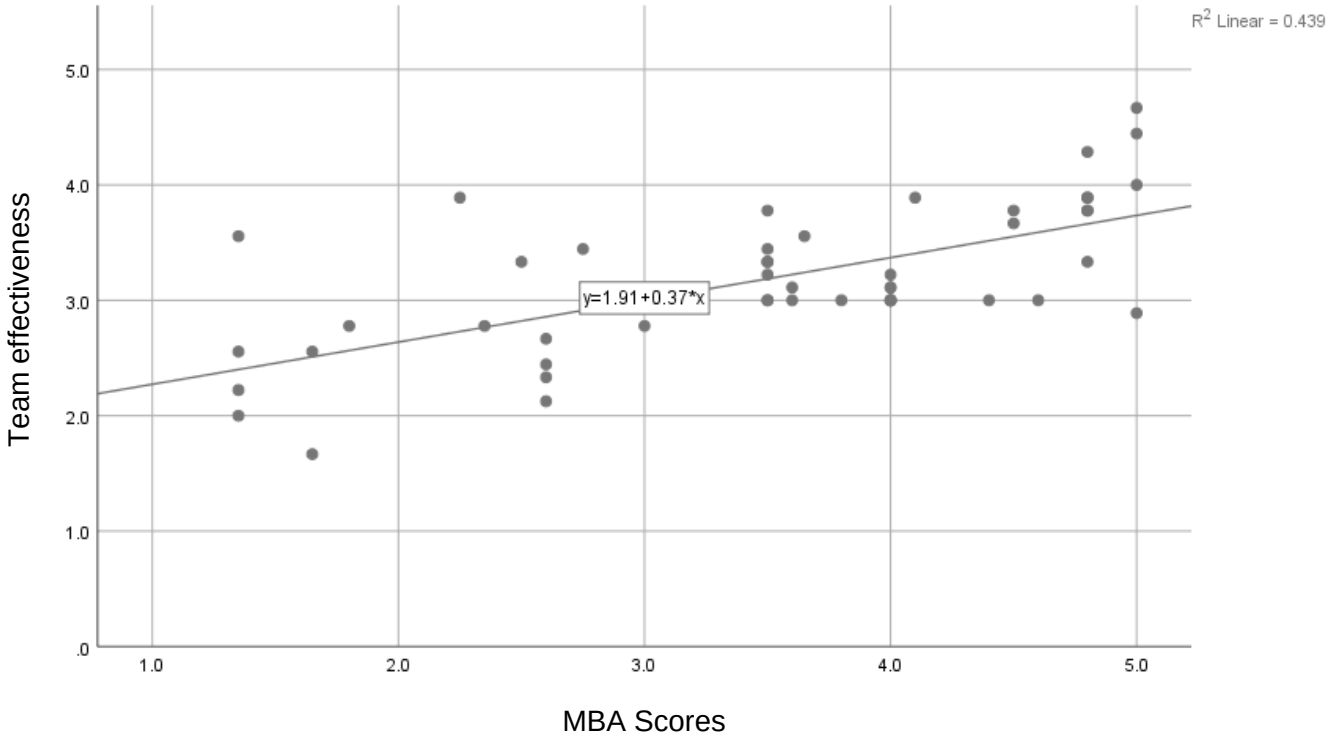

Figure 16:Scatter plot of MBA scores and team effectiveness ratings with fitted linear regression line

5.5.3. Team innovation

A linear regression was performed to assess the relationship between the independent variable, namely MBAs, and the dependent variable, namely team innovation. As mentioned in Section 4.3.7, the senior managers' responses were ultimately used for the analysis seeing as they were considered to be the most objective and their responses were the least likely to be affected by common method bias that is caused by social desirability.

As mentioned in Section 5.5.1, before a regression analysis can be performed, a set of seven assumptions need to be valid for the data set. The assessment of the assumptions for innovation can be found in Appendix D. It was found that the data did not violate any of the assumptions and that it was acceptable to perform a linear regression analysis on the data.

The results indicate that there is a statistically significant positive relationship between MBA scores and team innovation with $F(1,48) = 14.396$, $p < 0.0005$. The impact of MBA scores on team innovation accounts for 23.1% of the variation in team innovation with adjusted $R^2 = 21.5\%$— which is regarded as a small effect size (Cohen, 1988). Figure 17 shows a scatter plot of MBA scores and team innovation ratings with a linear regression line fitted to the data.

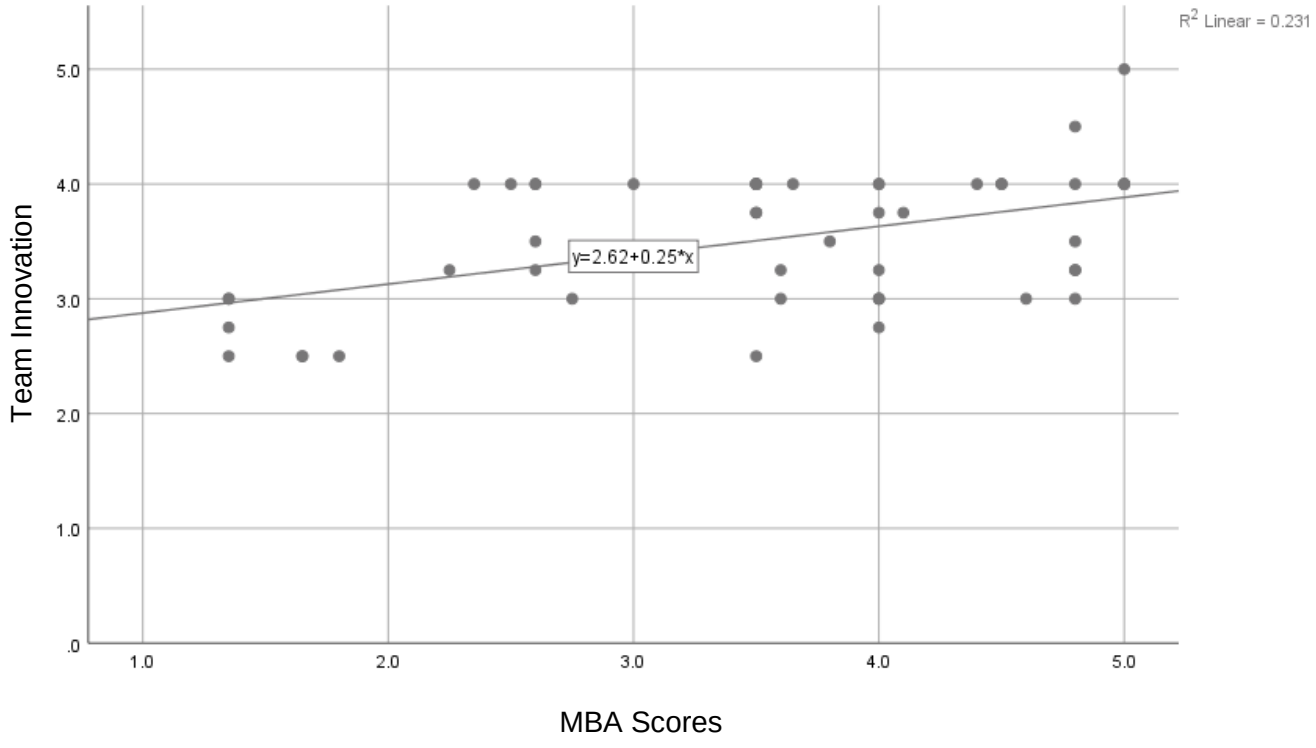

Figure 17:Scatter plot of MBA scores and team innovation ratings with fitted linear regression line

5.6. Multilevel analysis

When data is nested or clustered within units, a multilevel model is used to analyse the data. In this study, the employees are nested within the MBA teams, because each employee belongs to a specific MBA along with other employees in their team. In other words, the employees are embedded in the MBA teams. If an employee is nested within an MBA team, it cannot be assumed that this employee's responses are independent from the rest of the team's responses. In order to explain the concept of nested data thoroughly, another example of nested data is provided. If, for example, a study collected responses from learners in a school, each learner is part of a specific class. Thus, the learners are nested within the different classes and therefore, the responses that are provided by an individual learner are not independent of the other learners' responses in their class due to the fact that they are all embedded in the same class.

Employee engagement and job satisfaction are referred to as Level 1 variables since they are measured on an individual basis. The MBAs are referred to as the Level 2 variable, since MBAs are measured on the team level. A multilevel model (MLM) allows researchers to study the influence of both individual (i.e. Level 1) and cluster-level (i.e. Level 2) variables (Enders & Tofighi, 2007). In this study, the effect of a Level 2 variable (MBAs) on a Level 1 variable (job satisfaction) with a Level 1 mediator (employee engagement) is measured. A model with a Level 2 predictor and a Level 1 mediator and outcome variable is referred to as a 2-1-1 model. Figure 18 illustrates the 2-1-1 multilevel model for this study and shows the different levels on which the variables are measured. Note that the multilevel model that is illustrated in Figure 18 is an extract from the entire model that is evaluated in this research (presented in Figure 3 in Section 3.2).

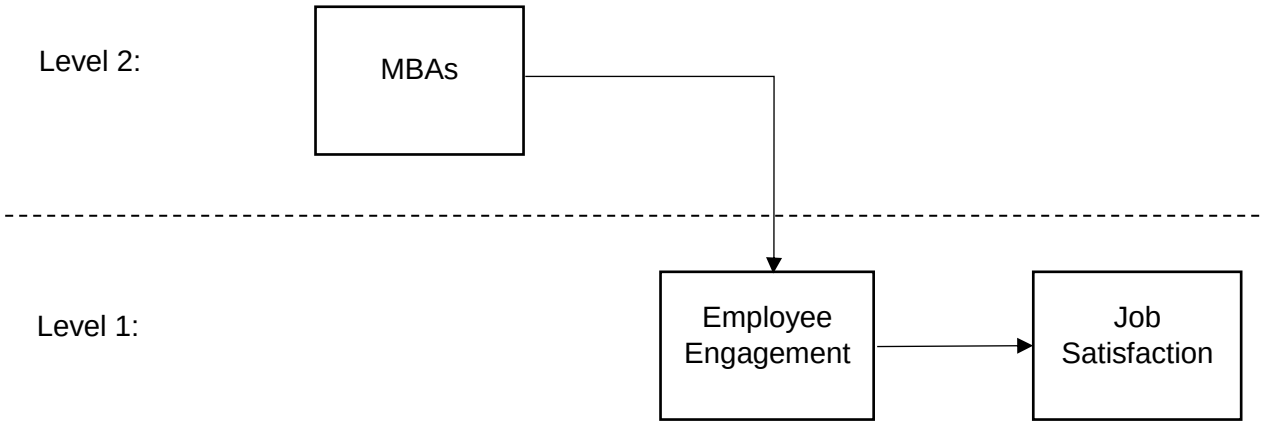

Figure 18: Illustration of the multilevel model and the different levels on which the variables were measured

In Section 5.5 a simple linear regression analysis was used to analyse the effect of MBAs on team effectiveness and team innovation. A linear regression analysis was appropriate for the analysis of those two outcome variables because the responses that were provided were independent from each other (which is an underlying assumption of a linear regression analysis).

In the case of job satisfaction, however, the responses that were provided by the employees are not independent due to the nesting of the responses. The responses that were provided by employees who all belong to the same MBA are likely to be non-independent from each other. According to Hayes (2006), non-independence of data invalidates the use of single-level methods of analysis (such as linear regressions). Therefore, the effect of MBAs on job satisfaction had to be analysed with an MLM.

It would not be appropriate to aggregate the responses of each individual employee into one response per team, seeing as job satisfaction is considered to be unique to each individual and that values for job satisfaction that are aggregated to the team level would take away the true essence of the construct.[14] Team effectiveness is a construct that is applicable to a team, not an individual, and that is why it was deemed fit to aggregate the individual responses of team effectiveness into one response per team.

Although the SPSS software tool was used to perform the linear regression analyses in Section 5.5, the multilevel model was analysed with a software tool called Mplus since it is regarded as a more powerful software tool for conducting analyses of multilevel models (Hayes, 2006).

5.6.1. Considerations

Before conducting a multilevel model analysis, there are a number of points that need to be considered and each of these considerations of the model is discussed separately:

1. It needs to be decided whether the variables should be centred or not. If centring is identified as the best course of action, it needs to be decided how the variables should be centred.
2. It should be decided whether the intercepts of the model should be estimated as fixed or random.
3. It should be decided whether the slopes of the model should be estimated as fixed or random.

[14] Some literature pieces refer to the ‘flaw of averages’, which states that whenever an uncertain quantity is represented by an average, the results are distorted because the effect of unavoidable variations are then ignored (Savage, 2002). Thus, using an average for a variable that is unique to each individual, such as job satisfaction, could easily conceal valuable information about the individuals and therefore, the responses for job satisfaction were not aggregated.

Centring the variables:

Psychological constructs are often expressed on arbitrary metrics with zero points that are not particularly meaningful and cannot be clearly interpreted (Blanton & Jaccard, 2006). Although centring cannot solve this problem entirely, it is a useful method for establishing a zero point for measures that do not have a meaningful zero point (Enders & Tofighi, 2007). The establishment of a meaningful zero point enables the clear interpretation of the final results of the analysis.[15]

For a multilevel analysis, two options for centring the data exist. The first option is to centre the variables at the grand mean (CGM). The second option is to centre the variables at the group mean, which is referred to as centring within cluster (CWC) (Enders & Tofighi, 2007). CWC is when the variables are deviated around the mean of the specific cluster j to which case i belongs.

The decision on how to centre Level 1 data and how to centre Level 2 data should be made separately. The decision between CGM and CWC for the Level 1 variable is particularly important since these two methods of centring can generate parameter values that are different in meaning and in value (Enders & Tofighi, 2007). The decision of centring should be based on the substantive research question that is being investigated (Enders & Tofighi, 2007). The substantive research question of interest in this study is the impact of MBAs (a Level 2 predictor variable) on job satisfaction (a Level 1 outcome variable). Therefore, a Level 2 predictor variable is present. According to Enders and Tofighi (2007): “CGM is the method of choice for assessing the impact of cluster-level variables, controlling for Level 1 covariates.” Therefore, the CGM method was used to centre the Level 1 variates in this study.

According to Enders and Tofighi (2007), the process of deciding how to centre a Level 2 variable is much simpler than deciding how to centre a Level 1 variable because one can only use the raw metric or use CGM. Since each member of a given cluster (or, in terms of this research, since each employee of a given MBA) shares the same value on the Level 2 predictor (the MBA score in this case), CWC cannot be an option for centring. In general, decisions regarding the centring at Level 2 in MLM imitate the practice that is prescribed from the ordinary least squares regression literature (Aiken & West, 1991). When Level 2 variates are centred, it only changes the intercept, no other parameter estimates. Since the p-value is the only parameter of interest for the interpretation of the results of this study, the intercept will not be interpreted and therefore, it is not necessary to change the intercept. Thus, the raw metric data will be used for the Level 2 predictor.

[15] Although the data for the multilevel model was centred, the data for the linear regression models in Section 5.3. was not centred since no interaction effects (moderators) were present in the linear models and therefore centring was unnecessary for those models (Hayes, 2005).

Estimating the intercepts as random or fixed:

According to Hayes (2006), in order to allow variation between the mean of the Level 1 units nested under a common Level 2 unit to vary between Level 2 units, the intercept of an MLM is almost always estimated as a random effect. Although this variation between Level 2 units does not account for all of the nonindependence between nested Level 1 units, it does account for much of it. It is this nonindependence that discredits the use of single-level methods of analysis such as standard multiple regression for this type of model. Thus, according to the recommendation provided by Hayes (2006), the intercept was estimated as random.

Estimating the slopes as random or fixed:

Hayes (2006) made a recommendation regarding the decision of whether to set the slopes of the MLM as random or fixed: “If it makes sense to assume or predict on theoretical or methodological grounds that the relationship between a level-1 variable and the outcome differs between level-2 units, this suggests setting the effect as random.”

In other words, if the relationship between employee engagement and job satisfaction is expected to differ according to the different MBA scores, it is recommended that the intercepts are set as random in the model. In this study, however, it was not expected that the various MBA scores would cause the relationship between engagement and job satisfaction to differ, and therefore the slopes were set as fixed.

5.6.2. Analysis

The analysis was done by using the multilevel structural equation modelling (MSEM) framework that was developed by Preacher, Zyphur and Zhang (2010). According to Preacher et al. (2010), other approaches to test multilevel mediation were previously developed within an MLM paradigm and each of these approaches was developed in response to a need to estimate a specific model that hypothesised about multilevel mediation.

However, these approaches failed to provide a sufficient method of analysing different models that also contained multilevel mediation relationships and three variables. Concerning the 2-1-1 model in this study, the existing MLM framework has limitations when it comes to the evaluation of a 2-1-1 model because the current MLM framework does not completely separate the between-group effects and the within-group effects without causing bias (Preacher, Zyphur & Zhang, 2010). In a multilevel model containing two levels, the variance of a variable in the clustered data can be divided into two orthogonal latent components[16] named the between (cluster) component and the within (cluster) component (Asparouhov & Muthen, 2007). If a variable is measured at Level 2, it only has between components of variance. If a variable is measured at Level 1, it usually has between components and within components (although sometimes, if a Level 1 variable doesn't have between-group variation, it will only have a within component).

According to Preacher et al. (2010), ordinary uses of MLM only report a single estimate for the mean slope. This single estimate combines between effects and within effects instead of estimating a mean slope separately for each. This can be problematic for a multilevel mediation analysis, since it can produce indirect effects that are biased because the component paths may mistakenly add effects that are relevant to mediation to other effects that are not relevant to mediation.

The MSEM approach can overcome the limits that are experienced with a traditional MLM approach when 2-1-1 models need to be analysed (Preacher et al., 2010), and therefore the MSEM approach was used in this study. The code that was used for the analysis in the Mplus software tool was provided by Preacher et al. (2010) and can be seen in Appendix E. The code was slightly altered in order to accommodate the centring of the variables; therefore, the altered code is shown alongside the original code as provided by Preacher et al. (2010).

In a mediation model, the effect of the predictor variable (referred to as X for the purpose of illustration), on the outcome variable (referred to as Y) is divided into two components, namely a direct effect and an indirect effect (Hayes, 2018). The direct effect is referred to as the effect that X has on Y. The indirect effect is referred to as the effect that X has on Y through the mediator (referred to as M). When interpreting the results of a multilevel mediation analysis, both the direct and indirect effect are interpreted.

[16] 'Orthogonal' refers to the fact that the components are linearly independent and that the cosine of the angle between them is zero (Rodgers, Nicewander & Toothaker, 1984), and 'latent' refers to the fact that the components are unobserved (Cai, 2012).

Figure 19 provides an illustration of the direct and indirect effect of X on Y. The direct effect of X on Y is estimated by *c'* (Hayes, 2018). A general explanation of the direct effect is that if two observations differ with only one unit on X and they are equal on M, then they are estimated to differ by *c'* units on Y. A positive direct effect indicates that an observation that is higher in X is estimated to be higher in Y, and a negative direct effect indicates that an observation that is higher in X is estimated to be lower on Y (Hayes, 2018).

The indirect effect of X on Y through M is calculated by multiplying *a* and *b* (Hayes, 2018). Through the indirect effect, two observations that differ by one unit on X are estimated to differ by *ab* units on Y due to the effect of X on M which, in turn, has an effect on Y (Hayes, 2018). For example, if *a* = 0.6 and *b* = 0.5, then the indirect effect of X on Y through M will be *ab* = 0.3.

In the model, *a* specifies how much two observations that differ by one unit on X are approximated to differ on M. The sign of *a* determines whether an observation of X will be higher (+) or lower (-) on M. Furthermore, *b* is interpreted in a similar way as *c'*, except that M is now the antecedent instead of X. Thus, two observations that are equal on X but have a one-unit difference on M will differ by *b* units on Y. The sign of *b* also indicates whether the observation that is higher in M will be estimated as higher (+) or lower (-) on Y (Hayes, 2018).

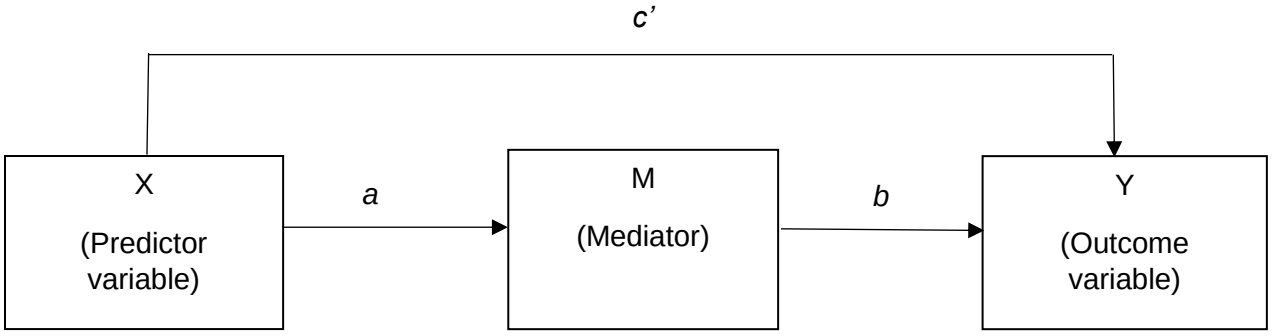

Figure 19: Illustration of the direct and indirect effect of X on Y

The mediator in the model, employee engagement, was divided into three facets (vigour, dedication and absorption), and the multilevel analysis was performed for each facet separately. When statistical significance was tested, a confidence interval of 95% was used.

The results for the first facet of employee engagement, namely vigour, indicated that the MBA scores did not have a significant direct effect on job satisfaction since a p-value of 0.674 was obtained ($p > 0.05$). Concerning the indirect effect, the MBA scores also did not have a significant indirect effect on job satisfaction with vigour as a mediator since a p-value of 0.704 was obtained ($p > 0.05$).

The results for the second facet of employee engagement, namely dedication, indicated that the MBA scores did not have a significant direct effect on job satisfaction since a p-value of 0.165 was obtained ($p > 0.05$). Concerning the indirect effect, the MBA scores also did not have a significant indirect effect on job satisfaction with dedication as a mediator since a p-value of 0.992 was obtained ($p > 0.05$).

The results for the third facet of employee engagement, namely absorption, indicated that the MBA scores did not have a significant direct effect on job satisfaction since a p-value of 0.759 was obtained ($p > 0.05$). Concerning the indirect effect, the MBA scores also did not have a significant indirect effect on job satisfaction with absorption as a mediator since a p-value of 0.810 was obtained ($p > 0.05$).

Thus, it is concluded that the MBA scores did not have a significant effect on job satisfaction with employee engagement as a mediator. Chapter 6 will discuss possible reasons why the findings for this portion of the model do not align with what was expected based on the theorising presented in Chapter 3.

5.7. Conclusion: Analysis and results

In this chapter, the model that was presented in Section 3.2 was statistically analysed. Firstly, the sample that was used in this study was described and the variables in the study were categorised as continuous variables due to the continuous nature of the data that was obtained through averaging. Thereafter, the demographic variables were presented in order to provide a typical profile of the respondents that participated in the study and the descriptive statistics for the data were provided.

As an interesting addition to the study, the responses that were provided by the different groups of respondents for team effectiveness and team innovation were compared to each other with the help of a repeated measures ANOVA. For both team effectiveness and team innovation, the senior managers provided considerably lower ratings than the team managers and employees.

A possible reason for this is the fact that the team managers and employees had the desire to portray the teams favourably, regardless of whether the teams were doing well in terms of effectiveness and innovation or not. This is attributed to common method bias caused by social desirability. It is believed that the senior managers were less likely to be subject to common method bias.

The team effectiveness outcome variable was analysed by performing a simple linear regression analysis and it was found that there was a statistically significant, positive relationship between the MBA scores and team effectiveness. The team innovation outcome variable was also analysed by performing a simple linear regression analysis and it was found that there was a statistically significant, positive relationship between the MBA scores and team innovation.

The job satisfaction outcome variable was analysed using the multilevel structural equation modelling (MSEM) framework that was developed by Preacher et al. (2010). Job satisfaction (the outcome variable) and employee engagement (the mediator) were measured on an individual level (Level 1) while the MBA scores were measured on a team level (Level 2). The different levels of measurement necessitated the use of a multilevel model for analysis. Since employee engagement consisted of three facets (vigour, dedication and absorption), a separate analysis was done for each facet. The results of all three of the analyses indicated that the MBA scores did not have a significant direct effect on job satisfaction. The results also indicated that the MBA scores did not have a significant indirect effect on job satisfaction through the mediator, employee engagement.

A discussion of these results is provided in Chapter 6.

CHAPTER 6: DISCUSSION OF RESULTS

This chapter discusses the results that were obtained from the data analysis in the previous chapter. It starts by evaluating the hypotheses that were developed in Section 3.3 Then it reflects on possible reasons for the different results that were obtained from the three different groups of raters (senior managers, team managers and employees). Since QCs are the predecessors of MBAs, the results of the study are compared to the known outcomes of QCs to determine whether MBAs in a South African manufacturing environment have the same outcomes as QCs in a Japanese or North American environment. The implications of the research are discussed and thereafter, a few recommendations are made regarding the outcome variables, the implementation of MBAs and conducting studies of a similar nature. The chapter then concludes with a summary.

6.1. Evaluation of hypotheses

The hypotheses of each outcome variable are evaluated separately. Since employee engagement was modelled as a mediator between MBAs and job satisfaction, employee engagement and job satisfaction are discussed together.

6.1.1. Team effectiveness

The hypothesis for team effectiveness was as follow:

H1: The implementation of MBAs improves team effectiveness.

According to the senior managers' responses, it was found that there was a statistically significant positive relationship between MBA scores and team effectiveness. The effect of MBAs accounted for 43.9% of the variation in team effectiveness with an adjusted R^2 value of 42.7%, which is regarded as a medium-size effect according to Cohen (1988). The p-value was positive and significant ($p < 0.0005$). Thus, hypothesis H1 is not rejected and it is concluded that when the MBA scores improve, this leads to an improvement in team effectiveness.

The improvement in team effectiveness is illustrated by a comment that was made by one of the team members that participated in the study: “I’ve become familiar with so many things because of the MBA meetings—like how to read job cards and how to make graphs of our production levels and the number of defects produced. In the beginning, I would just sit and stare during the MBA meetings because I did not think that they would benefit us at all, but I’ve learnt so much through the MBAs and I really think they have made us perform better as a team.” This comment was an indication that this specific employee did not only feel that the MBA meetings had an impact on her personal development, which helped her to be more effective within her job, but that it also had an impact on the entire team’s effectiveness.

6.1.2. Job satisfaction and employee engagement

The hypotheses for job satisfaction and employee engagement were as follow:

H2a: The implementation of MBAs improves overall job satisfaction within the team.

H2b: Vigour (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

H2c: Dedication (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

H2d: Absorption (a facet of employee engagement) mediates the effect of the implementation of MBAs on job satisfaction.

The analysis of the responses provided by the employees indicated that the MBAs did not have a significant direct effect on job satisfaction, and therefore hypothesis H2a is rejected. Furthermore, the analysis of the data also indicated that MBAs did not have a significant indirect effect on job satisfaction through any of the facets of employee engagement, namely vigour, dedication and absorption. Therefore, hypotheses H2b, H2c and H2d are also rejected. Thus, overall, no relationship between MBAs and job satisfaction was observed in this research.

Although the expected relationship between MBAs and job satisfaction was not observed, this negative finding is still valuable seeing as it increases the depth of our knowledge about MBAs and can therefore be useful in assisting organisations with deciding whether to implement MBAs or not. Furthermore, although it cannot be said that MBAs have a positive influence on job satisfaction, it can be said that it does not have a negative influence on job satisfaction. This is considered to be good news, especially in South Africa where labour relations are weak (World Economic Forum, 2017).

A possible reason for the fact that MBAs did not have any effect on job satisfaction could be that the monotonous nature of the employees' jobs suppressed any possible effect that MBAs could have on job satisfaction. All of the employees that participated in the study work in a manufacturing environment and the majority of them do the same type of work every day.

Previous research has established that job monotony could be a job satisfaction dampener (Melamed, Ben-Avi, Luz & Green, 1995). A number of comments that employees made when they were asked questions about engagement and job satisfaction during the present research study seems to indicate that at least some of the employees experience their jobs as monotonous. Examples of these comments include the following: "My job does not inspire me because I do the same thing every day and we don't learn anything else"; "We are not excited about our jobs because we do the same thing over and over every day"; "I want to grow in my work, but there isn't always an opportunity for that"; and "I'm not always satisfied with my job because I want to grow."

It is plausible that the small amount of time that is spent on the MBAs daily (10 minutes per day) is not sufficient to promote job satisfaction compared to the rest of the day being spent on doing monotonous work that reduces job satisfaction. The veracity of this possible explanation for the outcome observed in this research can be validated through future empirical research.

As a final comment, it is also possible that common method bias due to social desirability could have influenced the responses that were provided by the employees regarding job satisfaction and employee engagement. It is possible that these potentially biased responses influenced the results obtained from the analysis of job satisfaction. Section 5.4 indicated that common method bias due to social desirability was likely to be present in the team manager and employee responses for the other two outcome variables in this study and therefore, it is plausible that this outcome variable was also influenced by common method bias. Since the employees were the only ones who provided responses for job satisfaction, however, a comparison cannot be drawn between the employees' responses and the responses provided by other groups of respondents in order to confirm or disprove the presence of common method bias. As discussed in Section 4.3.2, it would not be appropriate to obtain responses for these two variables from the team managers or senior managers as these variables are concerned with the individual employees' attitudes.

6.1.3. Team innovation

The hypothesis for team innovation was as follows:

H3: The implementation of MBAs improves team innovation.

The results that were obtained from the senior managers' responses indicated that there was a statistically significant positive relationship between MBAs and team innovation with a p-value smaller than 0.05 ($p < 0.0005$). MBAs accounted for 23.1% of the variation in team innovation with adjusted $R^2 = 21.5\%$—which is regarded as a small effect size according to Cohen (1988). Therefore, hypothesis H3 is not rejected.

The contribution made by MBAs to team innovation could perhaps be attributed to the fact that employees are taught to think creatively in the MBAs since it is compulsory for them to provide a certain number of suggestions for improvement per year.

The MBA meetings also encourage employees to take notice of their production levels and number of defects produced since these topics are discussed daily, and to find a solution if these levels are not up to standard. The process of solving these problems during MBA meetings could possibly increase innovation within the team since the team members are also trained to use problem-solving techniques such as Ishikawa diagrams (also referred to as fishbone diagrams).

6.2. Comparison of MBA results with the results of QCs

Since MBAs are a variation of QCs, an important research question is whether MBAs in South African manufacturing organisations have similar effects to those which QCs have in Japanese and North American organisations. Three outcomes were tested in this study, namely team effectiveness, team innovation and job satisfaction.

The study found that MBAs had a significant effect on team effectiveness and that an increase in MBA scores led to an increase in team effectiveness. Previous studies that investigated the impact of QCs have found that QCs improved productivity (Marks et al., 1986; Shobharani, 2009; Jin & Doolen, 2014), while another study had mixed results (Buch, 1987) regarding productivity.

Productivity can be considered as a quantitative measure of a team's performance. Although previous studies used productivity as a quantitative measure for performance, as discussed in Section 3.1.1, such a quantitative measure for performance could not be used in this study and a qualitative measure (team effectiveness) was used instead.

Thus, in the same way that QCs have been found to have a positive impact on teams' performance by measuring productivity, this study established that MBAs have a positive impact on a team's performance, by measuring team effectiveness. Although the specific measures for the performance of MBAs and QCs cannot be compared directly, it can be concluded that both QCs and MBAs had a positive effect on team performance through productivity and team effectiveness respectively.

Regarding team innovation as an outcome variable, the study found that MBAs had a significant effect on team innovation and that an increase in MBA scores led to an increase in team innovation. Similarly, a study done by Prester and Bozac (2012) found that QCs led to innovation. Thus, QCs and MBAs appear to both have a positive impact on innovation.

The present study also investigated job satisfaction as an outcome variable and found that MBAs did not have a significant effect on job satisfaction. In contrast, previous studies that investigated the effect of QCs on job satisfaction found that QCs significantly improved job satisfaction (Shores, 1984; Mohr & Zoghi, 2008; Hosseinabadi et al., 2013). Another study done by Marks et al. (1986) found that although QCs did not necessarily lead to an increase in job satisfaction, they could possibly have prevented a decrease in job satisfaction during times of uncertainty at the organisation that was participating in the study. Thus, the results that were obtained for the impact of MBAs on job satisfaction do not align to previous findings of the impact of QCs on job satisfaction.

6.3. Implications of the research

This study has added to the limited body of knowledge that is currently available regarding (i) MBAs in general, and (ii) QCs or variations of QCs in the South African context specifically. In addition to making a contribution to management literature, this research could also be of value to other manufacturing organisations that are considering the implementation of MBAs, by providing them with information on some of the outcomes that can and can't be expected.

The study has shown that the implementation of MBAs can have outcomes that are similar to QCs, but that these outcomes are not necessarily identical. It can provide some reassurance to manufacturing organisations that the implementation of a programme that is similar to a QC programme, albeit not identical, can have similar outcomes to QCs, albeit not completely identical. It is, however, still necessary for organisations to be cautious when implementing programmes that are not similar to a QC or MBA programme seeing as there is a limitation to how much the results of studies regarding QCs and MBAs can be generalised to other similar programmes, and perhaps more future research on other variations of QCs is necessary to help support such decision-making.

6.4. Recommendations

The recommendations regarding this study are divided into three parts: recommendations regarding the outcomes of this study, recommendations regarding the implementation of MBAs, and recommendations for conducting studies of a similar nature. Each of these categories is discussed separately below.

6.4.1. Recommendations regarding the outcome variables of this study

The study found that MBAs have a positive and significant effect on team effectiveness and team innovation. Therefore, if organisations wish to improve team effectiveness and team innovation, MBAs are recommended as a useful tool that could help to achieve this. It is recommended that organisations decide whether MBAs should be implemented in conjunction with other tools or whether they should be implemented on their own. If an organisation's only goal is to improve job satisfaction among employees, MBAs might not be a sufficient tool to accomplish this aim and other alternative tools should be investigated.

A possible reason for the fact that MBAs did not have an effect on job satisfaction was provided in Section 6.1.2. It is believed that the monotonous nature of the employees' jobs could have suppressed any possible effect that MBAs could have on job satisfaction. An interesting topic for future research could be to study the impact that monotony has on job satisfaction in South African manufacturing organisations.

In order to improve levels of job satisfaction among employees, it is recognised that organisations need to find a way to make employees' jobs more meaningful. The fact that this could be difficult in a manufacturing environment is also recognised. A recommendation that could possibly help alleviate monotony is the implementation of a cross-training programme that teaches employees how to do different types of jobs within their team, as described by Kobayashi (1995).

6.4.2. Recommendations regarding the implementation of MBAs

The fact that some organisations in this study have managed to implement MBAs successfully for more than 10 years could be an indication that, if MBAs are implemented correctly, they can be successful. Therefore, it is recommended that manufacturing organisations consider the implementation of MBAs as a way to improve team effectiveness and team innovation.

The aim of this study is not necessarily to instruct organisations on the process of implementing MBAs, but some knowledge regarding the successful implementation of MBAs was obtained during the exploratory conversations and interviews that is worth sharing as a valuable addition to the study. It is, however, recommended that organisations obtain more information regarding the implementation of MBAs before proceeding with their implementation.

Firstly, it was noticed that leadership plays a critical role in the successful implementation of MBAs. This echoes the findings of a previous study regarding QCs that also found that leadership can contribute to the success or failure of QCs (Guthrie, 1987). In the case of MBAs specifically, the FLMs (team managers) play a very important role and it is recommended that they receive appropriate training in order to be able to guide the MBAs towards success.

It was noticed that the way in which an FLM treats employees' suggestions can either encourage or discourage the team from continuing to make suggestions. It is the FLM's responsibility to take suggestions that were made by the team to senior management for approval and to oversee the implementation of the suggestions if such approval is obtained. However, this does not always happen. There were a number of complaints that the FLMs did not take their team's ideas seriously, which caused employees to become discouraged. There were also complaints that FLMs took the credit for good ideas that were in fact provided by employees. It's worth mentioning though, that there were also compliments from other teams who said that their FLMs usually gave all the ideas a try, which was encouraging to them.

Currently, it seems as if the FLM is the only person who has the authority to decide whether an idea should be taken to senior management for approval or not. It is recommended that such a decision should rather be made by the team as a whole, and perhaps the implementation of a voting system can achieve this.

Furthermore, it appeared as if some of the FLMs and other employees found employees who often speak up about issues intimidating. Comments such as the following brought this under the researcher's attention: "If you speak up the whole time, the manager starts saying that you have an attitude problem, which prevents team members from speaking up when there is a problem or coming up with new ideas." and "People get intimidated if you come with too many ideas. Such a team member is cast out to the side and it discourages the members from providing ideas." It is recommended that senior management take note of and address this underlying social phenomenon seeing as it can prevent the MBA from making progress. It is suggested that senior management find a way to make the MBAs feel like a safe space where problems and ideas can be discussed without fear of judgement or social rejection.

Additionally, a central theme that recurred was the fact that, given the high unemployment rate of 27.2% in South Africa (Statistics South Africa, 2018), employees are fearful of losing their jobs. This causes people to refrain from bringing problems out into the open during an MBA meeting, because they are afraid of getting themselves or others into trouble and ultimately losing their jobs. This coincides with the study done by Guthrie (1987), where it was found that employees were hesitant to participate in QCs out of fear of how senior management would react if they were critical. This is counterproductive to the progress of MBAs, and once again, it is recommended that senior management takes note of this challenge and seeks to find a way to create an environment within the MBAs where employees are comfortable to address problems for the sake of improvement without fear of losing their jobs.

The FLM also plays an important role in ensuring that the discussions that take place during the MBA meeting stay on track and do not stray to unrelated topics. It is also the FLM's responsibility to keep communication channels open by communicating information received from senior management to the team and by ensuring that all employees understand the graphs that are drafted and updated daily in the MBA. From the interviews with employees, it became apparent that not all of the FLMs take their responsibility seriously.

For example, an employee reported that he did not find the MBA meetings useful seeing as the team used the time to discuss personal matters such as their plans for the weekend. Another employee reported that other FLMs provided their teams with significantly more information than her team's FLM provided them with. This only became apparent to the employee once she joined another MBA team for a few weeks due to a breakdown on her own team's production line. For the first time, despite the fact that she had been an employee at the organisation for a long time, she finally understood the graphs that the MBAs had to draft because the other team's FLM took the time to explain them to everyone—which is something that her FLM did not do. It is thus recommended that senior management ensure that all FLMs undergo training so that they have the necessary skills to be able to steer the discussions in the right direction and sufficiently communicate with employees.

Furthermore, during the interviews a few of the employees' concerns regarding the implementation of new ideas became apparent. Employees expressed their discouragement with providing new ideas because they felt as if the new ideas were hardly ever implemented. Employees reported being told that there aren't any funds available for the implementation of a new idea, or being reluctant to take responsibility for the implementation of new ideas. According to the employees, they only occasionally receive feedback from management about their decisions regarding new ideas. This can be disheartening to employees.

On the other hand, one of the team managers explained that before a new idea can be implemented, they have to assess whether the idea will indeed solve the problem at hand, and oftentimes, the ideas are not able to solve the problems. The team manager explained that in such a case management will sometimes try to come up with alternative ideas, but this isn't always possible. This can be frustrating to both parties, and it is recommended that FLMs ensure that communication lines are open at all times in order to keep the frustration to a minimum. If management considers an idea to be unsuitable for solving a problem, the reasoning behind the decision should be clearly explained to employees for every idea that is provided.

Furthermore, it is recommended that senior management ensures that feedback is provided for all ideas at all times, following up with FLMs to ensure that the feedback has been communicated to the employees. FLMs can also make sure that they give employees appropriate recognition for coming up with an idea, even if the idea is not implemented.

One of the benefits of QCs and MBAs is the fact that management can benefit from employees' intimate knowledge of the production process (Moore & Stevens, 1981). It is argued that since employees work on the production line daily, they have in-depth knowledge about the machines and the flow of the production line. From industry visits, it did indeed seem as if the employees have an inherent knowledge and expertise regarding the production process and the machines they work on every day.

However, remarks from the employees gave the impression that senior management did not always take this inherent expertise seriously, for example: "I knew what was wrong with the machine when it broke down, but management would not listen. They brought in an expert to check the machine, and then the expert just confirmed what I have been saying all along. I know this machine so well, I can tell you what is wrong with it just by listening to the sound it makes." and "I have 40 years of experience. So, I know by now that if we use imported raw materials, we don't experience any quality problems. But as soon as we use local raw materials, we experience problems. I have told management about this issue, but they don't want to listen." Although it is wise for organisations to enlist the services of an expert in specific situations, in order to reap the full benefits of the MBAs and the inherent knowledge of the employees, senior management are encouraged to identify situations where the employees can be consulted for advice instead of recruiting external service providers.

Another concern that was raised, is that the length of time that is available for the MBA meetings is too short. This could potentially limit problem-solving within the MBAs because the team can run out of time before the problem is solved. The team then has to wait until the next day's MBA meeting to continue the discussion. Although it is acknowledged that it might not be feasible to significantly increase the daily meeting time for MBAs, perhaps a longer MBA meeting can be scheduled once a week to give teams sufficient time to discuss problems and to find a solution.

One of the senior managers who had more than 10 years' experience with MBAs noted that the MBAs are cyclical in nature and that the level of activity within the MBAs goes up and down with time. When the MBAs go through a phase of lower activity, it is management's responsibility to help the MBAs get back to functioning at full capacity again. Therefore, it is recommended that senior management should learn how to swiftly identify when the MBAs are going through a period of reduced activity, and to have a strategy in place to get the MBAs functioning to their full potential again.

Finally, it should be noted that MBAs evolve uniquely within each organisation depending on the needs of the organisation and the intensity of the involvement of leadership and that each organisation should identify the unique goals that they want to achieve with the MBAs and set a plan in place to achieve them.

6.4.3. Recommendations for conducting studies of a similar nature

Regarding the implementation of a study that is of a similar nature to this one, it is definitely recommended that the questions on the employee questionnaire be simplified as far as possible without changing the essence of the question. This is especially recommended if the respondents' first language is not the same as the language in which the study is conducted and if they have low levels of education. It can perhaps also be considered to simplify the questions on the team managers' questionnaires in order to avoid any chances of misunderstandings.

Furthermore, although interviews are more time-consuming than simply giving each participant a questionnaire to complete, it is recommended to interview the team managers and employees when conducting a similar study as it provides these respondents with an opportunity to ask questions, which reduces the chance that respondents might misinterpret or misunderstand a question. It was found that the senior managers generally did not need to be interviewed since they were able to complete the questionnaires by themselves.

It is recommended that researchers make sure to take common method bias into account—specifically common method bias caused by common raters and common method bias caused by social desirability. Researchers should ensure that the dependent and independent variable are not rated by the same rater which causes common method bias due to common raters. In order to avoid common method bias due to social desirability, it is recommended that researchers obtain responses from parties that are least likely to be affected by it (such as the senior managers). If this is not possible, it is recommended that researchers place emphasis on the fact that respondents will remain anonymous during the study, that there is no right or wrong answer, and that respondents should answer as truthfully as possible.

6.5. Conclusion: Discussion of results

The chapter started off by evaluating each of the hypotheses of the study separately. The hypotheses regarding team effectiveness and team innovation (H1 and H3) were not rejected, while the hypotheses regarding job satisfaction and employee engagement were rejected (H2a to H2d). It was found that MBAs had a significant positive effect on team effectiveness and team innovation, but that MBAs did not have a significant effect on job satisfaction. Although the results for job satisfaction were not as expected, the finding still proves to be valuable seeing as, along with the findings on team effectiveness and team innovation, it adds to the body of knowledge regarding MBAs.

In order to answer the research question of whether MBAs in South African manufacturing organisations have the same effect as QCs in Japanese and North American organisations, the known effects of QCs were compared to the effects of MBAs that were established in this study. It was found that MBAs can have similar effects on team effectiveness and team innovation as QCs, but that MBAs did not necessarily have the same effects on job satisfaction as QCs did.

After comparing MBAs to QCs, the chapter discussed the implications of the research. This study adds to the limited body of knowledge that is available regarding MBAs. This study also provides information that was not previously available to decision-makers at organisations that are currently implementing MBAs and organisations that are considering the implementation of MBAs. The study also further showed that the implementation of variations of QCs can be successful, but warns that more research is needed if organisations consider the implementation of a variation of QCs other than MBAs.

Lastly, recommendations were made regarding the outcome variables of this study, the implementation of MBAs, and on conducting studies of a similar nature.

The next chapter provides summaries of the document, the conclusions, and the contributions of this research. It also provides recommendations regarding future research, and then concludes the study with a final closing summary.

CHAPTER 7: CONCLUSION

The previous chapter discussed the results of the statistical analyses that were performed, compared the results obtained for MBAs to the results obtained for QCs in previous studies, discussed the implications of the research and provided recommendations. This chapter provides a summary of the document, a summary of the conclusions that were drawn from the study, a summary of the contributions of the study and recommendations for future research. Lastly, the chapter provides a final closing summary.

7.1. Summary of document

Chapter 1 provided a background to the research by providing a definition of QCs and explaining which variations of QCs were found in South African manufacturing organisations—namely SGAs and MBAs. The aim and objectives of the research were defined and the ethical implications of the research, research design, research methodology and research scope were also addressed.

Chapter 2 provided a literature review of the origin of MBAs, namely QCs, by investigating the history of QCs and different variations of QCs that have evolved with time. Literature that posits that QCs are a fad were investigated, and literature that provided a counter-argument by providing examples of the successful implementation of QCs were also investigated. The literature review explored factors that can contribute to the successful implementation of QCs and investigated the presence of QCs (or rather, variations of QCs) in South Africa. Lastly, a summary of previous studies that investigated the outcomes of QCs was provided before a general discussion of the literature was provided.

The model that was empirically evaluated in this research was developed in Chapter 3 and a motivation was provided for each of the variables that was selected for measurement. The expected relationships between MBAs and the outcome variables were motivated by theorising about such relationships. Chapter 3 also discussed the demographic variables that were measured in the study.

CHAPTER 7: CONCLUSION

Chapter 4 started by discussing the type of study that was conducted and the characteristics of the data. Qualitative data was used in the study and the research instruments that were used to measure the data included a rubric to measure the maturity of the MBAs, and a questionnaire to measure the outcome variables as well as the mediator. The chapter discusses the design of the questionnaire and the scales that were selected to measure each of the constructs. Common method bias and the mitigation of the two sources of common method bias in this study was discussed. The administration of the questionnaire and the steps that were taken to ensure the anonymity of participants were also explained.

Chapter 5 provided a layout of the analyses that were performed and the results that were obtained. It started off by describing the sample that was used in the study, the demographic variables of the participants in the study and providing the descriptive statistics of each of the constructs for each of the groups of respondents. Before the analyses, a comparison was drawn between the responses that were provided by the different groups of participants. Two of the outcome variables, namely team effectiveness and team innovation, were analysed by performing a linear regression with the responses provided by the senior managers. The last outcome variable, job satisfaction, was analysed with a multilevel analysis with the responses provided by the employees.

Chapter 6 provided a discussion of the results that were obtained in the previous chapter. Firstly, the hypotheses were evaluated. The hypotheses regarding team effectiveness and team innovation were not rejected, and it was found that MBAs have a significant positive effect on both of these constructs. The hypotheses regarding employee engagement and job satisfaction were rejected and it was found that MBAs did not have a direct effect on job satisfaction or an indirect effect on job satisfaction through employee engagement as a mediator. Chapter 6 then proceeded to compare the outcomes of MBAs to the known outcomes of QCs to see whether MBAs had similar effects in South African manufacturing organisations as they did in Japanese and North American organisations. It was found that MBAs and QCs had similar effects on team effectiveness and team innovation, but that their effects on job satisfaction differed. The implications of the research were also discussed and then recommendations were provided before concluding.

7.2 Summary of conclusions

The aim of this study was to contribute to the limited body of knowledge surrounding MBAs by determining what effect MBAs have on South African manufacturing organisations and by comparing such effects with those of QCs in other countries. This was done by investigating selected outcome variables and comparing the findings to the effect that QCs have on those same outcome variables as recorded in the literature.

It was found that the implementation of MBAs can have a significant positive effect on team effectiveness and team innovation in South African manufacturing organisations. Thus, if an organisation wishes to improve the effectiveness and innovation within their teams, MBAs can be considered as a possible way to achieve this. It was also found, however, that MBAs do not have a direct effect on job satisfaction or an indirect effect on job satisfaction through employee engagement as a mediator. Although this outcome is not in line with what was expected based on the theorising presented in Chapter 3, it is nonetheless still valuable since it still contributes to broadening the knowledge and understanding that organisations have of MBAs.

It was discovered that the scores that were provided by the senior managers for team effectiveness and team innovation were significantly lower than the scores that were provided by the team managers and the employees. These differences were attributed to common method bias that is caused by social desirability. It was established that the senior managers were the least likely to be affected by social desirability and therefore, their responses were used to draw the final conclusions of the study for team effectiveness and team innovation. In the case of job satisfaction and employee engagement, the responses of the employees had to be used since the senior managers were not asked to provide responses for those two constructs.

In order to answer the research question of whether MBAs in South African manufacturing organisations have similar effects as QCs have in Japanese and North American organisations, the results of the study were compared to the known results of QCs. It was found that both MBAs and QCs have a statistically significant positive effect on team performance through team effectiveness and productivity respectively. It was also found that both MBAs and QCs have a significant positive effect on team innovation. However, when the effects of MBAs and QCs on job satisfaction were compared, it was found that the results differed. It was found that QCs have a significant positive effect on job satisfaction, but that MBAs had no effect on job satisfaction.

7.3. Summary of contributions

A large volume of empirical research has been conducted on the outcomes and effectiveness of QCs across the world, especially in Japan (where QCs were originally popularised) and the United States. However, little research has been done on the impact and outcomes of QCs or variations of QCs, such as MBAs, in the South African environment. Providing for the fact that each country has a specific culture, language(s) and quality of education, it cannot necessarily be assumed that the results that were obtained from studies that were conducted in other countries on the effects and outcomes of QCs will be applicable to South Africa. Similarly, it cannot be assumed that findings on the outcomes of QCs in their original form will be an identical replication for variations of QCs, such as SGAs or MBAs.

During the literature review, it was found that there is no published research available on the outcomes and effects of QCs or variations of QCs (such as MBAs) in a South African manufacturing environment.

By investigating specific outcomes of MBAs, this study helped to fill the gap that exists in literature regarding the impact of MBAs in South African manufacturing organisations. In addition to the theoretical contribution, such research also has practical value, enabling local organisations to make more informed decisions on whether to devote resources to the implementation of MBAs or not.

As mentioned in Section 3.1.1, labour productivity is described by the OECD as an important aspect of economic performance and is also a significant influencer when it comes to changing living standards (OECD, 2018). Data provided by the OECD indicated that, comparatively, the South African workforce is underperforming in terms of productivity (OECD, 2018) and it is therefore reasonable to conclude that there is room for improvement for the South African workforce in terms of performance. It was also mentioned in Section 3.1.1 that a quantitative measure of team performance such as productivity would not be practical for the purpose of this study due to the different nature of the products that were produced at the participating organisations, and therefore, team effectiveness was used as a uniform qualitative measure of the teams' performance across all of the organisations instead. This study has shown that MBAs can have a significant effect on team effectiveness and therefore, the study has shown that MBAs could make a practical contribution to the above problem.

As mentioned in Section 3.1.3, according to the South Africa Economic Update, South Africa is falling behind its market peers and other international technological and knowledge frontrunners when it comes to innovation (Dessus, et al., 2017). According to Dessus et al. (2017), the lack of innovation efforts by private firms is a crucial factor that contributed to a reduction in South Africa's economic growth in 2017. Dessus et al. (2017) further argue that in order for South Africa to remain economically competitive and to reduce poverty, the country's untapped potential for innovation should be utilised. This study has shown that MBAs have the potential to increase innovation among manufacturing teams. Although MBAs are not a panacea for South Africa's broader problem regarding a lack of innovation, they could be a valuable starting point for manufacturing organisations that wish to promote innovative thoughts within their general workforce.

In a recent study, the Labour Market Intelligence Partnership reported that a large proportion of low-wage workers in South Africa were dissatisfied with their jobs (Mncwango, 2016). Similarly, a case study done by Mapadimeng (2006) also reported high levels of discontent among workers in South African factories. Although it was initially hypothesised that MBAs would increase job satisfaction, the results of this study showed that MBAs do not have an effect on job satisfaction. Thus, if an organisation was considering the implementation of MBAs in the hope of increasing job satisfaction among employees, the organisation now has evidence that this would not be a sufficient solution and that they should rather devote resources to alternative solutions that have been demonstrated to have an impact on job satisfaction.

7.4. Future research

There are a number of avenues for future research that can be explored.

Due to the fact that SGA groups are not permanent (as mentioned in Section 1.2, the group disperses as soon as the problem is solved or an improvement theme has been implemented), and that the members of SGAs are also not necessarily from the same group, department, or organisational level, as stated in Table 1, it is difficult, or possibly infeasible, to study their medium- to long-term impact on a work group. Therefore, they were not included in the study.

If organisations can be found where the members of the SGAs remain the same (similar to MBAs), it could be interesting to repeat this study for SGAs in order to compare them with the outcomes of both QCs and MBAs.

During the exploratory conversations with senior management, those who recently started with the implementation of MBAs expressed their interest in a guideline for the implementation of MBAs and how to avoid typical pitfalls. An in-depth study that investigates the best approach to implementing MBAs and pitfalls that can be avoided could provide interesting and useful findings for the implementation of MBAs.

Since the MBAs at the participating organisations were already operational when the research started, this study was dependent on a correlational design where data was collected only during one assessment without manipulating the variables. Therefore, it is important to note that the study is limited in its ability to provide evidence of causal links between MBAs and the outcome variables. As discussed previously, this limitation was addressed by incorporating the theorising in Chapter 3. However, a positive result in this study provides sufficient grounds for experimental and longitudinal research to be conducted in future in order to establish more conclusive findings about the direction of causality. It is therefore recommended that such experimental or longitudinal research on the relationship between MBAs and the outcomes of team effectiveness and team innovation be conducted.

As mentioned in Section 1.2, each country has a specific culture, language(s) and quality of education, and thus it could not be assumed that the results that were obtained from previous studies on the effects and outcomes of QCs in other countries would be applicable to South Africa. Similarly, it could not be assumed that findings on the outcomes of QCs in their original form would be identical for variations of QCs, such as SGAs or MBAs. This study focused on investigating the effects of MBAs in a South African manufacturing context. It is recommended that further research investigates whether MBAs can be successfully implemented and what their effects are in other contexts such as other countries, other industries like the service or construction industries, and in settings where the level of education of the team members has a different profile.

Additionally, it appeared as if the MBAs had other benefits apart from those that were investigated in this research and that could be studied in future. One of the possible benefits that were mentioned by employees during the interviews include the fact that they learnt new skills needed for their jobs during the MBAs.

An outcome variable that could be particularly interesting to investigate in a South African context is labour relations. According to the Global Competitiveness Report of 2017–2018 (World Economic Forum, 2017) South Africa received the worst ranking for cooperation in labour-employer relations (South Africa was ranked 137th out of 137 countries). South Africa also received the worst ranking in the Global Competitiveness Report of the previous year (World Economic Forum, 2016). Evidence of this ranking can be seen in the numerous labour strikes and protests that are frequent occurrences in South Africa.

Previous research has found that QCs improved communication between employees and their supervisors (Elvins, 1985) and that the number of employee grievances were reduced due to QC implementation (Buch, 1987). Thus, there is reason to believe that MBAs can have a positive influence on the relationship between labourers and employers. Labour relations were not investigated in this study due to the lack of a formal mechanism that can be used for measurement. Thus, it is recommended that future research aims to develop a measurement for labour relations and uses it to investigate the impact of MBAs on such relations.

Some of the language in the measurement scales that were used in this study was found to be inappropriate for respondents who speak English as a second or even a third language and who may have had limited formal education. The development of formalised measurement scales that require a less advanced level of proficiency in English could be a valuable contribution that could make it easier to use the measurement scales for a larger audience with a variety of language proficiencies.

Job monotony was suggested as a possible reason why MBAs did not have an effect on job satisfaction. Future research that either proves or disproves this suggestion could provide valuable findings. Furthermore, since MBAs were shown to have a significant positive relationship with team effectiveness and team innovation, perhaps it would be interesting to investigate whether MBAs have an indirect influence on job satisfaction through team effectiveness and/or team innovation as mediators.

The recommendations that were made in Section 6.4.2. were based on statements made by participants during the interviews and observations. Evidence of these statements can be collected to determine the seriousness of such statements so that they can be properly addressed by organisations.

7.5. Closing summary

The aim of this study was to determine whether MBAs, a variation of QCs, have the same effect in South African manufacturing organisations as QCs have in Japanese and North American organisations.

The effect of MBAs on three outcome variables were studied, namely team effectiveness, team innovation and job satisfaction, and employee engagement was modelled as a mediator between MBAs and job satisfaction. Five manufacturing organisations participated in the study and a total of 390 participants provided responses for questionnaires that were developed to measure the three outcome variables and mediator. The participants consisted of 21 senior managers, 50 team managers and 319 employees. The data that was obtained for team effectiveness and team innovation were analysed with a linear regression analysis and the data that was obtained for job satisfaction were analysed with a multilevel structural equation modelling (MSEM) framework.

The results indicated that MBAs have a statistically significant positive relationship with team effectiveness and team innovation, but that MBAs have no effect on job satisfaction. It was found that MBAs had similar effects to those of QCs for team effectiveness and team innovation, but that MBAs did not have the same effect on job satisfaction as QCs did in previous studies.

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APPENDIX A: QUESTIONNAIRES

This appendix shows the three questionnaires that were used for data collection during this study. The three questionnaires are: 1) Employee Questionnaire, 2) Team Manager Questionnaire, and 3) Senior Manager Questionnaire.

Employee Questionnaire

What is the name of the organization that you work for?_____
What is the name of the team that you work in? _____

1) How long have you worked at your current **organization**? Please draw a cross next to the applicable answer:	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

2) How long have you been a member of your current **team**? Please draw a cross next to the applicable answer:	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

3) What is your home language? Please draw a cross next to the applicable answer:	
Afrikaans	
English	
Ndebele (isiNdebele)	
Northern Sotho (Sesotho sa Leboa)	
Sesotho	
Swazi (siSwati)	
Tsonga (Xitsonga)	
Tswana (Setswana)	
Venda (Tshivenḓa)	
Xhosa (IsiXhosa)	
Zulu (isiZulu)	
Other	

4) What age are you? Please draw a cross next to the applicable answer:	
18-24 years	
25-34 years	
35-44 years	
45-54 years	
55-64 years	
65 years or older	

5) What is your gender? Please draw a cross next to the applicable answer:			
Male		Female	

6) What is the highest level of education that you have completed? Please draw a cross next to the applicable answer:	
No schooling completed	
High school or equivalent	
Vocational training (certificate or diploma)	
Bachelor's degree (three-year degree)	
Bachelor's degree (four-year degree)	
Honours degree	
Master's degree	
Doctoral degree (PhD)	

7) For how long has your team been having **Mini Business** meetings? Please draw a cross next to the applicable answer:	
Less than 3 months	
3 - 6 months	
7 - 12 months	
1-3 years	
4-10 years	
Longer than 10 years	
I don't know	

8) For how long has your team been using **Small Group Activities (SGAs)**? Please draw a cross next to the applicable answer:	
Less than 3 months	
3 - 6 months	
7 - 12 months	
1-3 years	
4-10 years	
Longer than 10 years	
I don't know	

9) Please read the statements about your work team below and decide how much you agree with each statement. Make a cross in the block that best describes how you feel.

	Not True at all	Usually not true	Sometimes true	Usually true	Totally True
The members of this team reach the performance goals that are set for them.					
The members of this team produce good quality work.					
This team is productive.					
The relationships in our work team are good.					
In our team, we do not disagree or fight often.					
In our team, we get along with each other.					
Team members adjust to the changes that happen in their work environment.					
When a problem occurs, the members of this team manage to solve it.					
The new members fit into the team easily.					
The members of this team could work together for a long time into the future.					

10) The following 9 statements are about how you feel at work. Please read each statement carefully and decide if you ever feel this way about your job. Make a cross in the block that best describes how you feel.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
At my work, I feel like I have a lot of energy.					
At my job, I feel strong and healthy.					
When I get up in the morning, I feel like going to work.					
I am excited about my job.					
My job inspires me.					
I am proud of the work that I do.					
I am deeply involved in my work.					
I get carried away when I'm working.					
I feel happy when I am working very hard.					
Right now, I feel fairly satisfied with my present job.					
I enjoy my work.					
I think my job is rather unpleasant.					
Each day of work seems like it will never end (the time goes by very slowly).					

OPTIONAL:

Do you think Mini Businesses and Small Group Activities add value to the organization? Why or why not?

Team Manager Questionnaire

Note to team manager: If you manage more than one team, you are kindly requested to complete a questionnaire for each team that you manage. Your cooperation in this regard is highly appreciated.

What is the name of the organization that you work for?_____

What is the name of the team that you manage/supervise? _____

1) How long have you worked at your current **organization**? Please draw a cross next to the applicable answer:	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

2) How long have you been the manager/supervisor of this specific **team**? Please draw a cross next to the applicable answer:	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

3) What is your home language? Please draw a cross next to the applicable answer:	
Afrikaans	
English	
Ndebele (isiNdebele)	
Northern Sotho (Sesotho sa Leboa)	
Sesotho	
Swazi (siSwati)	
Tsonga (Xitsonga)	
Tswana (Setswana)	
Venda (Tshivenḓa)	
Xhosa (IsiXhosa)	
Zulu (IsiZulu)	
Other	

4) What age are you? Please draw a cross next to the applicable answer:	
18-24 years	
25-34 years	
35-44 years	
45-54 years	
55-64 years	
65 Years or older	

5) What is your gender? Please draw a cross next to the applicable answer:	
Male	
Female	

6) What is the highest level of education that you have completed? Please draw a cross next to the applicable answer:	
No schooling completed	
High school or equivalent	
Vocational training (certificate or diploma)	
Bachelor's degree (three-year degree)	
Bachelor's degree (four-year degree)	
Honours degree	
Master's degree	
Doctoral degree (PhD)	

7) For how long has your team been using Small Group Activities (SGAs)? Please draw a cross next to the applicable answer:	
Less than 3 months	
3 - 6 months	
7 - 12 months	
1-3 years	
4-10 years	
Longer than 10 years	
I don't know	

7) Please indicate the extent to which each statement describes the team that you manage. Make a cross in the block that best describes how you feel.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Team members often implement new ideas to improve the quality of our products and services.					
This team gives little consideration to new and alternative methods and procedures for doing their work.					
Team members often produce new services, methods or procedures.					
This is an innovative team.					

8) Please read the statements about the team that you manage/supervise below and decide how much you agree with each statement. Make a cross in the block that best describes how you feel.

	Not True at all	Usually not true	Occasionally true	Usually true	Totally True
The members of this team reach their assigned performance goals.					
The members of this team produce good quality work.					
This team is productive.					
The social climate in the work team that I manage/supervise is good.					
In our team, we do not fight or disagree often.					
In this team, the members get along with each other.					
Team members adjust to the changes that happen in their work environment.					
When a problem occurs, the members of this team manage to solve it.					
The new members are easily integrated into this team.					
The members of this team could work together for a long time into the future.					

Senior Manager Questionnaire

Note to senior manager/supervisor: If more than one team reports to you, you are kindly requested to complete a questionnaire for each team that you manage. Your cooperation in this regard is highly appreciated.

What is the name of the organization that you work for?_____

What is the name of the team that reports to you? _____

1) How long have you worked at your current **organization**? Please indicate your answer with an **X**.	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

2) For how long has this specific **team** reported to you? Please indicate your answer with an **X**.	
Less than 1 year	
Between 1-2 years	
Between 2-5 years	
Between 5-10 years	
10 years or more	

3) What is your home language? Please draw a cross next to the applicable answer:	
Afrikaans	
English	
Ndebele (isiNdebele)	
Northern Sotho (Sesotho sa Leboa)	
Sesotho	
Swazi (siSwati)	
Tsonga (Xitsonga)	
Tswana (Setswana)	
Venda (Tshivenḓa)	
Xhosa (IsiXhosa)	
Zulu (IsiZulu)	
Other	

4) What age are you? Please indicate your answer with an **X**.	
18-24 years	
25-34 years	
35-44 years	
45-54 years	
55-64 years	
65 Years or older	

5) What is your gender? Please indicate your answer with an **X**.	
Male	
Female	

6) What is the highest level of education that you have completed? Please indicate your answer with an **X**.	
No schooling completed	
High school or equivalent	
Vocational training (certificate or diploma)	
Bachelor's degree (three-year degree)	
Bachelor's degree (four-year degree)	
Honours degree	
Master's degree	
Doctoral degree (PhD)	

7) For how long has this team been using Small Group Activities (SGAs)? Please indicate your answer with an **X**.	
Less than 3 months	
3 - 6 months	
7 - 12 months	
1-3 years	
4-10 years	
Longer than 10 years	
I don't know	

7) How good is the team that reports to you as a manager? Please rate the team's effectiveness by drawing an **x** in the applicable block. Leave the item blank if you don't know enough to rate the team on this dimension or if the statement is not applicable.

	Poor	Fair	Good	Very Good	Excellent
Quality of work done.					
Customer service provided.					
Productivity (i.e., quantity of work completed).					
Job satisfaction of the members.					
Completing work on time.					
Completing work within budget.					
Providing innovative products or services.					
Responding quickly to problems or opportunities.					
Overall performance					

8) Please indicate the extent to which each statement describes the team that has to report to you:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Team members often implement new ideas to improve the quality of our products and services.					
This team gives little consideration to new and alternative methods and procedures for doing their work.					
Team members often produce new services, methods or procedures.					
This is an innovative team.					

APPENDIX B: ADAPTION OF MEASUREMENT SCALE QUESTIONS

As explained in Sections 4.3.4. – 4.3.6., due to the limited proficiency in English of some of the first-line workers (the employees) in the manufacturing organisations, some of the questions had to be adapted in order to make them more understandable. Appendix B explains which scales were adapted and shows how the questions were adapted. Even though the questions were adapted in such a way so that they would be more straightforward, the essence of the question still remained the same.

B.1. Team effectiveness

As mentioned in Section 4.3.4, a measurement scale by Aubé and Rousseau (2005) was used for the Employee Questionnaire and the Team Manager Questionnaire, while a different measurement scale was used for the Senior Manager Questionnaire. A measurement scale that was developed by Campion et al. (1996) was used to measure team effectiveness on the senior managers' questionnaire.

Although it was necessary to adapt some of the questions for the Employee Questionnaire and Team Manager Questionnaire, it was not necessary to make any changes to the questions that were used in the Senior Manager Questionnaire. Table19 shows how the questions were adapted to make them more understandable to employees with slightly limited proficiency in English. Four out of the ten questions remained unaltered.

Table 19: Illustration of the alterations that were made to some of the questions in the scale developed by Aubé & Rousseau (2005).

Element of Team Effectiveness that was measured	Original Question	Adapted Question
Team performance	The members of this team attain their assigned performance goals.	The members of this team reach the performance goals that are set for them.
	The members of this team produce quality work.	The members of this team produce good quality work.
	This team is productive.	-
Quality of group experience	The social climate in our work team is good.	The relationships in our work team are good.
	In our team, relationships are harmonious.	In our team, we do not disagree or fight often.
	In our team, we get along with each other.	-
Team viability	Team members adjust to the changes that happen in their work environment.	-
	When a problem occurs, the members of this team manage to solve it.	-
	The new members are easily integrated into this team.	The new members fit into the team easily.
	The members of this team could work a long time together.	The members of this team could work together for a long time into the future.

B.2. Job satisfaction

As mentioned in Section 4.3.5, the five-item Brayfield and Rothe (1951) scale was used to measure job satisfaction on the employee questionnaire. There were no questions relating to job satisfaction on the team manager or senior manager questionnaire. Table 20 shows the minor alterations that had to be made to the questions in order to make them easier to understand. Most of the questions had to be slightly simplified.

Table 20: Illustration of the alterations that were made to some of the questions in the scale to measure job satisfaction developed by Brayfield & Rothe (1996).

Original Question	Adapted Question
Right now, I feel fairly satisfied with my present job.	Right now, I am satisfied with my job.
Most days I am enthusiastic about my work.	Most days, I am excited about my work.
I find real enjoyment in my work.	I enjoy my work.
I consider my job to be rather unpleasant.	I think my job is unpleasant.
Each day of work seems like it will never end.	-

B.3. Employee engagement

As mentioned in Section 4.3.6, the UWES-9 (Schaufeli et al., 2006) measurement scale was used to measure employee engagement on the employee questionnaire. Employee engagement was not measured on the team manager or senior manager questionnaire; therefore, the questions only appear on the employee questionnaire. Table 21 shows how some of the questions were altered in order to make them clearly understandable to employees with a limited proficiency in English. Approximately half of the questions had to be slightly altered.

Table 21: Illustration of the alterations that were made to some of the questions in the UWES-9 scale developed by Schaufeli et al. (2006).

Original Question	Adapted Question
At my work, I feel bursting with energy.	At work, I feel like I have a lot of energy.
At my job, I feel strong and vigorous.	At my job, I feel strong and healthy.
When I get up in the morning, I feel like going to work.	-
I am enthusiastic about my job.	I am excited about my job.
My job inspires me.	-
I am proud of the work that I do.	-
I am immersed in my work.	I am deeply involved in my work.
I get carried away when I'm working.	-
I feel happy when I am working intensely.	I feel happy when I am working very hard.

APPENDIX C: ASSESSMENT OF ASSUMPTIONS FOR ONE-WAY REPEATED MEASURES ANOVA

As discussed in Section 5.4.2, before a dataset can be used for a one-way repeated measures ANOVA, three assumptions have to be valid. These assumptions are as follow:

1. There should be no extreme outliers.
2. The residuals of the regression line of the dependent variable should be approximately normally distributed for each level of the within-subjects factor.
3. The variances of the differences between all combinations of levels of the within-subjects factor must be equal. This is known as sphericity.

The assessment of the assumptions for each dataset is discussed in this appendix. As discussed in Section 5.4.2, the recommendations of Maxwell and Delaney (2004) were followed in this study and the Greenhouse-Geisser correction was used in the analyses, which deemed it unnecessary to test for sphericity. Since it was no longer necessary to check for Assumption 3, only Assumption 1 and Assumption 2 were assessed for each variable.

C1: Team effectiveness: Senior manager responses

Assumption 1 states that there should be no extreme outliers in the data. The box plots illustrated in Figure 20 indicated that there were no extreme outliers for the senior managers' responses regarding team effectiveness, and therefore, Assumption 1 is valid.

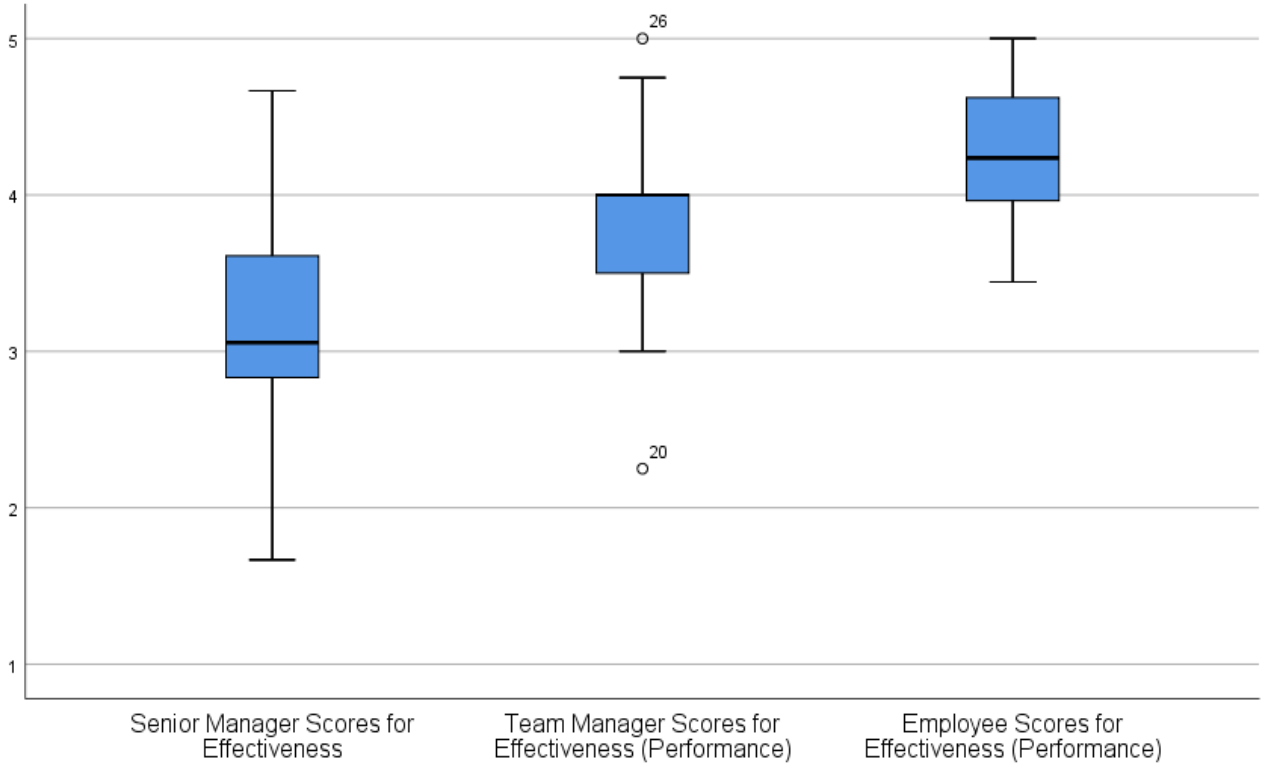

Figure 20: Box plots of the responses provided by the different groups regarding team effectiveness and performance (a facet of team effectiveness)

Assumption 2 states that the data should be approximately normally distributed. In order to assess for normality graphically, the histogram of the regression standardised residuals and the P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities were assessed visually.

From the histogram in Figure 21 it was confirmed that the standardised residuals appear to be approximately normally distributed. An assessment of the mean of $2.21E^{-15}$ indicated that it is approximately zero, and an assessment of the standard deviation of 0.990 confirmed that the standard deviation is approximately equal to one. Therefore, the mean and the standard deviation confirmed the approximate normality of the data for the first test for normality.

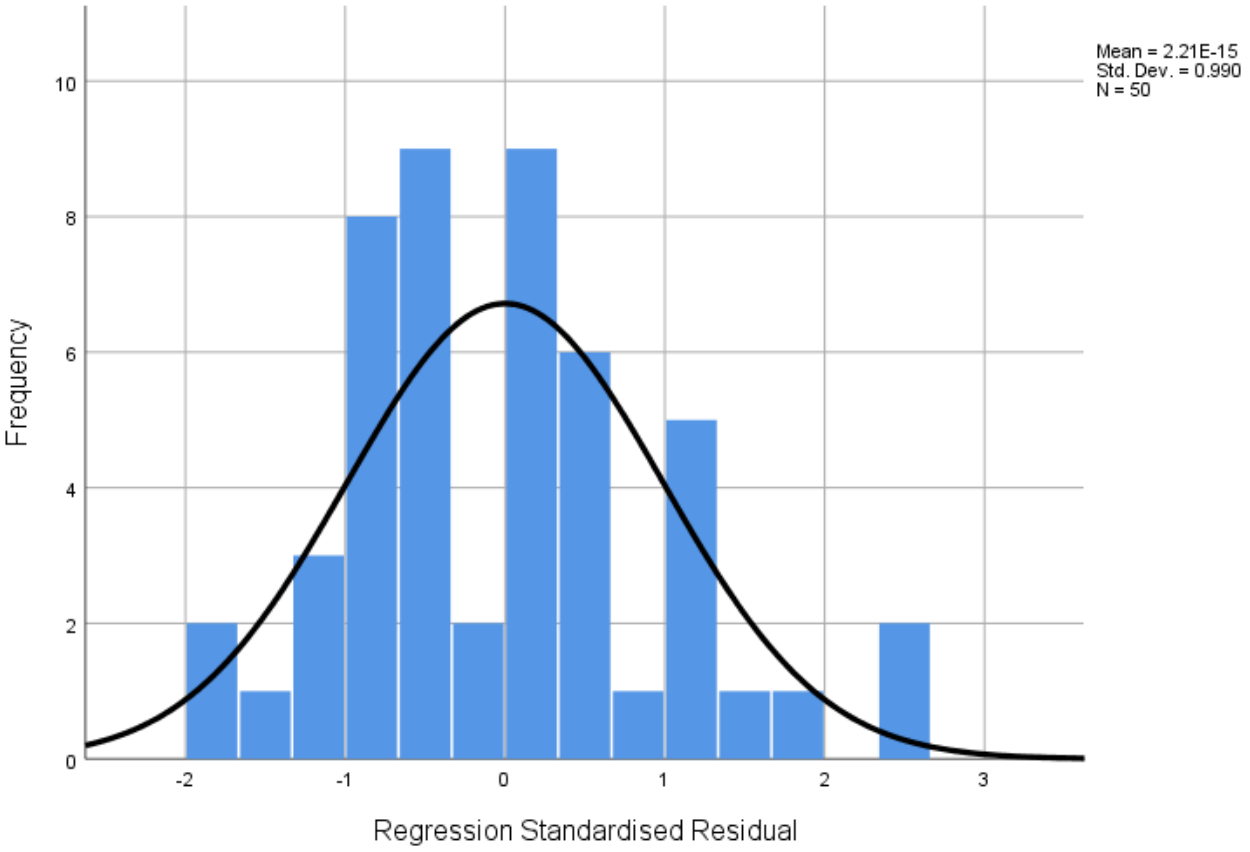

Figure 21: Histogram of the regression standardised residuals of the senior managers' responses for team effectiveness

From the P-P plot in Figure 22 it could be seen that although the points were not perfectly aligned along the diagonal line, they were close enough to show that the residuals are approximately normally distributed.

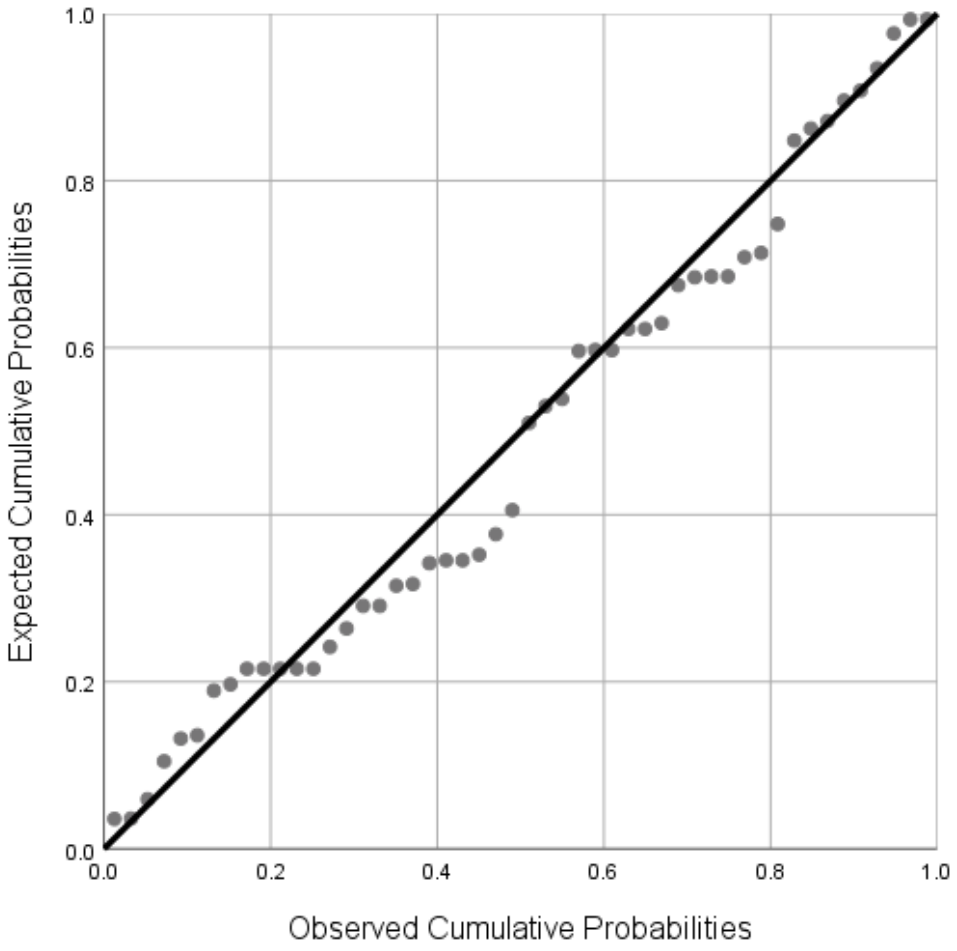

Figure 22: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the senior managers' responses for team effectiveness

Four numerical tests for normality were also performed. A skewness statistic of -0.002 with a standard deviation of 0.337 was obtained, thus yielding a z-score of -0.00593. A kurtosis statistic with a value of 0.166 and a standard deviation of 0.251 were obtained for the data, and the z-score for kurtosis was calculated to be 0.251. Both of these scores are within a range of ±2.58. Therefore, team effectiveness scores were normally distributed with a skewness of -0.002 (standard error = 0.337) and kurtosis of 0.166 (standard error = 0.662).

The p-value for team effectiveness was 0.079 for the Kolmogorov-Smirnov test, thus $p > 0.05$. The p-value for team effectiveness was 0.704 for the Shapiro-Wilk test, thus $p > 0.05$. Thus, team effectiveness scores were normally distributed, as assessed by the Shapiro-Wilk test and the Kolmogorov-Smirnov test. Six out of the six tests for normality indicated that the data is approximately normally distributed. The data also did not violate any of the other assumptions, and thus it was acceptable to use the data for a one-way repeated measures ANOVA.

C2: Team effectiveness (Team performance)

Team managers

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 20 indicated that there were no extreme outliers since there are no responses that were marked with an asterisk (*) and therefore, Assumption 1 is valid.

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram of the regression standardised residuals in Figure 23.

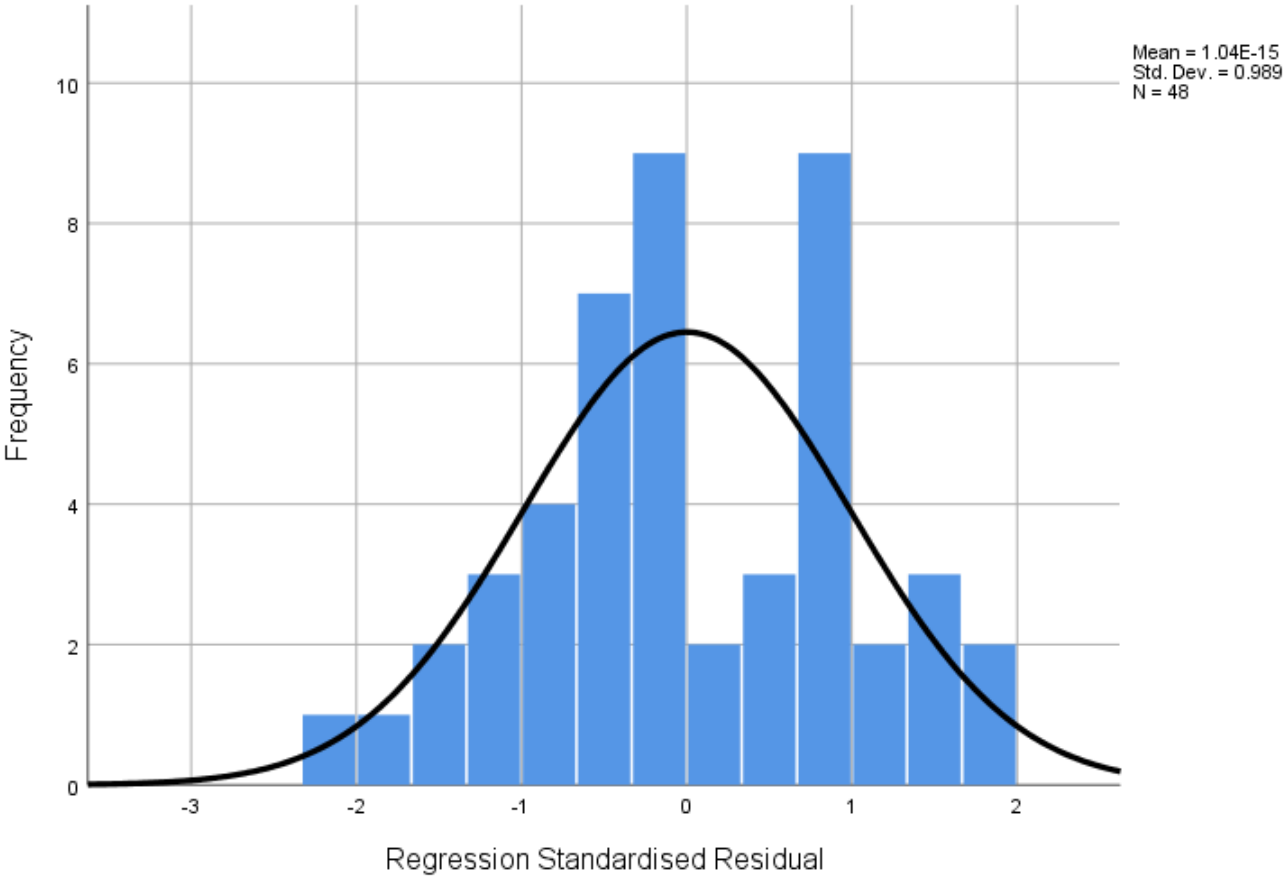

Figure 23: Histogram of the regression standardised residuals of the team managers' responses for performance (a facet of team effectiveness)

The mean of 3.16 E^{-15} was approximately equal to zero, and the standard deviation of 0.990 was approximately equal to one. Therefore, the mean and the standard deviation confirmed the approximate normality of the data.

Visual inspection of a normal probability plot (P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities) in Figure 24 indicated that the residuals were approximately normally distributed.

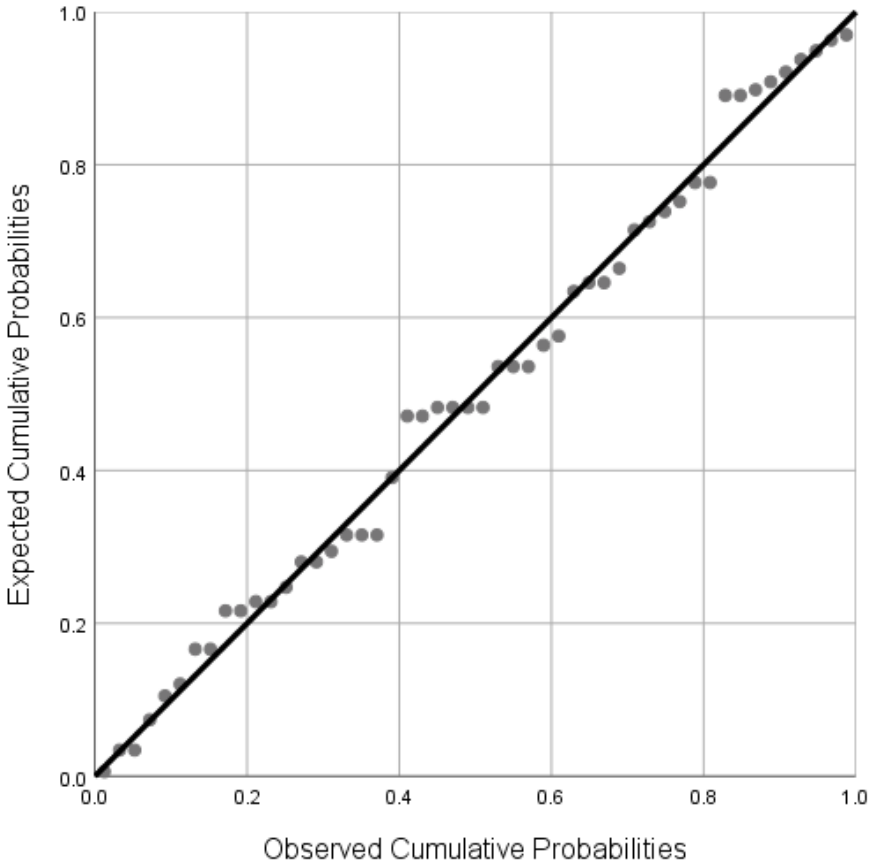

Figure 24: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the team managers' responses for performance (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.128 (standard error = 0.337) and kurtosis of -0.319 (standard error = 0.662). The z-score for skewness was *z* = -0.380 and the kurtosis z-sore was *z* = -0.482. Both of these scores are within a range of ±2.58.

The p-value for the Kolmogorov-Smirnov test was p = 0.002. (p < 0.05). Thus, it cannot be concluded that the data is normally distributed for the Kolmogorov-Smirnov test. For the Shapiro-Wilk test, p = 0.058 (p > 0.05). Therefore, it is concluded that the data is approximately normally distributed for the Shapiro-Wilk test. The data was considered to be approximately normally distributed seeing as five out of the six tests for normality indicated an approximately normal distribution.

Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

Employees

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 20 indicated that there were no extreme outliers and therefore, Assumption 1 is valid. Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram in Figure 25.

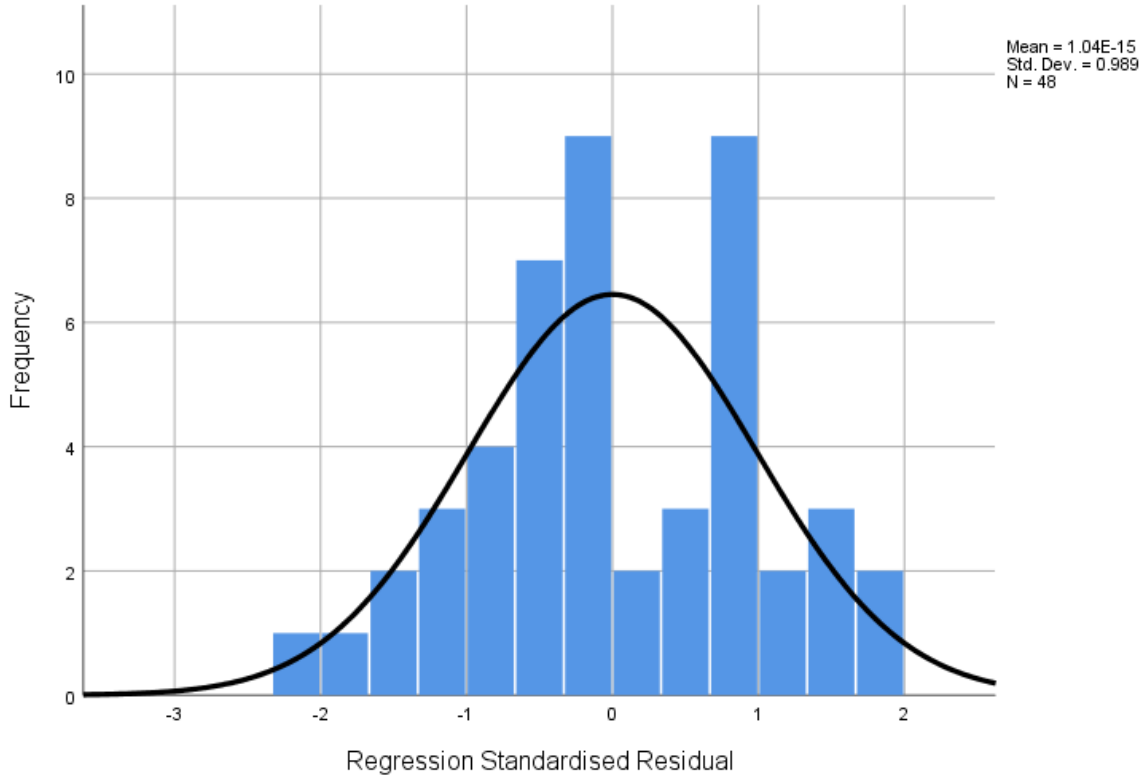

Figure 25: Histogram of the regression standardised residuals of the employees' responses for performance (a facet of team effectiveness)

The mean of 1.04 E $^{-15}$ was approximately equal to zero, and the standard deviation of 0.989 was approximately equal to one. Therefore, the mean and the standard deviation confirmed the approximate normality of the data.

Visual inspection of a normal probability plot (P-P plot) in Figure 26 indicated that the residuals were approximately normally distributed.

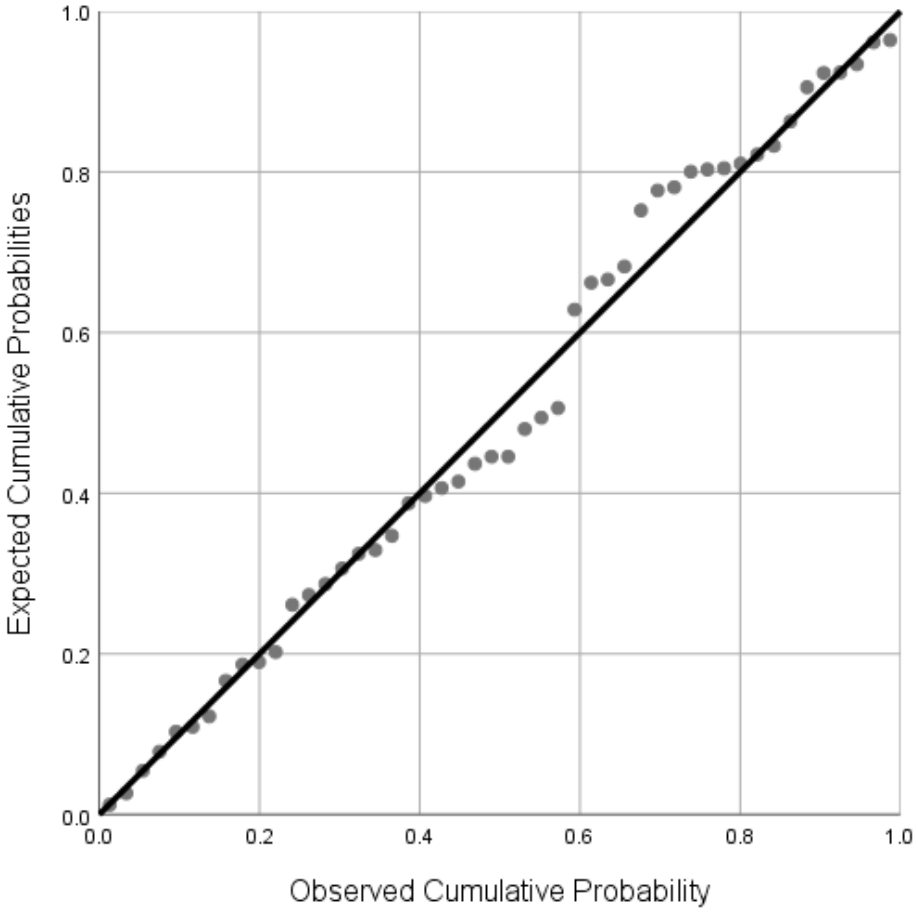

Figure 26: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the employees' responses for performance (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.098 (standard error = 0.343) and kurtosis of -0.630 (standard error = 0.674). The z-score for skewness was *z* = -0.286 and the kurtosis z-sore was *z* = -0.935. Both of these scores are within the acceptable range of ±2.58.

The p-value for the Kolmogorov-Smirnov test was p = 0.200. (p > 0.05). For the Shapiro-Wilk test, the p-value was p = 0.502 (p > 0.05). Thus, the null hypothesis is not rejected and it is concluded that the data is approximately normally distributed according to these two tests.

The data was considered to be approximately normally distributed seeing as six out of the six tests for normality indicated an approximately normal distribution.

Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA

C3: Team effectiveness (Quality of group experience)

Team managers

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 27 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

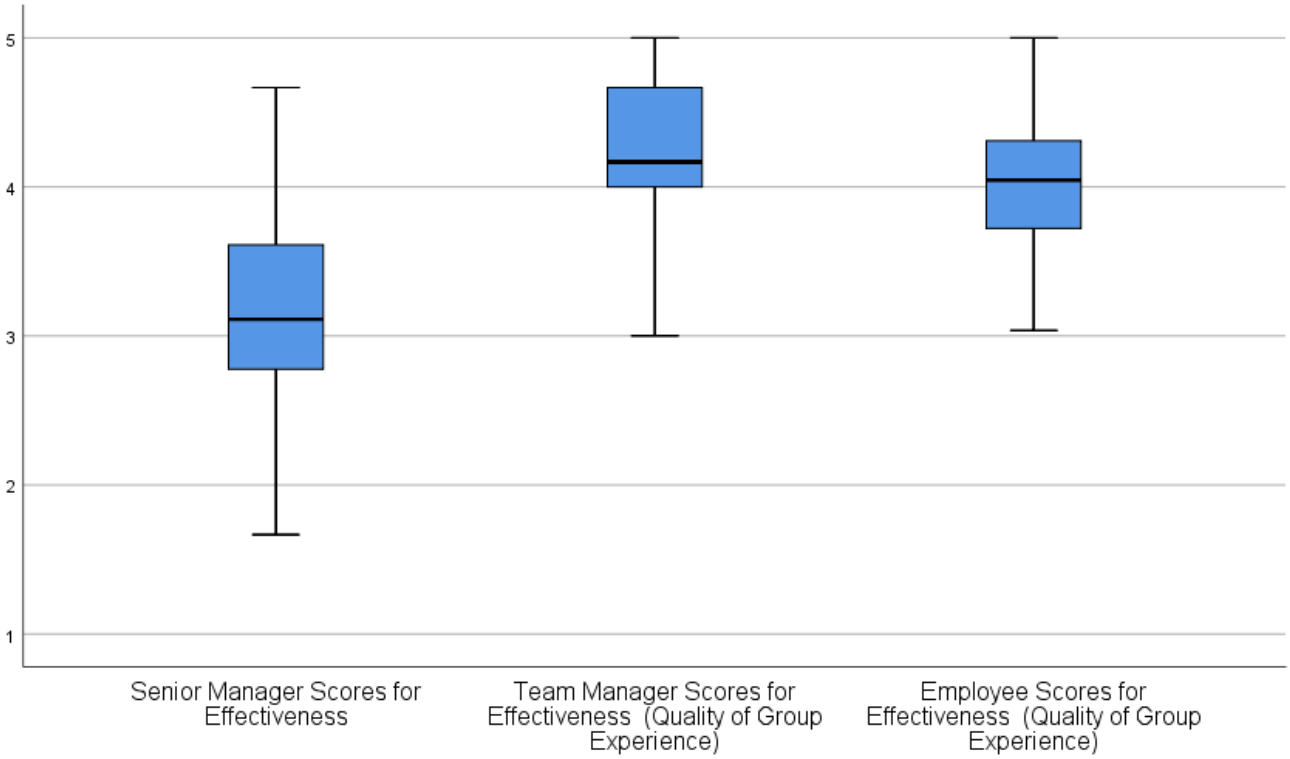

Figure 27: Box plots of the responses provided by the different groups regarding team effectiveness and quality of group experience (a facet of team effectiveness)

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram in Figure 28. The mean of -2.14 E^{-15} was approximately equal to zero, and the standard deviation of 0.990 was approximately equal to one. Therefore, the mean and the standard deviation confirms the normality of the data.

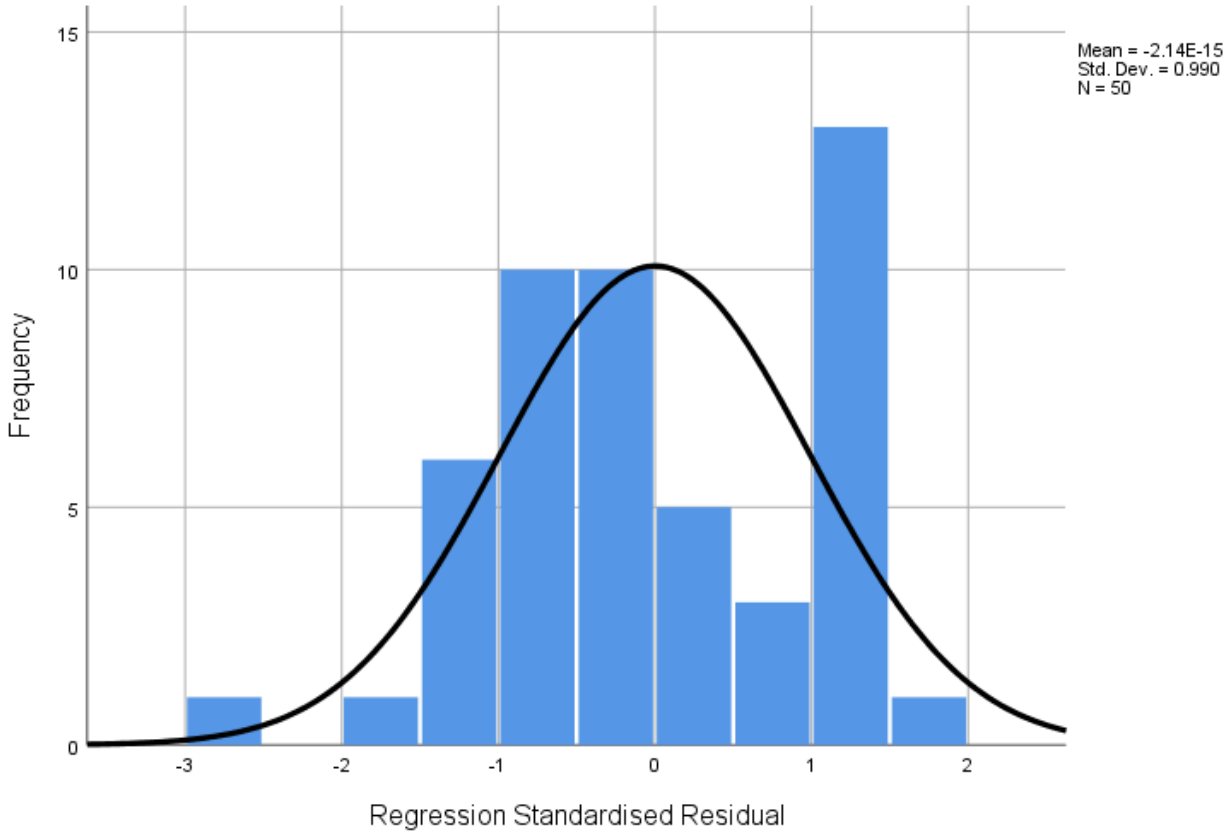

Figure 28: Histogram of the regression standardised residuals of the team managers' responses for quality of group experience (a facet of team effectiveness)

Visual inspection of the normal probability plot (P-P plot) in Figure 29 indicated that the residuals were approximately normally distributed.

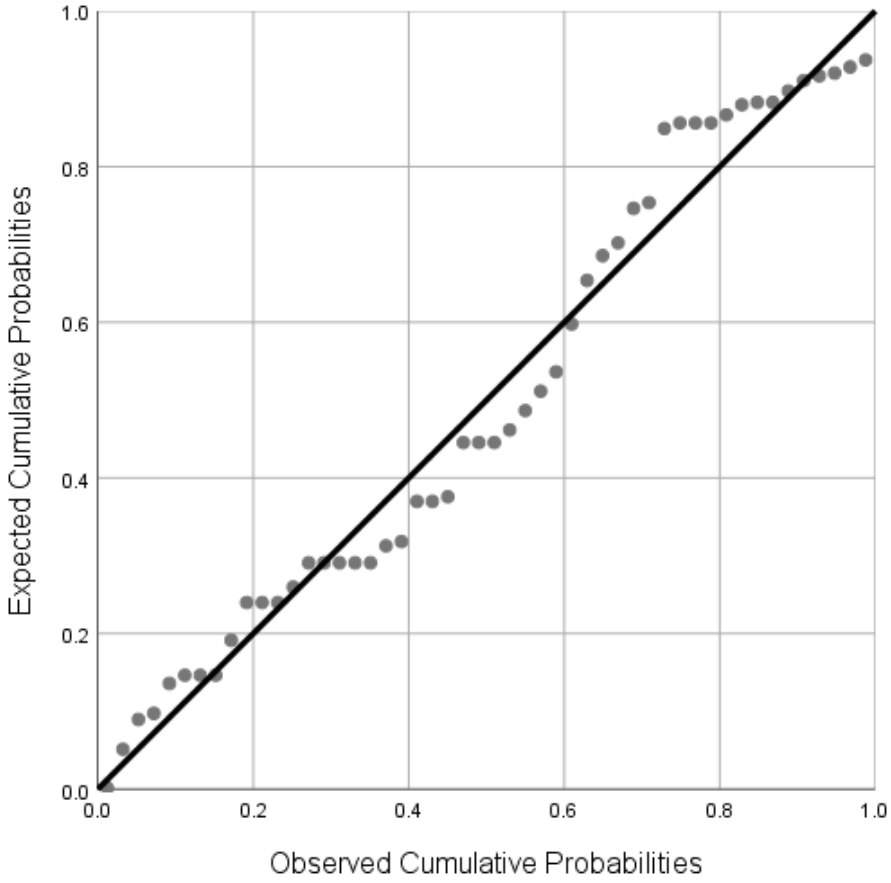

Figure 29: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the team managers' responses for quality of group experience (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.274 (standard error = 0.337) and kurtosis of -0.347 (standard error = 0.662). The z-score for skewness was z = -0.813 and the kurtosis z-sore was z = -0.524. Both of these scores are within a range of ±2.58. The p-values for both the Kolmogorov-Smirnov test and the Shapiro-Wilk test were so small that SPSS did not report their values but merely stated that they are smaller than 0.0005. Thus, $p < 0.05$ for both tests and it cannot be concluded that the data is normally distributed from these tests.

The data was considered to be approximately normally distributed seeing as four out of the six tests for normality indicated an approximately normal distribution. Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

Employees

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 27 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram in Figure 30. The mean of 3.85 E^{-15} was approximately equal to zero, and the standard deviation of 0.987 was approximately equal to one. Therefore, the mean and the standard deviation confirm the approximate normality of the data.

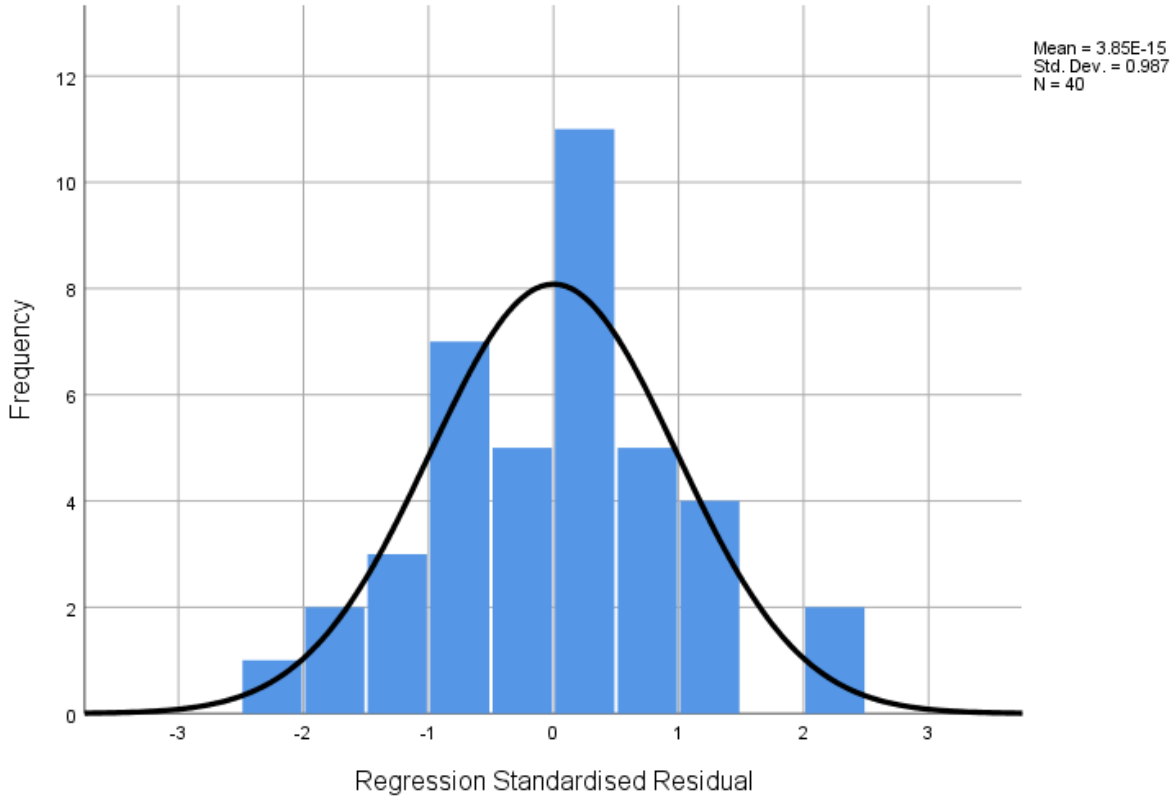

Figure 30: Histogram of the regression standardised residuals of the employees' responses for quality of group experience (a facet of team effectiveness)

Visual inspection of a normal probability plot (P-P plot) in Figure 31 indicated that the residuals were approximately normally distributed.

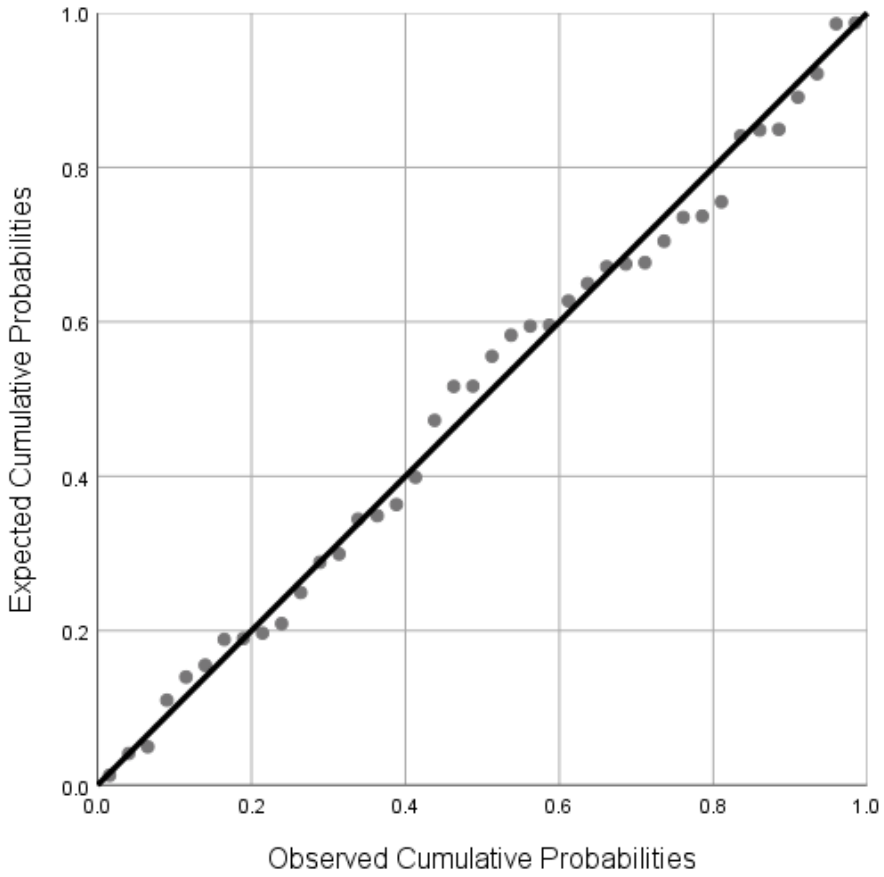

Figure 31: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the employees' responses for quality of group experience (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.067 (standard error = 0.374) and kurtosis of -0.087 (standard error = 0.733). The z-score for skewness was z = -0.179 and the kurtosis z-sore was z= -0.119. Both of these scores are within the acceptable range of ±2.58.

The p-value for both the Kolmogorov-Smirnov test was p= 0.200 > 0.05. The p-value for both the Shapiro-Wilk test was p= 0.945 > 0.05. The p-values of both of the tests were larger than 0.05, therefore the null hypothesis cannot be rejected and it is concluded that the data is approximately normally distributed according to these two numerical tests.

The data was considered to be approximately normally distributed seeing as six out of the six tests for normality indicated an approximately normal distribution.

Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

C4: Team effectiveness (Team viability)

Team managers

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 32 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

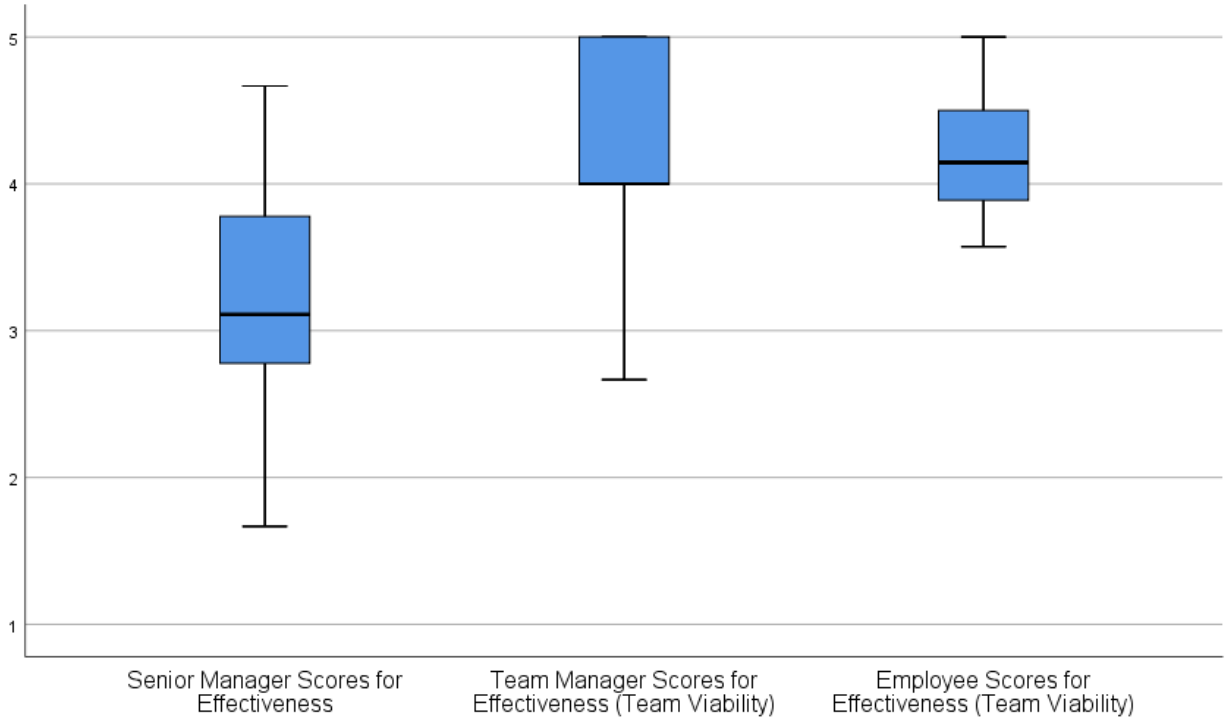

Figure 32: Box plots of the responses provided by the different groups regarding team effectiveness and team viability (a facet of team effectiveness)

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram of the regression standardised residuals in Figure 33. The mean of 3.68 E^{-15} was approximately equal to zero, and the standard deviation of 0.990 was approximately equal to one. Therefore, the mean and the standard deviation confirm the approximate normality of the data.

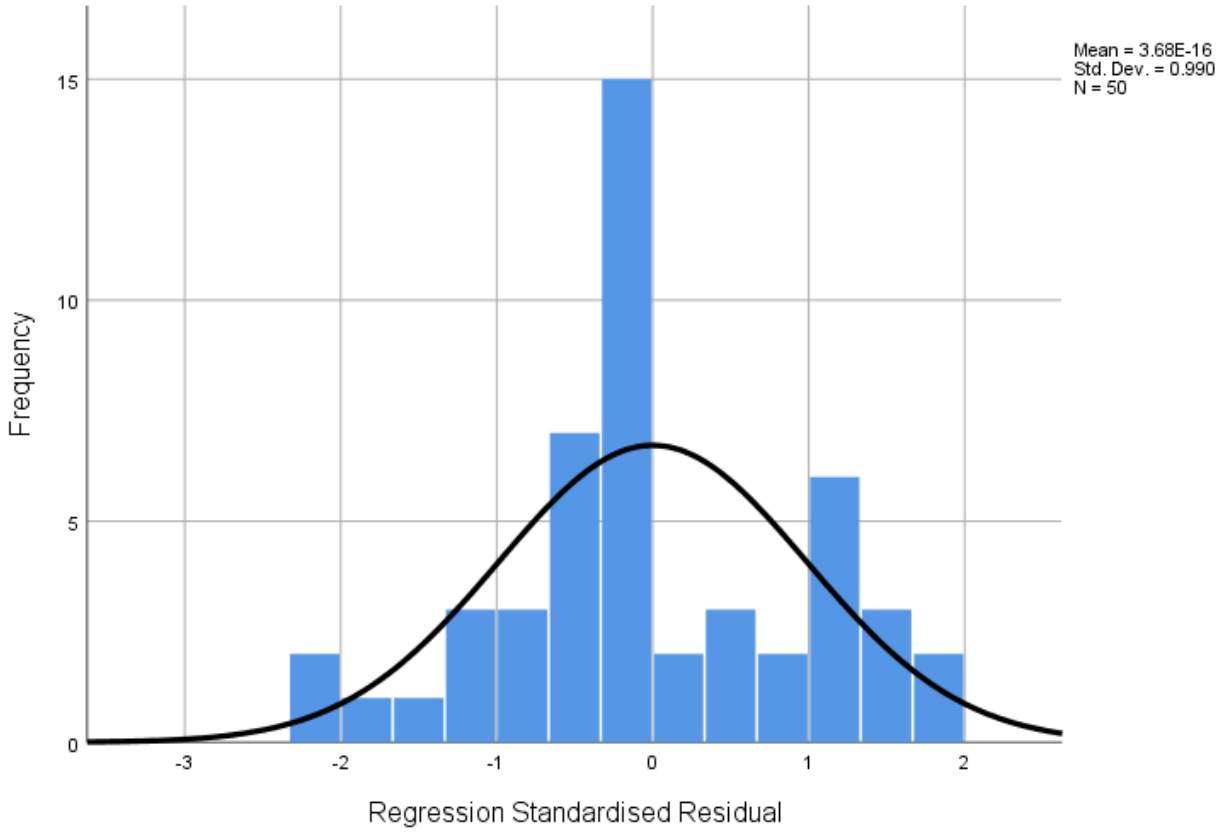

Figure 33: Histogram of the regression standardised residuals of the team managers' responses for team viability (a facet of team effectiveness)

Visual inspection of a normal probability plot (P-P plot) in Figure 34 indicated that the residuals were approximately normally distributed.

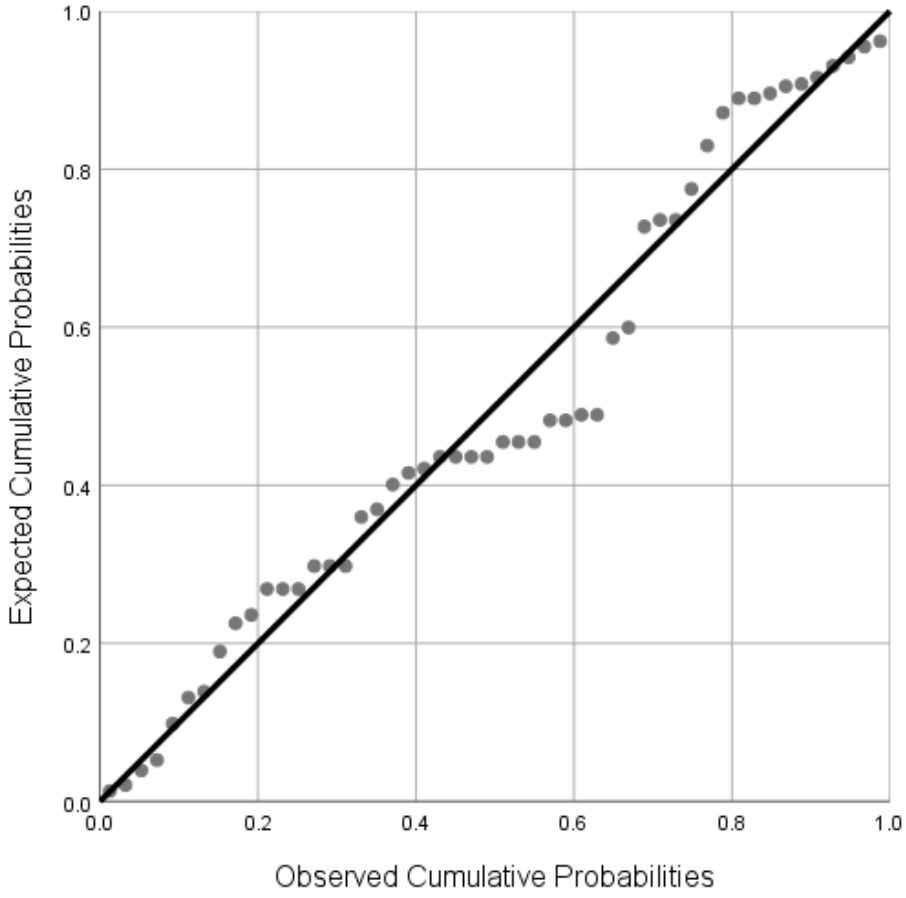

Figure 34: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the team managers' responses for team viability (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.070 (standard error = 0.337) and kurtosis of -0.352 (standard error = 0.662). The z-score for skewness was $z = -0.208$ and the kurtosis z-sore was $z = -0.5317$. Both of these scores are within a range of ±2.58. The p-values for both the Kolmogorov-Smirnov test and the Shapiro-Wilk test were so small that SPSS did not report their values but merely stated that they are smaller than 0.0005. Thus, $p < 0.05$ for both tests and it cannot be concluded that the data is normally distributed from these tests.

The data was considered to be approximately normally distributed seeing as four out of the six tests for normality indicated an approximately normal distribution. Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

Employees

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 32 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram in Figure 35. The mean of 1.02 E^{-15} was approximately equal to zero, and the standard deviation of 0.989 was approximately equal to one. Therefore, the mean and the standard deviation confirmed the approximate normality of the data.

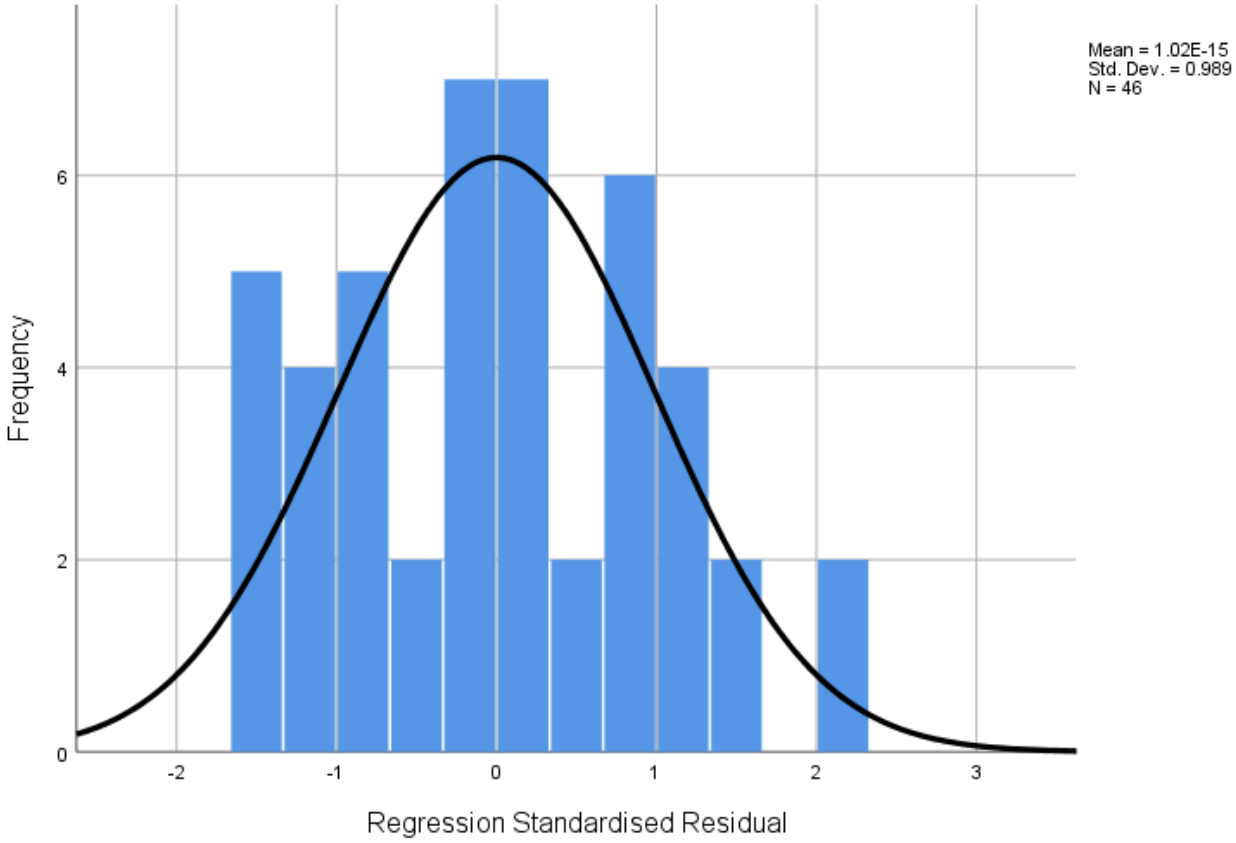

Figure 35: Histogram of the regression standardised residuals of the employees' responses for quality of team viability (a facet of team effectiveness)

Visual inspection of the normal probability plot (P-P plot) in Figure 36 indicated that the residuals were approximately normally distributed.

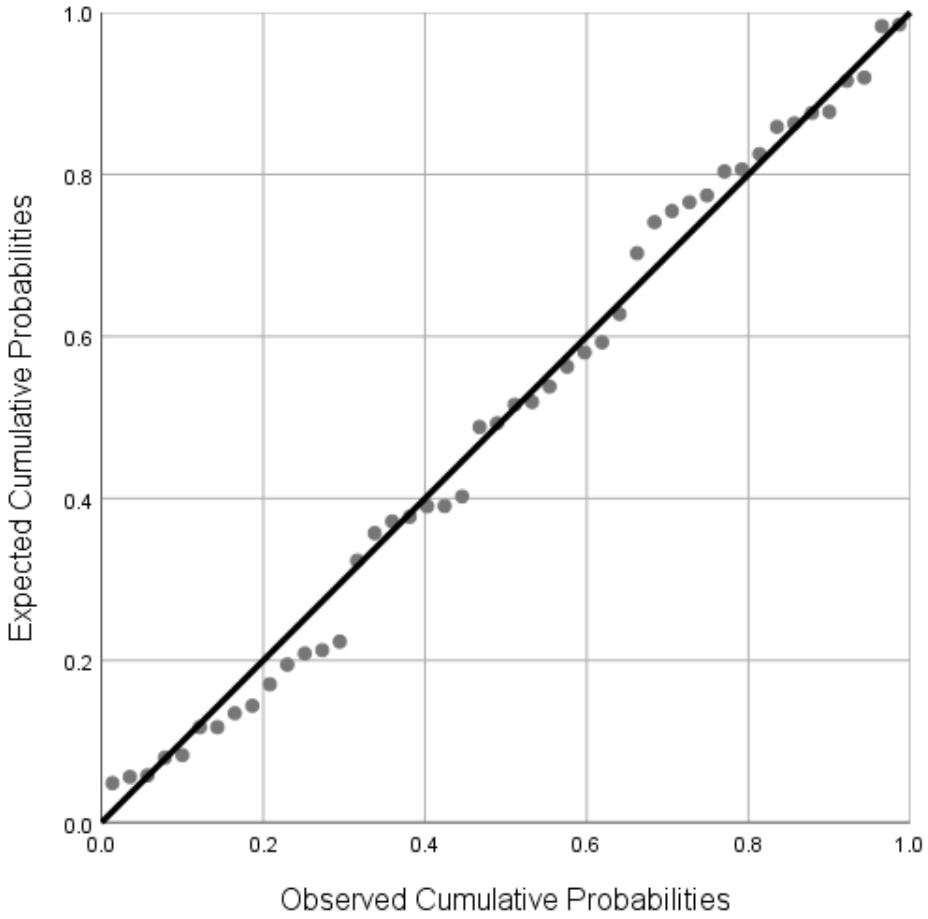

Figure 36: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the employees' responses for team viability (a facet of team effectiveness)

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.188 (standard error = 0.350) and kurtosis of -0.676 (standard error = 0.688). The z-score for skewness was z = -0.537 and the kurtosis z-sore was z = -0.982. Both of these scores are within the acceptable range of ±2.58. The p-value for both the Kolmogorov-Smirnov test was $p = 0.200 > 0.05$. The p-value for both the Shapiro-Wilk test was $p = 0.365 > 0.05$. The p-values of both of the tests were larger than 0.05, therefore the null hypothesis cannot be rejected and it is concluded that the data is approximately normally distributed according to these two numerical tests.

The data was considered to be approximately normally distributed seeing as four out of the six tests for normality indicated an approximately normal distribution. Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

C5: Team innovation: Senior manager responses

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 37 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

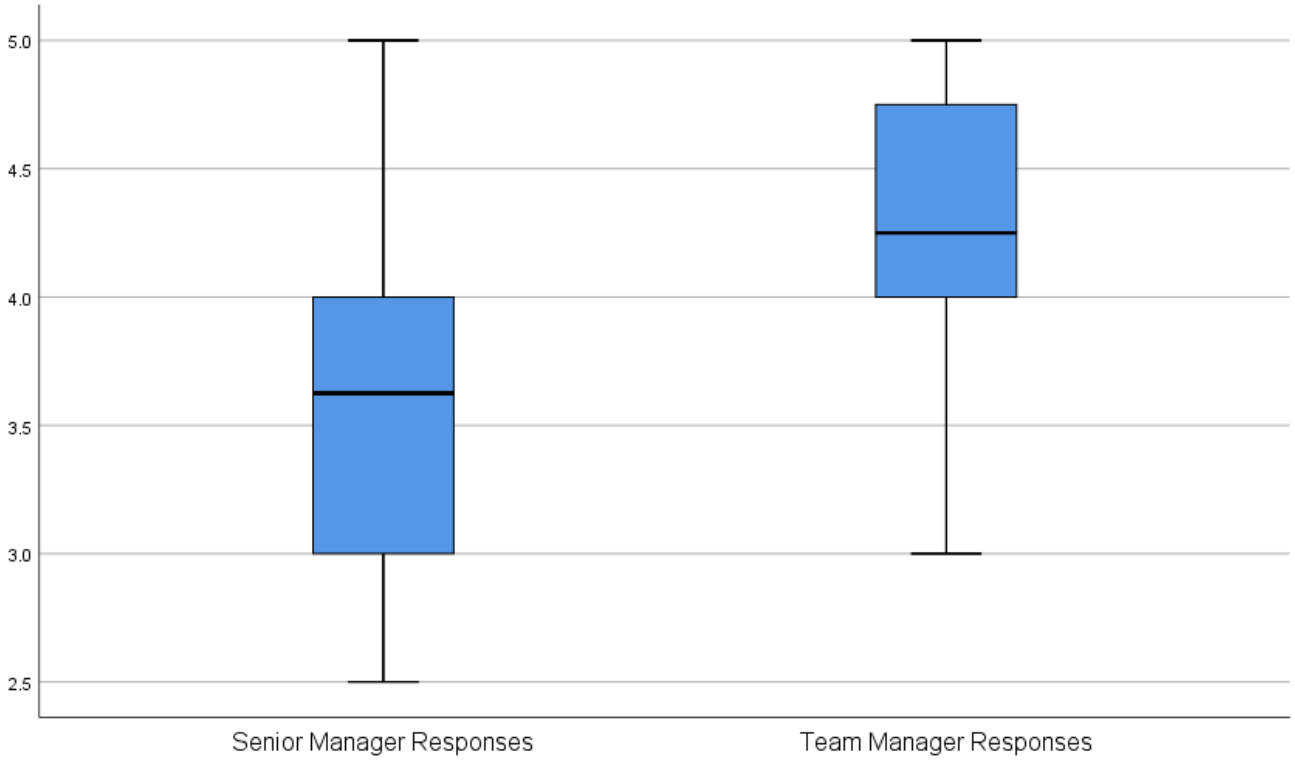

Figure 37: Box plots of the responses provided by the different groups regarding team innovation

According to Assumption 2, residuals (errors) of the regression line should be approximately normally distributed. Firstly, the histogram of the regression standardised residual of team innovation was plotted in Figure 38 and visually inspected. Although the mean of 5.57E $^{-16}$ is almost zero, and the standard deviation of 0.990 is almost equal to one (and therefore indicating that the data is approximately normally distributed), by visually inspecting the histogram it appeared as if there might be slight positive kurtosis.

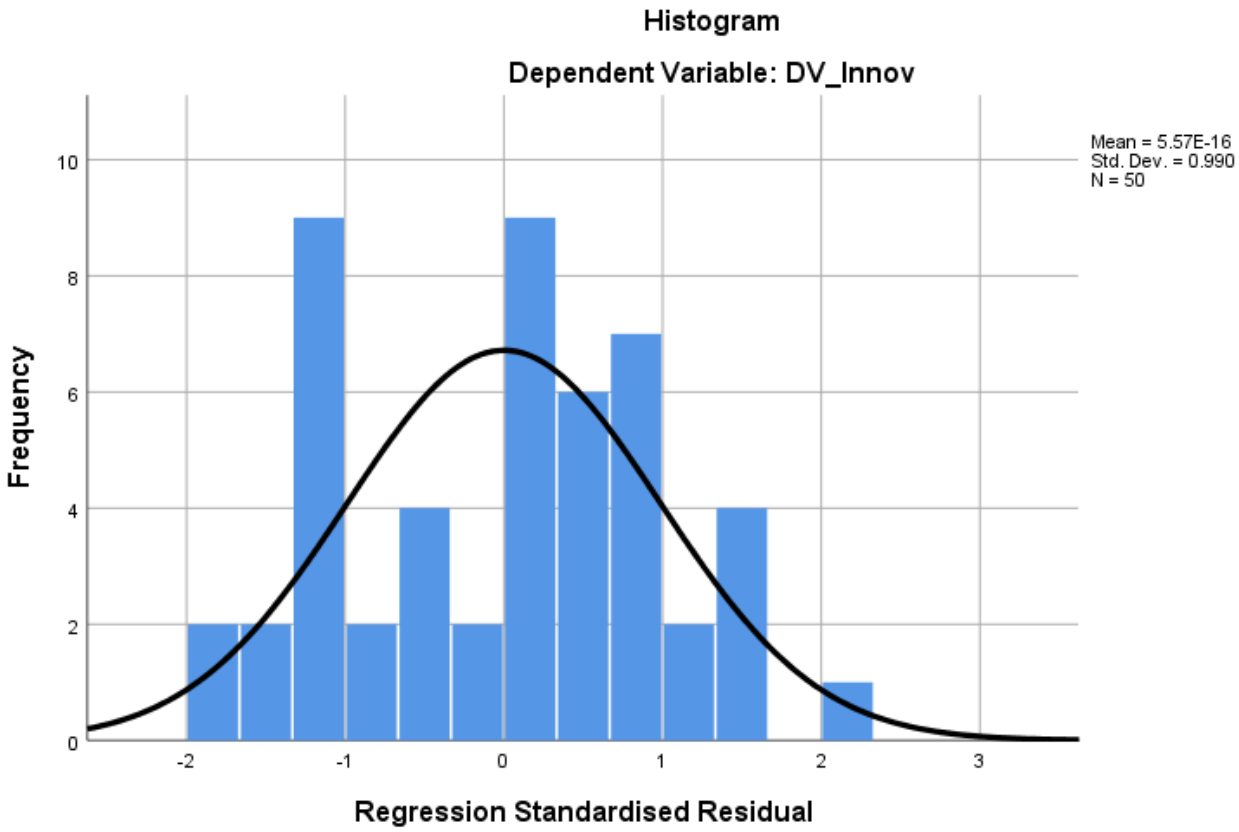

Figure 38: Histogram of the regression standardised residuals of the senior managers' responses for team innovation

Secondly, by inspecting the P-P plot of standardised residuals versus standardised predicted values in Figure 39, it also appeared as if there might be slight positive kurtosis. From visual inspection, it was concluded that the data is, however, still approximately normally distributed.

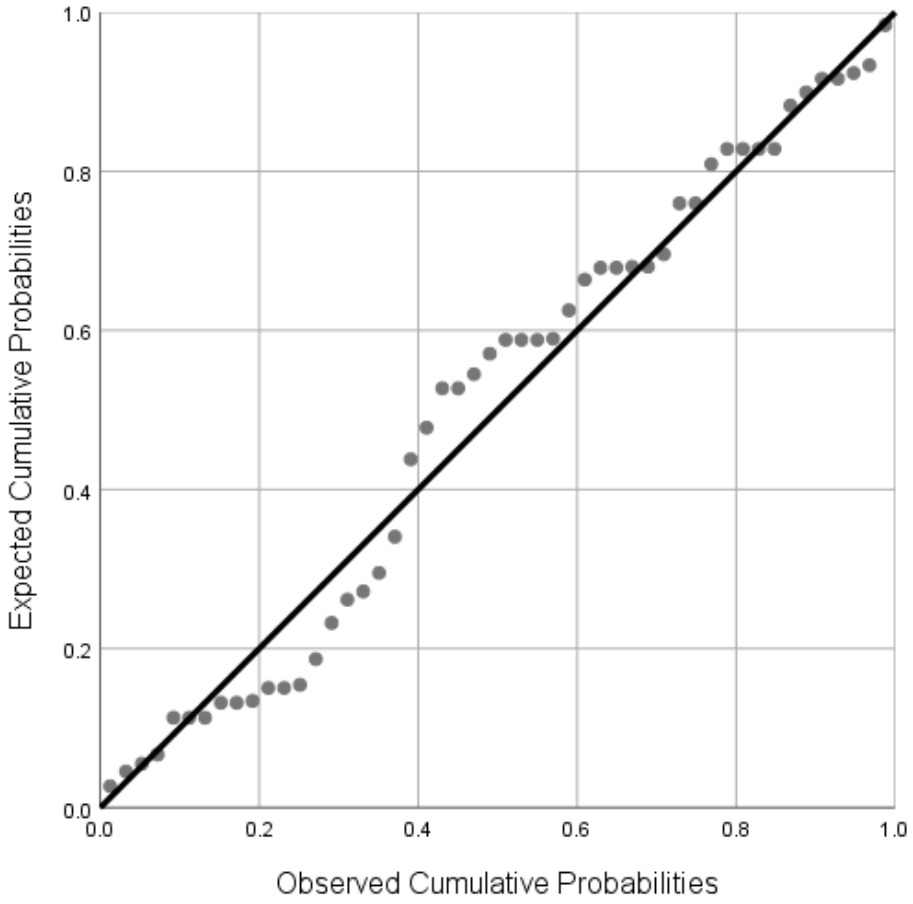

Figure 39: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the senior managers' responses for team innovation

The data had a skewness statistic of -0.079 with a standard deviation of 0.337. The z-score for skewness was calculated as -0.234 and fell within the range of ±2.58 with a conservative significance level of 0.01. This is an indication that the data is approximately normally distributed. A kurtosis value of -0.603 with a standard deviation of 0.662 yielded a z-score of -0.911 which was also within the range of ±2.58. Therefore, by assessing the skewness and kurtosis scores, it was concluded that the data is approximately normally distributed.

SPSS does not report the exact estimates of the p-values if they are significantly small, but merely reports that they are smaller than 0.0005. The Kolmogorov-Smirnov test with Lilliefors significance correction yielded a p-value smaller than 0.0005 ($p < 0$ .0005) and the Shapiro-Wilk test yielded a p-value of 0.001. Both of these values are less than 0.05 ($p < 0.05$). Thus, it could not be concluded that the data is normally distributed from these tests.

As a final result, four out of the six tests for normality indicated an approximately normally distribution. Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

C6: Team innovation: Team manager responses

Assumption 1 states that there should be no extreme outliers in the data. The box plots in Figure 37 indicated that there were no extreme outliers and therefore, Assumption 1 is valid.

Residuals were approximately normally distributed (Assumption 2) as assessed by visual inspection of the histogram in Figure 40. The mean of 2.95 E $^{-17}$ was approximately equal to zero, and the standard deviation of 0.990 was approximately equal to one. Therefore, the mean and the standard deviation confirm the approximate normality of the data.

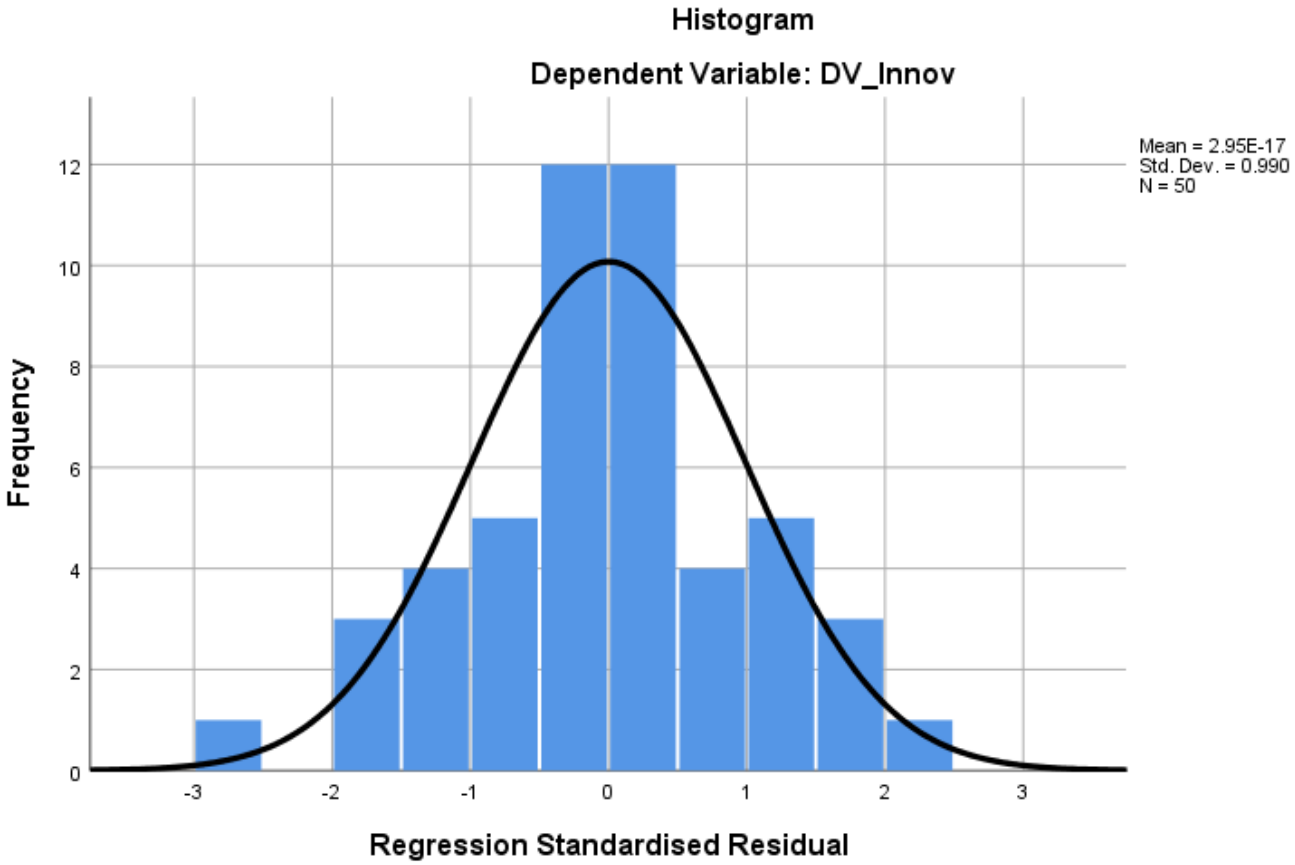

Figure 40: Histogram of the regression standardised residuals of the team managers' responses for team innovation

Visual inspection of a normal probability plot (P-P plot) in Figure 41 indicated that the residuals were approximately normally distributed.

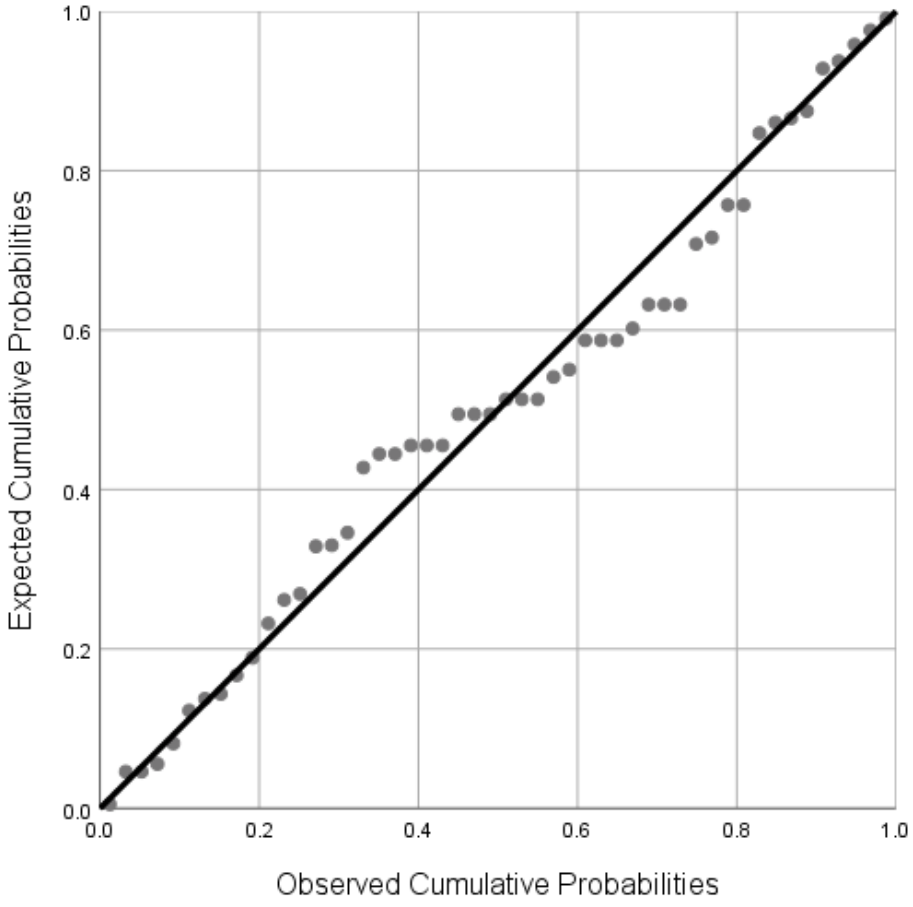

Figure 41: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities for the team managers' responses for team innovation

Skewness and kurtosis scores indicated approximately normally distributed data with a skewness of -0.227 (standard error = 0.337) and kurtosis of 0.611 (standard error = 0.662). The z-score for skewness was -0.674 and the kurtosis z-sore was 0.922. Both of these scores are within the acceptable range of ±2.58.

The p-value for the Kolmogorov-Smirnov test was $p = 0.001$. ($p < 0.05$). Thus, the null hypothesis is rejected and it cannot be concluded that the data is normally distributed for the Kolmogorov test. For the Shapiro-Wilk test, $p = 0.058$ ($p > 0.05$). Therefore, the null hypothesis cannot be rejected and it is concluded that the data is approximately normally distributed for the Shapiro-Wilk test.

The data was considered to be approximately normally distributed seeing as five out of the six tests indicated an approximately normal distribution. Since the data did not violate any of the other assumptions, it was acceptable to use the data for a one-way repeated measures ANOVA.

APPENDIX D: ASSESSMENT OF ASSUMPTIONS FOR LINEAR REGRESSION ANALYSES

As discussed in Section 5.5.1, before a linear regression analysis can be performed, a set of seven assumptions have to be valid for the data. The assumptions are as follows:

1. There is only one independent variable present and it is measured at the continuous level.
2. There is only one dependent variable present and it is measured at the continuous level.
3. There should be a linear relationship between the independent and dependent variables.
4. The residuals of the observations should be independent.
5. There shouldn't be any significant outliers.
6. The data conforms to homoscedasticity (this is when the variances along the best line of fit remain similar as one moves up and down the line).
7. The residuals (also referred to as the errors) of the regression line are approximately normally distributed.

The assessment of the assumptions for the senior managers' responses for team effectiveness and team innovation are discussed in this appendix. As discussed in Section 5.1, all of the variables are continuous variables, and therefore Assumption 1 and 2 are valid for all of the constructs in the study and will not be discussed again individually.

D.1. Assumptions for team effectiveness

In order to test Assumption 3, a scatterplot of team effectiveness against the MBA scores was plotted and can be seen in Figure 42. Visual inspection of the scatterplot indicated a linear relationship between the two variables.

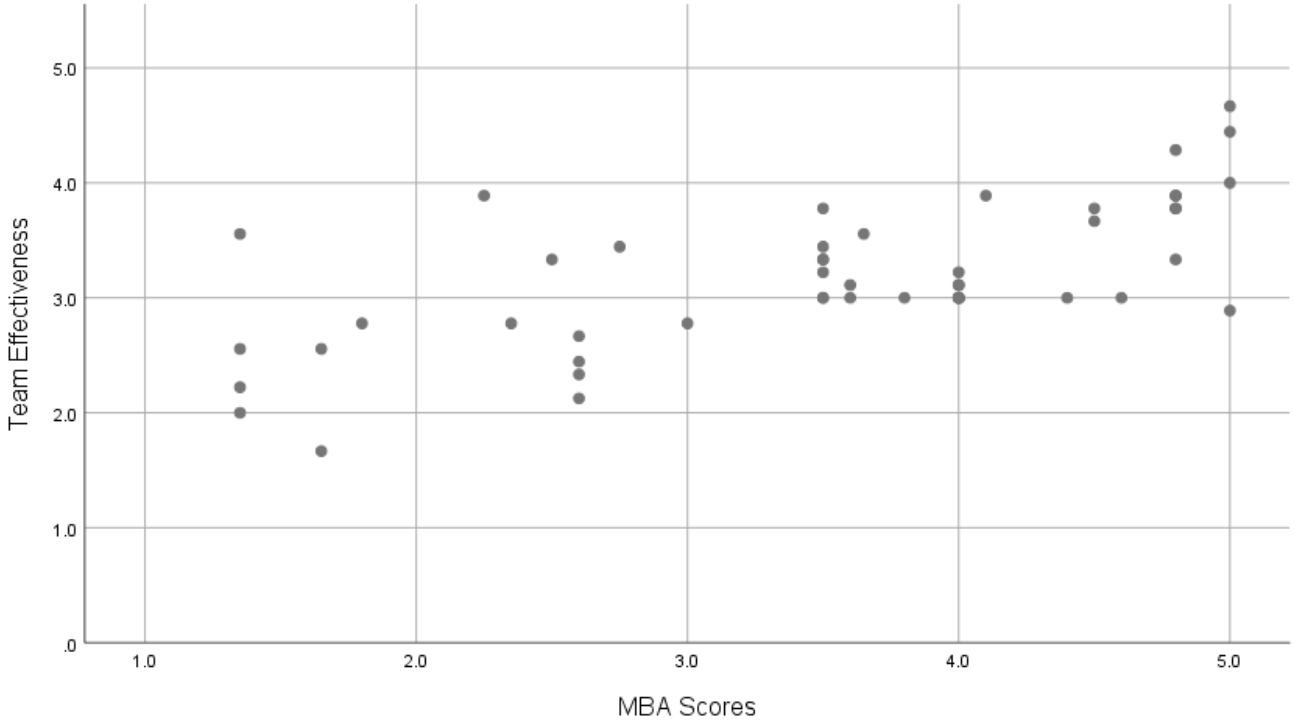

Figure 42: Simple scatterplot of team effectiveness against the MBA scores

Assumption 4 states that the observations should be independent. The Durbin-Watson statistic (d) that was obtained for team effectiveness had a value of d = 1.438. This is an indication that there is a slight positive autocorrelation. In order to determine whether this value was cause for alarm, the value was compared to the lower and upper bounds of the Durbin-Watson tables. The lower bound is d_L =1.324 and the upper bound is d_U= 1.403. A comparison of the Durbin-Watson statistic with the upper and lower bounds yielded the following results:

$d > d_U$, therefore there is no statistical evidence that the error terms are positively autocorrelated; and

$(4-d) > d_U$, therefore there is no statistical evidence that the error terms are negatively autocorrelated.

The above tests concluded that there is no statistical evidence that the error terms have an autocorrelation and therefore, the observations can be assumed to be independent, which indicates that Assumption 4 is valid.

As seen in Figure 42, there were no significant outliers in the data. SPSS also did not provide a table indicating any outliers in the data. Therefore, Assumption 5 is valid.

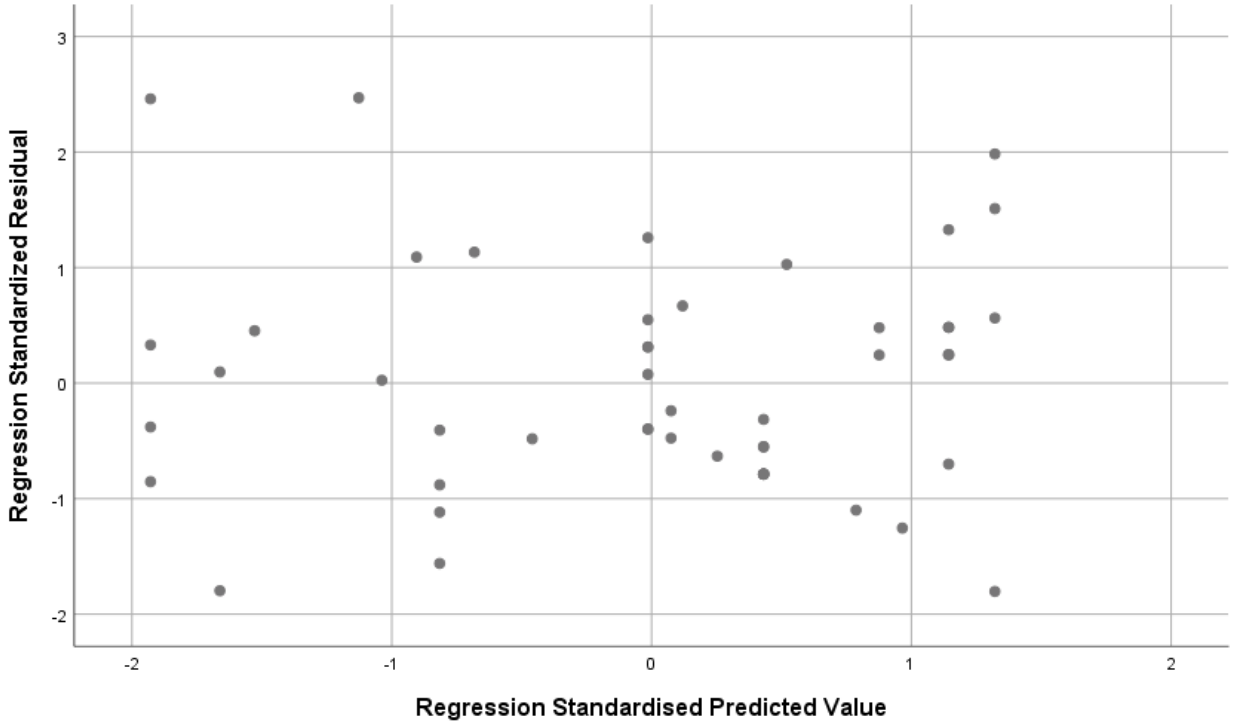

Figure 43: Scatterplot of the regression standardised residuals and the regression standardised predicted values for team effectiveness

According to Assumption 6, there should be no homoscedasticity of the data. A scatterplot of the regression standardised residuals and the regression standardised predicted values for team effectiveness was plotted and can be seen in Figure 43. Visual inspection of the plot indicated that the points appeared to be approximately evenly spread, which is an indication of homoscedasticity. Thus Assumption 6 holds true for the data.

Assumption 7 states that the data is normally distributed. In order to assess for normality graphically, the histogram of the regression standardised residuals and the P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities was assessed visually and can be seen in Figure 44 and Figure 45 respectively. From the histogram in Figure 44 it was confirmed that the standardised residuals appear to be approximately normally distributed.

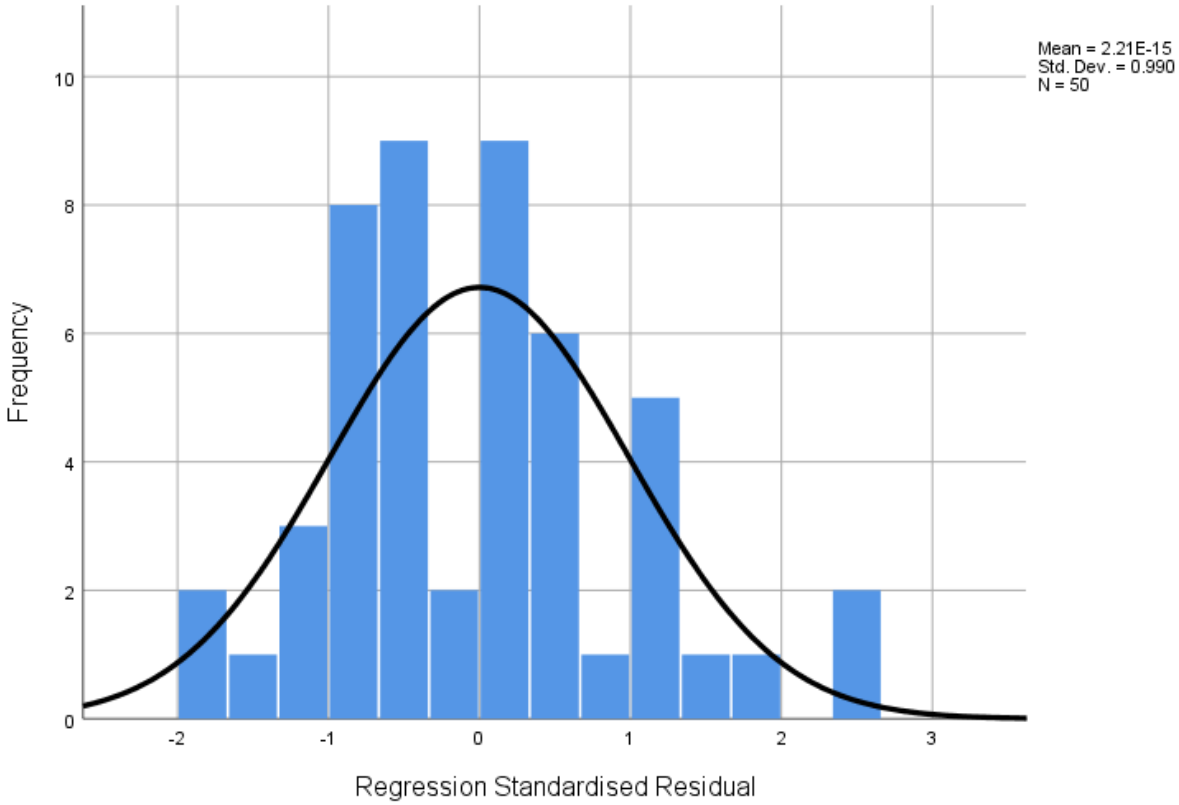

Figure 44: Histogram of the regression standardised residuals of the senior managers' responses for team effectiveness

An assessment of the mean of $2.21E^{-15}$ indicated that it is approximately zero, and an assessment of the standard deviation of 0.990 confirmed that the standard deviation is approximately equal to one. Therefore, the mean and the standard deviation confirmed the approximate normality of the data for the first test for normality.

From the P-P plot in Figure 45 it could be seen that although the points were not perfectly aligned along the diagonal line, they were close enough to show that the residuals are approximately normally distributed.

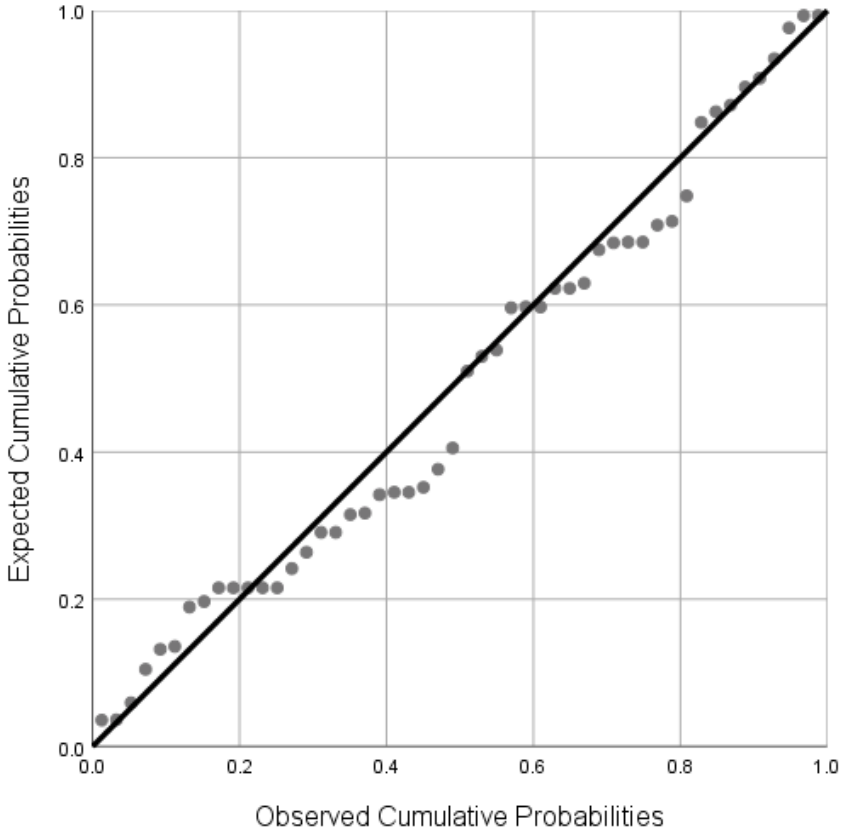

Figure 45: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities of the senior managers' responses for team effectiveness

Four numerical tests for normality were also performed. A skewness statistic of -0.002 with a standard deviation of 0.337 was obtained, thus yielding a z-score of -0.00593. A kurtosis statistic with a value of 0.166 and a standard deviation of 0.251 was obtained for the data, and the z-score for kurtosis was calculated to be 0.251. Both of these scores are within a range of ±2.58. Therefore, team effectiveness scores were normally distributed with a skewness of -0.002 (standard error = 0.337) and kurtosis of 0.166 (standard error = 0.662). The p-value for team effectiveness was 0.079 for the Kolmogorov-Smirnov test, thus $p > 0.05$. The p-value for team effectiveness was 0.704 for the Shapiro-Wilk test, thus $p > 0.05$. Thus, team effectiveness scores were normally distributed, as assessed by the Shapiro-Wilk test and the Kolmogorov-Smirnov test.

Six out of the six tests for normality indicated that the data is approximately normally distributed. The data also did not violate any of the other assumptions, and thus it was acceptable to perform a linear regression with the data. None of the assumptions for a linear regression analysis had been violated and therefore, it was acceptable to perform a linear regression analysis on the data for team effectiveness.

D.2. Assumptions for team innovation

In order to determine whether a linear relationship existed between the two variables (Assumption 3), a scatterplot of team innovation against the maturity score of the MBA was plotted. Linearity was established by visually inspecting the scatterplot in Figure 46.

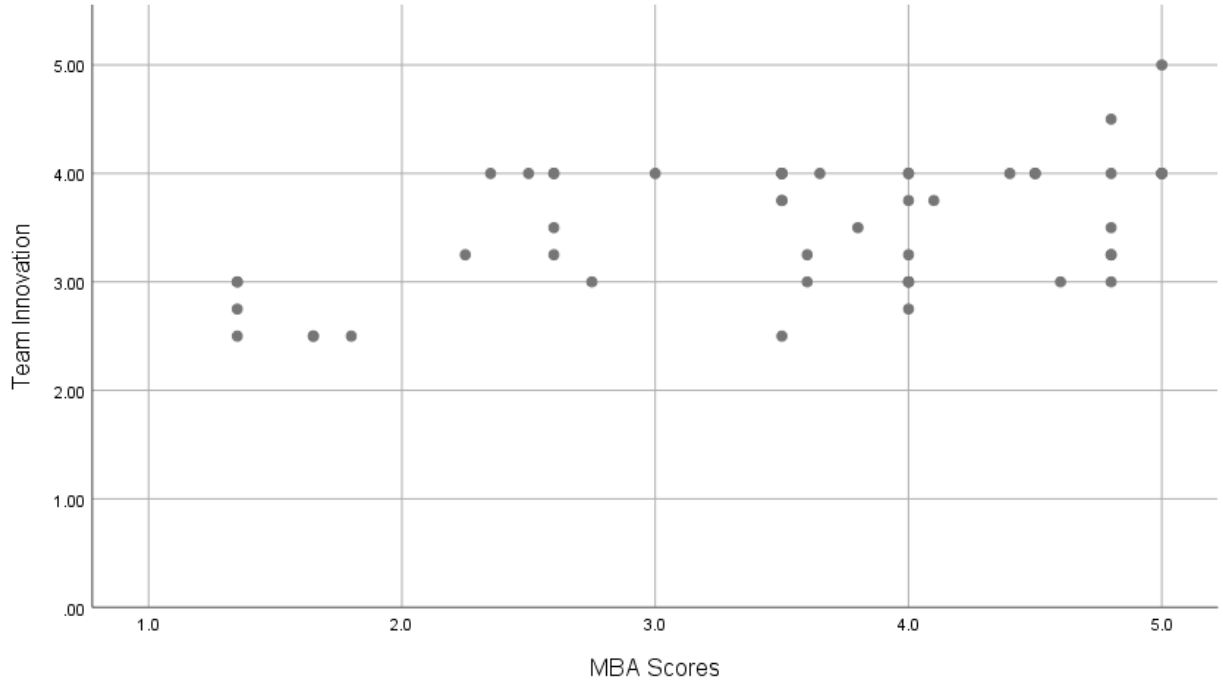

Figure 46: Simple scatterplot of team innovation against the MBA scores

Assumption 4 was also not violated seeing as the Durbin-Watson statistic for team innovation was d =1.433 with a lower bound of d_L =1.324 and an upper bound of d_U = 1.403. An assessment of d yielded the following results:

d > d_U, therefore there is no statistical evidence that the error terms are positively autocorrelated; and

(4-d) > d_U, therefore there is no statistical evidence that the error terms are negatively autocorrelated.

Thus, there was independence of residuals, as assessed by a Durbin-Watson statistic of 1.433.

According to Assumption 5, there should be no significant outliers. The scatterplot in Figure 46 was investigated for outliers and none could be found. SPSS also did not provide a table indicating any outliers. Thus, there were no significant outliers in the data and therefore, Assumption 5 was valid.

By visually inspecting the plot of standardised residuals versus standardised predicted values in Figure 47, it was determined that there was homoscedasticity since the points on the plot did not exhibit any patterns and appeared to be evenly spread. Therefore, Assumption 6 holds true for team innovation.

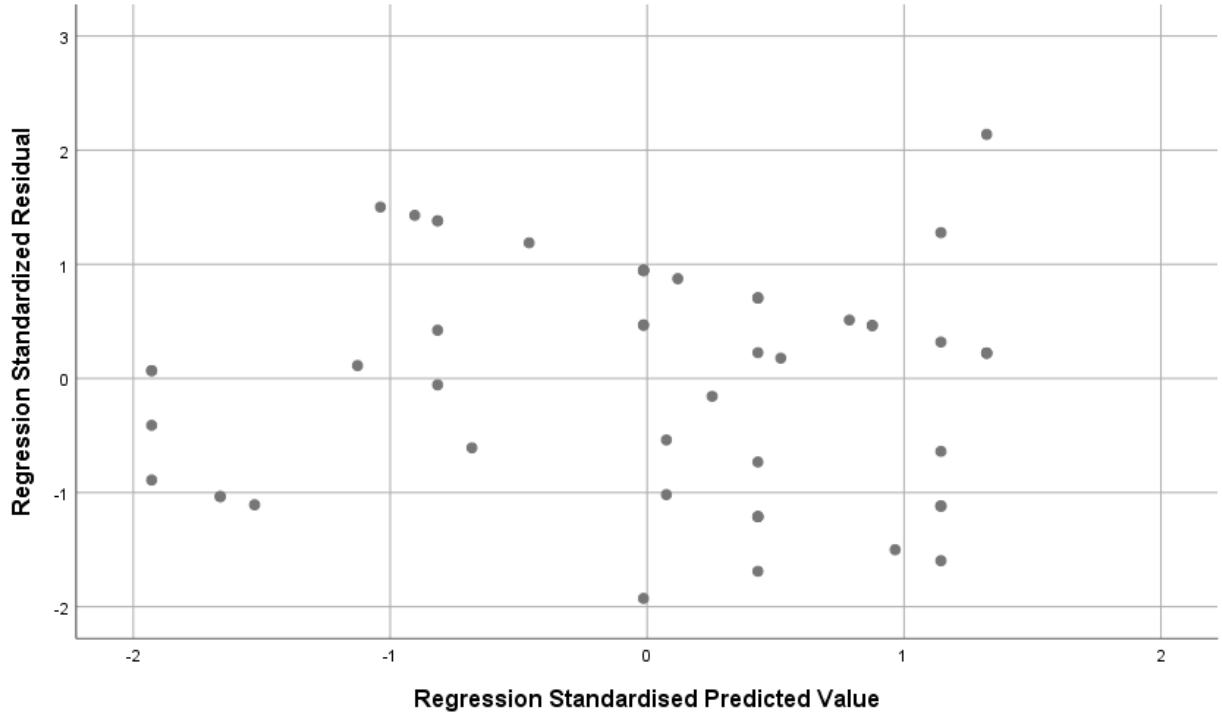

Figure 47: Scatterplot of the regression standardised residuals and the regression standardised predicted values for team innovation

According to Assumption 7, residuals (errors) of the regression line should be approximately normally distributed. As mentioned in Section 5.5.1, non-normality does not have a problematic effect on a linear regression analysis if the sample size is 15 or higher. Since the sample size for this study is 50 teams, the sample size is large enough in order for approximately normally distributed data not to be problematic. For the sake of completeness, however, the data is tested for normality with the same six tests that were used to test for normality of team effectiveness.

Firstly, the histogram of the regression standardised residual of team innovation was visually inspected and can be seen in Figure 48. Although the mean of 5.57E $^{-16}$ is almost zero, and the standard deviation of 0.990 is almost equal to one (and therefore indicating that the data is approximately normally distributed), by visually inspecting the histogram it appeared as if there might be slight positive kurtosis.

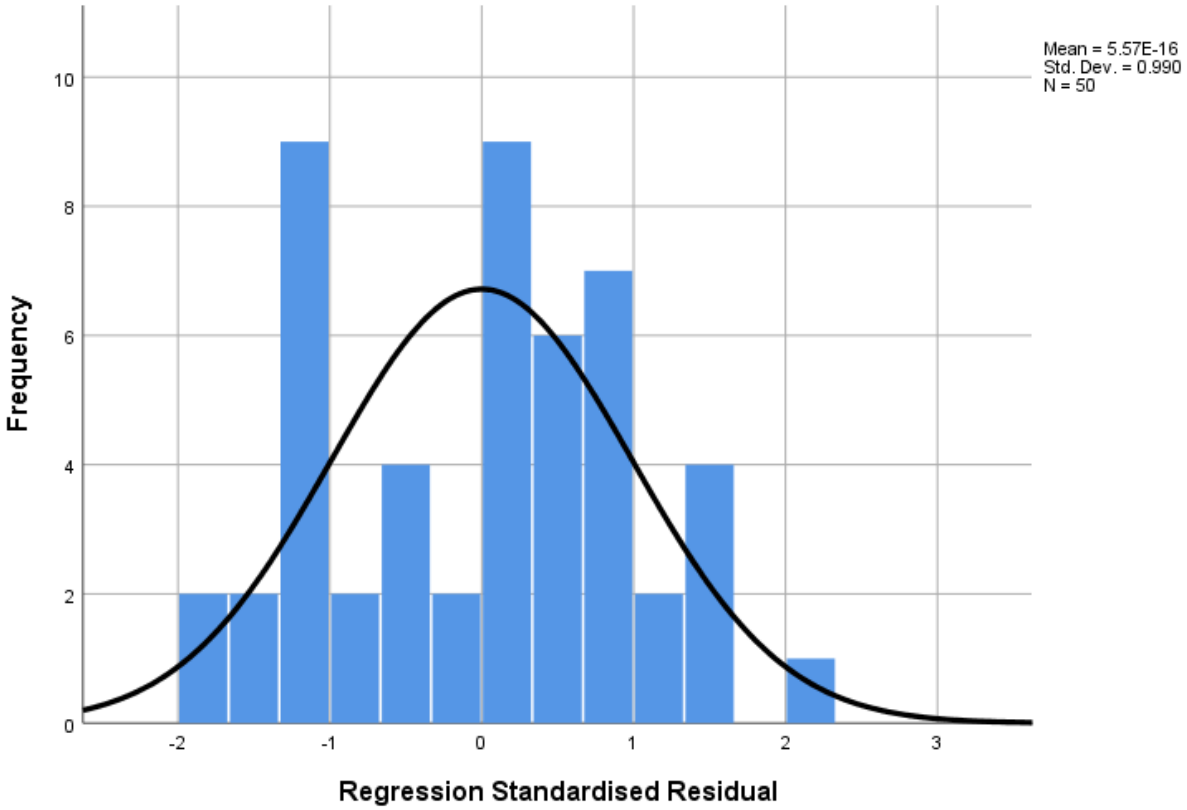

Figure 48: Histogram of the regression standardised residuals of the senior managers' responses for team innovation

Secondly, by inspecting the P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities in Figure 49, it also appeared as if there might be slight positive kurtosis. From visual inspection, it was concluded that the data is, however, still approximately normally distributed.

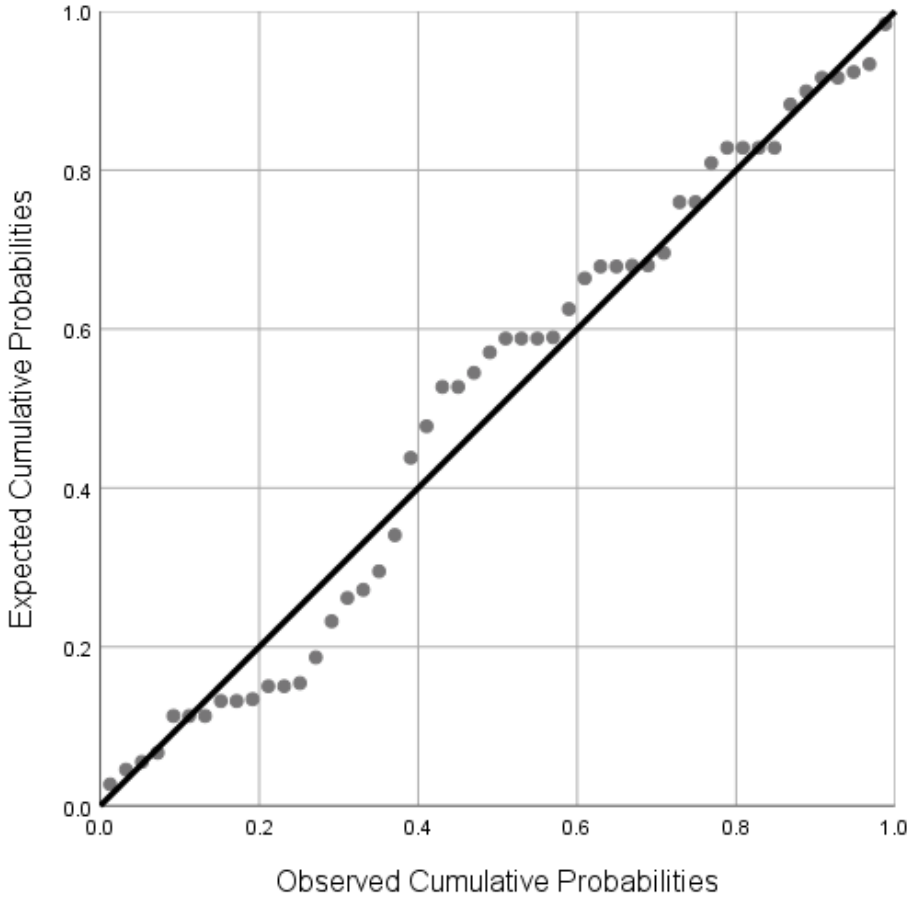

Figure 49: P-P plot of the observed cumulative probabilities versus the expected cumulative probabilities of the senior managers' responses for team innovation

The data had a skewness statistic of -0.079 with a standard deviation of 0.337. The z-score for skewness was calculated as -0.23442 and fell within the range of ±2.58 with a conservative significance level of 0.01. This is an indication that the data is approximately normally distributed. A kurtosis value of -0.603 with a standard deviation of .662 yielded a z-score of -0.91087 which was also within the range of ±2.58. Therefore, by assessing the skewness and kurtosis scores, it was concluded that the data is approximately normally distributed.

SPSS does not report the exact estimates of the p-values if they are significantly small, but merely reports that they are smaller than 0.0005. The Kolmogorov-Smirnov test with Lilliefors significance correction yielded a p-value smaller than 0.0005 ($p < 0.0005$) and the Shapiro-Wilk test yielded a p-value of 0.001. Both of these values are less than 0.05 ($p < 0.05$). Thus, it could not be concluded that the data is normally distributed from these tests.

As a final result, four out of the six tests for normality indicated an approximately normally distribution, which is acceptable. As mentioned earlier, non-normality is not problematic for a sample size of 50 because the sample size is large enough in order for approximately normally distributed data not to be problematic.

None of the assumptions for a linear regression analysis had been violated and therefore, it was acceptable to perform a linear regression analysis on the data for team innovation.

APPENDIX E: CODE USED IN ANALYSIS OF MULTILEVEL MODEL

E.1. Original Code as provided by Preacher et al. (2010)

Model E. 2-1-1 (MSEM)

```
TITLE: 2-1-1 mediation (MSEM)
DATA: FILE IS mydata.dat; ! text file containing raw data in long format
VARIABLE: NAMES ARE
group x m y;
USEVARIABLES ARE
group x m y;
BETWEEN IS x; ! identify variables with only Between variance;
                ! variables that are not claimed as "BETWEEN IS" or "WITHIN IS" can have
                ! both Within and Between variance
CLUSTER IS group; ! Level-2 grouping identifier
ANALYSIS: TYPE IS TWOLEVEL RANDOM;
MODEL: ! model specification follows %WITHIN% !
Model for Within effects follows
m y; ! estimate Level-1 (residual) variances for m and y
y ON m; ! regress y on m
%BETWEEN% ! Model for Between effects follows
x m y; ! estimate Level-2 (residual) variances for x, m, and y
m ON x(a); ! regress m on x, call the slope "a"
y ON m(b); ! regress y on m, call the slope "b"
y ON x; ! regress y on x
MODEL CONSTRAINT: ! section for computing indirect effect
NEW(indb); ! name the indirect effect
indb=a*b; ! compute the Between indirect effect
OUTPUT: TECH1 TECH8 CINTERVAL; ! request parameter specifications, starting values,
        ! optimization history, and confidence intervals for all effects
```

E.2. Altered code to enable centring

Model E. 2-1-1 (MSEM)

```
TITLE: 2-1-1 mediation (MSEM)
DATA: FILE IS mydata.dat; ! text file containing raw data in long format
VARIABLE: NAMES ARE
group x m y;
USEVARIABLES ARE
group x m y;
BETWEEN IS x; ! identify variables with only Between variance;
                ! variables that are not claimed as "BETWEEN IS" or "WITHIN IS" can have
                ! both Within and Between variance
CLUSTER IS group; ! Level-2 grouping identifier
DEFINE:             CENTER m1 y (GRANDMEAN); !Centring
ANALYSIS: TYPE IS TWOLEVEL RANDOM;
MODEL: ! model specification follows %WITHIN% !
Model for Within effects follows
m y; ! estimate Level-1 (residual) variances for m and y
y ON m; ! regress y on m
%BETWEEN% ! Model for Between effects follows
x m y; ! estimate Level-2 (residual) variances for x, m, and y
m ON x(a); ! regress m on x, call the slope "a"
y ON m(b); ! regress y on m, call the slope "b"
y ON x; ! regress y on x
MODEL CONSTRAINT: ! section for computing indirect effect
NEW(indb); ! name the indirect effect
indb=a*b; ! compute the Between indirect effect
OUTPUT: TECH1 TECH8 CINTERVAL; ! request parameter specifications, starting values,
        ! optimization history, and confidence intervals for all effects.
```