

**The impact of transactional and transformational
leadership styles on incremental innovation for
artisans and foremen in the SA coal mining sector**

24078892

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

03 November 2025

Abstract

The South African mining industry is currently facing challenging operating environments, impacting its overall performance. Much of its innovation has remained supplier-driven, with limited innovation contributions originating from its internal environment, specifically, the operational frontline. Given leadership's focal role in mining and its potential to stimulate internally driven innovation, this study investigated the impact of transformational and transactional leadership styles on incremental innovation among artisans and foremen. Despite extensive studies linking leadership styles to innovation, there is limited research examining the impact of transformational and transactional leadership on incremental innovation in high-risk, compliance-driven industries such as mining.

The study utilised a positivist quantitative research design, using a structured survey distributed to artisans and foremen in the South African coal-mining sector. Data were analysed using factor analysis and structural equation modelling. The results revealed a significant positive relationship between transformational leadership and incremental innovation. Transactional leadership, however, showed no significant relationship with incremental innovation.

The study concludes that the mining sector's to unlock the innovative potential of the frontline workforce, mining organisations must cultivate functionally ambidextrous leaders, those who can maintain transactional discipline for safety while applying transformational behaviours to inspire and empower their teams. The findings offer practical insights for leadership development, organisational design, and the creation of innovation-driven cultures in high-risk industrial contexts.

Keywords:

Transformational leadership, transactional leadership, incremental innovation, South African coal mining, frontline-driven innovation

Declaration

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

24078892

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List of Acronyms

AVE	Average Variance Extracted
CFA	confirmatory factor analysis
CMV	common method variance
CR	composite reliability
DMPR	Department of Mineral Petroleum and Resources
DMRE	Department of Mineral Resources and Energy
GIBS	Gordon Institute of Business Science
HTMT	Heterotrait-Monotrait Ratio of Correlations
KMO	Kaiser-Meyer-Olkin
MAE	mean absolute error
MBA	Master of Business Administration
MBEA	management by exception-active
MBEP	management by exception-passive
MHSA	Mine Health and Safety Act No. 29 of 1996
PCA	Principal Component Analysis
PLS-SEM	Partial Least Squares Structural Equation Modelling
RMSE	root mean square error
SA	South African
SLPs	Social and Labour Plans
VIF	Variance Inflation Factor

CHAPTER 1: INTRODUCTION

1.1 Background and research problem

The mining industry is currently facing challenging operating environments that directly impact its overall performance. Key pressures include diminishing ore grades and volatile commodity prices, both of which put a strain on the profitability of mining firms (Olvera, 2022). These adverse environmental conditions, as highlighted by Olvera (2022) and Durrant-Whyte et al. (2015), have created an imperative for mining companies to pursue innovation to maintain competitiveness. Unlike firms in other industries, mining firms cannot differentiate their products, as their outputs are commodities with little to no room for variation in features or qualities (Recabarren et al., 2024). Consequently, as argued by Reimann et al. (2009), competition in the mining sector predominantly centres around cost efficiency, product delivery speed to the market, and the reliability of operational processes rather than product uniqueness. To gain a competitive edge, mining firms increasingly focus on process innovation to improve cost efficiency, product delivery speed to the market, and strengthen operational process reliability (Kamalaldin et al., 2021).

Having established the growing importance of innovation for competitiveness in mining, it is essential to consider how innovation actually unfolds within the sector. In many cases, innovation in the mining industry is characterised primarily as "supplier-led innovation," as mining firms rely on their suppliers to innovate (Kamalaldin et al., 2021; Pietrobelli et al., 2024; Olvera, 2022). While this approach facilitates access to advanced technologies, a supplier-led innovation approach can limit the possibilities for inherent continuous improvement in day-to-day operations. Furthermore, although suppliers are generally familiar with the generic mining environment, they frequently lack detailed insight into the unique challenges and operational characteristics of individual mines. Balci and Kumral (2022) emphasise that innovations should be customised to mine specific characteristics due to the uniqueness of each mine's geology, rock, orientation, and processes, highlighting a significant challenge of supplier-led innovation. In addition, such reliance on external innovation tends to overlook the vital role of internal organisational underlying forces and cultural factors, in that they may affect internal innovativeness (Kashan et al., 2021). These limitations highlight the importance of exploring alternative forms of

innovation that emerge from within the organisation itself, particularly from frontline employees who operate closest to core production processes.

Contrary to supplier-led innovation, innovation led from a frontline employee perspective is particularly beneficial because frontline employees possess firsthand experience of process inefficiencies and potential areas for optimisation. Bäckström and Bengtsson (2019) emphasise the significance of recognising the vital role of "ordinary" employees in contributing to innovation in firms. Unlocking the innovative potential of these employees can lead to incremental innovations that result in cost-effectiveness, operational reliability, and efficiency improvements, the key drivers of competitiveness in the mining sector. Leadership is widely recognised as a central determinant of organisational innovation, shaping the level of encouragement, resources, and support allocated to innovative activities within the firm (Alblooshi et al., 2020). It then becomes pertinent to understand the impact of leadership on influencing innovative employee work behaviour to tap into this potential and ensure sustainable improvement in mining operations (Bäckström & Bengtsson, 2019; Engen & Magnusson, 2015). Research consistently highlights the importance of both transformational and transactional leadership in fostering innovation, positioning these styles as key enablers of frontline potential and long-term operational advancement in mining (Alblooshi et al., 2020; Cortes & Herrmann, 2020; Hoch, 2012; Visser & Scheepers, 2021). However, despite growing recognition of the role of leadership in driving innovation, limited empirical research has examined how transformational and transactional leadership styles specifically influence incremental innovation among frontline employees in the mining context. Addressing this gap provides the foundation for the present study.

1.2 Purpose statement

This study explored the impact of transactional and transformational leadership styles on incremental innovation among frontline mining employees, specifically artisans and foremen. Understanding this relationship and its consequences is vital for enabling mining companies and managers to recognise how these two leadership styles can contribute to a culture of continuous improvement, enhance operational efficiency, and improve safety. This study aimed to pinpoint triggers for leadership styles that managers can adopt to promote incremental innovation, leading to better business performance. By focusing on frontline personnel, who are closest to

operational realities and complexities, this study aimed to identify appropriate leadership further approaches that can harness incremental innovative potential and drive long-term success in the mining sector.

Although there are several leadership styles in existence, they were not considered for this study. Instead, this study focused exclusively on the prevalence, relationship, and consequences of transformational and transactional leadership styles within the mining sector. Specifically, it addressed a gap in the literature by investigating the impact of these two styles on incremental innovation among frontline workers, namely foremen and artisans. Other leadership styles are excluded from the scope of this research.

1.3 The business and theoretical rationale

1.3.1 Business contribution

Mining companies can significantly benefit from understanding how leadership styles influence the incremental innovation of frontline employees. By identifying leadership styles that effectively inspire and empower artisans and foremen to develop creative solutions to issues affecting efficiency, safety, and processes, mining companies can access a valuable source of internal innovation. When innovation originates from the frontline, driven by those closest to operational realities, it can yield more context-specific and easily implementable solutions (Balci & Kumral, 2022; Engen & Magnusson, 2015). Furthermore, these internally generated innovations can improve safety procedures, operational effectiveness, and ultimately the resilience and profitability of mining companies (Olvera, 2022; Reimann et al., 2009).

The value proposition of this study is to explore the relationships between different leadership styles and incremental innovation, providing insights that mining firms can utilise to foster a culture of continuous improvement through leadership-focused strategies. Managers in mining companies can capitalise on this unrealised potential by adopting more effective leadership styles after understanding the impact that each leadership style, whether transactional or transformational, has on frontline employees' incremental innovation. Increased operational efficiency, lower operating costs, improved process reliability, and faster delivery times are just a few of the observable advantages that may result (Acemoglu et al., 2022). These are all essential for maintaining competitiveness in the South African coal mining industry

as well as the broader mining sector (Bäckström & Bengtsson, 2019; Reimann et al., 2009). Ultimately, this research equips mining companies with the knowledge necessary for transitioning from externally driven improvements to a more internally driven, context-specific, and sustainable innovation ecosystem.

1.3.2 Theoretical contribution

The relationship between leadership styles and their impact on innovation has been extensively studied in organisational research. Literature on the impact of transformational and transactional leadership styles on incremental innovation has, in some instances, highlighted contradictions. Several scholars, including Berraies and Abidine (2019), Berraies and Bchini (2018), Zuraik and Kelly (2018), Le and Le (2023), and Kraft and Bausch (2016), argue that transformational leadership has a positive impact on incremental innovation, suggesting that leaders who inspire, motivate, and intellectually stimulate employees can foster incremental innovation in organisational processes. However, contrasting perspectives argue that transformational leadership has no influence on incremental innovation, only affecting radical innovation (Baškarada & Watson, 2017; Jansen et al., 2016).

Similarly, the role of transactional leadership in fostering incremental innovation presents varying perspectives. While Berraies and Abidine (2019) and Berraies and Bchini (2018) argue that transactional leadership has a positive impact on incremental innovation through clear structures and performance-based rewards, other researchers, including Duan et al. (2022), argue that the short-term extrinsic rewards linked to transactional leadership are so benefit-oriented that they diminish employees' willingness to implement incremental innovation. These divergent findings in the literature may indicate that the relationship between transformational and transactional leadership and incremental innovation can vary across different contexts and settings. This idea is further reinforced by Oswald et al. (2022), who found that the most effective ways to demonstrate these leadership behaviours also depend on the context and industry, strengthening the argument for a significant contextual element in studying their impacts, with Afsar and Umrani (2020) calling for future research to occur in different contexts to deepen understanding of these relationships.

Despite the extensive literature, labour-intensive, hierarchical industries such as mining, especially in developing nations like South Africa, have been mainly

overlooked in leadership and innovation literature. Known for safety-critical tasks and operational rigidity, the mining industry presents a unique context where continuous, incremental innovations are vital for both efficiency and safety (Gruenhagen & Parker, 2019). To address this gap, this study investigated the impact of leadership styles on the incremental innovation among foremen and artisans in the South African coal mining industry. By focusing on this understudied area, this study provided context-specific insights into the effectiveness of leadership styles and offers valuable guidance for promoting innovation in constrained environments. Additionally, the results aimed to enhance theoretical understanding of the transactional-transformational leadership paradigm by examining the impact that these leadership styles have on incremental innovation in high-risk, operationally rigid settings.

Prior research has provided significant insights into the impact of transformational and transactional leadership on innovation; however, much of this work has been conducted within corporate or high-technology contexts, leaving labour-intensive sectors such as mining largely understudied. Additionally, the conflicting results from current studies suggest that the correlation between leadership styles and incremental innovation may depend on context. This emphasises the necessity of empirical research in specific operational contexts, such as the South African coal mining industry, where leadership practices converge with hierarchical frameworks, safety-critical procedures, and frontline decision-making. In light of this context, the subsequent section outlines the particular research gap that this study aimed to address.

1.3.3 Research gap

Despite the need for innovation in the mining industry due to adverse operating conditions, decreasing ore grades, and fluctuating commodity prices (Durrant-Whyte et al., 2015; Olvera, 2022; Recabarren et al., 2024; Reimann et al., 2009), research on innovation within the industry reflects a reliance on "supplier-led innovation" by mining companies (Olvera, 2022; Pietrobelli et al., 2024). This approach may limit continuous improvement, as suppliers may not possess the specific, granular knowledge of mine-site characteristics and operational intricacies, consequently overlooking internal elements vital to building innovativeness (Balci & Kumral, 2022; Kashan et al., 2021). Granting the literature has explored the link between leadership

styles, transformational and transactional leadership, and innovation (Alblooshi et al., 2020; Cortes & Herrmann, 2020; Hoch, 2012; Visser & Scheepers, 2021), the mixed evidence concerning the direct impact on incremental innovation remains (Duan et al., 2022; Gui et al., 2021; Nguyen et al., 2021). Furthermore, this body of research primarily does not address the significant role of frontline workers, such as artisans and foremen, who possess valuable firsthand experience in recognising process inefficiencies and optimisation opportunities during their day-to-day work (Bäckström & Bengtsson, 2019).

A gap remains in investigating the impact of different leadership styles, specifically transactional and transformational leadership, on incremental innovation among frontline workers, such as artisans and foremen. This space is particularly nuanced in the unique setting of the South African coal mining sector that is characterised by unionism, regulation, safety-critical work, and highly skilled, trade-based labour, differing from the corporate or high-technology settings commonly studied in innovation and leadership literature (Alblooshi et al., 2020; Cortes & Herrmann, 2020; Kashan et al., 2021). A study of this relationship in this specific, understudied context is important because artisans and foremen are at the forefront of operations and vital for leading the continuous, incremental cost reduction, process improvements, and delivery advancements credited with contributing to competitiveness in the mining sector (Bäckström & Bengtsson, 2019; Reimann et al., 2009). Therefore, a research gap exists in examining how leadership styles impact incremental innovation among key frontline employees in the highly regulated, high-risk, and compliance-driven South African coal mining industry.

1.4 Context of the study

This study considered key constructs related to the topic under investigation, which are briefly discussed below.

1.4.1 Incremental innovation

Innovation can be divided into two distinct approaches: radical and incremental innovation. Radical innovation encompasses significant enhancements of products or services, and incremental innovation involves minor changes in products, services, and processes that provide relatively low and cumulative benefits. Incremental innovation involves refining and reinforcing existing products,

processes, technologies, and organisational structures (Kobarg et al., 2019; Yusof et al., 2022). In contrast to radical innovation, incremental innovation does not require expensive and effort-intensive technology to implement (Al-Khatib & Al-Ghanem, 2021). Incremental innovation reduces uncertainty and provides a more stable and predictable path for innovation because it occurs in the same environments and involves only slight changes. The nature of incremental innovation, which entails minor cumulative improvements, means that firms can develop such innovations more easily than radical innovations.

1.4.2 Transformational leadership

Transformational leadership and its manifestation in organisations have been extensively studied. Transformational leadership is considered a more people-focused leadership style (Abbas & Ali, 2021), where leaders actively engage with followers and transform them to achieve outcomes that exceed expectations (Deichmann & Stam, 2015). The behaviours of transformational leaders aim to create, convey, and maintain a clear vision that stimulates followers' internalisation of the values and goals that the organisation represent. This internalisation results in employees transcending their self-interests and striving towards the organisation's goals. (Donkor et al., 2021; Gui et al., 2021; Jacobsen et al., 2021).

1.4.3 Transactional leadership

Transactional leadership is a task-focused leadership style through which leaders use contingent rewards and sanctions to create alignment between followers' self-interest and the organisation's goals (Abbas & Ali, 2021; Jacobsen et al., 2021). Transactional leadership is founded, in principle, on transactions of both financial and non-financial nature that involve rewarding employees for high effort or superior performance and imposing sanctions when effort or performance is low. Through the exchange of anticipated rewards and sanctions against specific outcomes, leaders direct and sustain followers' behaviour in order to meet organisational goals (Cai et al., 2023; Donkor et al., 2021; Deichmann & Stam, 2015; Jensen et al., 2016; Young et al., 2020).

1.5 Outline of this study

To provide a comprehensive examination of the identified research problem, this research report is organised into seven chapters. By outlining the necessity of this investigation and precisely defining the issue, Chapter One establishes the foundation. Chapter Two provides a comprehensive analysis of the body of knowledge by reviewing the literature on the theory supporting the study. The specific goals of the study are then outlined in Chapter Three, along with the main research questions that directed the inquiry. Chapter Four provides a detailed description of the methodology used in this study, including the techniques selected for data collection and analysis. The results of the data analysis are presented in Chapter Five, which offers a concise analysis of the outcomes. Subsequently, Chapter Six offers a detailed discussion and interpretation of the results obtained. Finally, Chapter Seven concludes the research project by concluding the key results and recommendations based on insights gained from the study.

1.6 Chapter conclusion

Chapter one outlined the South African Coal mining industry context, detailing the demanding mining business environment that is characterised by diminishing ore grades, fluctuating commodity prices and limited product differentiation opportunities. With these challenges, incremental innovation was revealed as a critical pathway for mining companies to gain a competitive advantage. The reliance on supplier-led innovation, although common, presents inherent limitations due to a lack of understanding of the intricacies specific to a particular mine. Recognising the untapped potential of frontline employees, artisans, and foremen who possess invaluable operational insights, Chapter One outlined the aim of this study, which is to understand the impact of leadership styles on incremental innovation. Given the identified gaps in existing literature, particularly in the context of the South African coal mining industry with its specific regulatory, labour, and operational characteristics, a focused investigation into the impact of transactional and transformational leadership on the incremental innovation of these frontline employees is not only academically relevant but a pressing necessity for the future sustainability and competitiveness of the coal mining industry.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter aims to deepen the conceptual understanding of the relationship between leadership styles and incremental innovation. The literature review begins by exploring the key constructs of this research, namely, incremental innovation, transformational and transactional leadership. This Chapter then proceeds by contextualising incremental innovation, exploring its theoretical roots, characteristics and significance for organisational competitiveness, with specific attention to labour-intensive, safety-critical and process-driven sectors such as mining. The chapter further discusses literature on transformational and transactional leadership theories, outlining their development, conceptual distinctions, and their respective mechanisms of influence on employee behaviour and organisational outcomes.

Subsequently, the literature review outlines the relationship between the two leadership styles and incremental innovation, identifying areas of alignment, contradiction, and emerging perspectives. The emphasis is placed on studies that explore how leadership impacts innovation in complex, high-risk operating environments. The chapter also positions these discussions within the South African coal mining context, highlighting sector-specific dynamics such as regulations, safety-critical work, and hierarchical structures that influence leadership and innovation. Finally, the chapter reviews the literature on the role of frontline mining employees, artisans and foremen, in driving incremental innovation and the dominant leadership patterns within the South African mining landscape.

2.2 Key constructs

This section presents the key constructs that form the foundation of this study, namely incremental innovation, and the leadership styles of transformational and transactional leadership. This section establishes the theoretical basis to understand how leadership styles impact incremental innovation.

2.2.1 Incremental innovation

Incremental innovation refers to the gradual improvement of an organisation's products, processes, or services through continuous, small-scale changes (Al-Khatib

& Al-Ghanem, 2021; Gui et al., 2021; Hansen et al., 2019). Incremental innovation is often used interchangeably with the term exploitative innovation and represents a process through which firms constantly renew themselves by exploiting their existing competencies and capabilities. Rather than relying on entirely new technologies or radical shifts, incremental innovation builds upon established knowledge and skills to optimise existing products, services, and operations (Cho et al., 2020). Incremental innovation is crucial for developing innovations that enhance productivity and sustaining competitive performance over time (Acemoglu et al., 2022).

In contrast to radical innovation, which introduces disruptive advancements, incremental innovation follows a low-risk path and enables organisations to maintain operational efficiency, stability and long-term competitiveness (Visser & Scheepers, 2021). Duong et al. (2021) present a compelling case for the merits of incremental innovation, particularly as it applies to construction companies. They emphasise that by building on operational capability, companies can gain modest financial performance returns for even incremental improvements, most importantly, without exposing organisations to additional risks. This underscores the strategic value of incremental innovation, which provides organisations with a significant advantage of a reliable approach to achieving tangible performance improvements at a lower risk exposure.

Incremental innovation is essential in industries such as mining, where product innovation and differentiation are limited, and competitiveness depends on process optimisation, cost reduction, and regulatory compliance (Kashan et al., 2021). The mining industry's innovation model differs from sectors like IT or pharmaceuticals, where new product development is the primary driver of competitiveness (Olvera, 2022). In contrast, mining companies lack control over commodity prices, making cost-saving and operational efficiency their primary sources of advantage. Research indicates that incremental innovation constitutes the dominant form of innovation in the mining industry (Sánchez & Hartlieb, 2020). This focus on continuous, small-scale improvements is not arbitrary; it is driven by the characteristics of the industry, with production reliability and safety compliance outweighing risk-taking for breakthrough technologies. Furthermore, there is increasing pressure from operational costs that pushes firms to seek marginal gains in efficiency across the mining value chain. Finally, the increasingly stringent environmental regulations

demand continuous, iterative improvements in areas like water management, energy consumption and waste handling (Olvera & Iizuka, 2023).

While the rationale for incremental innovation is clearly established, the mechanism for its realisation, specifically its source, is complex. The mining industry has historically relied heavily on large-scale technological advancements, often coming from external suppliers such as equipment manufacturers and technology providers. Internal innovation within mining firms, although small in scope, is shifting towards incremental and operationally focused improvements rather than large-scale research and development efforts (Joughin, 2023; Pietrobelli et al., 2023). This shift represents a practical departure from the typical large-scale research and development projects common in other fields. Instead, internal resources are utilised to enhance current processes, machine utilisation, and workplace safety through incremental, ongoing improvements. This is a practical way to be innovative in a rigid, asset-heavy environment.

Having established the significance of incremental innovation as a driver of competitiveness, it is equally important to consider the theoretical perspectives that explain the human and behavioural mechanisms enabling such innovation. Leadership theories provide an essential understanding of the motivations driving individuals and teams to seek ongoing improvements within established systems. Among these, transformational and transactional leadership styles have emerged as two of the most significant frameworks for understanding the link between leadership and innovative outcomes. The following section explores these two leadership styles in greater depth.

2.2.2 Transactional leadership

The foundation of leadership can be traced to early behavioural studies that viewed leadership as a system of reinforcement, where behaviour is shaped by its consequences, reward or punishment. Initial studies observed that followers and their leaders form reciprocal relationships based on what is being exchanged, negotiate costs and benefits of the exchange, and decide whether their interests are met. Based on this relationship, the leader is required to promote acceptable follower behaviours while correcting undesirable ones. These initial studies laid the foundation for transactional leadership theory (Young et al., 2020).

Transactional leadership centres around tasks, where leaders employ conditional rewards or penalties to ensure that the self-interests and actions of followers align with the objectives of the organisation (Abbas & Ali, 2021; Jacobsen et al., 2021). Transactional leadership embodies an exchange-based relationship, where leaders provide contingent rewards such as bonuses, recognition, or career advancement in return for compliance and satisfactory performance, and apply corrective measures when expectations are not met (Hansen & Pihl-Thingvad, 2018).

It can be argued, based on the research conducted by Jacobsen and Andersen (2017) and Nielsen et al. (2018), that the methods employed in transactional leadership to influence and motivate followers present both advantages and disadvantages. An advantage it offers is its ability to create a precise and fair incentive mechanism, where employees can see how their efforts lead to rewards. Both material and verbal rewards can function as positive feedback, potentially satisfying the need for competence and boosting intrinsic motivation (Jacobsen & Andersen, 2017). A significant disadvantage lies in the nature of the reward; some rewards can be perceived as controlling and detrimental to intrinsic motivation. When individuals perceive that their actions are being externally regulated through rewards, their sense of personal choice diminishes, leading to a reduction in their internal drive to engage in tasks for their own satisfaction. Similarly, the use of penalties tends to be viewed as controlling and detrimental to feelings of autonomy and competence, further eroding motivation. When external controls like rewards and penalties dominate, individuals often experience a decline in their perceived autonomy, the sense that they are acting out of their own free will and competence, and the belief in their ability to succeed.

These psychological needs are fundamental for fostering sustained and high-quality performance over time. When people focus primarily on external motivators, their motivation changes from wanting to do well for its own sake to meeting outside obligations or avoiding punishments. This change causes people to follow the rules superficially, rather than genuinely committing to the work or generating new ideas. Ultimately, relying too heavily on controlling rewards and punishments can lead people to merely meet requirements, rather than being enthusiastic and creative, both of which are essential for long-term success and growth. (Nielsen et al., 2018; Young et al., 2020). Therefore, while transactional leadership can link performance

to outcomes through rewards, its impact on follower motivation and autonomy can be detrimental.

2.2.3 Transformational leadership

Transformational leadership is considered a more people-focused leadership style (Abbas & Ali, 2021), where leaders actively engage with followers and transform them to achieve outcomes that exceed their initial expectations (Deichmann & Stam, 2015). Transformational leaders aim to challenge the status quo and provide an inspirational vision of a future that also motivates followers to pursue (O'Reilly & Chatman, 2020). Nguyen et al. (2021) suggest that transformational leadership has a positive relationship with psychological empowerment, which ultimately leads to engagement in the creative process and intrinsic motivation.

Transformational leadership comprises four key factors:

Idealised influence

Idealised influence relates to charisma and describes the way transformational leaders make followers want to identify with them and see the leader as a role model (Eaton et al., 2024). A transformational leader becomes a role model due to how the leader shows how determined they are to reach the goals of the organisation, which sets a good example for their followers. With this characteristic, the leader motivates their followers to challenge existing processes, procedures and practices of the organisation by empowering them to share risks and also share possible solutions to problems they encounter. These leaders instil confidence and maturity in their followers, which assists them in developing their ability to apply creative thinking and come up with new ideas for solving operational challenges (Afshari, 2022; Gui et al., 2021; I. U. Khan et al., 2022).

By using idealised influence, the leader understands how their followers think and act, and makes them develop pride to be associated with the leader. These leaders who possess these characteristics make their followers believe that they are competent and confident, which in turn improves their self-efficacy and helps them solve problems. A key trait of leaders who use this characteristic is that they continuously share with followers their beliefs and encourage them to trust one another (Afshari, 2022; I. U. Khan et al., 2022).

Inspirational motivation

Inspirational motivation refers to how the transformational leader communicates and stimulates the organisation's vision, goals, and high standards that have been set for the followers. The leader expresses the confidence they have in their followers to achieve those goals and high standards, and in turn, the followers will show commitment to achieve the goals and high standards that have been communicated by the transformational leader (I. U. Khan et al., 2022).

With inspirational motivation, the leader uses behaviours that challenge and motivate their followers and provide an idea that their work is meaningful and makes a difference in the organisation. The transformational leader with inspirational motivation always looks into the future and communicates a compelling vision of the organisation. I. U. Khan et al. (2022) posit that this characteristic is particularly effective in challenging circumstances, and can be used to lift team spirit, stimulate enthusiasm and encourage behaviour that is creative in order to solve organisational problems.

Intellectual stimulation

Intellectual stimulation involves the transformational leader challenging assumptions that their followers hold without criticism, assisting the followers in re-framing their perspective on challenges and stimulating ideas to help solve those problems (Bakker et al., 2022). Etomes et al. (2024) and J. Kim et al. (2023) further expand this characteristic by highlighting that intellectual stimulation involves leaders who actively challenge the status quo and encourage employees to think independently and solve problems creatively. Rather than providing direct answers, these leaders provoke thought by questioning assumptions and encouraging followers to look beyond conventional wisdom or established rules.

This approach fosters a culture where new ideas and new perspectives are welcomed, risks are tolerated, and organisational learning becomes second nature. Leaders who practice intellectual stimulation are highly adaptable and receptive to novel suggestions, consequently enhancing the organisation's capacity for creativity and innovation. According to Etomes et al. (2024), the deliberate challenge to

conventional thinking has been shown to have the greatest impact on sustainable productivity by developing self-reliant followers who continually develop their skills and are proactive in generating and implementing new solutions.

Individual consideration

Individualised consideration is the transformational leadership behaviour that treats each follower as a unique person with distinct needs, wishes, and strengths. This behaviour completely goes against the “one-size-fits-all” management styles (Bakker et al., 2022). Leaders who adopt this behaviour assume the role of mentors and coaches, dedicating their personal time and attention to each follower to develop them and aligning their resources to support followers with their individual aspirations and abilities (J. Kim et al., 2023).

In times of crisis, this behaviour is particularly effective because it addresses followers’ immediate needs by building their psychological capital, enhancing their confidence, resilience and efficacy (Njaramba, 2024). Ultimately, using this behaviour, leaders give personal attention and acknowledge followers, causing them to feel protected, valued and essential to the organisation. A strong connection is then created between the follower and the organisation, and maximises the follower’s motivation to perform and innovate.

Transformational leadership criticism

Transformational leadership theory is not without critique; some research has raised concerns about the theory and continues to question its validity. Notably, Siangchokyoo et al. (2019) argue that transformational leadership lacks a robust and clear operationalised conceptual foundation, particularly in terms of how the causal relationship between the leader and the follower transformation functions. Furthermore, they argue that this fundamental weakness in explaining and measuring the core mechanism of follower change leads to significant theoretical flaws.

Another major criticism is that charismatic leaders might use their power for their own gain or to push agendas that people may not want, potentially leading to moral and ethical failures. Critics also argue that putting too much emphasis on idealised

influence and inspirational motivation can lead to followers being abused and manipulated. Furthermore, the theory has been criticised for ignoring the social and cultural factors and potentially overlooking the value of followers inherent beliefs and autonomy (Alzoraiki et al., 2024; Ladkin & Patrick, 2022; Siswanto & Yuliana, 2022).

2.2.4 Transformational, transactional leadership and incremental innovation

There is extensive published literature that explores the relationship between leadership styles and innovation (Alblooshi et al., 2020; Cortes & Herrmann, 2020; Hoch, 2012; Visser & Scheepers, 2021). This includes examining the impact of transformational leadership on radical innovation and transactional leadership on incremental innovation (Cortes & Herrmann, 2020; Hoch, 2012; Visser & Scheepers, 2021). However, these conventional associations are challenged, some studies suggest that transformational leadership has an impact on incremental (exploitative) innovation (Berraies & Abidine, 2019; Berraies & Bchini, 2018), while other literature argues that it is only associated with radical innovation (Alblooshi et al., 2020; Scheepers & Storm, 2019). Similarly, although transactional leadership is generally associated with incremental innovation (Alblooshi et al., 2020; Berraies & Abidine, 2019; Berraies & Bchini, 2018), other studies indicate that this may not be the case (Duan et al., 2022).

Le and Lei (2019) propose that transformational leadership influences innovation, with knowledge sharing acting as a mediator of this relationship. The use of transformational leadership motivates employees, leading them to share more knowledge, skills, and expertise. Sharing knowledge enhances employees' knowledge base, enabling them to possess the necessary skills and expertise to respond rapidly and effectively to existing problems and contribute to enhancing their innovative capacity. Furthermore, Feranita et al. (2020) argue that transformational leadership can foster creativity and provide intellectual stimulation, thereby encouraging employees to challenge norms and think creatively. Building on this concept, Le (2020) suggests that leaders who adopt a transformational leadership approach can foster a healthy climate for both radical and incremental innovation. They do this by focusing mainly on conveying a clear vision and sense of mission (idealised influence); on fostering employees' intelligence and creativity for problem-solving (intellectual stimulation); inspiring employees to higher values by portraying

a desirable vision for the future (inspirational motivation); and focusing more on employees' needs, thoughts, and feelings in order to get timely support and guidance (individualised consideration).

Literature has suggested that there is a relationship between leadership styles and innovation. This study probed further, through data gathering and analysis, into this relationship and the impact the leadership styles may have on incremental innovation in the South African coal mining sector.

2.3 South African Coal Mining

The South African coal mining sector is the backbone of the country's economy, with 90% of energy generated from coal, and the industry contributing 2.3% to the national GDP (Hanto et al., 2021). The industry contributes approximately 100,000 jobs (Kengni, 2023; Stats SA, 2021). Coal, like other mining sectors, is experiencing a decline in grade quality, and more efficient methods of recovery are required to extract coal with maximum efficiency. Furthermore, the mining industry faces other external challenges, including managing increasing geopolitical unrest, complex global supply chains, and the pressing need for decarbonisation (Hanto et al., 2021). Rademeyer (2021) highlights that the future of coal mining may also become affected by a reduction in export demands due to environmental pressures, resulting in mines becoming less profitable, inevitably leading to the closure of mines with high operating costs. For mines to remain competitive in this eventuality, they need to become more cost-effective and efficient.

Optimisation of mining operations requires a careful balancing act between integrating sustainable practices, adopting rapidly changing technologies, and effective talent management. These forces lead to the creation of complex and unpredictable operating environments. Breaking through these tough barriers and seizing new opportunities requires a shift from traditional methods, emphasising the vital role that leadership plays in actively promoting an innovative culture within their organisations. Consequently, innovation will be imperative for mining firms to survive and thrive within these adverse business environments (Sanders & Swart, 2025).

2.4 Impact of leadership styles on artisans and foremen

Artisans and foremen are key components of frontline employees; these groups of individuals are found in various industries, including mining, construction, and the automotive industry. Artisans (tradesmen) work in areas including assembly lines, maintenance of mining and construction machinery. Artisans are typically viewed as service providers to production departments, offering maintenance and repair services for production machinery. Foremen, also referred to as supervisors, are a group of people who are the first line of management, and their duties are primarily the supervision of artisans. Smit et al. (2021) investigated the impact of transformational leadership on artisans in the automotive industry, revealing a negative relationship between transformational leadership and work engagement. This suggests that the effects of leadership styles on frontline employees may not be universally positive and can depend on specific industry and workforce characteristics.

The contextual dependency is further supported by research conducted in the Australian construction industry by Oswald et al. (2022), indicating that certain transactional leadership practices are effective in this field. This supports the assertion that the effects of a leadership style depend on the specific situation and the type of frontline staff being managed, rather than being absolute. The discussion has demonstrated that it may become essential to explore the impact of leadership styles within the coal mining context and on frontline workers such as artisans and foremen.

2.5 Leadership styles in the South African mining sector

Across the South African mining sector, literature highlights a dominance of two leadership styles, transformational leadership and transactional leadership. Most of the literature highlights the “command-and-control” leadership type, transactional, as the more prevalent leadership style used in mining. The majority of the studies conducted in South African mining describe supervisory behaviours, without explicitly labelling them as “transactional” or “transformational”; yet, the characteristics map cleanly onto the leadership models. References to characteristics such as “contingent rewards” and “management by exception” indicate transactional leadership, while an emphasis on “inspirational motivation” and “intellectual

stimulations" suggests transformational leadership (Kumar et al., 2024; McLaggan et al., 2013; Mokganya et al., 2024; Prinsloo & Hofmeyr, 2022; Uys & Webber-Youngman, 2019). Further analysis of the literature revealed that South African mining highlights the promotion of engagement-oriented transformational leadership, yet transactional controls remain pervasive in routine, compliance- and safety-critical work (McLaggan et al., 2013; Prinsloo et al., 2022).

This mixed pattern is also echoed in recent studies on technology adoption in the mining sector, which argues that leaders should encourage "risk-taking and creativity" (transformational) while simultaneously ensuring "efficient technology integration" (transactional), implying that both styles are active in the sector (Mokganya et al., 2024). Taken together, sector evidence suggests that transactional and transformational leadership have meaningful links to outcomes that matter for operations, including engagement, commitment, and safety. Specifically, transformational behaviours have been shown to relate positively to employee engagement, which is further supported by findings that "organisational respect" and "employee care" significantly increase work engagement and organisational commitment, establishing the relevance for performance (Bezuidenhout & Schultz, 2013; Kotzé & Nel, 2020; Kumar et al., 2024).

Concurrently, accountability-driven routines maintain the transactional backbone of safe and reliable production (Prinsloo et al., 2022), reflecting a programmatic view in which transformational leadership enables exploration and learning, while transactional leadership consolidates adoption and execution (Mokganya et al., 2024). This prevalence and demonstrated complementarity, further highlighted by a broader mining review that positions these two styles as the most frequently discussed across the industry literature (Kumar et al., 2024), provide a clear rationale for the present study's focus on the balance between transactional and transformational leadership at the frontline, and how that balance enables, or constrains, incremental innovation in South African mining.

2.6 Incremental innovation in the mining context

2.6.1 Enhancing operational efficiency in mining

Mining is a highly structured and conservative industry, stemming from substantial technical, environmental risks, financial risks, safety risks, as well as vulnerability to

economic and political instability and high internal change barriers. The mining industry's growing financial pressures and globalisation, as well as the increased focus on sustainable practices, create an environment in which incremental innovation, which is easier to implement and less disruptive, can provide substantial benefits. Mining companies can mitigate these risks and structural limitations while adapting to changing market demands and sustainability requirements by implementing smaller, targeted innovations (Balci & Kumral, 2022; Olvera, 2022).

Incremental innovation offers a compelling pathway for the mining sector to evolve without incurring the significant disadvantages associated with radical innovation (Yusof et al., 2022). This is primarily because incremental innovation does not require the adoption of expensive technology, thereby avoiding the risk of high financial costs. Furthermore, the inherent high risks, whether related to safety or production interruptions, associated with radical innovation are significantly mitigated through incremental innovation (Al-Khatib & Al-Ghanem, 2021; Lay et al., 2022). In a risk-averse industry like mining, leadership becomes an essential catalyst for building on the benefits of incremental innovation by deliberately leading to enable and facilitate employee-led innovation (Escrig-Tena et al., 2020).

2.6.2 The role of leadership in employee innovation

According to Le and Lei (2019), transformational leadership encourages staff members to impart their expertise, which in turn improves their capacity for innovation. This implies that transformational leaders can unleash a larger reservoir of collective intelligence, which can be directed toward creating novel concepts and solutions. Additionally, Feranita et al. (2020) emphasise how transformational leadership can directly promote creativity. These leaders foster an atmosphere where "outside the box" ideas can thrive by stimulating employees' minds and pushing them to question the status quo.

Managers should give top priority to essential transformational leadership practices in order to successfully foster employee-driven innovation, especially for both gradual and drastic breakthroughs. These include providing employees with individualised support and guidance, encouraging their intellectual curiosity and problem-solving skills, and inspiring them with a compelling vision of the future and a sense of mission. By focusing on these elements, businesses can create a

welcoming and engaging environment that encourages staff members to share their unique perspectives and foster internal innovation.

2.7 Legislation in the mining environment

The South African mining sector is regulated by the Department of Mineral and Petroleum Resources. The governing act, the Mine Health and Safety Act No. 29 of 1996 (MHSA), has specific regulations that are designed to protect mine workers from occupational hazards by promoting health and safety standards. The MHSA regulates almost every aspect of mining, from the leadership structures to be employed to specific responsibilities for roles within the mining environment, and requires strong leadership to ensure its effectiveness (Mine Health and Safety Act, 1996 [Act No. 29 of 1996] and Regulations, 2018).

The regulatory bodies in the mining industry enforce strict compliance with MHSA in mines, which has been highlighted as an impediment to innovation in mining operations. The Mine Health and Safety Act fundamentally obliges employers and employees to assess and respond to risks in their working environments. This requires comprehensive risk assessments and procedures for any new processes or modifications, regardless of their scale (Gruenhagen & Parker, 2019). Furthermore, the inherently high-risk nature of mining, coupled with the legal consequences of non-compliance, can lead to a pervasive culture of risk aversion within management. This may result in a preference for maintaining existing, well-understood procedures over experimenting with new ideas from frontline workers (Lumadi & Nyasha, 2024). Consequently, this regulatory landscape can become a bureaucratic obstruction, disincentivising frontline employees, namely artisans and foremen, from experimenting with incremental innovations, even when they could be beneficial to mining operations.

Given this context, understanding the impact of transformational and transactional leadership styles on incremental innovation among frontline employees becomes important. This research is vital because it seeks to uncover how different leadership styles can either exacerbate or mitigate the innovation-stifling side effects of stringent regulations. Examining whether transactional leadership, with its emphasis on rules and compliance, further entrenches risk aversion that hinders incremental innovation, or whether transformational leadership, by fostering a shared vision and empowering employees, can create a climate where safety and innovation coexist.

This study provided invaluable insights and potentially yielded results that will inform strategies for mining companies operating in this environment.

2.8 Relevant theories

It is imperative to explore the underlying theories that have dominated past research when determining the relationship between leadership styles and incremental innovation. This study draws on leadership and innovation theories to investigate how transactional and transformational leadership styles impact incremental innovation in the South African Coal mining sector.

Transformational leadership theory, originally developed by Bernard Bass, is based on leaders who inspire followers to exceed expectations by aligning personal, intrinsic goals with the organisational vision. The components of transformational leadership theory are as follows (Ladkin & Patrick, 2022);

- Idealised influence, which implies that the leader should act in ways that make followers desire to identify with them.
- Inspirational motivation is the method a leader creates an appealing vision that followers desire to attain, while simultaneously setting high standards, being positive, and creating goals that followers strive to attain.
- Intellectual stimulation refers to the leader's ability to challenge assumptions, promote dissent, and encourage followers to pursue their curiosity.
- Individual consideration is the leader's capacity to treat each individual follower as distinct and significant, appealing to their individuality.

Transactional leadership theory, also studied by Bernard Bass, outlines a leadership style that is characterised by "management by exception-active" (MBEA), "management by exception-passive" (MBEP), and contingent compensation. management by exception-active is the routine monitoring of follower behaviour to actively detect and remedy deviations from the norm as they occur. In contrast, management by exception-passive refers to addressing such errors after they have occurred. Contingent reward, as the name implies, relates to compensating followers in exchange for meeting certain expectations. Essentially, "the transactional leader closely resembles the traditional definition of a manager (Young et al., 2020).

2.9 Best practice

The use of incremental innovation to improve business is not a new concept; other industries have implemented processes related to incremental innovation to improve business processes and consequently performance. Mui et al. (2021) discuss Kaizen as an "incremental innovative practice" in a study conducted among Malaysian manufacturing companies, highlighting its importance in achieving sustainable operational performance. Mui et al. (2021) further argue that managers have a role to play in fostering this "incremental innovative practice," known as Kaizen. Kaizen was first introduced by the Japanese automotive company, Toyota, with the success of the company attributed to this philosophy. Kaizen has been linked to the sustainable improvement of Toyota, serving as a bridge between short-term operational performance and long-term sustainable growth (Khan & Deb, 2025; Palhau et al., 2024).

Other industries, to name the least, that have also adopted this approach and realised substantial benefits include artisanal company that manufactures "Talavera" products in Puebla, Mexico (Monteiro et al., 2024), health care, and construction (Sahmi & Abbadi, 2024). In summary, the above examples strongly advocate that incremental innovation (Kaizen) is not just a beneficial approach, but a crucial and highly effective strategy for continuous and sustainable improvement in business processes, resulting in significant gains in efficiency, quality and overall competitiveness, often at lower costs. The literature also highlights the importance of effective leadership in fostering and cultivating a Kaizen culture that encourages continuous, small-scale improvements (Mui et al., 2021). While Kaizen has been effective in lean manufacturing, its success depends on leadership that empowers bottom-up idea generation (Mui et al., 2021). This aligns conceptually with transformational leadership, yet in highly hierarchical, safety-critical industries like mining, the structured discipline of transactional leadership may paradoxically support Kaizen practices by institutionalising small changes. Drawing from successful implementations in the manufacturing and construction industry, the principles of incremental innovation and the pivotal role of leadership are equally imperative in the mining sector, given the similar operational complexities and reliance on continuous frontline efforts.

2.10 Chapter conclusion

This chapter has illuminated the critical concepts of incremental innovation, its importance and relevance in the South African Coal mining sector, and the foundational theories of transactional and transformational leadership. While existing literature acknowledges the generational relationship between leadership styles and innovation, significant oversights remain. More specifically, the impact of these leadership styles on frontline employees like artisans and foremen in a unique, highly regulated, and safety-critical environment of the South African Coal mining industry. This gap in the literature highlights the need for this study, which aims to provide context-specific insights into how these leadership styles influence incremental innovation. By addressing this gap, this study aims to contribute valuable theoretical knowledge and practical guidance for fostering a culture of continuous improvement, enhancing the resilience of the South African coal mining sector from the ground up.

CHAPTER 3: RESEARCH QUESTIONS AND HYPOTHESES

3.1 Introduction

This study examined the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal industry. The scope of this study encompassed the South African coal sector, specifically looking at artisans and foremen, because this pairing represents an intersection of fostering meaningful and sustainable incremental innovation within a risk-averse industry. Adopting less disruptive yet advantageous changes is essential for the future of the Coal industry in South Africa, which faces pressures from the energy transition, environmental regulation, declining quality, and potentially declining demand (Olvera & Iizuka, 2023; Rademeyer, 2021). Based on the research problem and literature review, the following research questions are formulated along with the proposed hypothesis:

3.2 Main research question

The main research question, RQ1, represents the overarching question that the study aims to focus on; thus, it is the fundamental question that this study seeks to answer.

RQ1: What is the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal mining sector?

This primary question is further unpacked into three sub-research questions and corresponding hypotheses designed to test the relationships between leadership styles and incremental innovation.

3.3 Sub-research questions and hypotheses

RQ1a: Does transformational leadership positively impact incremental innovation among artisans and foremen?

Transformational leadership is often associated with encouraging creativity, empowering employees, and involving them, all of which are conducive to innovation. In situations that demand flexibility and ongoing improvement, such as mining,

transformational leaders may be crucial in fostering an environment where artisans and foremen are motivated to recognise and implement incremental improvements. Based on this line of thought, the following hypotheses are put forward:

- H_1 : Transformational leadership has a significant positive impact on incremental innovation among artisans and foremen.
- H_0 : Transformational leadership has no significant impact on incremental innovation among artisans and foremen.

RQ1b: Does transactional leadership positively impact incremental innovation among artisans and foremen?

Transactional leadership, characterised by structured rewards, clear performance expectations, and corrective feedback, may also influence incremental innovation by promoting discipline and consistency in operational processes. In the mining sector, where safety and compliance are paramount, this form of leadership could indirectly encourage process-related improvements aligned with organisational objectives. Accordingly, the study tests the following hypotheses:

- H_1 : Transactional leadership has a significant positive impact on incremental innovation among artisans and foremen.
- H_0 : Transactional leadership has no significant impact on incremental innovation among artisans and foremen.

RQ3: Is there a relationship between transactional and transformational leadership styles and incremental innovation?

Transactional and transformational leadership are frequently analysed as separate constructs; however, increasing evidence indicates that their impacts on innovation may either interact or vary in intensity based on contextual and organisational factors. It is crucial to understand the comparative influence of these two leadership styles to determine which behaviours most effectively promote incremental innovation among frontline employees. In hierarchical, safety-critical settings like coal mining, transactional leadership might guarantee adherence and procedural discipline, while transformational leadership could promote creativity, engagement, and a collective vision for enhancement. Investigating the correlation between these leadership

styles and their relative impact on incremental innovation offers an enhanced understanding of whether transformational leadership exerts a more significant influence than transactional leadership in fostering continuous improvement. Consequently, the following hypotheses are posited:

H₃: There is a significant relationship between transactional and transformational leadership styles and incremental innovation

3.4 Chapter conclusion

This study investigated the influence of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal industry. The main research question explored how these leadership styles affect innovation. It was broken down into sub-questions focusing on transformational leadership's encouragement of creativity and transactional leadership's emphasis on structured performance. Hypotheses were proposed to assess the positive impacts of both leadership styles on incremental innovation. The study also aims to clarify the relationship between these leadership styles, noting that while transactional leadership may ensure compliance, transformational leadership fosters engagement and innovation. Overall, it sought to understand which leadership style more effectively promotes incremental innovation in this industrial context.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

Chapter 4 outlines the methodological framework employed to investigate the impact of transformational and transactional leadership on incremental innovation among artisans and foremen within the South African coal mining industry. This chapter outlines the research methodology used, beginning with the research design, which encompassed the research philosophy, research approach, methodological choices, the purpose of the research design, and the strategy. Furthermore, it expanded on the research horizon for the study, providing a comprehensive description of the study's population and sample, including the selection criteria. To ensure the rigour of the results, this chapter also addressed the measurement instruments, data gathering process and the approach to analysing the data, with limitations and quality control considerations outlined at the end of the chapter. This study applied a quantitative research methodology, with surveys used for data gathering.

4.2 Research design

4.2.1 Research philosophy

The primary research question aimed to investigate the impact of leadership styles (transactional and transformational) on incremental innovation. This impact was explored through a philosophy of positivism. Positivism was chosen because the aim of this research was to quantify the impact of leadership style constructs on the incremental innovation construct. Positivism emphasises objectively observable behaviours and measurable outcomes to identify relationships in data to develop law-like generalisations (Bonache, 2020; Crow, 2024; Saunders & Lewis, 2017). Positivism provides statistical analysis to determine causal or correlational correlations between leadership methods and innovation outcomes (Kamolov & Tarazevich, 2023; Kavar et al., 2024). This study aimed to identify the relationship between leadership styles and incremental innovation at the frontline.

4.2.2 Research approach

A deductive research approach was adopted for this study, as it enabled the systematic testing of established theories, specifically transactional and

transformational leadership theories, in the context of incremental innovation among frontline mining employees. The deductive research approach involves translating existing theories into testable hypotheses, which were subsequently examined through the collection and analysis of empirical data (Kuhlicke et al., 2023).

4.2.3 Methodological choice

A mono-quantitative method was used for this study to best evaluate the stated hypotheses developed from the literature review, which was to ensure that objective measurements and statistical analysis of the impact of leadership styles on incremental innovation of frontline employees were determined. The systematic nature of quantitative methods improved the generalisability of results, making them more applicable to similar contexts (Zyphur & Pierides, 2019). Quantitative research is effective for explaining real-world events using theories, hypotheses, models, and measurable data. This ensures that the information collected, such as the survey results and data patterns, accurately reflects reality (Cortina, 2019). As this study aimed to test the impact of leadership styles on innovation using real data, a quantitative approach provided the best way to achieve these goals.

4.2.4 Purpose of research design

A descriptive-explanatory design was used, with descriptive research providing a clear picture of the situation. Descriptive research aims to accurately describe characteristics or events using quantifiable data, like questionnaires. Explanatory research takes it a step further by examining the relationships between variables (Saunders & Lewis, 2017). For this study, a descriptive-explanatory technique was most suitable since it allowed for a thorough analysis of the relationship between frontline mining employees' incremental innovation and leadership styles (transactional and transformational). With this method, the relationships between these variables were thoroughly examined, and their direction and strength were ascertained. This explanatory ability was essential for comprehending how various leadership philosophies impacted innovation and for formulating useful suggestions for mining managers.

4.2.5 Research strategy

A survey was selected as the research strategy because it enables the systematic collection of data from a broad sample of frontline mining employees, including artisans, foremen, and miners. Because they provide standardised data gathering, guaranteeing consistency and comparability among responses, surveys are useful for quantitative research (Saunders & Lewis, 2017). Because it offers quantifiable insights into employees' opinions and experiences, this approach was ideal for investigating the connection between leadership styles and incremental innovation. Furthermore, surveys facilitated a rapid way to gather a lot of data, which lessened researcher bias and improved the generalisability of results (Evans & Mathur, 2018; Kock et al., 2021).

4.2.6 Time horizon

This study used a cross-sectional time horizon to collect data at a particular point in time, offering a glimpse of the link between leadership styles and incremental innovation among frontline mining employees. A cross-sectional time horizon represented a "snapshot" of a moment in time, enabling an examination of variables, patterns, and relationships as they exist in that moment and cannot be used to demonstrate changes related to the variables over time. (Saunders & Lewis, 2017). This approach is particularly appropriate for this research due to the time limitations, as it allows for efficient data collection within the limited timeframe of a Master's degree research project. The research questions focused on whether there is a relationship between leadership styles and incremental innovation, not on how this relationship changes over time.

4.3 Population and unit of analysis

This study focused on the impact of leadership styles on incremental innovation of frontline mining employees. The target population for this study was frontline mining employees, specifically artisans and foremen (supervisors). The unit of analysis in this study was individual employees in the South African coal mining sector. Frontline employees gain a thorough understanding of operations and the current technologies; as a result, they can identify areas for innovation that managers might not have been receptive to, while also having the capacity to create and execute the innovations themselves (Bäckström & Bengtsson, 2019). These Frontline employees

deal with safety-critical, process-heavy tasks where incremental innovation has high value. For this reason, this level of employees was selected as the target population for this study.

4.4 Sampling method and size

A purposive non-probability was selected as the sampling method for this research because it allowed for the deliberate selection of the most relevant respondents to the study, specifically, artisans and foremen. A probability-based sample was not feasible due to the lack of a complete database of all artisans and foremen working in the South African coal mining sector and a risk of potential non-response biases (Kim & Wang, 2018; Saunders & Lewis, 2017). Given these practical difficulties, purposive sampling offered a viable solution. The researcher, who worked in the coal mining business, was able to leverage their professional network to secure respondents, ensuring that data collection could be completed within the time frame of a Master's research project while still reaching the right people.

To make sure the results were valid and applicable across all mining sites, the sample size was 120 to 200 artisans and foremen. This sample size was chosen due to a similar study done by Edelbroek et al. (2019) that attracted 178 responses. The researcher works in the coal sector and thus leveraged his networks to secure the needed responses timeously. The sample size was sufficiently large to encompass a wide range of perspectives while remaining statistically sound.

The selection criteria that were used for respondents included: employees must be frontline employees with at least two years' experience to ensure familiarity with workplace processes and enough exposure to leaders. It is recognised that purposive sampling produces selection bias, as the researcher intentionally chooses respondents instead of employing a random method. To reduce this bias, the sampled employees chosen were from diverse mining operations, including underground mines, surface (open cast) mines, and processing plants. This variety made the data more representative and less likely to reflect perspectives that were relevant only to one type of operation or site. This sampling approach ensured that data were collected from those most qualified to provide insights into leadership's impact on incremental innovation.

4.5 Measurement instrument

A structured questionnaire was administered to a representative sample of frontline employees at coal mines in the Mpumalanga area. The questionnaire included closed-ended questions that utilised validated scales to measure transactional and transformational leadership styles (based on previous research) and incremental innovation (also based on previous research). Certain sections of the questionnaire were developed by adapting from existing literature by Lennerts et al. (2019), Hansen and Pihl-Thingvad (2018), Sheng and Chien (2015), Le et al. (2020), Lei et al. (2019), Visser and Scheepers (2021), and Kim et al. (2021). The questions were modified to suit the intended research context, specifically to adapt them to the mining industry and the target population of artisans and supervisors.

The questionnaire, shown in Appendix B: Instrument (Survey), was provided in English, as the business language of South Africa. Consent was obtained from the respondents through the inclusion of a 'consent section' within the questionnaire. Thus, permission was obtained from every respondent in this study. Respondents were also assured of anonymity and that they could withdraw without penalty. There were 30 questions to complete, and respondents were advised that completing the survey would take approximately 15 minutes. To prevent the same respondent from completing the survey more than once, the "limit to one response" option was used on the electronic survey.

Pilot testing of the questionnaire was necessary to detect any possible errors with a particular group of respondents before the survey was released, which would lower the chance of finding problems with the questionnaire later (Saunders & Lewis, 2017). A pilot test was undertaken before sending out the survey to potential respondents, during which the survey was given to a small group of industry peers who were familiar with mining operations and frontline employees. The goal of this step was to check the instrument for any unclear, inconsistent, or wrong text, structure, or flow. To make sure the questions were clear and acceptable for the intended target group of artisans and foremen, the feedback from the pilot respondents was carefully reviewed and no problems were identified during this process, and the questionnaire was deemed adequate for collecting data on a large scale.

4.6 Measurement instrument

The measurement instrument for this study consisted of a structured questionnaire designed to systematically capture data on leadership styles and incremental innovation among frontline mining employees. The questionnaire included an introduction to the survey, providing respondents with information about the study. This section also provided respondents with an indication of the time required to complete the questionnaire and information about the researcher and supervisor. Section 1 of the survey began with a consent letter that highlighted the anonymity of the response and requested permission to participate. Additionally, this section outlined the general demographic questions required to profile the sample. This included questions on gender, age, qualifications, years of service and whether the respondent is an artisan or a supervisor. Section 2 focused on the independent variables, transactional and transformational leadership. Section 3 addressed the dependent variable, incremental innovation. This section incorporates questions drawn from various validated and robust literature sources. The questions were obtained from literature conducted by Visser and Scheepers (2021), Lennerts et al. (2019), Sheng and Chien (2015), Le et al. (2020) and Lei et al. (2019). To note, the questions were carefully adapted and tailored to the specific needs of the mining industry. This adaptation process involved modifying the wording and phrasing to better reflect the experiences and viewpoints of frontline mining employees, ensuring that the questions accurately captured the complexities of incremental innovation in this specific operational setting.

The questions were on a 5-point Likert scale. This was selected because Likert scales offer the following benefits: they quantify subjective traits like ease of use and aesthetic appeal, facilitating direct comparisons between different visualisations. They standardise subjective response collection, making cross-study comparisons easier, and offer flexibility in customisation to fit specific study needs. Likert scales enable robust statistical analysis, enhancing the reliability and feasibility of future replication studies, and are efficient to administer and analyse, making them a practical choice for researchers. These advantages made Likert scales a valuable tool for systematically measuring and analysing subjective responses in research.

The 5-point Likert scale is particularly effective for artisans and foremen in the coal mining industry because it is simple, intuitive and reduces cognitive load, making it

accessible to personnel with varying, often not very high, education levels. Its straightforward format encourages participation and completion rates among frontline workers, who might find more complex structures daunting. Additionally, the structure provides a spectrum of attitudes, from strong disagreement to strong agreement, allowing respondents to express their subtle and nuanced perspectives. The structure also aligns with clear direct communication styles, of which artisans and foremen are typically exposed to in their line of work. Overall, the 5-point scale balances ease of use with the depth of insight needed for quantitative analysis, making it ideally suited to capturing reliable, detailed data from coal mining artisans and foremen

4.7 Data gathering process

The data-gathering process comprised self-administered questionnaires where respondents completed the questionnaires themselves. This was conducted in the form of electronic questionnaires set up in online form builder platforms and distributed to respondents via a link in email, LinkedIn and WhatsApp. The researcher worked in the coal sector and had direct contact with several individuals who were potential respondents; these networks were leveraged to send out the links and reach a wider audience. The number of responses was monitored daily to ensure that adequate responses were obtained. Follow-ups with potential respondents were conducted regularly to ensure that sufficient responses were obtained. The data was stored on a cloud drive without any identifiers to ensure that it would not be lost and was protected via passwords and the standard security measures of the cloud drive services.

4.8 Analysis approach

Before conducting statistical tests, the dataset underwent data cleaning and preparation, including handling missing values, checking for outliers, and performing normality tests to determine the appropriate statistical tests. The collected data were analysed using SPSS, employing descriptive statistics to summarise demographic and response data.

A simple linear regression test was used to determine the impact of transformational and transactional leadership styles on incremental innovation. For RQ1a and RQ1b, a simple linear regression was structured with incremental innovation as the

dependent variable and transformational or transactional leadership as the independent variable. The β coefficients for transformational and transactional leadership were analysed to determine whether the relationships were positive and statistically significant. The R-squared values were examined to determine the proportion of variance explained by transformational and transactional leadership.

For RQ3, a multiple linear regression was employed with transactional and transformational leadership as the independent variables and incremental innovation as the dependent variable. The p-values were *analysed to test* the hypotheses (H_1 and H_0), and the R-squared values were used *to determine* the proportion of variance in incremental innovation that was explained by both leadership styles. This provided an understanding of their joint predictive power and enabled the researcher to evaluate whether transactional and transformational leadership jointly *influenced* incremental innovation.

Additionally, a correlation analysis was conducted to assess the relationships between leadership styles and incremental innovation. Correlation analysis was selected as the most suitable method because the data collected for all variables (both dependent and independent) were measured on an interval scale. Furthermore, correlation analysis effectively determined both the strength and direction of the relationships between these variables. The results were expressed as correlation coefficients, ranging from -1 to +1, where +1 indicated a perfect positive correlation (variables increased together), 0 indicated no correlation (variables were independent), and -1 indicated a perfect negative correlation (one variable increased as the other *decreased*).

To ensure the robustness of results, data normality was checked using the Shapiro-Wilk test and visual inspections of histograms and Q-Q plots. Multicollinearity was *assessed* using the Variance Inflation Factor (VIF) values, with a threshold of less than 5 *considered* acceptable. Homoscedasticity and linearity assumptions were tested through scatterplots of residuals, and the reliability of the regression models was verified through F-tests.

Finally, the results were interpreted in relation to the research hypotheses and existing literature to determine whether the empirical evidence supported or contradicted theoretical expectations.

4.9 Quality controls

According to Saunders and Lewis (2017), reliability pertains to replication and consistency. This is performed to ensure that the researcher can reproduce the study and produce consistent results. In this study, the Cronbach alpha test was used to ensure the reliability of measured constructs. A threshold of ≥ 0.7 , indicating acceptable internal consistency, was used to ensure reliability (Field, 2013). Mochon and Schwartz (2019) report that "the extent to which an operationalisation measures the theoretical concept which it is intended to measure". It is important to confirm whether the questionnaire is designed in such a manner that it measured the theoretical construct it is intended to measure. For this study, discriminant and convergent validity were used to measure construct validity. For convergent validity to exist, concepts that should be connected must be related. For discriminant validity to exist, measures of different, theoretically unrelated constructs must be distinct and not highly correlated. It ensures that a measurement tool accurately captures the intended concept without unintentionally measuring other constructs (Zikmund et al., 2010).

The questionnaire was extracted and adapted from existing research, which provides some indication of validity; however, for the purpose of this study, confirmatory factor analysis (CFA) was used. CFA is the best technique for evaluating construct validity in this study because it enables the testing of specific links between survey questions and their related constructs (Zikmund et al., 2010). This is relevant given that the research is grounded in well-established theories of transactional and transformational leadership as well as incremental innovation. The Fornell-Larcker criterion and Average Variance Extracted (AVE) were used to analyse the convergent and discriminant validity, ensuring that leadership and innovation variables are statistically distinct (Cheung et al., 2023; Henseler et al., 2014). According to Nielsen et al. (2020), triangulation is the process of combining multiple methodological approaches to mitigate biases, errors, and limitations inherent in any single approach. From a data collection point, data was collected from individuals employed by different mining companies and working in different mining sites to enable the triangulation of results. The combination of these quality control methods ensured that the data were robust, reliable, and valid, providing confidence in the study's statistical inferences and generalisability within the South African coal mining context.

4.10 Methodological limitations

While this study intended to provide valuable insights, there were limitations that were acknowledged. This study only made use of quantitative techniques, which restricted its ability to identify deeper motivations, insights, and contextual elements that qualitative approaches may highlight. The study was unable to evaluate how leadership styles and innovation trends evolve over time because the data were gathered simultaneously within a cross-sectional design. Because the sample was not selected at random, the conclusions could not be generalised to all mining employees. The results might be affected by selection bias, and external validity was limited in the absence of a probability sample. The study used survey data, which could skew self-perceptions. Respondents' experiences could be overestimated or underestimated.

Furthermore, because the study was conducted in the South African coal mining industry, its generalisability was constrained to similar labour-intensive, safety-regulated, and hierarchical industrial contexts. Other mining or manufacturing sectors might not exhibit the same leadership–innovation dynamics due to different operational structures, technologies, or organisational cultures.

Because the study was conducted in the mining industry, its generalised conclusions might not be entirely applicable to other sectors. This study's focus on transactional and transformational leadership may have excluded alternative leadership philosophies that could have an impact on innovation, such as servant leadership and genuine leadership.

Finally, external environmental factors such as commodity price fluctuations, unionisation, and regulatory changes were not controlled for *and* could have affected the observed relationships between leadership and innovation. Despite these limitations, the *study* contributed valuable evidence on how leadership behaviour influenced incremental innovation at the frontline level within the South African coal mining context.

4.11 Chapter conclusion

Chapter 4 details the methodological framework employed to assess the effects of transformational and transactional leadership on incremental innovation among

artisans and foremen in the South African coal mining industry. It begins with the research design that follows a positivist philosophy, aiming to quantify the relationships between leadership styles and innovation through objective, measurable data. A deductive approach was utilised to test established theories, supported by mono-quantitative methods for objective measurement. The research strategy included a survey targeting frontline mining employees, selected through purposive non-probability sampling, with a sample size of 120 to 200 respondents chosen for their relevance and representativeness. A structured questionnaire was developed to capture data on leadership styles and innovation, employing a 5-point Likert scale. The data gathering involved self-administered electronic questionnaires, complemented by rigorous statistical analysis via SPSS, including regression and correlation analyses to confirm relationships and the robustness of results. The chapter also acknowledges methodological limitations such as the reliance on quantitative measures, potential selection bias, and constraints to the specific context of the South African coal mining sector, while asserting the study's contribution to understanding leadership's impact on innovation.

CHAPTER 5: RESULTS OF THE STUDY

5.1 Introduction

The study investigated the impact of transactional and transformational leadership styles on incremental innovation for artisans and foremen in the SA coal mining sector. There were 130 respondents who all confirmed that they currently work as an artisan or foreman in the South African coal mining industry. The study tested three hypotheses, which were based on the main research questions and three sub-questions, which were presented in chapter 3, and can be recapped as follows: RQ1: What is the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal mining sector?

RQ1: Does transformational leadership positively impact incremental innovation among artisans and foremen?

RQ2: Does transactional leadership positively impact incremental innovation among artisans and foremen?

RQ3: Is there a relationship between transactional and transformational leadership styles and incremental innovation?

This chapter of results starts with data screening and cleaning, followed by demographic information. The descriptive statistics follow this, then the reliability of the instrument and the exploratory factor analysis to confirm the number of sub-constructs for each construct. This is then followed by the structural equation modelling partial least squares, developing the measurement model for reliability and validity, and then the structural model to test the hypotheses.

5.2 Data code, screening and quality

Data were compiled with the variables named VAR1 – VAR27 (Table 5.1). Before conducting descriptive and inferential statistical analysis, it is essential to screen the data set to ensure quality. Missing values can occur due to non-responses or data entry errors, which may reduce statistical power and bias parameter estimates (Hair et al., 2021). In this data, there were no issues of missing values with the detailed missing value analysis output in Appendix D. This was followed by extreme outliers,

which deviate substantially from other data points and can distort relationships among variables and model estimates (Kline, 2016). This was analysed with box plots, with values at three times the interquartile range regarded as extreme outliers. There were no issues with extreme outliers except VAR8.

Table 5.1: Coding of variables

Description of Variable	#
1. You frequently seek solutions to operational challenges by refining existing techniques rather than adopting completely new approaches	VAR1
2. Your team has frequently applied moderately improved mining techniques or equipment modifications in new operational areas over the last three years	VAR2
3. You continually refine and improve the processes and techniques used in your daily mining and maintenance operations	VAR3
4. You regularly implement small changes to enhance the efficiency and safety of your tasks.	VAR4
5. You introduce improved but existing mining/maintenance methods and tools to optimise performance in your work.	VAR5
6. You actively find ways to enhance the efficiency of equipment maintenance and repair processes.	VAR6
7. You contribute to reducing operational costs by improving work methods and resource utilisation in mining activities	VAR7
8. You regularly make small adjustments to mining equipment, tools, and procedures to enhance efficiency.	VAR8
9. You work towards reducing costs and improving productivity by optimising the use of available resources and scaling operations.	VAR9
10. My leader's leadership style can motivate me to innovate	VAR10
11. My leader provides a clear vision for the future of the organisation	VAR11
12. My leader effectively communicates the organisation's vision to the employees	VAR12

Description of Variable	#
13. My leader continuously works to generate enthusiasm for the organisation's vision.	VAR13
14. My leader has a clear sense of where the organisation should be in five years.	VAR14
15. My leader encourages employees to align with common organisational goals.	VAR15
16. My leader ensures that the team works together towards a shared direction	VAR16
17. My leader clarifies how employees can contribute to achieving the organisation's goals.	VAR17
18. My leader gives me positive feedback when I perform well.	VAR18
19. My leader actively shows appreciation when I exceed expectations	VAR19
20. My leader personally compliments me when I do outstanding work	VAR20
21. I receive performance rewards when I meet set performance expectations	VAR21
22. The performance rewards I receive depend on how well I perform my job as per individual, team and organisational targets set	VAR22
23. My leader clearly communicates performance ratings and what I will receive if I meet performance requirements accordingly.	VAR23
24. The effort I put into my work determines the performance rating and performance rewards I receive	VAR24
25. There are negative consequences, as per internal processes, if I perform worse than the targets set.	VAR25
26. If I do not consistently meet performance expectations, my leader ensures there are consequences as per internal processes.	VAR26
27. My leader takes action, as per internal processes, when I do not improve my performance.	VAR27

Source: Author's own.

This variable was excluded from further analysis because the removal of outliers meant that there was no variability. This was followed by analysing the common method variance (CMV), which arises when measurement error is attributed to the measurement method rather than the constructs (Podsakoff et al., 2003). The CMV was assessed using the Harman single-factor test, and the results show that the single factor extracted was 41.75%. As this was less than the 50% threshold, it can be concluded that there were no CMV issues.

5.3 Demographic information

This section gathers demographic information to better understand the background and work environment of the respondents. Questions focus on trade, current position, years of experience, and type of mining operation. Figure 5.1 illustrates the distribution of respondents by trade type. The majority of respondents were in the mechanical trade (39.23%), followed by the electrical trade (28.46%). Diesel/Petrol Mechanical accounted for 9.23%, while other trades each represented less than 2% of the sample. This indicates that the respondents were primarily composed of mechanical and electrical specialists.

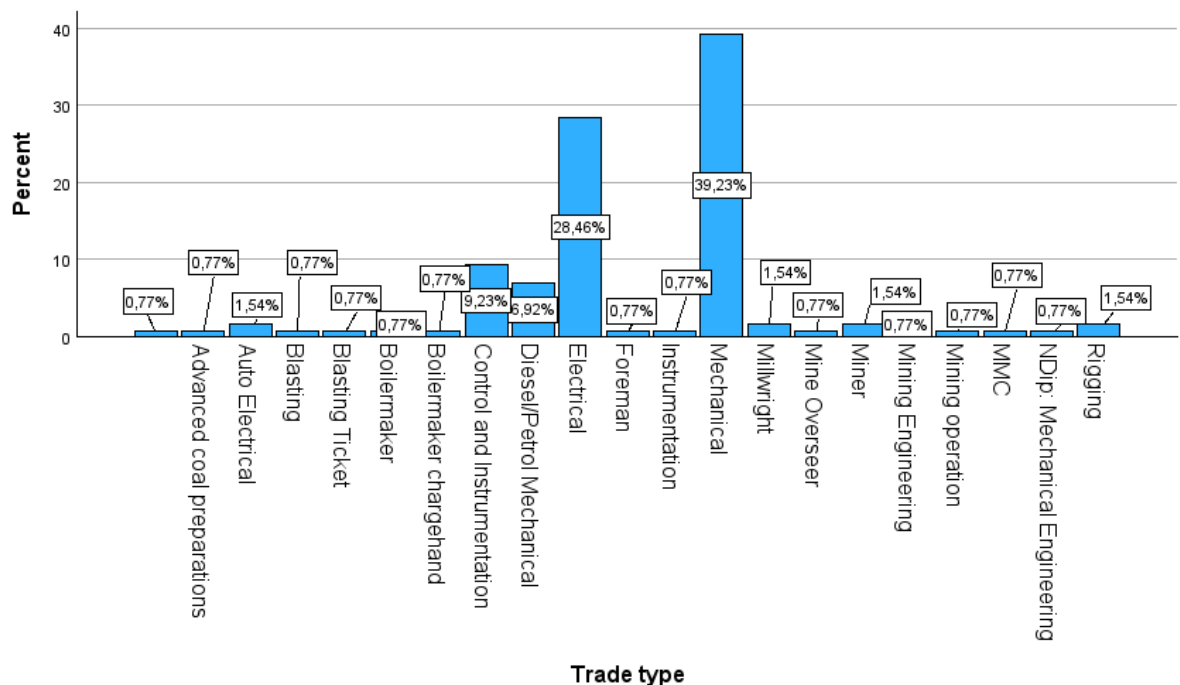


Figure 5.1: Type of trade

Source: Author's own.

Figure 5.2 shows the distribution of the respondents by position. Supervisors make up the majority at 60%, while artists account for 40%. This indicates a higher representation of supervisory roles in the sample.

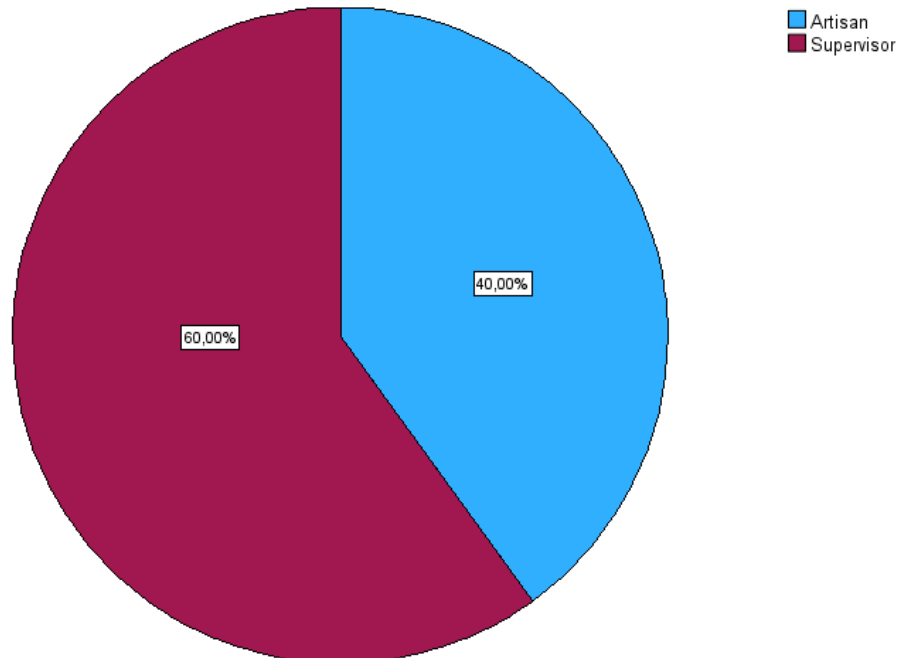


Figure 5.2: Position of the respondent

Source: Author's own.

Figure 5.3 shows the distribution of respondents' years of experience. The largest group is 18 years and older (26.92%), followed closely by those with 2-4 years (26.15%) and 7–12 years (26.15%). Respondents with 12 to 17 years of experience represent 20.77% of the sample. This shows a balanced distribution across experience levels.

Figure 5.4 illustrates the distribution of respondents by mining operation type. Nearly half work in opencast mining (49.23%), followed by processing plants (29.23%) and underground operations (21.54%). This indicates a higher representation of opencast mining workers in the sample.

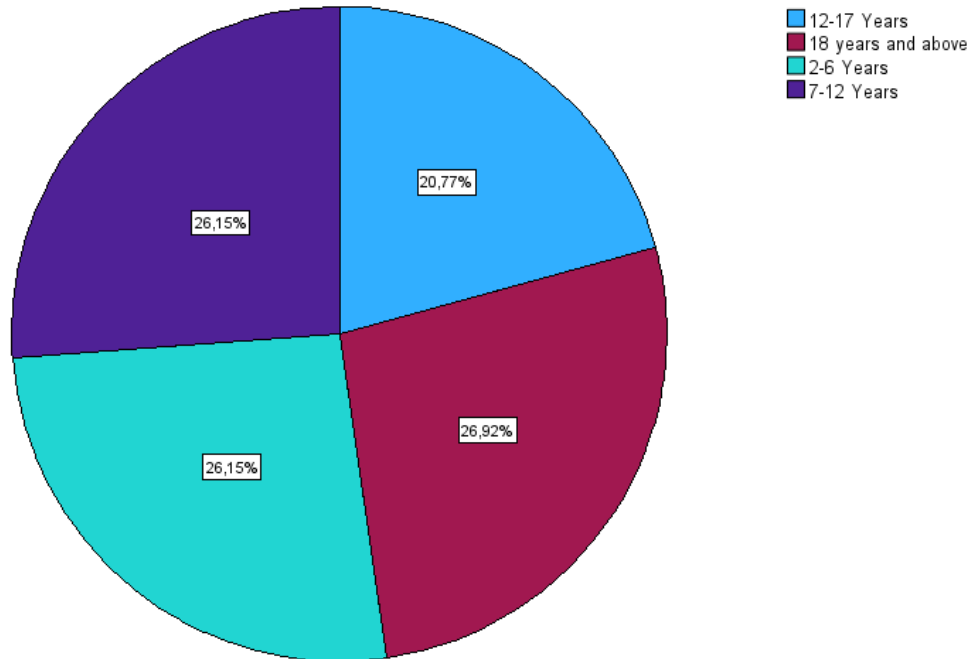


Figure 5.3: Experience of the respondents

Source: Author's own.

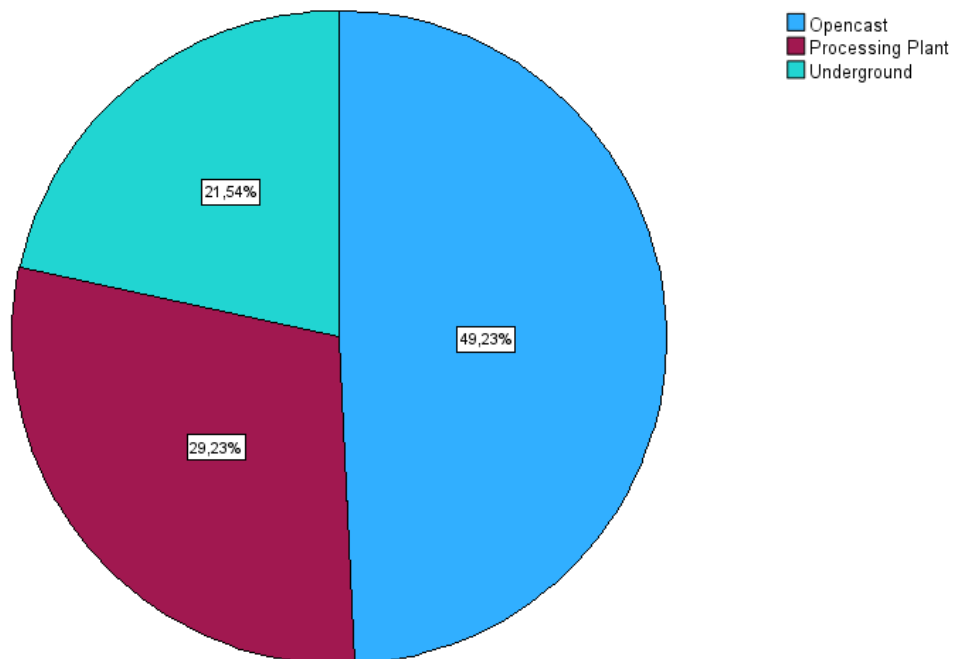


Figure 5.4: Types of mining operations

Source: Author's own.

5.4 Descriptive statistics and reliability

5.4.1 Overall descriptive statistics

The descriptive statistics for the 27 items on the 5-point Likert scale are presented in Table 5.2. Variables reflecting incremental innovation behaviours (VAR1-VAR10 excluding VAR8) showed generally high levels of agreement, with the highest mean reported for VAR4 ("You regularly implement small changes to improve the efficiency and safety of your tasks", mean, $M = 4.37$, ($SD = 0.88$) and median, $Md = 5.00$). Similarly, VAR5 ("You introduce improved mining/maintenance methods and tools to optimise performance in your work," $M = 4.30$, $SD = 0.75$, $Md = 4.00$) and VAR6 ("You actively find ways to improve the efficiency of equipment maintenance and repair processes", $M = 4.27$, $SD = 0.76$, $Md = 4.00$) also indicated strong agreement. These variables showed highly negative skewness (e.g., VAR4 = -2.083, VAR6 = -1.809) and high kurtosis (e.g., VAR4 = 5.372, VAR6 = 6.238), suggesting a strong clustering of responses at the high end of the scale and clear consensus among respondents. The elements related to transformational leadership (VAR11–VAR17) also reflected a high general agreement, with VAR16 ("My leader ensures that the team works together in a shared direction," $M = 4.08$, $SD = 1.00$, $Md = 4.00$). Negative skewness across these variables (ranging from -0.872 to 1.471) indicates that most of the respondents leaned toward agreement. On the contrary, the transactional leadership variables (VAR18–VAR27) had the lowest mean scores, indicating lower agreement. The lowest was observed for VAR21 ("I receive performance rewards when I meet set performance expectations," $M = 3.40$, $SD = 1.26$, $Md = 4.00$), closely followed by VAR22 ("The performance rewards I receive depend on how well I perform my job", $M = 3.43$, $SD = 1.22$, $Md = 4.00$).

Table 5.2: Descriptive statistics

#	Mean	Median	Std. Deviation	Skewness	Kurtosis
VAR1	3.79	4.00	0.921	-0.662	0.541
VAR2	3.98	4.00	0.952	-1.212	1.637
VAR3	4.18	4.00	0.785	-1.705	5.148
VAR4	4.37	5.00	0.876	-2.083	5.372

#	Mean	Median	Std. Deviation	Skewness	Kurtosis
VAR5	4.30	4.00	0.754	-1.773	5.484
VAR6	4.27	4.00	0.755	-1.809	6.238
VAR7	4.26	4.00	0.877	-1.801	4.357
VAR8					
VAR9	4.23	4.00	0.822	-1.645	4.286
VAR10	4.12	4.00	1.111	-1.471	1.673
VAR11	3.99	4.00	1.067	-1.150	0.816
VAR12	3.89	4.00	1.101	-1.162	0.914
VAR13	3.84	4.00	0.995	-0.965	0.888
VAR14	3.83	4.00	1.086	-0.872	0.272
VAR15	4.00	4.00	0.980	-1.153	1.288
VAR16	4.08	4.00	1.001	-1.428	2.184
VAR17	3.96	4.00	1.030	-1.220	1.361
VAR18	4.04	4.00	1.015	-0.982	0.299
VAR19	3.95	4.00	1.033	-0.849	-0.034
VAR20	3.91	4.00	1.038	-0.785	0.010
VAR21	3.40	4.00	1.261	-0.489	-0.770
VAR22	3.43	4.00	1.220	-0.462	-0.732
VAR23	3.55	4.00	1.155	-0.604	-0.366
VAR24	3.55	4.00	1.135	-0.798	-0.073
VAR25	3.62	4.00	0.983	-0.824	0.629
VAR26	3.53	4.00	0.966	-0.822	0.277
VAR27	3.82	4.00	0.852	-0.858	1.081

Source: Author's own.

The internal consistency of the 27-item scale was evaluated using the Cronbach alpha, which produced a strong reliability coefficient of $\alpha = .945$ (Table 5.3), indicating excellent internal consistency (Nunnally & Bernstein, 1994). The correct item-total correlations ranged from .177 (VAR1) to .811 (VAR13, VAR15), demonstrating that most of the items were moderately to strongly correlated with the overall scale.

Table 5.3: Internal consistency (reliability)

#	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR1	102,12	291,953	,177	,947
VAR2	101,91	285,735	,369	,945
VAR3	101,72	284,750	,488	,944
VAR4	101,53	283,032	,494	,944
VAR5	101,60	282,335	,608	,943
VAR6	101,64	285,077	,496	,944
VAR7	101,64	282,372	,514	,944
VAR8	102,02	287,445	,285	,946
VAR9	101,67	282,049	,564	,943
VAR10	101,80	270,693	,722	,941
VAR11	101,90	270,857	,758	,941
VAR12	102,00	268,594	,797	,940
VAR13	102,05	271,067	,811	,940
VAR14	102,06	271,871	,712	,942
VAR15	101,89	271,582	,810	,941
VAR16	101,83	272,127	,761	,941
VAR17	101,93	270,503	,800	,941
VAR18	101,85	274,720	,681	,942
VAR19	101,94	273,902	,691	,942

#	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VAR20	101,98	273,734	,693	,942
VAR21	102,51	267,002	,720	,941
VAR22	102,48	269,595	,679	,942
VAR23	102,36	270,372	,699	,942
VAR24	102,36	269,606	,734	,941
VAR25	102,29	285,253	,364	,945
VAR26	102,38	285,691	,358	,945
VAR27	102,09	283,757	,481	,944
Overall				,945

Source: Author's own.

5.4.2 Interpretation of Worker-Level Differences

The descriptive results show clear differences between artisans and supervisors in how they perceive leadership and innovation within the coal mining sector. Supervisors reported higher mean scores across all constructs: incremental innovation ($M = 4.24$), transformational leadership ($M = 4.07$), transactional leadership 1 – contingent reward ($M = 3.84$), and transactional leadership 2 – management by exception ($M = 3.85$). In comparison, artisans' mean scores were slightly lower across all areas: incremental innovation ($M = 4.04$), transformational leadership ($M = 3.71$), transactional leadership 1 ($M = 3.42$), and transactional leadership 2 ($M = 3.41$).

These results suggest that supervisors perceive greater exposure to leadership behaviours and organisational mechanisms that support innovation. Because supervisors are more directly involved in operational planning, performance discussions, and leadership interactions, they are more likely to experience transformational behaviours such as vision-sharing and motivation, as well as transactional mechanisms like feedback and rewards. Artisans, although actively

engaged in day-to-day process improvements, appear to experience less visibility of leadership communication and fewer structured reward or feedback processes.

From a managerial perspective, this pattern highlights that while transformational leadership is effectively shaping innovation at the supervisory level, its full influence may not be cascading down to artisans. Mining organisations should therefore strengthen communication channels, recognise artisans' contributions to incremental innovation more visibly, and ensure consistent application of performance feedback and reward systems. Doing so would bridge the perceptual gap between supervisors and artisans, ensuring that leadership behaviours reach all operational layers and further enhance innovation performance across teams.

5.5 Confirmation of constructs with exploratory factor analysis

5.5.1 Incremental innovation

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .810, indicating sampling adequacy for factor analysis (Kaiser, 1974). Bartlett's sphericity test was significant, $\chi^2(36) = 414.65$, $p < .001$, confirming that the correlation matrix was appropriate for factor extraction (Table 5.4). Principal Component Analysis (PCA) revealed two components with eigenvalues greater than 1, explaining 56.88% of the total variance. After the Varimax rotation, Component 1 accounted for 36.45%, while Component 2 explained 20.43% of the variance. Items VAR4, VAR5, VAR6, VAR7, and VAR9 loaded strongly on Component 1, while VAR1, VAR2, VAR3, and VAR10 loaded primarily on Component 2. These results confirm that the construct consists of two distinct sub-constructs, reflecting separate but related dimensions of the underlying construct, incremental innovation. The results of the analysis indicate that the data were suitable for factor analysis, revealing two separate but related components of incremental innovation among artisans and foremen. This suggests that their innovation primarily occurs in two ways: Operational improvement, where employees implement small, efficiency-focused changes to tasks and equipment, and Process enhancement, which involves refining techniques and applying improvements across new areas. Taken together, these results strongly suggest that workers are actively involved in improving existing methods rather than introducing radical changes, thereby aligning well with the concept of incremental innovation.

Table 5.4: Principal Component Analysis for incremental innovation

Kaiser-Meyer-Olkin measurement of sampling adequacy							,810		
Bartlett's Test of Sphericity				Approx. Chi-Square			414,654		
				df			36		
				Sig.			<.001		
Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,094	45,487	45,487	4,094	45,487	45,487	3,281	36,451	36,451
2	1,025	11,389	56,876	1,025	11,389	56,876	1,838	20,425	56,876
3	,876	9,731	66,607						
4	,768	8,531	75,138						
5	,654	7,267	82,406						
6	,617	6,852	89,257						
7	,409	4,544	93,801						
8	,319	3,549	97,350						
9	,239	2,650	100,000						
Extraction Method: Principal Component Analysis.									

Rotated Component Matrix^a		
#	Component	
	1	2
VAR7	,816	,111
VAR4	,788	,107
VAR9	,765	,193

Rotated Component Matrix ^a		
#	Component	
	1	2
VAR5	,759	,225
VAR6	,621	,399
VAR2	,114	,824
VAR1	,071	,592
VAR3	,515	,523
VAR10	,405	,514
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalisation.		
a. Rotation converged in 3 iterations.		

Source: Author's own.

5.5.2 Transformational leadership

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .907, indicating suitability for factor analysis. Bartlett's sphericity test was significant, $\chi^2(21) = 855.43$, $p < .001$, confirming that correlations between items were sufficient for factor extraction (Table 5.5). PCA revealed a single factor with an eigenvalue of 5.36, which explained 76.58% of the total variance. These results confirm that the transformational leadership construct is unidimensional, with all elements measuring a single underlying construct. The analysis confirmed that transformational leadership is a single, unified concept in this context. All the items strongly measured one underlying idea: leaders who inspire, motivate, and guide their teams through vision and teamwork. This means that the respondents view transformational leadership as a consistent behaviour pattern, not as separate traits. It suggests that within mining operations, leaders who communicate vision, encourage shared goals, and inspire others are seen as one coherent leadership style.

Table 5.5: Principal Component Analysis for transformational leadership

Kaiser-Meyer-Olkin measurement of sampling adequacy						,907
Bartlett's Test of Sphericity				Approx. Chi-Square		855,433
				df		21
				Sig.		<.001
Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,360	76,576	76,576	5,360	76,576	76,576
2	,542	7,749	84,324			
3	,341	4,871	89,196			
4	,246	3,511	92,707			
5	,225	3,220	95,927			
6	,145	2,074	98,001			
7	,140	1,999	100,000			
Extraction Method: Principal Component Analysis.						

Source: Author's own.

5.5.3 Transactional leadership

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .822, indicating good suitability for factor analysis. Bartlett's sphericity test was significant, $\chi^2(45) = 973.82$, $p < .001$, confirming that the correlation matrix was suitable for factor extraction (Table 5.6). PCA extracted two components with eigenvalues greater than 1, explaining 71.47% of the total variance. After Varimax rotation, component 1 accounted for 46.59% of the variance and included items related to contingent rewards (VAR18, VAR19, VAR20, VAR21, VAR22, VAR23, VAR24). Component 2 explained 24.88% of the variance and was defined by items reflecting management by exception (VAR25, VAR26, VAR27). These results confirm that the transactional

leadership construct consists of two distinct but related subdimensions. Two distinct yet related dimensions of transactional leadership were found in the mining context: contingent rewards and management by exception. This indicates that workers recognise transactional leaders primarily through two different behavioural approaches. On one hand, some leaders focus on rewarding employees for meeting expectations (contingent rewards). On the other hand, others emphasise correcting errors and enforcing compliance (management by exception). While both behaviours are core parts of transactional leadership, their observed separation in the data highlights that workers differentiate between the use of positive reinforcement (rewards) and corrective control (discipline) within their leadership experience.

Table 5.6: Principal Component Analysis for transactional leadership

Kaiser-Meyer-Olkin measurement of sampling adequacy								,822	
Bartlett's Test of Sphericity				Approx. Chi-Square				973,819	
				df				45	
				Sig.				<.001	
Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,150	51,497	51,497	5,150	51,497	51,497	4,659	46,588	46,588
2	1,997	19,970	71,467	1,997	19,970	71,467	2,488	24,879	71,467
3	,979	9,787	81,254						
4	,431	4,306	85,560						
5	,403	4,029	89,589						
6	,349	3,485	93,074						
7	,270	2,695	95,769						
8	,197	1,967	97,736						
9	,124	1,243	98,979						

Kaiser-Meyer-Olkin measurement of sampling adequacy								,822	
Bartlett's Test of Sphericity				Approx. Chi-Square				973,819	
				df				45	
				Sig.				<.001	
Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
10	,102	1,021	100,000						
Extraction Method: Principal Component Analysis.									

Rotated Component Matrix ^a		
	Component	
	1	2
VAR19	,861	-,020
VAR21	,843	,219
VAR20	,833	,014
VAR18	,826	,004
VAR22	,788	,218
VAR24	,772	,330
VAR23	,741	,281
VAR26	,074	,882
VAR27	,233	,848
VAR25	,075	,841
Extraction Method: Principal Component Analysis.		
Rotation Method: Varimax with Kaiser Normalisation.		
a. Rotation converged in 3 iterations.		

Source: Author's own.

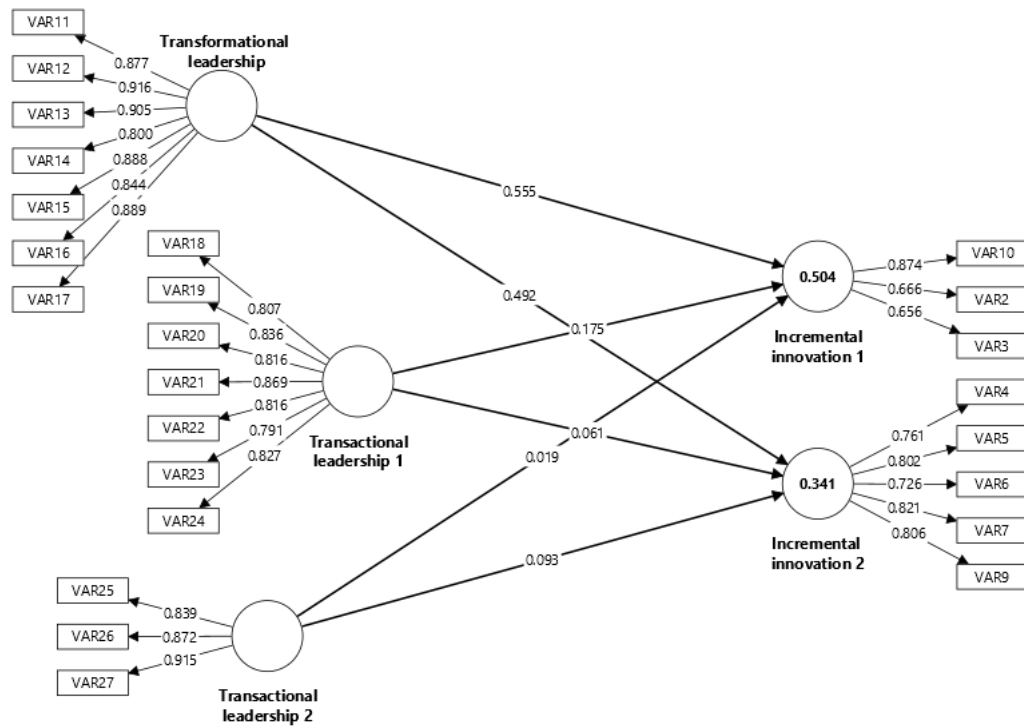
5.6 Structural Equation Modelling Partial Least Squares

5.6.1 Measurement model

Confirmatory factor analysis (CFA) was conducted to evaluate the validity and reliability of the constructs in the proposed model. The measurement model was first assessed to examine the relationships between the observed variables (indicators) and their respective latent constructs, ensuring adequate convergent and discriminant validity.

Figure 5.5 illustrates the measurement model with the outer loadings and the fit of the model. The measurement model was assessed by examining the outer loadings of the observed variables in their respective latent constructs. Outer loads of 0.70 or higher indicate adequate indicator reliability. Most of the loadings met this threshold, demonstrating strong convergent validity. For transformational leadership, all indicators ranged between 0.800 and 0.916, indicating excellent reliability. Transactional Leadership was divided into two subdimensions, with loadings from 0.791 to 0.915, also meeting recommended standards. For incremental innovation, most indicators were acceptable, ranging from 0.726 to 0.874, except for VAR2 (0.666) and VAR3 (0.656), which were slightly below the threshold but retained due to theoretical relevance. These results confirm that most indicators strongly represent their respective constructs, supporting the validity of the measurement model.

The model fit indices indicate an acceptable fit between the data and the model. The SRMR value was 0.086, which is within the acceptable range of <0.10 (Hair et al., 2021). The NFI was 0.701, suggesting a moderate model fit, although this value should be treated with caution in PLS-SEM as it depends on the complexity of the model.



SRMR = 0.082 NFI = 0.701

Figure 5.5: Measurement model with outer loadings and model fit

Source: Author's own.

The reliability and validity of the measurement model were assessed using Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE) (Table 5.7). Cronbach's alpha evaluates the internal consistency of items within each construct, with values of 0.70 or greater considered acceptable for research purposes. Composite reliability was also examined, as it provides a more accurate estimate of internal consistency, with recommended values above 0.70. Furthermore, AVE was calculated to assess convergent validity, with values above 0.50 indicating that the construct explains more than 50% of the variance of its indicators (Hair et al., 2021). The transformational leadership construct demonstrated excellent internal consistency and reliability, with a Cronbach alpha of 0.949 and a CR of 0.958, both exceeding the recommended thresholds. Its AVE value of 0.766 indicates strong convergent validity, confirming that the items effectively measure the intended latent construct. Similarly, Transactional Leadership 1 showed strong reliability ($\alpha = 0.921$, CR = 0.936) and convergent validity (AVE = 0.678). Transactional Leadership 2 also demonstrated acceptable levels, with a Cronbach's alpha of 0.850, CR of 0.908, and AVE of 0.767. These results suggest that the dimensions of transactional leadership are clearly defined and measured

reliably. For innovation constructs, Incremental Innovation 2 achieved acceptable levels of reliability and validity, with Cronbach's alpha of 0.843, CR of 0.888, and AVE of 0.615, exceeding minimum thresholds. However, Incremental Innovation 1 presented a Cronbach alpha of 0.627, which is slightly below the recommended level, suggesting moderate internal consistency. However, its CR (0.780) and AVE (0.546) met minimum requirements, indicating that, while the items moderately align, the construct still demonstrates sufficient convergent validity for retention based on theoretical importance.

In general, these results provide strong evidence that most constructs exhibit high reliability and validity, which confirms the suitability of the measurement model for hypothesis testing in the structural model. The slightly lower reliability of Incremental Innovation 1 highlights an area for improvement in future research, such as refinement of measurement items or introduction of additional indicators to strengthen the internal consistency.

Table 5.7: Reliability and convergence validity

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Incremental innovation 2	0.843	0.853	0.888	0.615
Incremental innovation 1	0.627	0.759	0.780	0.546
Transactional leadership 1	0.921	0.921	0.936	0.678
Transactional leadership 2	0.850	0.894	0.908	0.767
Transformational leadership	0.949	0.950	0.958	0.766

Source: Author's own.

The Heterotrait-Monotrait Ratio of Correlations (HTMT) analysis was performed to evaluate discriminant validity among the constructs. According to Henseler et al. (2015), HTMT values should be below 0.85 for conceptually distinct constructs and below 0.90 for more closely related constructs (Table 5.8). All relationships met this criterion, supporting adequate discriminant validity. However, the HTMT value between Transformational Leadership and Transactional Leadership 1 was 0.849, which is at the upper threshold, indicating a possible conceptual overlap. Similarly, Incremental Innovation 1 and Transformational Leadership showed a high HTMT value of 0.780, suggesting a strong relationship but still within acceptable limits. Overall, the results indicate satisfactory discriminant validity, although caution is warranted when interpreting constructs with values close to the threshold.

Table 5.8: Heterotrait-Monotrait Ratio of Correlations for Discriminant Validity

Construct	Incremental innovation 2	Incremental innovation 1	Transactional leadership 1	Transactional leadership 2	Transformational leadership
Incremental _innovation 2					
Incremental innovation 1	0.847				
Transactional leadership 1	0.543	0.760			
Transactional leadership 2	0.342	0.329	0.357		
Transformational leadership	0.637	0.780	0.849	0.420	

Source: Author's own.

5.6.2 Structural model and hypothesis testing

Structural equation modelling using the partial least squares (PLS-SEM) approach was employed because of its suitability for complex models and smaller sample sizes (Hair et al., 2021). This two-step approach allowed testing the theoretical framework by simultaneously evaluating the quality of the measurement model and the strength of the structural paths between constructs. Hypotheses were assessed using path

coefficients, *t-statistics*, and *p-values* generated through bootstrapping procedures, ensuring robust statistical inference. Before testing the hypothesis, the variance inflation factor (VIF) was assessed to examine potential multicollinearity among the indicators and the predictive relevance of the model with Q^2 .

According to Hair et al. (2018; 2019), VIF values below 5.00 indicate acceptable levels of collinearity, while values above 5.00 may signal a multicollinearity concern. Most indicators demonstrated acceptable VIF levels, ranging from 1.179 (VAR10) to 4.880 (VAR21), suggesting that overall, there are no significant multicollinearity issues. However, VAR12 (5.196) and VAR19 (5.032) slightly exceeded the threshold, indicating potential overlap with other predictors (Table 5.9). Given that these values are only marginally above 5.00, they are not considered severe but warrant careful interpretation. In general, multicollinearity is unlikely to significantly bias the results of the structural model.

Table 5.9: Variance Inflation Factor for multicollinearity

Variable	VIF
VAR10	1.179
VAR11	3.802
VAR12	5.196
VAR13	4.387
VAR14	2.835
VAR15	3.523
VAR16	3.703
VAR17	4.055
VAR18	2.831
VAR19	5.032
VAR2	1.329
VAR20	4.434
VAR21	4.880

Variable	VIF
VAR22	4.346
VAR23	2.619
VAR24	3.209
VAR25	1.868
VAR26	2.237
VAR27	2.240
VAR3	1.258
VAR4	1.786
VAR5	1.893
VAR6	1.751
VAR7	2.265
VAR9	2.095

Source: Author's own.

The predictive relevance of the model was assessed using Q^2_{predict} , the root mean square error (RMSE), and the mean absolute error (MAE) (Table 5.10). According to Hair et al. (2019), Q^2_{predict} values greater than 0 indicate that the model has predictive relevance for endogenous constructs. For incremental innovation 1, the Q^2_{predict} value was 0.470, demonstrating strong predictive relevance, with relatively low prediction errors (RMSE = 0.744; MAE = 0.553). Incremental Innovation 2 showed a Q^2_{predict} value of 0.261, which also indicates predictive relevance, although to a lesser extent, and had slightly higher error values (RMSE = 0.920; MAE = 0.652). These results suggest that the model predicts Incremental Innovation 1 more accurately than Incremental Innovation 2, providing evidence of good overall model performance and supporting the robustness of the structural model.

The structural model was evaluated by examining path coefficients (β), t-statistics, and p-values to test the hypothesised relationships (Table 5.11). A path is considered statistically significant when $p < .05$ and $t > 1.96$ (Hair et al., 2021).

Table 5.10: Predictive relevance of the model

Construct	Q ² predict	RMSE	MAE
Incremental _innovation 2	0.261	0.920	0.652
Incremental innovation 1	0.470	0.744	0.553

Source: Author's own.

The results showed that transformational leadership had a significant positive effect on both Incremental Innovation 2 ($\beta = 0.492$, $t = 3.449$, $p = .001$) and Incremental Innovation 1 ($\beta = 0.555$, $t = 5.196$, $p < .001$). This indicates that higher levels of transformational leadership behaviours are strongly associated with greater incremental innovation activities. This supports hypothesis 1 (H_1), which states that transformational leadership has a significant positive impact on incremental innovation among artisans and foremen. On the contrary, neither Transactional Leadership 1 nor Transactional Leadership 2 demonstrated significant effects on Incremental Innovation 1 or Incremental Innovation 2. For example, the path from Transactional Leadership 1 to Incremental Innovation 1 was non-significant ($\beta = 0.175$, $t = 1.544$, $p = .123$), and the path from Transactional Leadership 2 to Incremental Innovation 1 was also non-significant ($\beta = 0.019$, $t = 0.276$, $p = .783$). These results do not support hypothesis 2 (H_2), as such transactional leadership has no significant impact on incremental innovation among artisans and foremen. These results highlight that transformational leadership plays a crucial role in driving innovation within mining operations, while transactional leadership appears to have a minimal or negligible influence.

Table 5.11: Path coefficients of the model

Path	β	Standard deviation (STDEV)	T statistics (O/STDEV)	p-values
Transactional leadership 1 → Incremental innovation 2	0.061	0.137	0.448	0.654
Transactional leadership 1 → Incremental innovation 1	0.175	0.113	1.544	0.123

Path	β	Standard deviation (STDEV)	T statistics (O/STDEV)	p-values
Transactional leadership 2 → Incremental innovation 2	0.093	0.120	0.773	0.439
Transactional leadership 2 → Incremental innovation 1	0.019	0.068	0.276	0.783
Transformational _leadership → Incremental _innovation 2	0.492	0.143	3.449	0.001
Transformational _leadership → Incremental innovation 1	0.555	0.107	5.196	0.000

Source: Author's own.

The third hypothesis tested whether there is a significant relationship between transactional and transformational leadership styles and incremental innovation. Using the bootstrapped coefficient from Table 11, the difference is calculated between the paths. The absolute difference is calculated based on Equations 1-3:

$$\Delta\beta = |\beta_{TFL \rightarrow II} - \beta_{TSL \rightarrow II}| \quad (1)$$

$$SE_{\Delta\beta} = \sqrt{(SE_{TFL \rightarrow II}^2 + SE_{TSL \rightarrow II}^2)} \quad (2)$$

$$t = \frac{\Delta\beta}{SE_{\Delta\beta}} \quad (3)$$

The results indicate that transformational leadership has significantly stronger effects on both Innovation 1 and Innovation 2 compared to both dimensions (Table 5.12). All comparisons produced t-statistics greater than 1.96, indicating statistical significance at $p < .05$. The strongest difference was observed between Transformational Leadership and Transactional Leadership 2 for Innovation 1 ($\Delta\beta = 0.536$, $t = 4.23$), suggesting that transformational leadership plays a far more substantial role in fostering incremental innovation. The results support hypothesis 3, that there is a

statistically significant difference between the paths for transformational leadership to innovation and transactional leadership to innovation.

Table 5.12: Difference analysis of the paths

Comparison	$\Delta\beta$	$SE_{\Delta\beta}$	t-statistics
Transformational vs. Transactional 1 (Innovation 1)	0.380	0.156	2.44
Transformational vs. Transactional 2 (Innovation 1)	0.536	0.127	4.23
Transformational vs. Transactional 1 (Innovation 2)	0.431	0.198	2.18
Transformational vs. Transactional 2 (Innovation 2)	0.399	0.187	2.14

Source: Author's own.

5.7 Chapter conclusion

The results provide clear evidence for the hypotheses tested. Hypothesis 1, which proposed a positive relationship between transformational leadership and Incremental Innovation 1 and 2, was supported. On the contrary, Hypothesis 2, which suggested that transactional leadership would positively influence incremental innovation, was not supported. Neither the transactional leadership dimension showed a statistically significant effect on incremental innovation 1 or 2, as all p-values were greater than 0.05. In general, these results emphasise the dominant role of transformational leadership in driving innovation, while transactional leadership appears to have minimal impact within this context.

CHAPTER 6: DISCUSSION

6.1 Introduction

This chapter examines the empirical results and discussion pertaining to the study's central research problem: assessing the impact of transformational and transactional leadership styles on incremental innovation among artisans and foremen in the South African mining sector. The discussion tackles three hypotheses, tackling each separately by showing the study's results and thoroughly discussing them. After which, the results were compared to other academic work that was discussed in detail in chapter 2, and a contextual explanation of the relationships that were found.

6.2 Primary research question

The primary research problem in this study was to determine the extent to which transformational and transactional leadership styles impact incremental innovation among artisans and foremen within the South African mining sector. This problem emerged from the need to understand how leadership behaviours contribute to continuous improvement and incremental innovation in operational settings. The results revealed that transformational leadership demonstrated a significant and positive relationship with incremental innovation. Conversely, transactional leadership exhibited no statistically significant relationship with incremental innovation, showing that a compliance-driven and reward-based approach may not effectively promote innovative practices in this context. The overall results suggest that transformational leadership plays a dominant role in fostering incremental innovation at the frontline, while transactional leadership appears to have no significant impact.

6.3 Hypothesis 1: The impact of transformational leadership on incremental innovation

This hypothesis was intended to specifically determine the relationship between transformational leadership and incremental innovation among artisans and foremen in the South African mining sector. The results of the study support the first hypothesis (H_1 : Transformational leadership has a significant and positive impact on incremental innovation among artisans and foremen). Transformational leaders, through behaviours such as inspirational motivation, intellectual stimulation, and

individualised consideration, were found to encourage artisans and foremen to question existing processes, share ideas, and engage in creative problem solving.

These results align with the literature emphasising the role of transformational leaders in cultivating innovation across industries (Afsar & Umrani, 2020; Lin, 2023; Visser & Scheepers, 2021). Transformational leaders inspire followers to transcend routine performance by articulating a compelling vision, fostering intellectual stimulation, and demonstrating individualised consideration. In the mining sector, these leaders encourage artisans and foremen to challenge existing work practices, adopt new ideas, and engage in problem-solving that leads to gradual operational improvements. Within the mining context, where operational performance depends heavily on frontline initiative and adaptive problem-solving, transformational leadership appears to provide the psychological and motivational environment necessary for employees to generate and implement incremental innovations.

A critical psychological mechanism that explains the link between transformational leadership and incremental innovation is the creation of a psychological safety. Transformational leaders promote a climate of trust, mutual respect, and intellectual encouragement, which results in followers feeling safe to take interpersonal risks, express ideas, and challenge existing processes without fear of embarrassment or punishment (Bellibaş et al., 2024; Gui et al., 2021; Sobaih et al., 2022; Thanh & Van Quang, 2022; Xu et al., 2022). By cultivating this safe environment, transformational leadership directly empowers the specific behaviours necessary for low-risk, continuous improvement.

The mechanisms by which transformational leadership translates into these sustained incremental improvements are often mediated by knowledge-sharing behaviours, as argued by Gui et al. (2021). Employees are encouraged to actively seek information and expertise from colleagues and work structures, a behaviour known as knowledge collection. Literature indicates that the proactive behaviour of knowledge collection is an effective catalyst for incremental innovation, as this form of innovation depends directly on the enhancement and utilisation of accessible expertise to address present operational challenges (Gui et al., 2021; Tran et al., 2023). This ability to look for, share, and use internal knowledge makes it easier to put ideas into action that lead to long-term incremental improvements.

Literature presents nuanced perspectives on the relationship between transformational leadership and incremental innovation. Berraies and Abidine (2019) and Berraies and Bchini (2018) argue that transformational leadership can indeed foster incremental or exploitative innovation by stimulating employees to refine and improve existing processes through empowerment and idea-sharing. This perspective supports the current study's results that transformational leaders, even in structured and compliance-driven industries like mining, play a critical role in nurturing operational creativity that manifests through small but sustained improvements. The mechanisms underlying this effect include the leader's ability to articulate a compelling vision, promote collective learning, and instil confidence in employees to explore new approaches to daily challenges.

In contrast, some scholars have argued that transformational leadership primarily drive radical innovation rather than incremental innovation. Alblooshi et al. (2020) and Scheepers and Storm (2019) suggest that transformational leaders, through visionary and change-oriented behaviours, are more likely to initiate large-scale, disruptive innovation projects rather than incremental changes to established processes. These authors argue that transformational leadership may at times overlook the incremental innovation, as it tends to prioritise long-term vision over short-term operational improvements.

The results of this study suggest that within the South African coal mining context, where innovation forms a pivotal role in productivity and efficiency improvements, transformational leadership extends beyond promoting radical innovation. Instead, it also supports incremental innovation that cumulatively enhances performance and efficiency. The divergence from the broader literature may be due to contextual factors such as the hierarchical nature of mining operations, the emphasis on safety and compliance in which artisans and foremen operate. Under such strict conditions, transformational leaders adapt their behaviours to encourage practical, low-risk innovations that align with operational objectives.

This interpretation reinforces the argument of Kumar et al. (2024) that transformational leadership's influence on innovation is context-dependent. In settings where employees perform routine yet critical technical work, as in mining, transformational leadership's motivational and cognitive dimensions can lead to continuous improvement rather than radical transformation. Similarly, Sánchez and

Hartlieb (2020) assert that innovation in mining is largely incremental, emerging from the need to sustain productivity, safety, and environmental responsibility rather than to pursue radical transformation. The results, therefore, position transformational leadership as a bridge between stability and creativity, fostering a work climate that balances adherence to safety and operational standards with proactive innovation.

Under such strict conditions, transformational impact encourages practical, low-risk innovation that aligns with operational objectives. While the results support the findings of Berraies and Abidine (2019), they extend them by providing a unique industrial context. The present study's setting (a high-risk, safety-critical, and highly regulated environment) makes this relationship significant. It challenges the notion that transformational leadership only fosters radical innovation, instead, findings reveal that in mining the role of transformational leadership is creating psychological safety for employees to explore incremental innovations.

Artisans and foremen work in rigid, compliance-driven environments, where even minor procedural deviations may be perceived as risky. The fear of blame or disciplinary action if an idea goes wrong remains a barrier to frontline innovation (Lumadi & Nyasha, 2024). In this context, the strong positive relationship observed in this study suggests that transformational leadership does not merely motivate innovation, it permits it.

Therefore, in the South African coal mining context, transformational leadership is less about driving radical transformations and more about providing psychological permission to try out incremental innovations. It serves as the cultural and emotional lubricant that enables artisans and foremen to confidently participate in incremental innovation. When leaders consistently encourage employees to share their ideas and reflect on them, employees feel that their suggestions for improvement will be taken seriously rather than punished. This is an important step toward overcoming the cultural and regulatory challenges that often stifle innovation in safety-critical environments.

Summarising the above, this study provided empirical support for the view that transformational leadership contributes to incremental innovation, particularly within compliance and safety-driven industries. It challenges the premise that

transformational leadership solely drives radical innovation, suggesting instead that its outcomes are contingent on the context in which it is practised.

6.4 Worker-level differences

Transformational leadership

The descriptive findings in Chapter 5 revealed that a distinct gap exists between artisans and supervisors in how they experience transformational leadership and innovation within the coal mining sector. Supervisors had higher mean scores on all dimensions, including transformational leadership ($M = 4.07$), incremental innovation ($M = 4.24$), and transactional leadership. Artisans, on the other hand, had consistently lower average scores. This difference suggests that transformational leadership practices may be present at the supervisory level, but they may not have cascaded effectively to artisans.

From a theoretical standpoint, these findings align with Su et al. (2019), who argued that transformational leadership operates as a “multi-level phenomenon” that must cascade through hierarchical structures to influence employees who are considered distant from management, for example, frontline employees. Transformational influence is not confined to direct relationships, practically in large organisations, it relies on structured mechanisms, such as communication channels, feedback systems, and human resource practices that disseminate leadership values across all the layers of the organisation.

In instances where such mechanisms are weak, the diffusion of transformational behaviours, such as vision sharing, intellectual stimulation, and individual considerations, becomes diluted. In the context of the mining industry, where hierarchy and task segmentation are rigid, this failure in dissemination may result in artisans perceiving less exposure to transformational leadership, even though foremen may internalise and model it strongly.

This argument is further supported by a study conducted by Usman et al. (2024), who demonstrated that frontline workers' perception of leadership effectiveness is

closely tied to psychological contract fulfilment, the extent to which leaders meet employees' expectations of safety, fairness, and recognition. In high-risk industries, such as coal mining, artisans' motivation and trust are shaped by whether leadership behaviours show genuine concern for their safety and professional growth. When transformational leadership cues like recognition, individualised support and participative dialogue fail to disseminate or are inconsistently communicated, artisans may perceive that leadership promises are unmet. This perception weakens their psychological contract fulfilment and limits their willingness to engage in incremental innovative behaviour that contributes to continuous improvement.

The divide in perceptions highlighted earlier in this study also supports findings from Brown-Deveaux et al. (2022), who argued that innovation and process improvements depend on the direct involvement of frontline staff in decision-making and communication design. In their study that focused on frontline employees, the results showed a stronger ownership of innovations, improved communication, and higher satisfaction levels. These results highlight that transformational leadership works best when it is combined with inclusive structures that get frontline workers involved in making changes instead of just following orders. For mining companies, this means they need to set up participatory platforms like peer-led innovation boards, toolbox discussions, and structured reflection sessions where employees directly help solve problems and improve processes.

Collectively, these studies suggest that the challenge in the South African coal mining sector may not be the lack of transformational leadership, but rather its incomplete dissemination due to hierarchical and communication barriers. At the supervisory level, transformational leadership fosters motivation and planning; however, its efficacy diminishes at the operational level in the absence of consistent relational engagement and recognition mechanisms. The observed perceptual differences also provide a contextual explanation for the findings that supported Hypothesis 1, which confirmed a positive relationship between transformational leadership and incremental innovation.

Although the findings indicate a positive impact between the two constructs, it appears that the impact is uneven across hierarchical levels. The weaker perceptions among artisans suggest that the barrier to incremental innovation is not only due to the absence of transformational leadership, but also due to its transmission from

supervisors to artisans. As Su et al. (2019) emphasise, leadership influence needs to cascade through structured systems to reach distant followers. This incomplete diffusion may explain why incremental innovation thrives at the supervisory level but appears less pronounced among artisans, who engage in day-to-day operational improvements without the same exposure to motivational and visionary leadership cues.

Transactional leadership

In contrast, these findings also help contextualise the non-significant impact of transactional leadership on incremental innovation. The structural model results indicated that neither of the transactional leadership dimensions, contingent reward or management-by-exception, exhibited a statistically significant relationship with incremental innovation ($p > .05$). In contrast, the descriptive analysis revealed that the two worker levels had significantly varying perceptions. Supervisors gave higher average scores for contingent reward ($M = 3.84$) and management-by-exception ($M = 3.85$), while artisans gave lower scores for these two items ($M = 3.42$) and ($M = 3.41$), respectively. This pattern revealed that transactional leadership is not experienced the same through the different hierarchy levels.

Supervisors who are more actively involved in planning, performance evaluation, and recognition discussions tend to experience the “carrot” side of transactional leadership through contingent rewards and performance-linked incentives. In contrast, artisans whose interaction with leadership is mainly through operational monitoring, safety checks or fault rectification, are primarily exposed to the “stick” component of management-by-exception. This asymmetry may likely explain the higher mean score among supervisors and the lack of significant association between transactional leadership and incremental innovation outcomes.

According to Berraies and Abidine (2019), transactional leadership ensures compliance and operational control through contingent reinforcement but rarely promotes creativity or intrinsic motivation unless it is coupled with empowerment and recognition. When followers experience the corrective dimension without the

corresponding reward, leadership becomes compliance-focused rather than developmental. This limits the emergence of innovative behaviours, especially among frontline employees who perceive leadership interactions mainly in corrective or disciplinary terms. Consequently, the limited visibility of recognition and performance feedback among artisans may suppress the motivational drivers necessary for incremental innovation.

In general, this pattern supports the earlier finding that leadership influence in the mining industry decreases as you move down the hierarchy. Transformational leadership does not fully cascade, and transactional leadership seems to be broken up, giving supervisors recognition and rewards while limiting artisans' experiences to compliance and control. The fact that these patterns exist at the same time shows that mining companies need to change how they communicate, reward, and give feedback so that both transformational and transactional leadership methods can reach the operational frontline in a fair and helpful way.

6.5 Hypothesis 2: The impact of transactional leadership on incremental innovation

This hypothesis aimed to determine the relationship between transactional leadership and incremental innovation among artisans and foremen in the South African mining sector. The analysis revealed that transactional leadership did not have a statistically significant relationship with incremental innovation, as all p-values were greater than 0.05. This result suggests that leadership behaviours grounded in contingent reward, active management by exception, or corrective control mechanisms may not effectively stimulate incremental innovative behaviour among artisans and foremen in the SA coal mining sector. Although transactional leadership remains important for maintaining discipline, safety compliance, and task clarity, it appears insufficient for artisans and foremen to go beyond their normal duties and introduce new incremental improvement ideas.

The literature on this relationship presents mixed evidence. Studies by Alblooshi et al. (2020), Berraies and Abidine (2019), and Berraies and Bchini (2018) have argued that transactional leadership can support incremental innovation, particularly when incremental innovation is framed as efficiency improvements or optimisation within

established structures. These scholars argue that transactional leaders, through clear expectations, performance monitoring, and reward mechanisms using positive and negative reinforcement, may reinforce behaviours that yield gradual and systematic operational improvements. In stable industries where procedures and safety are paramount, such as manufacturing or mining, transactional leadership could, in theory, provide the structure necessary for incremental innovation to occur within defined boundaries.

However, the results of this study do not support these arguments; instead, they align with research suggesting that transactional leadership may inhibit innovation because it prioritises compliance and short-term task completion over creativity and learning. Duan et al. (2022) posit that the transactional approach restricts employees' psychological freedom to investigate novel concepts, as performance is intricately linked to established objectives and quantifiable results. This trend tends to make people less likely to try new things, which is an important part of incremental innovation, because employees might see deviations from standard procedures as possible threats to performance evaluations or safety records.

In the mining context, this interpretation is most noticeable. Mining operations are characterised by hierarchical control structures, stringent safety protocols, and explicit performance matrices, which naturally reinforce transactional behaviours. While such behaviour ensures stability and compliance, it does not leave much room for flexible, discretionary and innovative behaviours that are necessary for incremental innovation. This result corroborates the assertions of Scheepers and Storm (2019), who noted that transactional leadership is often effective in maintaining order but ineffective in generating innovative solutions in environments where adaptability and problem-solving are increasingly vital.

Furthermore, the insignificant relationship observed in this study suggests that even when transactional leaders incentivise employees for achieving efficiency or production targets, the emphasis focuses on performance maintenance rather than performance enhancement through innovation. This difference might help explain why transactional leadership, while good for productivity, may stifle incremental innovation. The focus on control and following the rules may unintentionally stifle the curiosity, reflection, and collaboration needed for incremental innovation to flourish.

Summarising the above, this study provided empirical support for the view argued by Duan et al. (2022) that transactional leadership's effectiveness may be impacted by the context in which it is practised. In environments requiring adaptability and continuous learning, transactional leadership alone is insufficient to drive incremental innovation. Instead, it requires leaders who balance transactional and transformational leadership, creating structures that support incremental innovation instead of constraining it.

6.6 Hypothesis 3: The relationship between transactional and transformational leadership styles and incremental innovation

This hypothesis investigated the correlation between transactional and transformational leadership styles and incremental innovation among artisans and foremen in the South African coal mining industry. It aimed to determine whether the combined leadership approaches significantly impact incremental innovation outcomes. The comparative analysis indicated that transformational leadership exerted substantially greater effects on both aspects of incremental innovation than transactional leadership. Every comparison yielded t-statistics exceeding 1.96, signifying statistical significance at $p < .05$. The most pronounced difference was identified between transformational leadership and transactional leadership ($\Delta\beta = 0.536$, $t = 4.23$), substantiating the alternative hypothesis (H_3 : There is a significant relationship between transactional and transformational leadership styles and incremental innovation). These results indicate that although both leadership styles exist in mining operations, transformational leadership is more influential in promoting employee-driven incremental innovation.

Literature has established a complementary connection between transactional and transformational leadership, rather than viewing them as mutually exclusive (McClanahan, 2019; Piwovar-Sulej & Iqbal, 2022). Transactional leadership provide the structural stability essential for consistent performance, and transformational leadership encourages growth, adaptability, and innovation (Nguyen et al., 2021). In the mining industry, where operational success relies on both adherence to safety regulations and enhancements in efficiency, this connection is important. The results of this study correspond with the theoretical claims that the two leadership styles operate on a continuum, where transformational behaviours enhance innovation

outcomes within the foundational context that is established by transactional leadership practices.

The comparative analysis indicated that transactional leadership's contribution to incremental innovation is negligible compared to that of transformational leadership. This supports the arguments of Scheepers and Storm (2019) and Duan et al. (2022), who contend that transactional leadership is beneficial for establishing structure and accountability. However, it may also inadequately foster the creativity and autonomy essential to innovation. Transformational leadership, on the other hand, seems to go beyond these limits by stimulating the mind, motivating people, and considering each individual. These things together make employees more intrinsically motivated to come up with new ideas within safe and regulated limits.

Interestingly, both types of leadership exist in mining. To keep safety and operational discipline in mining operations, there needs to be transactional mechanisms like performance monitoring, procedural compliance, and contingent reinforcement. However, the same environment can greatly benefit from transformational elements that empower employees to identify, propose, and implement small changes. The results of this study support the conceptual framework proposed by McClanahan (2019) and Piwovar-Sulej and Iqbal (2022), which asserts that effective leadership in complex operational environments often requires a dynamic balance between transformational and transactional components. Transformational leadership offers the vision and motivation essential for fostering innovation, whereas transactional leadership guarantees that innovative practices adhere to operational and safety standards.

The finding that transformational leadership's impact is significantly stronger than the non-existent impact of transactional leadership has profound implications for leadership development. It corroborates the thesis of this study: that only one of these leadership styles functions as a true driver of incremental innovation. However, this does not mean that transactional leadership should be completely discarded. As discussed in Section 6.4, transactional leadership serves an essential role that guarantees safety, adherence to procedures, and operational consistency. Therefore, the ultimate conclusion from Hypothesis 3 is that effective leaders in the coal mining sector must be able to apply two distinct leadership modes depending on situational demands. When managing safety and compliance, the leader must act

as a disciplined transactional leader, and when managing performance and improvement, the leader must act as an inspiring transformational leader.

The challenge highlighted by this research is that the mining culture has traditionally prioritised the first skill set, transactional control, while inadequately developing the second. The Hypothesis 2 results showed that this focus on following the rules does not lead to new ideas on its own. Moreover, the inability to disseminate transformational behaviours (as discussed in Section 6.5) suggests that even when foremen demonstrate transformational intent, they frequently lack the necessary skills or organisational backing to communicate it effectively within their teams. This finding indicates the necessity for a novel leadership development model within the mining sector, one that explicitly instructs foremen and frontline supervisors to become ambidextrous leaders, competent at transitioning between transactional and transformational methodologies to harmonise safety with innovation.

In conclusion, the results indicate that although both leadership styles enhance organisational performance, transformational leadership exerts a markedly greater impact on incremental innovation among artisans and foremen in the South African coal mining industry. The combination of the two styles, anchored in structure but propelled by inspiration, seems to be the best way to encourage innovation in industries that are high-risk and compliance-driven. These results not only validate the alternative hypothesis but also enhance theoretical understanding of leadership dynamics by demonstrating the interaction between transformational and transactional leadership in shaping innovation outcomes in complex industrial contexts.

6.7 Chapter conclusion

This chapter discussed the empirical findings of the study and interpreted them in relation to the hypotheses and theoretical framework. The results of this study confirmed Hypothesis 1, indicating that transformational leadership has a positive and strong impact on incremental innovation among artisans and foremen in South African coal mining. Transformational leaders, through inspirational motivation, intellectual stimulation and individualised consideration, create the psychological conditions necessary for employees to question existing practices, generate new ideas, and engage in continuous improvement. Conversely, the results did not support Hypothesis 2, revealing that transactional leadership, although prevalent in

safety-critical and compliance-driven environments, has no significant impact on incremental innovation.

This non-significant finding was interpreted as evidence that transactional leadership, while essential for ensuring compliance and safety, appears to be treated as a policing tool for monitoring and control, preventing it from being used to spark creativity. In contrast, transformational leadership behaviours (when effectively cascaded) serve as mechanisms for empowerment and incremental innovation. The chapter also highlighted a serious challenge of not spreading leadership behaviours across different levels of the organisation. Supervisors (foremen) exhibited elevated perceptions of both transactional and transformational leadership compared to artisans, indicating that leadership influence is predominantly restricted to middle management and inadequately transmitted to the operational frontline where incremental innovation originates.

Ultimately, the findings provide a direct response to the problem outlined in Chapter 1, the South African coal mining sector's reliance on external, supplier-led innovation. This study showed that the sector's innovation deficit is behavioural and leadership-driven and not necessarily due to technological challenges. The frontline workforce, artisans and foremen, has the potential to be innovative, but it is not being used because of the leadership style that values control, compliance and short-term results over empowerment and continuous improvement.

This Chapter empirically demonstrated that transformational leadership impacts incremental innovation, establishing that a key to unlocking the internal innovative capacity of the sector resides in the application of transformational leadership. It is not the absence of innovative ideas that constrains progress, but the absence of leadership behaviours that legitimise and enable such ideas to surface. Transformational leadership grants this permission by fostering trust, psychological safety, and a collective sense of purpose that transforms operational insight into sustainable innovation.

The results, therefore, give a clear plan for how to renew an organisation. To lessen reliance on supplier-driven innovation and to integrate continuous improvement into the essence of mining operations, leadership at all levels must exemplify and propagate transformational behaviours. Chapter 7 will build on these findings by giving the study's final conclusions, theoretical and managerial contributions, and

practical advice on how mining leaders and organizations can get their workers to use this hidden innovative potential.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter provides the final discussion of the study and summarises the main results, theoretical contributions, and practical implications that emerged from the research. The chapter begins by restating the primary objective of the study, which is to examine the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in South Africa's coal mining industry. The conclusions summarise how well this goal has been met and how each hypothesis has been addressed. The chapter further emphasises the study's significance by presenting its strategic, managerial, and theoretical contributions, especially in relation to leadership development, organisational culture, and frontline-driven innovation in mining operations.

This chapter also gives evidence-based advice to a number of groups, such as mining companies, leaders, communities, and policymakers like the Department of Mineral Petroleum and Resources (DMPR). The chapter ends with a discussion of the study's limitations and suggestions for future research. It focuses on areas where more research could help develop the understanding of how different leadership styles affect innovation in safety-critical, compliance-driven settings like mining.

7.2 Conclusion

The main objective of this research was to examine the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal mining sector. This was outlined in the main research question, RQ: What is the impact of transactional and transformational leadership styles on incremental innovation among artisans and foremen in the South African coal mining sector?

The study has adequately addressed the hypothesis and has given insight into the intricate relationship between transformational and transactional leadership styles and incremental innovation. The study also highlighted the contextual intricacies of this relationship in the coal mining sector in South Africa.

The results of this study confirmed that transformational leadership has a positive impact on incremental innovation among artisans and foremen in the mining sector. It was found that transformational leaders inspire creativity, encourage problem-solving, and promote continuous improvement. These results were found to align with previous research conducted by Berraies and Abidine (2019) and Le et al. (2020), who argued that transformational leadership can enhance both exploitative and incremental innovation by fostering psychological safety and driving intrinsic motivation that leads to incremental innovation.

In contrast, the study further highlighted that transactional leadership, which is characterised by contingent rewards and corrective actions, did not exhibit a statistically significant effect on incremental innovation. Although it has been observed from previous research that transactional leadership ensures compliance and operational discipline, it appears to limit the flexibility and autonomy that are necessary for employees to generate ideas and experiment with new ideas and ways of doing things. This result supports findings on previous studies conducted by Duan et al. (2022), who argued that transactional leadership can constrain innovative behaviour by reinforcing the routine and short-term performance goals.

7.3 Contribution of the study

7.3.1 Managerial and Practical Implications

7.3.1.1 Leadership development

The results of this study have important effects on how leaders are trained and how managers work in the South African mining industry. From a leadership development perspective, it is essential for mining companies to prioritise and allocate resources towards comprehensive leadership programs specifically designed to cultivate and enhance transformational leadership competencies. These programs should be aimed at developing important skills, such as how to come up with and clearly explain a compelling vision, how to empower and motivate employees, how to get followers

to think creatively and question the status quo, and how to show real empathy and understanding to their teams.

Organisations that develop leaders who have these skills will be able to build a robust talent pool that can use transformational leadership effectively to stimulate incremental innovation. Leaders who have these skills can motivate and inspire frontline workers, who know the intricacies of operations and their associated challenges. Mining companies can find new ways to improve operations and enhance safety by creating a culture that appreciates and supports innovation from the front line.

ultimately, mining companies in South Africa will be able to use transformational leadership throughout their organisations to make frontline innovation a strategic asset, which will improve their competitiveness in the industry. Companies that want to grow in a sustainable way, be flexible, and be able to handle ongoing economic, social, and environmental pressures need to develop their leaders to be transformational, yet balancing that with transactional leadership traits.

7.3.1.2 Organisational culture

In literature, innovation is always shown to be very important for making mining processes more efficient, safer, and more productive. Innovation is widely acknowledged as a catalyst that empowers companies to enhance operational efficiency, mitigate risks, and respond to a revolving environment. This study examines a relatively underexplored yet critical factor that can hinder innovation. The results show that transactional leadership, which is based on strict control, rewards, and punishments, can inhibit incremental innovation.

This important insight suggests that mining companies should shift away from traditional command-and-control leadership styles. It is essential to shift away from these styles, as they may hinder creative thinking and proactive problem-solving at the front lines. Instead, companies need to cultivate a culture that encourages: sharing ideas, collaboration across departments, and continuous learning and improvement. Such a culture empowers employees at all levels to share their thoughts, try out new ideas, and build upon each other's ideas. This approach will lead to an accelerated rate of the implementation of incremental improvements and new ideas.

The results of this study compellingly verify the necessity for cultural transformation within mining operations. Mining companies can derive more value from their employees by adopting leadership styles and organisational environments that foster collaboration and innovation. This will lead to long-term improvements in safety, productivity, and competitiveness. Ultimately, embracing this cultural shift will enable mining companies to navigate uncertainty, meet the evolving needs of their stakeholders, and remain successful in a challenging industry for an extended period.

7.3.1.3 Frontline drives innovation

This study empowers management and businesses to understand which leadership styles should be harnessed in order to drive innovation from the frontline. According to the research conducted by Balci and Kumral (2022) and Engen and Magnusson (2015), innovation that originates directly from the frontline, where employees are intimately involved with the daily operational realities, typically produces results that are more aligned with the unique context of the work environment. These innovations are often more useful, relevant, and easy to implement and adopt than top-down initiatives because they are made by people who know the problems and processes on the ground very well. Frontline-driven innovation can deal with more complex problems that higher-level management might miss because it is close to actual operations. This leads to solutions that better meet real needs and constraints.

Furthermore, innovations developed internally within an organisation, especially by operational personnel, have been demonstrated to substantially enhance safety protocols. Employees who help make new tools or procedures are more likely to feel responsible for them and committed to them. This makes it easier for them to use them in their daily work and makes the workplace safer. These context-specific innovations can also improve operational performance, which can lead to greater efficiency and productivity, which can have a positive effect on all mining operations. Olvera (2022) and Reimann et al. (2009) both point out that these internal innovations are important because they help mining companies not only in the short term but also in the long term by making them more resilient and profitable. Mining companies are better able to handle risks, deal with changing conditions, and keep their competitive edge over time by constantly changing and improving their practices based on what they learn from the front lines. In the mining industry, where changes in regulations,

environmental issues, and market conditions can have a big impact on business results, this resilience is very important. So, encouraging innovation at the front line is a strategic way to connect employee engagement, operational excellence, safety improvement, and financial success in the mining industry.

7.3.1.4 Bridging Leadership Cascades and Innovation Gaps

The findings underscore that mining leaders must move beyond top-down communication of vision and strategy to embed transformational behaviours within all operational layers. At the supervisor level, many traits of transformational leadership may be reflected; however, these behaviours must be deliberately cascaded to artisans who execute core production and maintenance tasks. This requires creating structural bridges between leadership intent and day-to-day operations through consistent engagement, recognition, and participatory feedback systems. To address this gap, leadership development initiatives should prioritise cascade alignment, ensuring that supervisors are equipped not only to implement transformational practices but to mentor and empower artisans. Structured dialogues, peer coaching, and participative innovation forums can facilitate two-way learning, enabling artisans to contribute ideas that inform incremental innovation.

Organisations should put in place recognition and feedback systems that are institutionalised in their organisations, that reinforce artisans' contributions to incremental innovation. As demonstrated by Brown-Deveaux et al. (2022), visible acknowledgement of frontline input instils ownership and strengthens the perceived connection between leadership and workers' lived experiences. Once these behaviours are instilled in frontline employees, the organisation can reap the benefits of continuous improvements that are implemented to improve processes, safety and other operational challenges.

Third, safety-specific and psychological contract principles (Usman et al., 2024) should be embedded within leadership and performance management frameworks. By visibly addressing artisans' needs for safety, inclusion, and fairness, leaders

signal fulfilment of implicit expectations, which enhances trust and motivates innovative and extra-role behaviours.

Lastly, mining firms should leverage collaborative human resource management practices, as suggested by Su et al. (2019), to promote information sharing, cross-level collaboration, and team-based rewards. These practices can act as conduits through which transformational leadership values, vision, trust, and empowerment flow consistently across hierarchical boundaries, enabling a culture of innovation that includes both supervisors and artisans.

In essence, the managerial challenge is not only to generate more transformational leadership but to extend its reach, from the strategic to the operational level, so that artisans perceive, internalise, and act upon the same transformative cues experienced by their supervisors.

7.3.2 Contribution to theory

This study enhances the existing knowledge on leadership and innovation by extending the application of Bass's Full Range Leadership Model discussed by Bakker et al. (2022) within the unique context of the mining industry, specifically the South African Coal mining industry. Much of the published literature has predominantly linked transformational leadership with radical or explorative innovation, often emphasising breakthrough technological advancements or disruptive change initiatives (Alblooshi et al., 2020; Scheepers & Storm, 2019). However, the results presented in this study expand that understanding by demonstrating that transformational leadership also play a role in incremental innovation, the ongoing, minor enhancements in processes that are crucial for operational efficiency, safety, and enduring competitiveness in a heavily regulated, safety-sensitive sector such as mining.

The mining industry's focus on safety, operational discipline, and following the rules has created a culture that is risk-conscious and afraid of taking such risks. This could

limit innovation, according to both theoretical perspectives and previous research. In this context, showing that transformational leadership can lead to incremental innovation goes against what the literature has previously argued. This broadens the applicability of Bass's model beyond industries characterised by rapid change and radical breakthroughs to encompass environments where gradual, adaptive innovation is paramount for survival and success (Balci & Kumral, 2022; Olvera, 2022). It emphasises that transformational leadership's focus on inspiring vision, intellectual stimulation, and individualised consideration can effectively cultivate a culture of continuous improvement, even in contexts where safety and compliance are imperative.

Another key contribution lies in the focus of frontline personnel, specifically artisans and foremen, who serve as the first line of management and play an indispensable role in translating leadership vision into day-to-day operational improvements. Most leadership research has focused on how senior executives and mid-level managers can encourage innovation, but it has largely overlooked the importance of supervisors and frontline leaders. This study fills a significant gap by focusing on artisans and foremen, demonstrating that effective leadership at this level is crucial for encouraging small changes that lead to innovative ideas. This result is consistent with recent assertions from leadership scholars, who highlight that innovation originates not solely from top management but also from individuals directly involved in technical and operational realities (Oswald et al., 2022; Smit et al., 2021).

In the mining context, where artisans and foremen are intimately involved with machinery maintenance, production processes, and safety operations, empowering these individuals through transformational leadership practices enhances their ability and willingness to propose and implement incremental improvements. This further demonstrates how hard it is for leaders to find a balance between transformational and transactional approaches. Transformational leadership encourages engagement and creative problem-solving, while transactional leadership makes sure that safety rules and operational discipline are followed. Both are equally important in mining's two main goals of innovation and risk management (Mokganya et al., 2024; Prinsloo et al., 2022).

Furthermore, this study contributes context-specific evidence from the South African Coal mining sector, a complex environment shaped by declining ore qualities,

stringent regulations, environmental pressures, and economic uncertainty (Hanto et al., 2021; Rademeyer, 2021). The research enhances the global discourse on leadership and innovation by offering empirical insights into the impact of leadership styles on incremental innovation in this context, particularly relevant to developing economies and resource-dependent industries. It provides direction for customised leadership development initiatives that prioritise transformational competencies while upholding stringent transactional controls, cultivating an innovative leadership framework that preserves safety without hindering innovation.

Lastly, the study's examination of transformational leadership's influence on knowledge sharing, psychological empowerment, and intellectual stimulation expands theoretical frameworks that connect leadership to innovation outcomes (Feranita et al., 2020; Le & Lei, 2019). It showcases how leaders at the frontline use transformational behaviours that have a direct effect on the innovation capacity of operational teams. This shows how important relational and empowerment-based leadership models are beyond senior leadership levels. This has important effects on both theory and practice. It calls for more distributed leadership styles that make innovation a part of everyday work.

In conclusion, this study substantially expands the theoretical and practical dimensions of leadership and innovation research by illustrating the essential function of transformational leadership in fostering incremental innovation within the operational core of the mining sector. It stresses the importance of having effective leaders at all levels of an organisation, especially among frontline supervisors. It also stresses the need for leaders to use a variety of styles to find a balance between safety and innovation. This in-depth contribution gives mining companies and researchers a stronger, evidence-based base to support leadership development, innovation management, and organisational resilience in industries that are constantly changing and need to be safe.

7.4 Recommendations

7.4.1 Recommendations for stakeholders

The study established that transformational leadership significantly enhances incremental innovation, while transactional leadership showed no measurable impact. This implies that for companies to improve incremental innovation, they need

to they need to leverage transformational leadership. With incremental innovation embedded in the firm's culture, they can be more competitive and thrive in the current challenging environment. Research reinforces this, showing that leadership and innovation must evolve together for mining companies to remain competitive in the current and future challenging environment (Atakhanova & Azhibay, 2023; Bi et al., 2022; Jianing et al., 2024).

This argument is further supported by Chen et al. (2021), Hia et al. (2023), and Adomako and Tran (2021), who collectively argue that technological advancement and strategic initiatives are crucial for enhancing a mining company's long-term competitiveness. This is a very important piece of advice for mining stakeholders, such as executives, investors, and boards: To get a strong competitive edge, they need to strategically combine their internal focus on incremental innovations (led by transformational leadership) with bigger strategic changes in the outside world. This long-term focus on the viability of the business is good for other important stakeholders as well, such as surrounding communities, small businesses, and suppliers. The resulting longevity and financial stability guarantee ongoing socio-economic advantages for host communities (e.g., sustainable employment, infrastructure enhancement, and social investment). This study recommends that communities actively seek mining companies to focus on transformational leadership to drive incremental innovation via the Social License to Operate (SLO). When communities make their support for a company depend on its commitment to shared value, long-term sustainable practices, and local development, it gives mining executives and policymakers a strong outside force that makes them focus on the innovation and strategic investments needed for long-term competitiveness.

7.4.2 Recommendations for policymakers and the Department of Mineral Resources and Energy

To successfully incorporate innovation into policy and regulatory frameworks, the Department of Mineral and Petroleum Resources (DMPR) should mandate the direct integration of innovation-related metrics and leadership development initiatives into company Social and Labour Plans (SLPs), making them integral to Mining Charter evaluations. This strategic regulatory alignment would create a strong incentive for mining companies to invest in leadership programs that actively encourage and

promote innovation and ongoing operational improvement by employees at the site level.

7.4.3 Strategy recommendations

To make Strategic and Practical Recommendations, companies should first work on Strategy Development by adding transformational leadership metrics to their main business strategies. This will make leadership style a key lever for innovation. This effort should be supported by the use of continuous innovation roadmaps that clearly link necessary leadership behaviours with important technology investments. Additionally, it is vital to directly connect innovation goals to talent retention and succession planning, as good leadership is key to attracting top talent in the mining industry. To put this into practice, businesses should create Innovation and Leadership Performance Indices to measure the effectiveness of leaders in driving innovation outcomes.

7.4.4 Recommendations for practice/practical application

To translate research results into tangible results, organisations must first demonstrate Transformational Leadership behaviours in daily Operations. This requires operational leaders to consistently exhibit core transformational traits: inspirational motivation, individualised consideration, and intellectual stimulation. Specifically, managers should proactively engage artisans in identifying operational inefficiencies and brainstorming improvements, which directly reinforces employee ownership and self-efficacy, and immediately translates the study's positive leadership–innovation link into measurable frontline behaviours. Complementing this is the need to develop a Coaching-Oriented Leadership Approach. Rather than defaulting to purely transactional correction or reward systems, supervisors should adopt a coaching style that actively encourages learning, thoughtful experimentation, and reflective practice. This approach can be accelerated through mentorship programs between experienced and newer supervisors, ensuring the diffusion of innovative practices across teams, and a coaching-led style that is a critical enabler of operational innovation in high-performing mines.

To further translate the findings of this study into direct, practical application, mining organisations must advance beyond theoretical leadership training. The competencies can be defined by the very items used to measure transformational

leadership in this study, which were empirically validated for their positive influence on innovation.

Based on the instrument used in this study, it suggests that "leadership development" for foremen should be structured as a behavioural checklist. When their artisan-reports can "Strongly Agree" with the following statements, a foreman is successfully practising transformational leadership:

- On Vision: "My leader gives me a clear idea of what the organisation will look like in the future."
- On Communication: "My boss does a good job of getting the organisation's vision across to the workers."
- About motivation: "My leader works all the time to get people excited about the organisation's vision."
- On Alignment: "My leader tells employees to work toward the same goals as the rest of the organisation" and "makes it clear how employees can help..."
- On Teamwork: "My leader makes sure that everyone on the team is working toward the same goal."

An organisation can directly train the specific actions that this study has shown will foster frontline incremental innovation by using these validated, innovation-linked behaviours as the curriculum for leadership development instead of generic theory.

7.5 Limitations of the study

This study provides significant insights into the relationship between transformational and transactional leadership and incremental innovation within the South African coal mining industry. Nevertheless, it is imperative to recognise several limitations to contextualise the results and guide future research endeavours appropriately.

7.5.1 Scope of the sector and context

This study was focused on the coal mining sector, and data were gathered from a limited number of operations within this industry. As such, the results may not be

entirely applicable to other mining commodities, including gold, platinum, or iron ore. These sectors may differ in terms of the advancements of their technology, the way their employees collaborate, and the challenges they encounter in their daily work. Additionally, insights from the mining sector may not be directly applicable to other industries outside of mining.

7.5.2 Design of the study and time constraints

This study utilised a cross-sectional research design, collecting data at a single moment in time. As a result, this study could not establish the impact of pre- and post-interventions that introduce transformational leadership. Leadership and innovation are dynamic constructs that develop over time, shaped by shifting organisational and environmental factors.

7.5.3 Concerns about data collection and bias

Data for the study were gathered through self-administered questionnaires, which depended on respondents' perceptions and honesty. This method may be subject to several limitations, including common method bias, social desirability bias, and response fatigue. Respondents might have provided answers that made them or their supervisors look good, which could have influenced the results.

7.5.4 Approach to methodology and level of insight

The chosen quantitative approach made it possible to test the relationships between the leadership styles and innovation statistically. However, it made it challenging to examine contextual details and the exploration of nuances of leadership behaviours as they performed and were perceived in the practical context.

7.5.5 Sample composition and hierarchical structure

The sample mainly consisted of artisans and foremen, representing the operational level of the organisation. This sample corresponds with the study's emphasis yet omits viewpoints from middle management and other higher levels. The relationships discovered in this study may manifest differently in those layers.

7.5.6 Time limitations

The study was conducted within the strict timelines imposed by the MBA research project. Because of these time limits, data collection could only take place for a short time, which meant that only a small number of people could be reached and surveyed. As a result, the sample size and diversity may have been impacted, especially concerning representation among various mining operations and geographical areas. The short time frame for data collection may have limited the range of insights and the overall applicability of the study's results. If the researcher had more time, they could have added more data to the dataset, making it bigger and more diverse.

7.6 Recommendations for future research

This study made a substantial contribution to the field of leadership styles and incremental innovation. It highlighted and addressed specific gaps in existing literature and offered a new lens to view the impact of transformational and transactional leadership on incremental innovation in the South African coal mining context. To extend the scope of understanding further, future studies should consider the following as possible focus areas.

7.6.1 Longitudinal research

To fully capture the dynamic interplay between leadership styles and innovation, future research is encouraged to adopt a longitudinal research design. A longitudinal study research design will provide a new perspective on the impact of prolonged implementation of diverse leadership styles on incremental innovation over time. Monitoring the progression of both the leadership-follower dynamic and the resulting innovative output at various measurement intervals. This will provide more information about the long-term effects and time-lagged mechanisms that help or hurt continuous improvement.

7.6.2 Comparative analysis

To test the external validity of the current results, future research should apply the same methodology to diverse, high-stakes industrial settings. Specifically, replication studies should focus on other sectors such as manufacturing, construction, or energy. These industries are generally considered heavy industries, with strict

compliance regulation requirements and significant safety concerns. By testing the existing model within these distinct, compliance-focused contexts, researchers can determine whether the relationships that have been discovered are consistent. This approach is essential for isolating the role of organisational context and institutional pressures as potential moderating variables on the core relationship observed.

7.6.3 Mixed-method approach

Future research should strategically extend the existing method by including a qualitative approach. This addition will be a supplementary approach that also provides explanatory power by allowing triangulation of results. Qualitative data, derived from semi-structured interviews, would offer richer insights into the relationship between leadership styles and incremental innovation. This would move the understanding beyond statistical relationships to a detailed explanation of the cultural and interpersonal factors that either facilitate or impede the successful implementation of leadership-driven innovation strategies.

7.6.4 Moderating variables

Future research could explore mediating or moderating factors such as organisational culture, psychological safety, or the compliance nature of the sector that strengthen or weaken the leadership innovation relationship. Specifically, researchers can investigate:

Mediators: factors that explain how leadership translates into innovation. For instance, psychological safety could serve as a crucial mediator, representing the mechanisms through which supportive leadership styles enable employee risk-taking and thus foster innovation.

Moderators: factors that determine when or for whom the leadership-innovation relationship is stronger or weaker. The compliance-driven sector is a possible moderator; the highly regulated context of industries like manufacturing or energy may significantly weaken or constrain the positive effect of innovation-focused leadership.

By integrating these mediating and moderating variables into the leadership-innovation relationship, future studies will be able to establish the boundary

conditions of the core relationship, significantly enhancing the understanding and practical relevance for organisational leaders.

7.7 Study conclusion

This chapter discusses the study's results on how transactional and transformational leadership styles impact incremental innovation among artisans and foremen in South Africa's coal mining sector. This chapter reiterates the study's primary objective, highlighting the positive effect of transformational leadership on incremental innovation. The chapter outlines managerial implications for leadership development, advocating for training in transformational leadership to enhance operational efficiency and innovation within mining companies.

This Chapter also highlights the need for a cultural shift from transactional to collaborative leadership to foster continuous improvement and safety. The study contributes to theory by extending Bass's leadership model to include incremental innovation in mining, underscoring the importance of frontline leaders, such as artisans and foremen, in driving innovation.

Recommendations for stakeholders include embedding transformational leadership metrics in corporate strategies and policy frameworks, with a focus on longitudinal research and comparative studies in other heavy industries to support and expand upon these results.

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List of Appendices

Appendix A	Invitation to participate and consent statement
Appendix B	Instrument (Survey)
Appendix C	Ethics approval
Appendix D	Missing value analysis
Appendix E	Outlier analysis

Appendix A: Invitation to participate and consent statement

Dear Respondent,

My name is Khuthadzo Netsianda, and I am currently a student at the University of Pretoria's Gordon Institute of Business Science (GIBS), completing my research in partial fulfilment of an MBA degree.

I am conducting research on "The Impact of Leadership Styles on Incremental Innovation Among Frontline Mining Employees (Artisans and Foremen)." This study aims to understand how different leadership approaches influence the ability of mining teams to implement ongoing, small-scale improvements in tools, processes, and productivity.

You are invited to participate in this research by completing a short questionnaire based on your personal experiences in your current mining operation. The survey will take approximately 15–20 minutes to complete.

Please note:

- Your participation is entirely voluntary, and you may withdraw at any time without any consequences.
- Your responses will be anonymous. Only aggregated data will be included in the final research report.
- By completing the questionnaire, you indicate that you voluntarily consent to participate in this study.

If you have any questions or concerns about the research, please feel free to contact me or my research supervisor. Our details are below:

Researcher:

Khuthadzo Netsianda | Email: 24078892@mygibs.co.za

Research Supervisor:

Dr Sherin Ramparsad | Email: sramparsad@mandelaminigprecinct.org.za

Thank you for your time and valuable contribution to this research.

Appendix B: Instrument (Survey)

Section 1

Your participation is entirely voluntary, and you may withdraw at any time without any consequences. Your responses will be anonymous. Only aggregated data will be included in the final research report.

By completing the questionnaire, I voluntarily consent to participate in this study.

Yes -1

No- 2

Screening question:

Do you currently work as an artisan/foreman in the South African Coal mining industry?

1-yes

2- No (All responders who select "No" will be thanked and exited from the survey)

1. Trade in possession:

Mechanical-1

Electrician -2

Auto Electrical-3

Diesel/petrol mechanic-4

Instrumentation -5

Other -6

2. Supervisor or Artisan:

Supervisor-1

Artisan -2

3. Years of experience: 2-6 years-2 7-12 years-3 12- 17 years-4 18 years and above-5 4. Type of operation you work: Open Cast-1 Underground -2 Processing plant-3	
Section 2 To what extent do you agree with the following statements? Please indicate your answer using the following 5-point scale: 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree	
Construct	Questions
incremental innovation	5. You frequently seek solutions to operational challenges by refining existing techniques rather than adopting completely new approaches 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree

	6. Your team has frequently applied moderately improved mining techniques or equipment modifications in new operational areas over the last three years 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	7. You continually refine and improve the processes and techniques used in your daily mining and maintenance operations 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree.
	8. You regularly implement small changes to enhance the efficiency and safety of your tasks. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	9. You introduce improved but existing mining/maintenance methods and tools to optimise performance in your work. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree

	5- Strongly Agree
	10. You actively find ways to enhance the efficiency of equipment maintenance and repair processes. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	11. You contribute to reducing operational costs by improving work methods and resource utilisation in mining activities 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	12. You regularly make small adjustments to mining equipment, tools, and procedures to enhance efficiency. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	13. You work towards reducing costs and improving productivity by optimising the use of available resources and scaling operations. 1- Strongly disagree 2- Disagree 3-Neutral

	4- Agree 5- Strongly Agree
	14. My leader's leadership style can motivate me to innovate strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
Transformational leadership	15. My leader provides a clear vision for the future of the organisation. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	16. My leader effectively communicates the organisation's vision to the employees. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	17. My leader continuously works to generate enthusiasm for the organisation's vision. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree

	5- Strongly Agree
	18. My leader has a clear sense of where the organisation should be in five years. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	19. My leader encourages employees to align with common organisational goals. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	20. My leader ensures that the team works together towards a shared direction. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	20. My leader clarifies how employees can contribute to achieving the organisation's goals. 1- Strongly disagree 2- Disagree 3-Neutral

	4- Agree 5- Strongly Agree
Transactional leadership	21. My leader gives me positive feedback when I perform well. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	22. My leader actively shows appreciation when I exceed expectations. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	23. My leader personally compliments me when I do outstanding work. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	24. I receive performance rewards when I meet set performance expectations. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree

	25. The performance rewards I receive depend on how well I perform my job as per individual, team and organisational targets set. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	26. My leader clearly communicates performance ratings and what I will receive if I meet performance requirements accordingly. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	27. The effort I put into my work determines the performance rating and performance rewards I receive. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	28. There are negative consequences, as per internal processes, if I perform worse than the targets set. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree

	5- Strongly Agree
	29. If I do not consistently meet performance expectations, my leader ensures there are consequences as per internal processes. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree
	30. My leader takes action, as per internal processes, when I do not improve my performance. 1- Strongly disagree 2- Disagree 3-Neutral 4- Agree 5- Strongly Agree

Appendix C: Ethics approval

I affirm that all relevant information has been provided in this form and its attachments and that all statements made are correct.

Date: 01 Jul 2025

Supervisor Name in capital letters: *****

Date: 14 Jul 2025

Co-supervisor Name in capital letters:

Date: 01 Jul 2025

Note: GIBS shall do everything in its power to protect the personal information supplied herein, in accordance to its company privacy policies as well the Protection of Personal Information Act, 2013. Access to all of the above provided personal information is restricted, only employees who need the information to perform a specific job are granted access to this information.

Approved

Decision:

REC comments:

Clearance is granted on the basis that the researcher meets all requirements under the POPIA

Date: 15 Jul 2025

Appendix D: Missing value analysis

Univariate Statistics							
	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
VAR1	130	3,79	,921	0	,0	3	0
VAR2	130	3,98	,952	0	,0	11	0
VAR3	130	4,18	,785	0	,0	5	0
VAR4	129	4,37	,876	1	,8	6	0
VAR5	130	4,30	,754	0	,0	5	0
VAR6	130	4,27	,755	0	,0	3	0
VAR7	130	4,26	,877	0	,0	6	0
VAR8	130	3,88	1,016	0	,0	.	.
VAR9	130	4,23	,822	0	,0	5	0
VAR10	130	4,12	1,111	0	,0	12	0
VAR11	130	3,99	1,067	0	,0	15	0
VAR12	130	3,89	1,101	0	,0	15	0
VAR13	130	3,84	,995	0	,0	0	0
VAR14	130	3,83	1,086	0	,0	0	0
VAR15	130	4,00	,980	0	,0	11	0
VAR16	130	4,08	1,001	0	,0	9	0
VAR17	130	3,96	1,030	0	,0	12	0
VAR18	130	4,04	1,015	0	,0	14	0
VAR19	130	3,95	1,033	0	,0	0	0
VAR20	130	3,91	1,038	0	,0	0	0
VAR21	130	3,40	1,261	0	,0	14	0

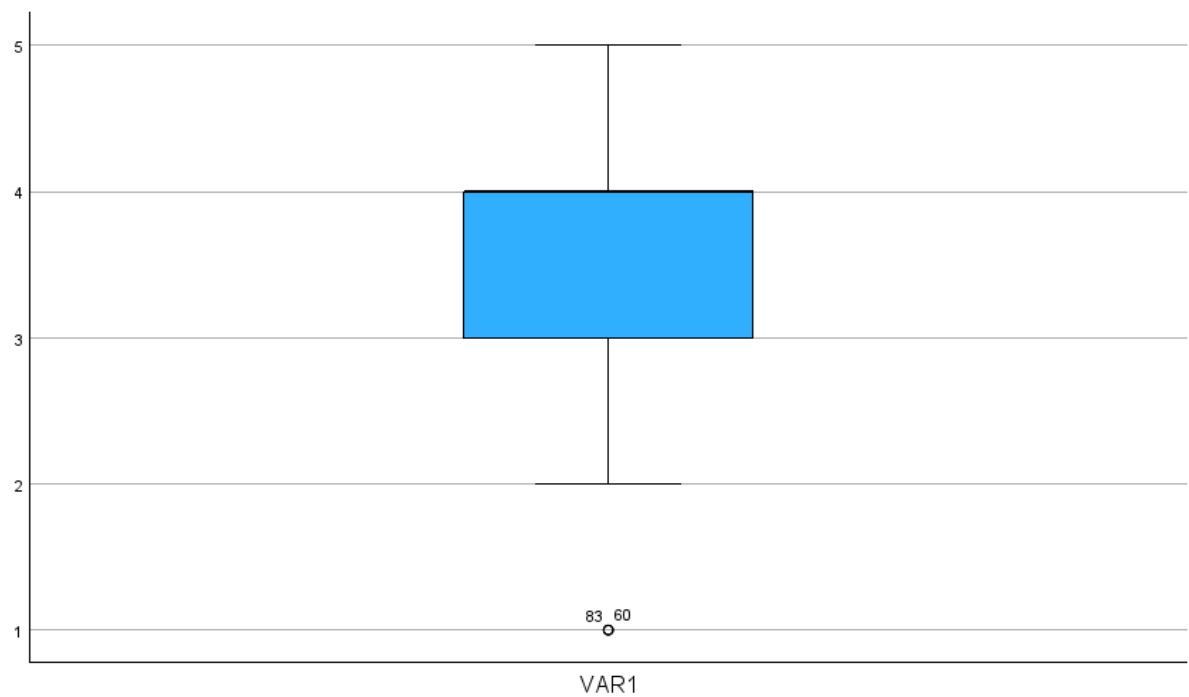
Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
VAR22	130	3,43	1,220	0	,0	11	0
VAR23	130	3,55	1,155	0	,0	9	0
VAR24	130	3,55	1,135	0	,0	10	0
VAR25	130	3,62	,983	0	,0	6	0
VAR26	130	3,53	,966	0	,0	5	0
VAR27	130	3,82	,852	0	,0	2	0

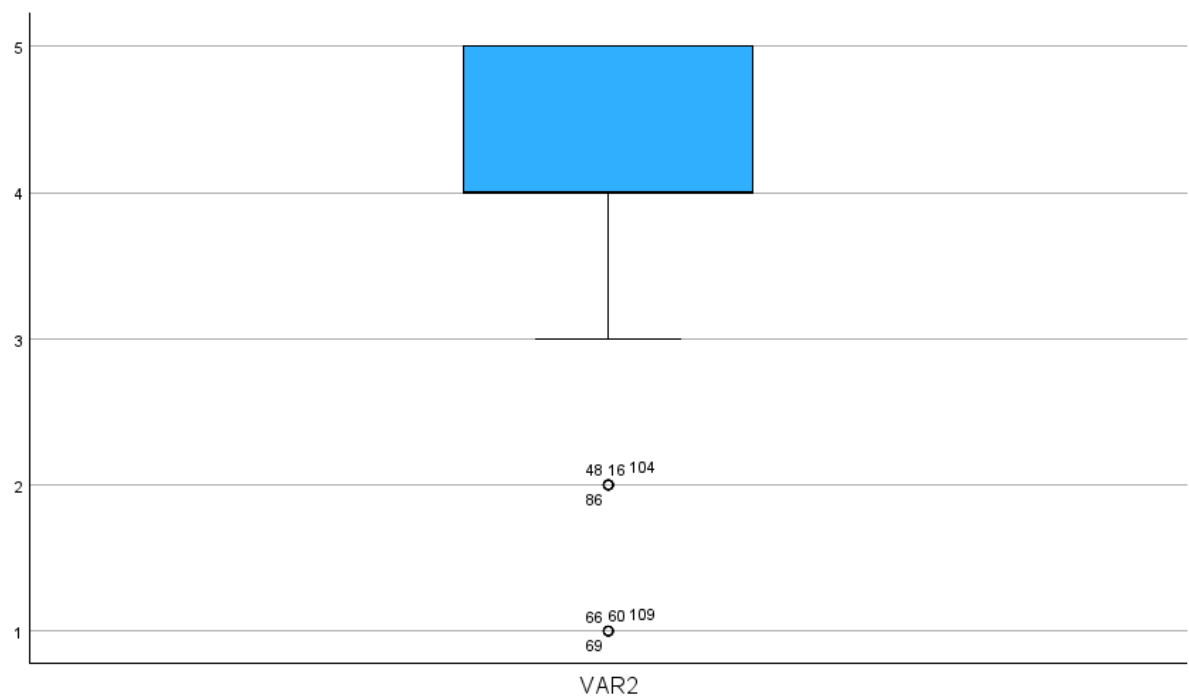
a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Appendix E: Outlier analysis

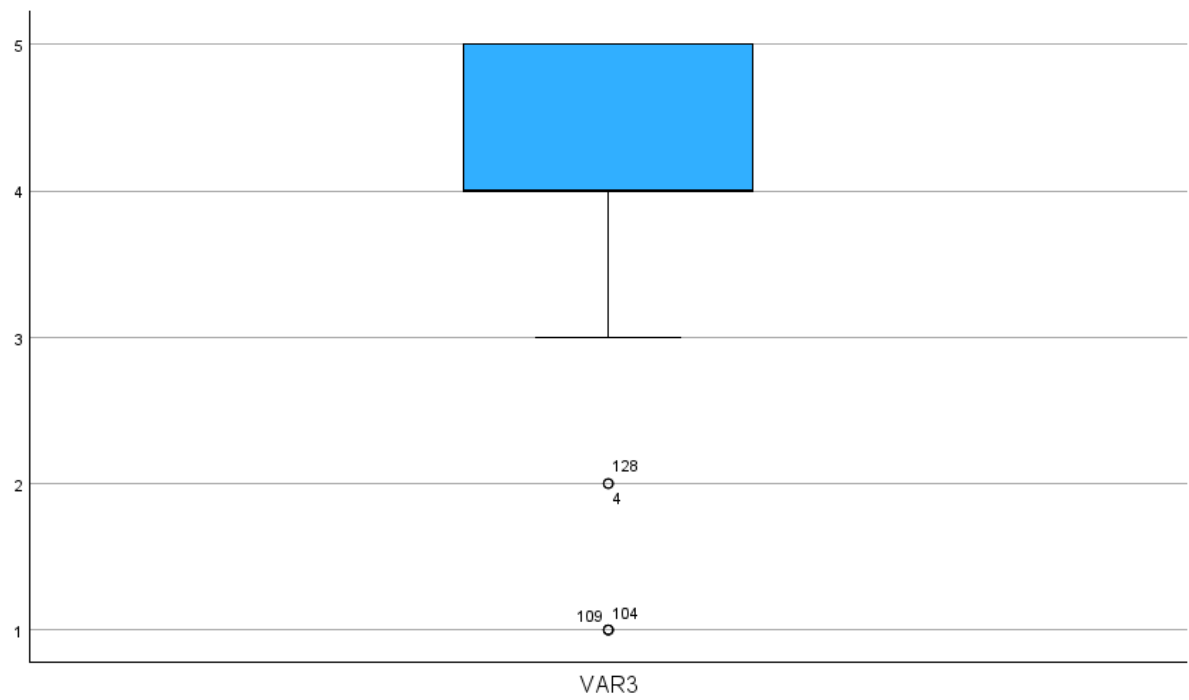
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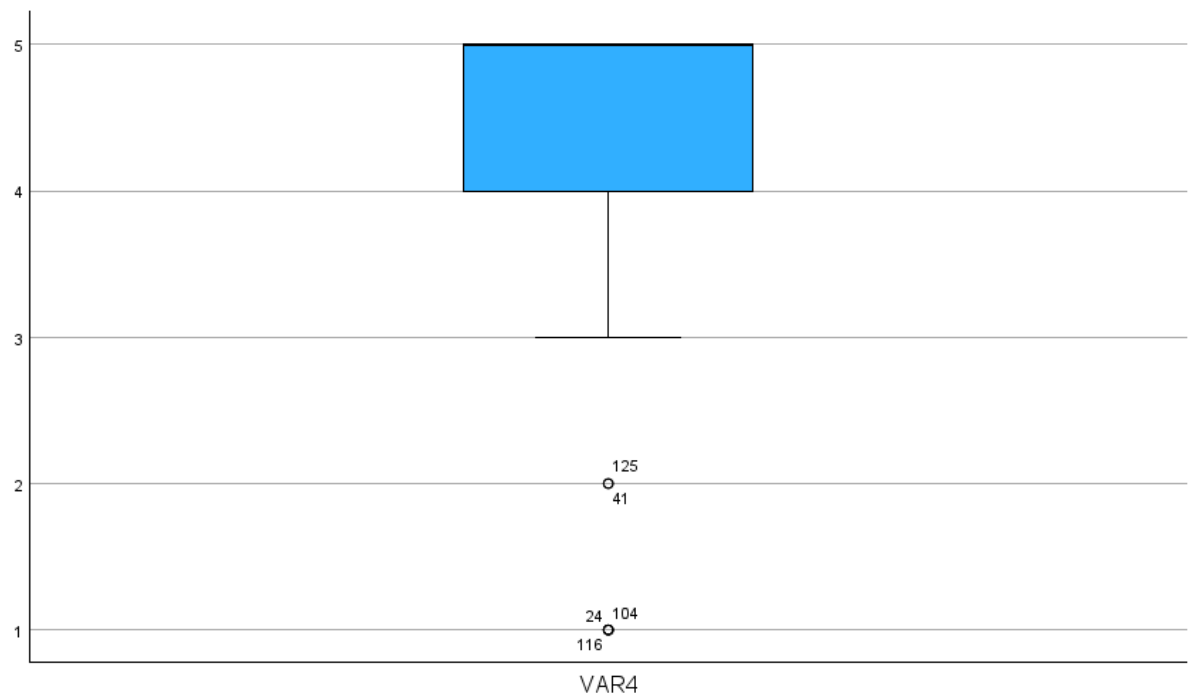
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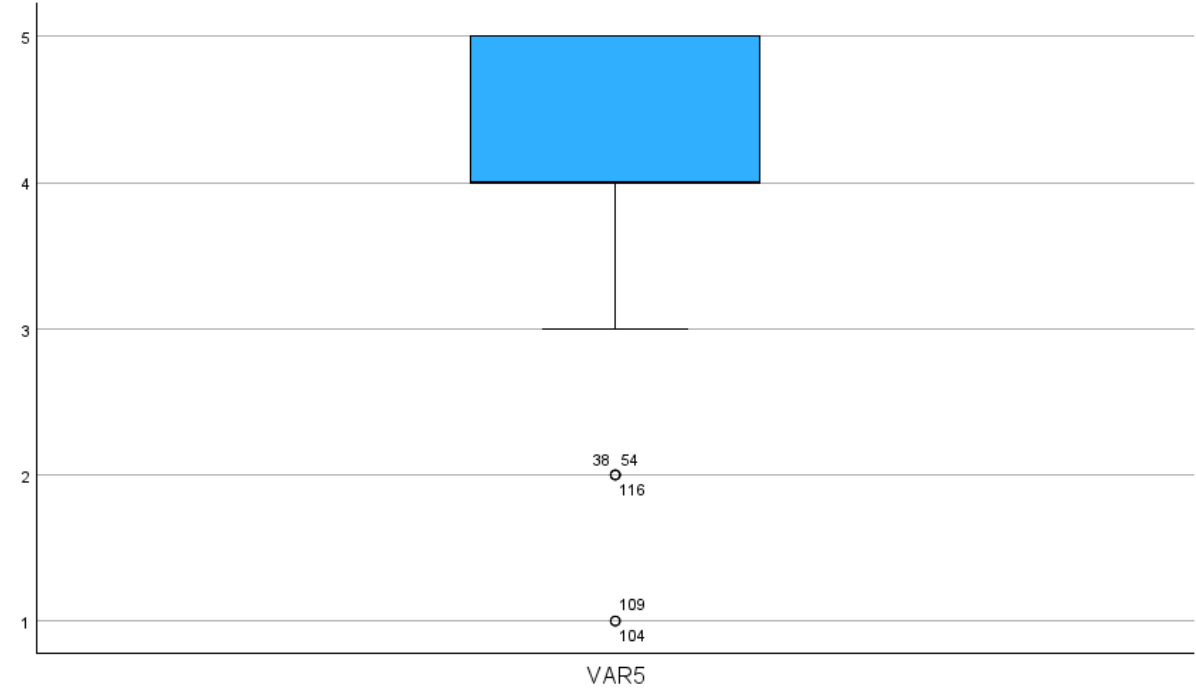
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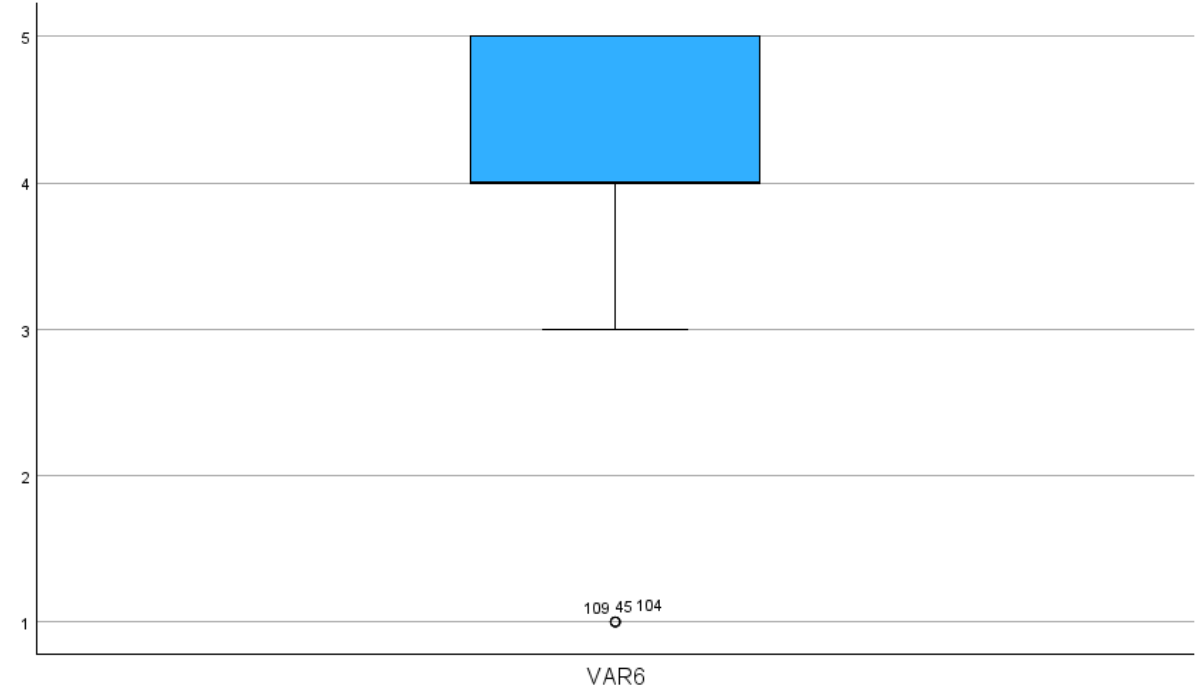
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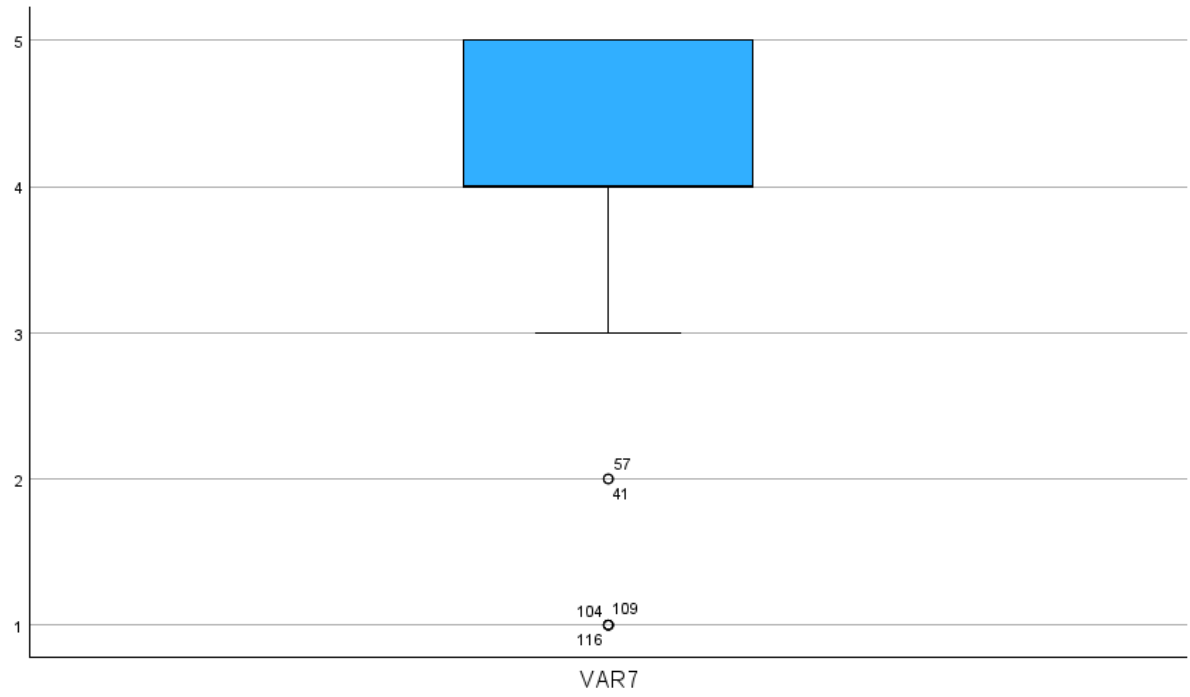
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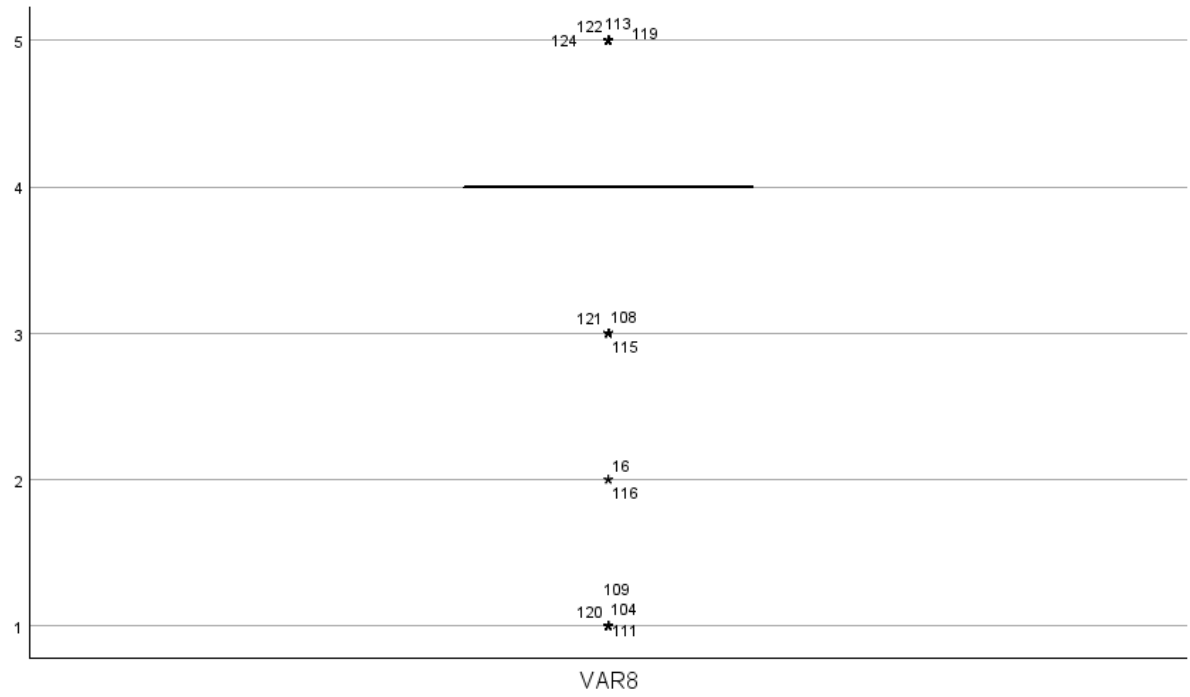
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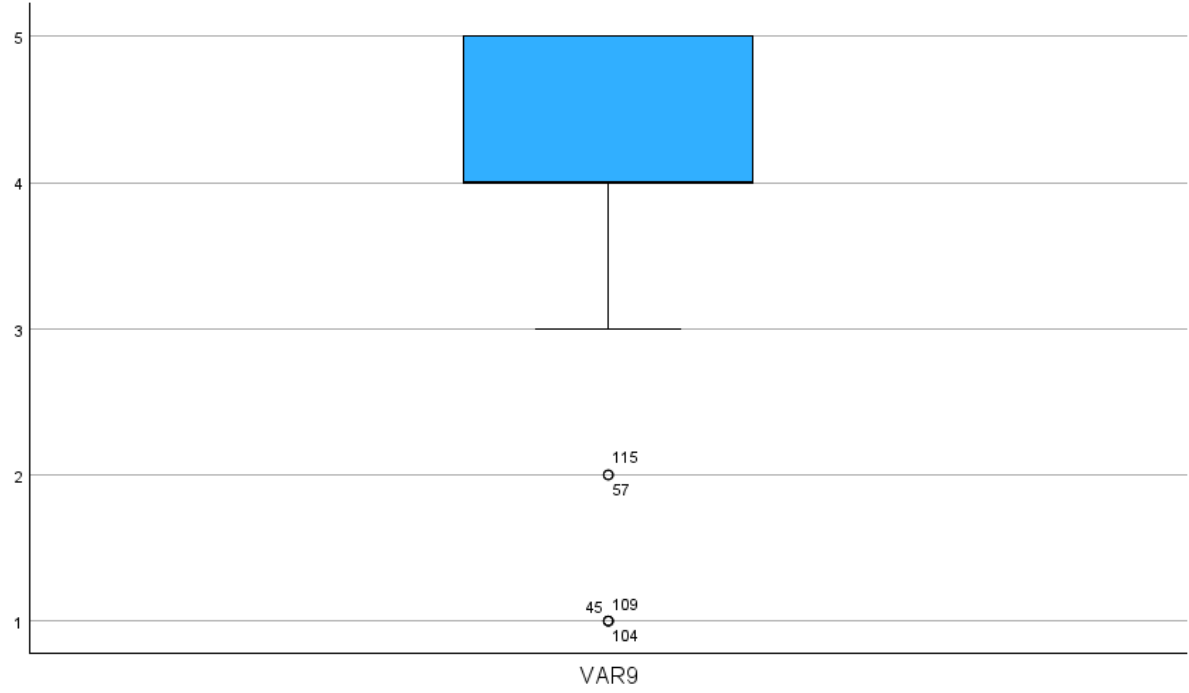
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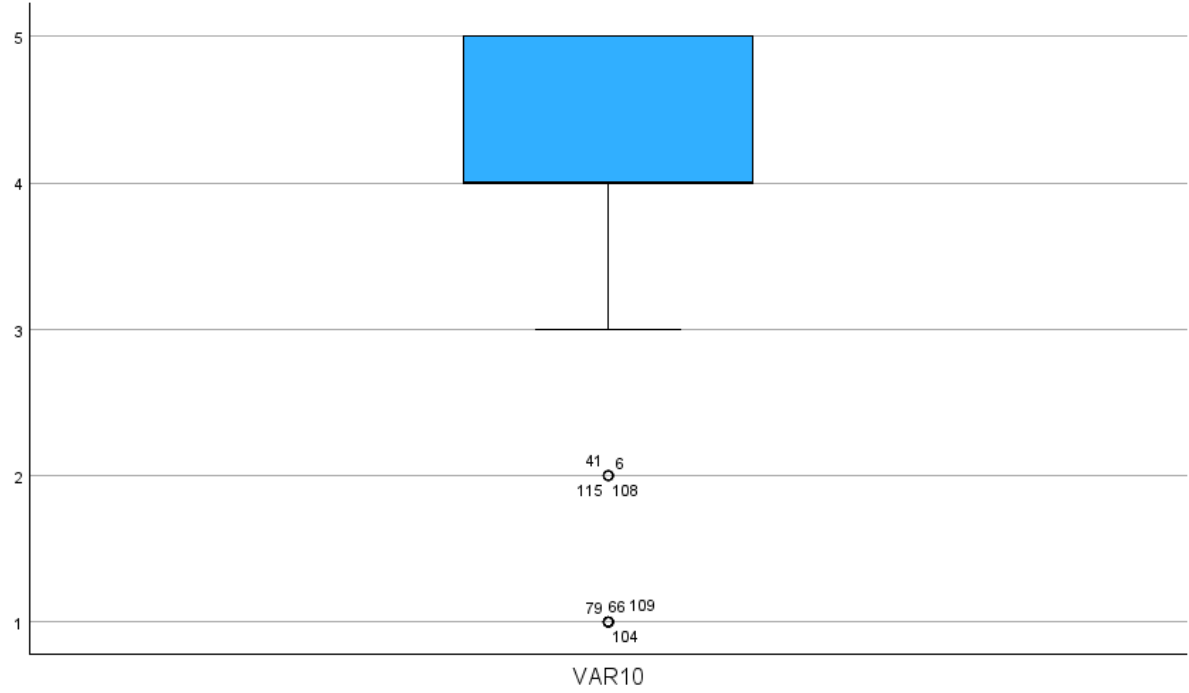
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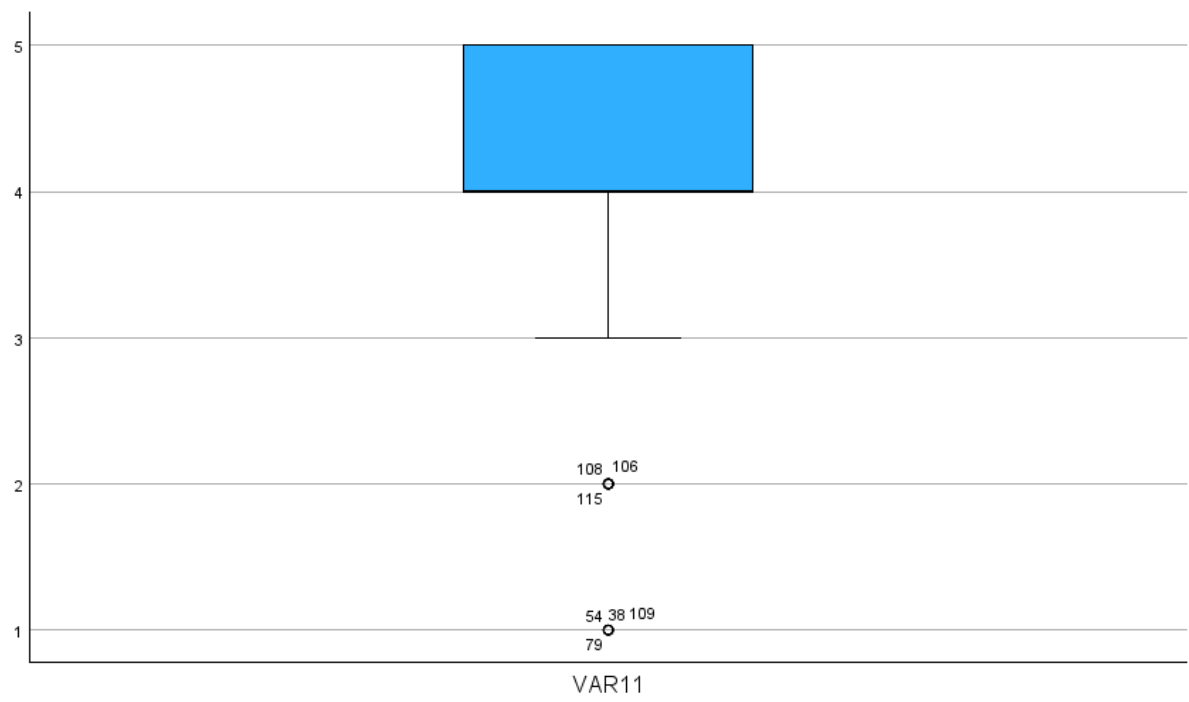
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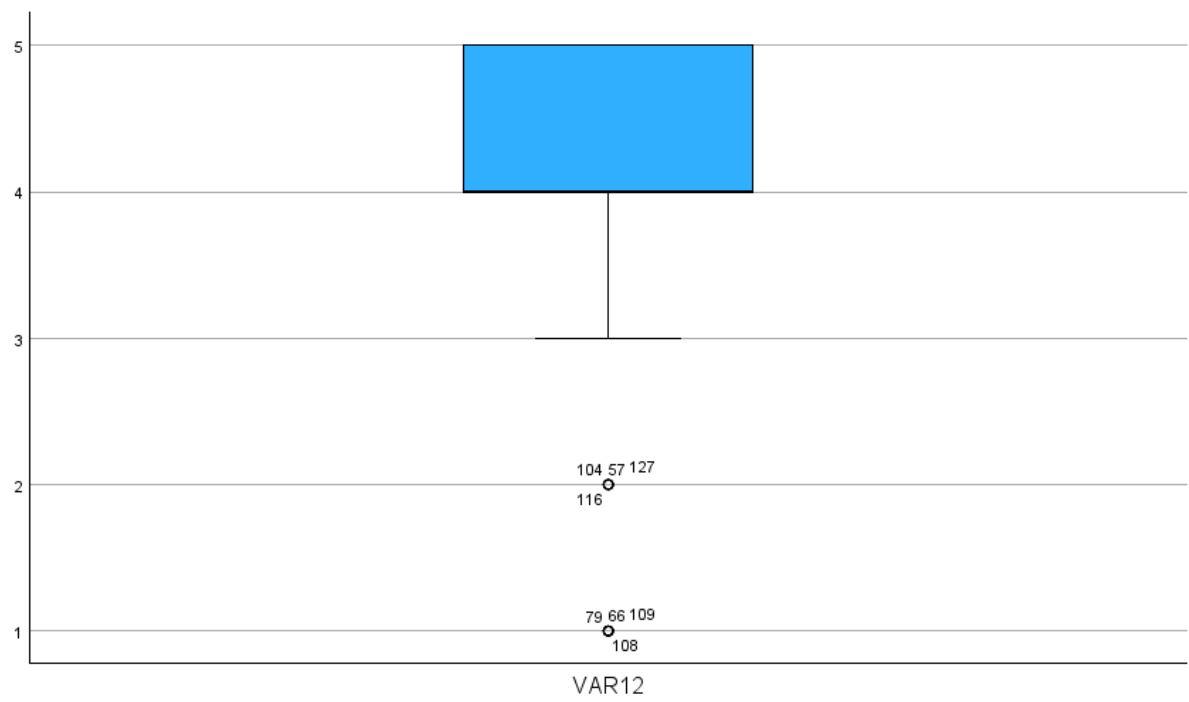
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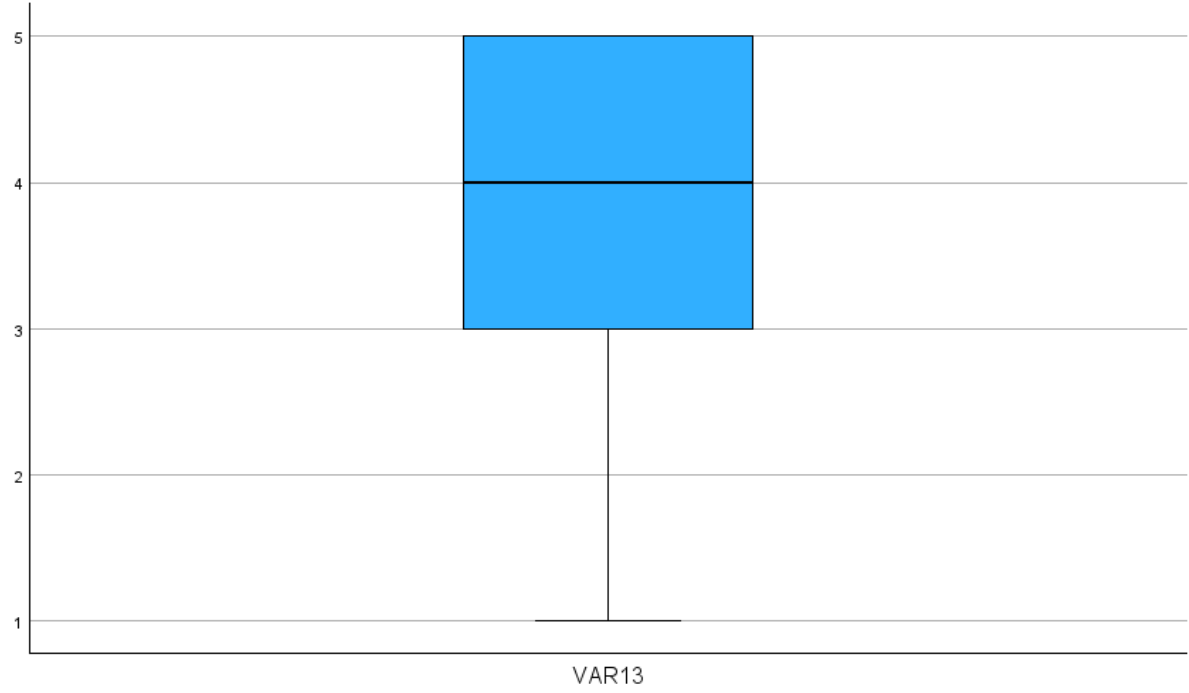
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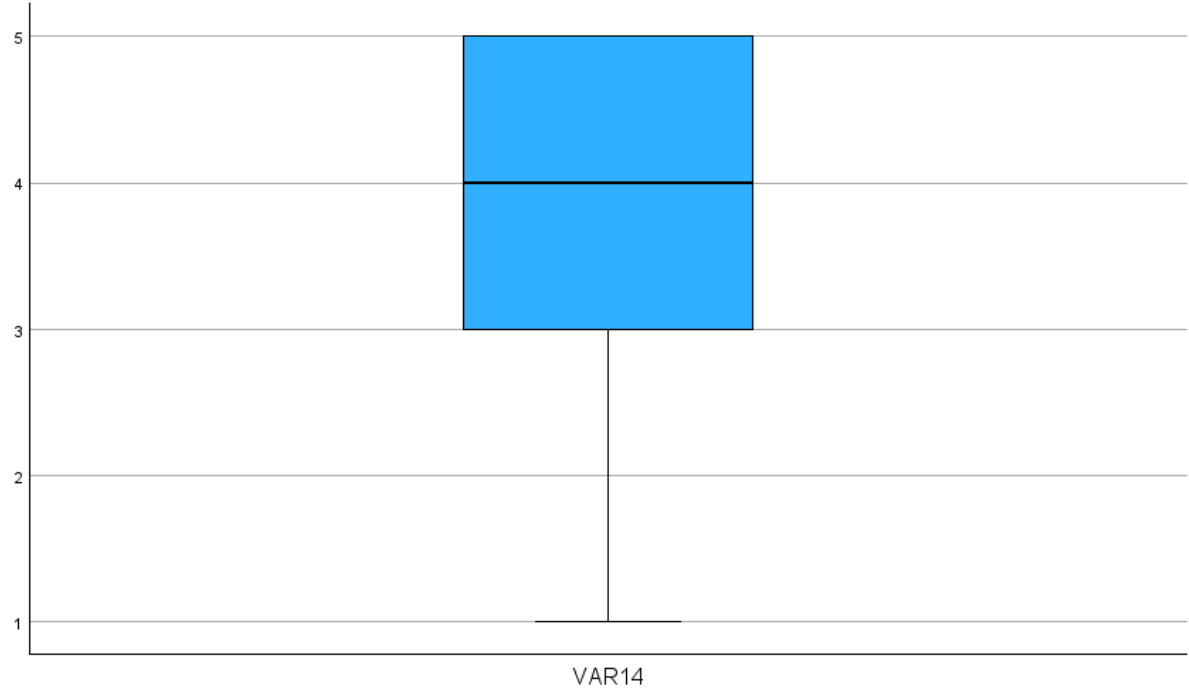
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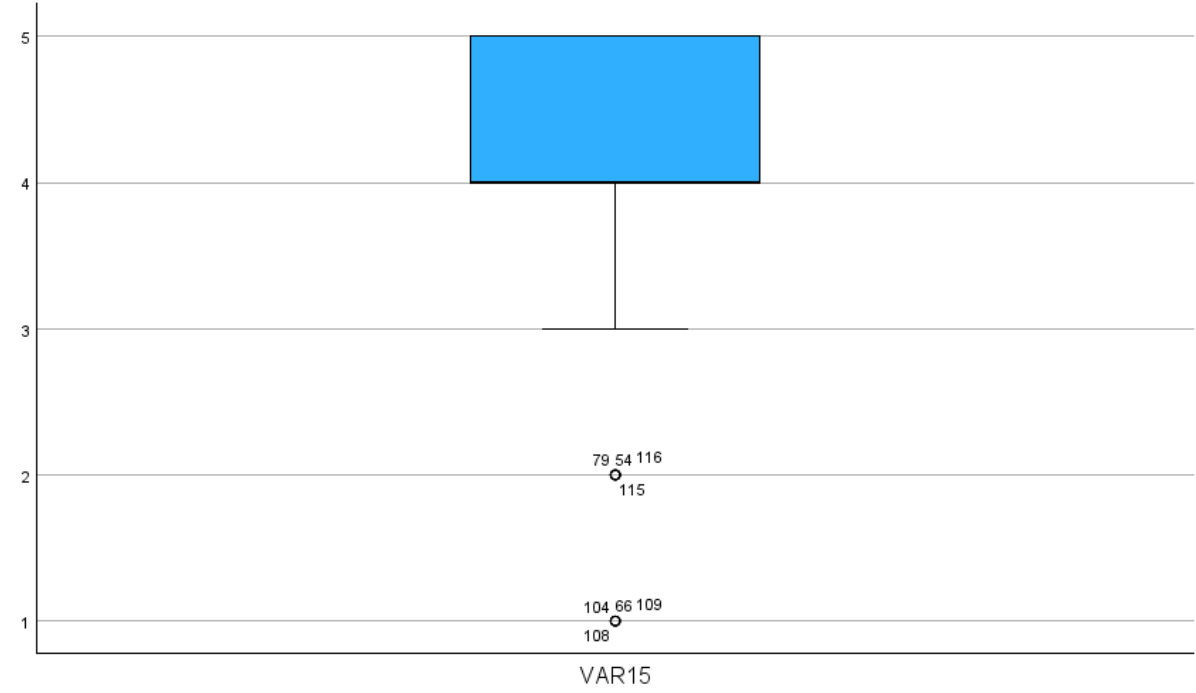
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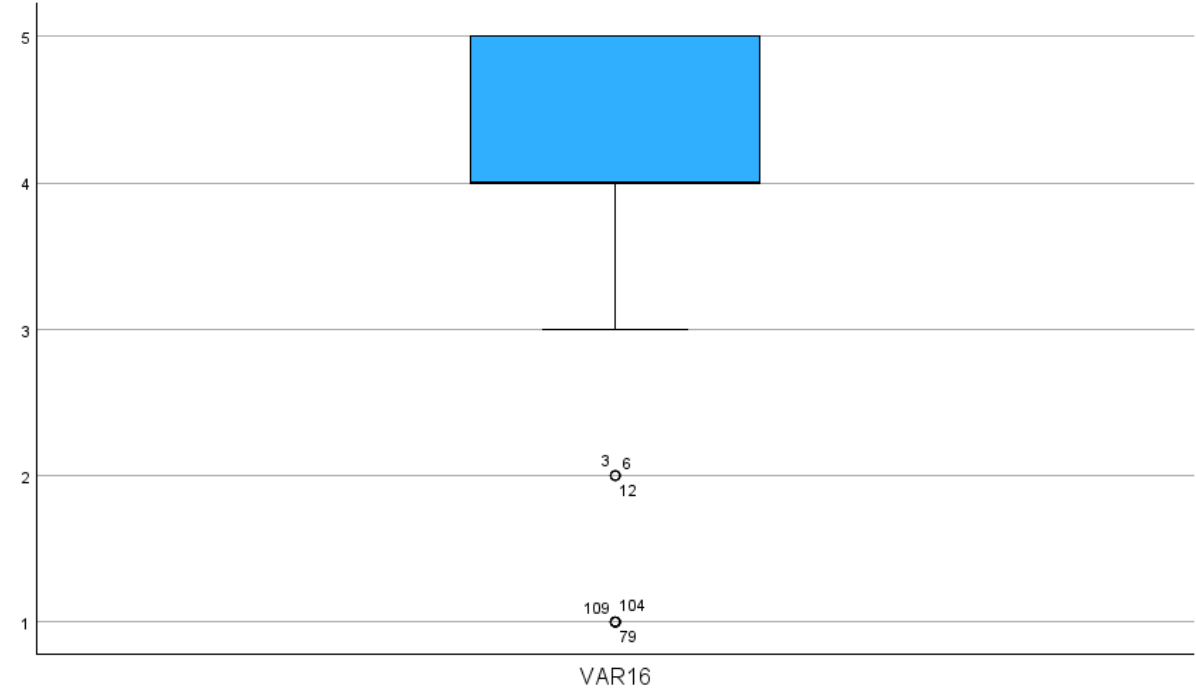
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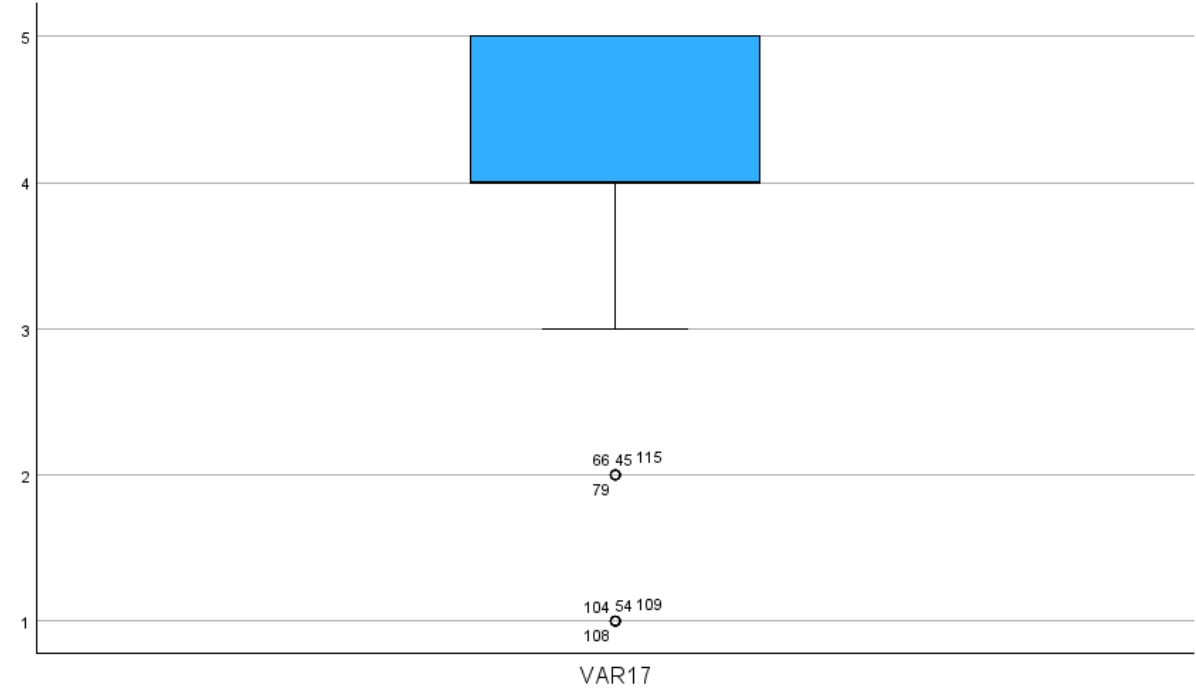
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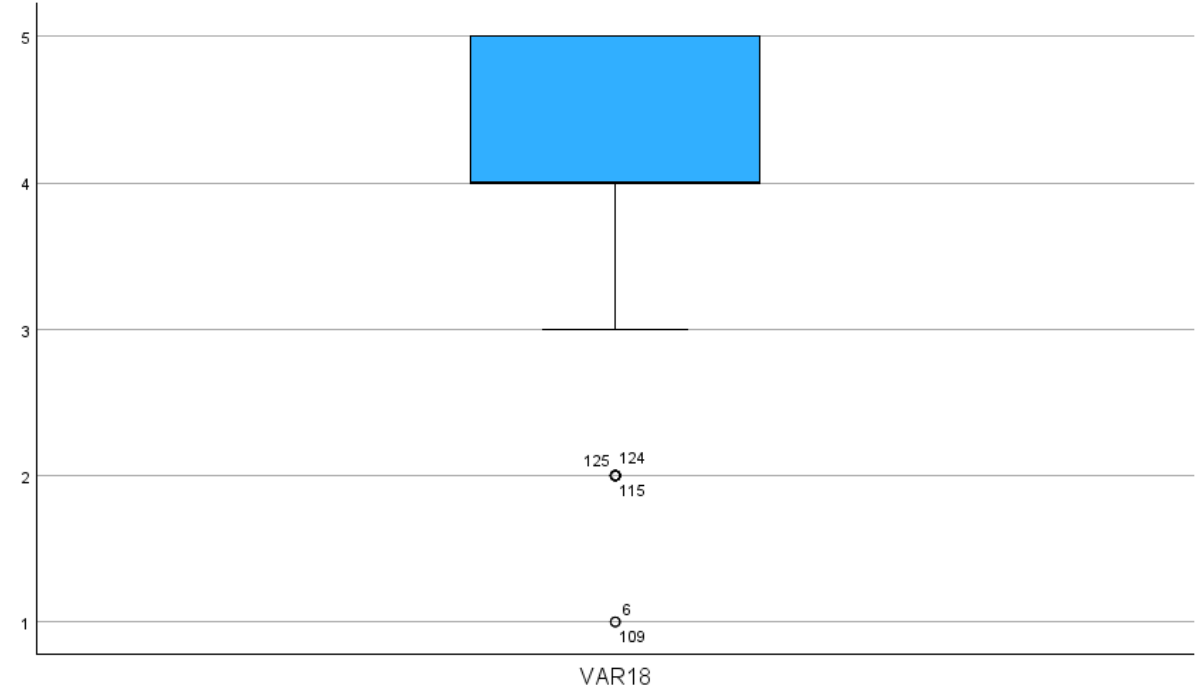
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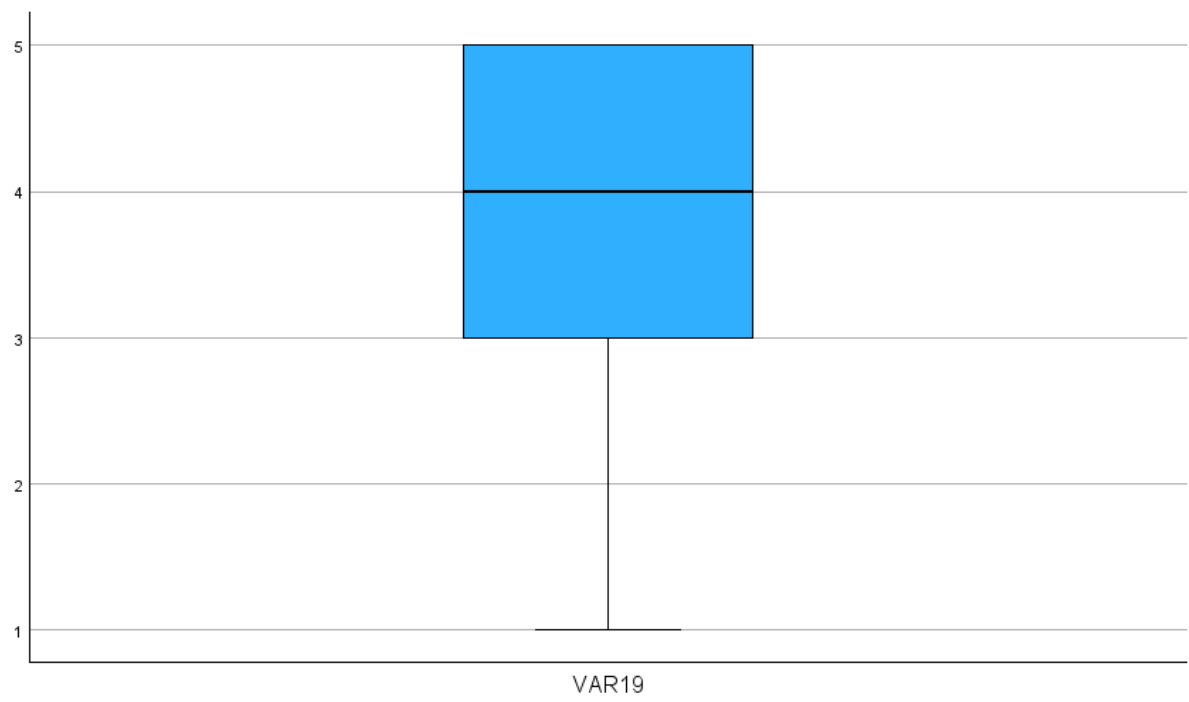
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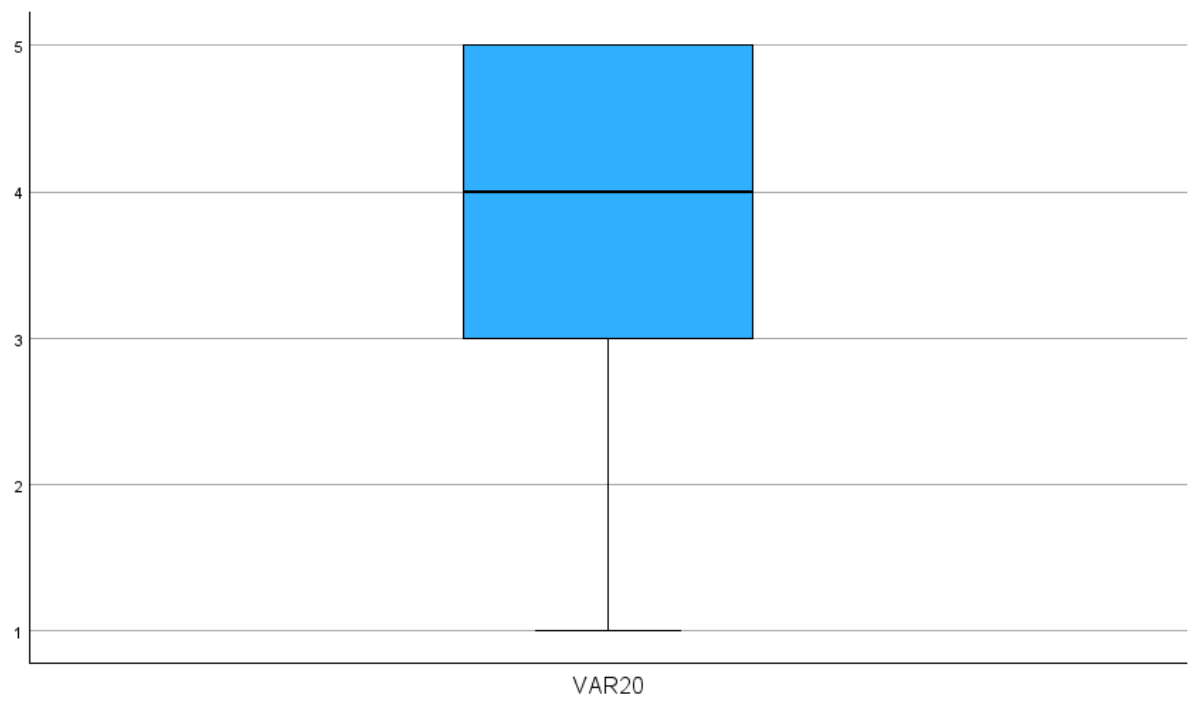
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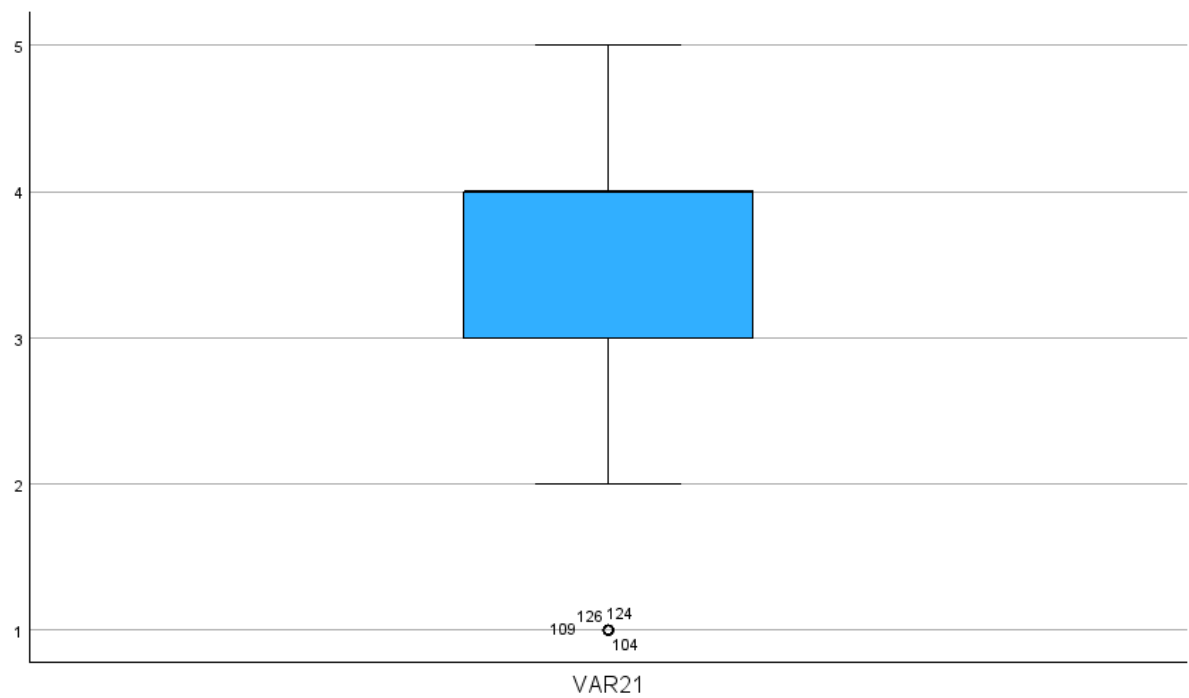
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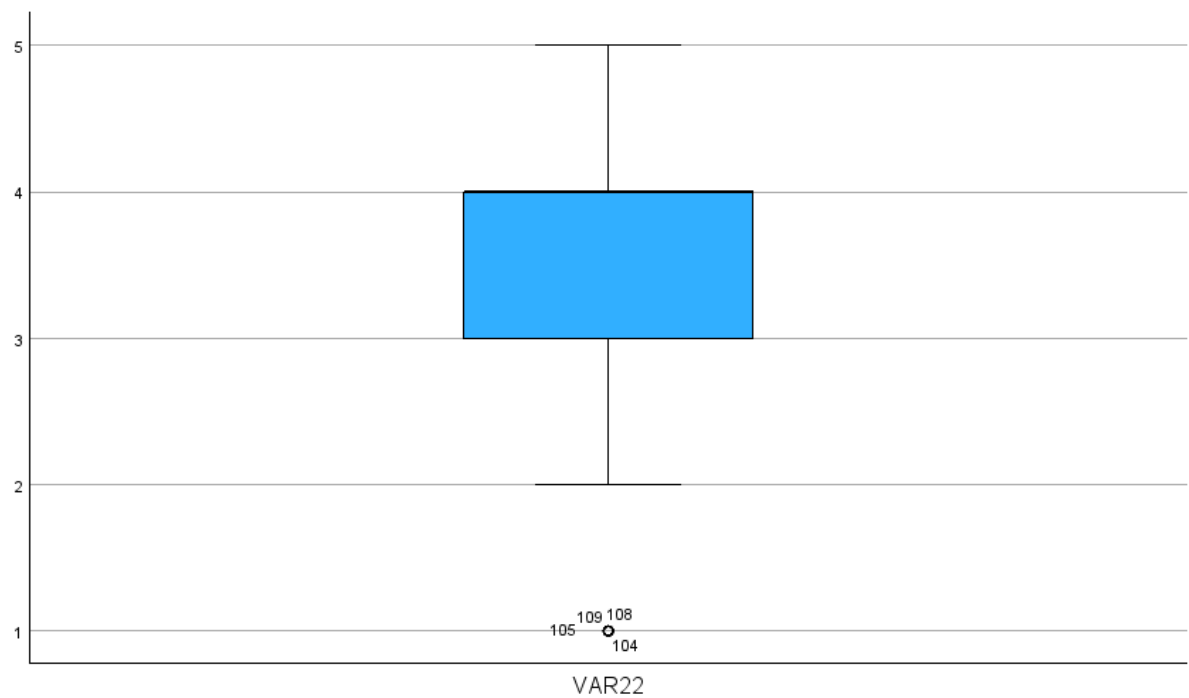
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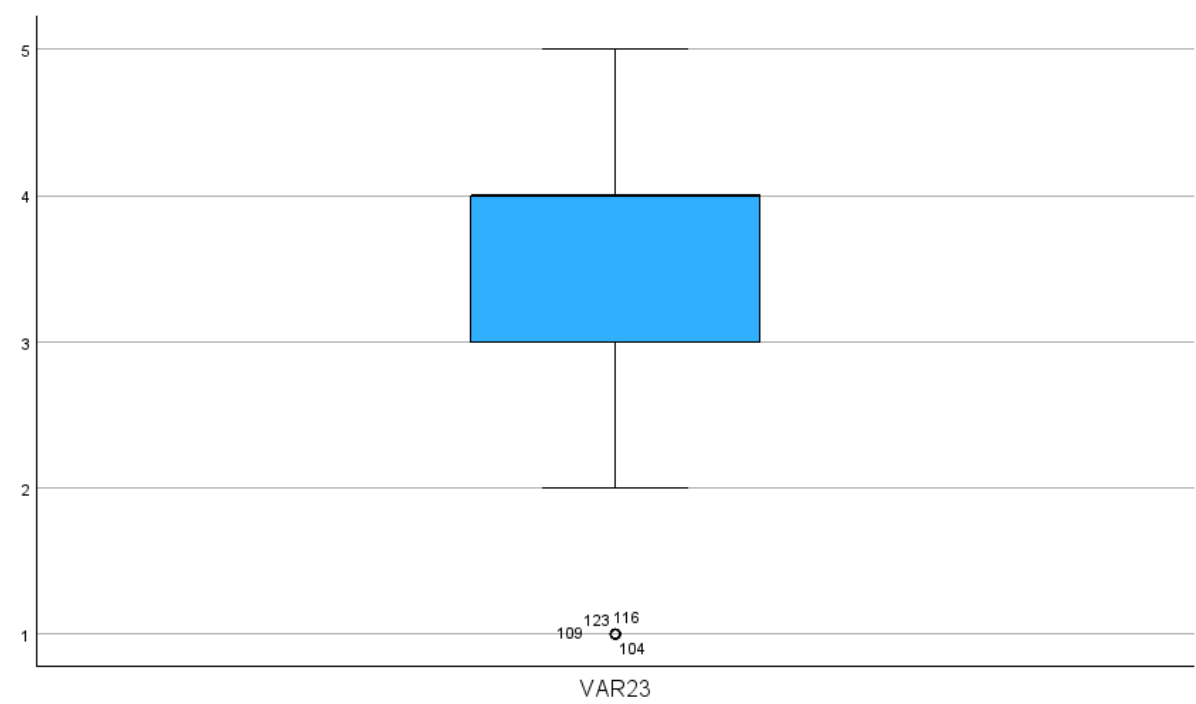
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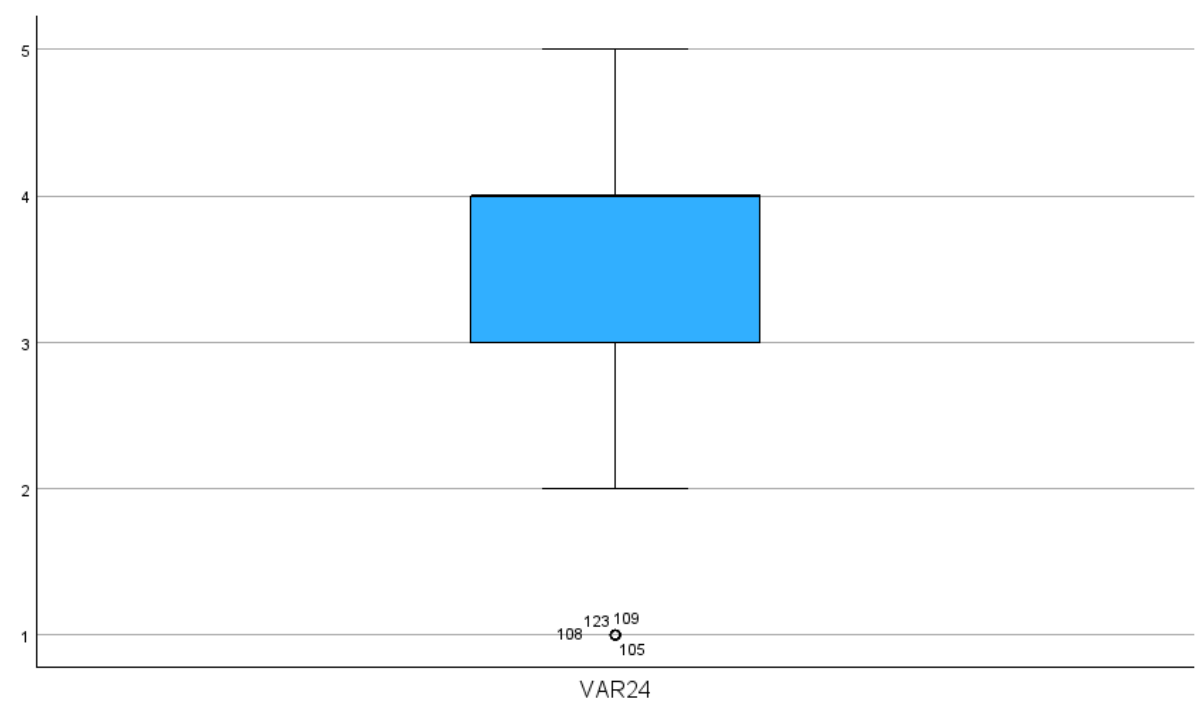
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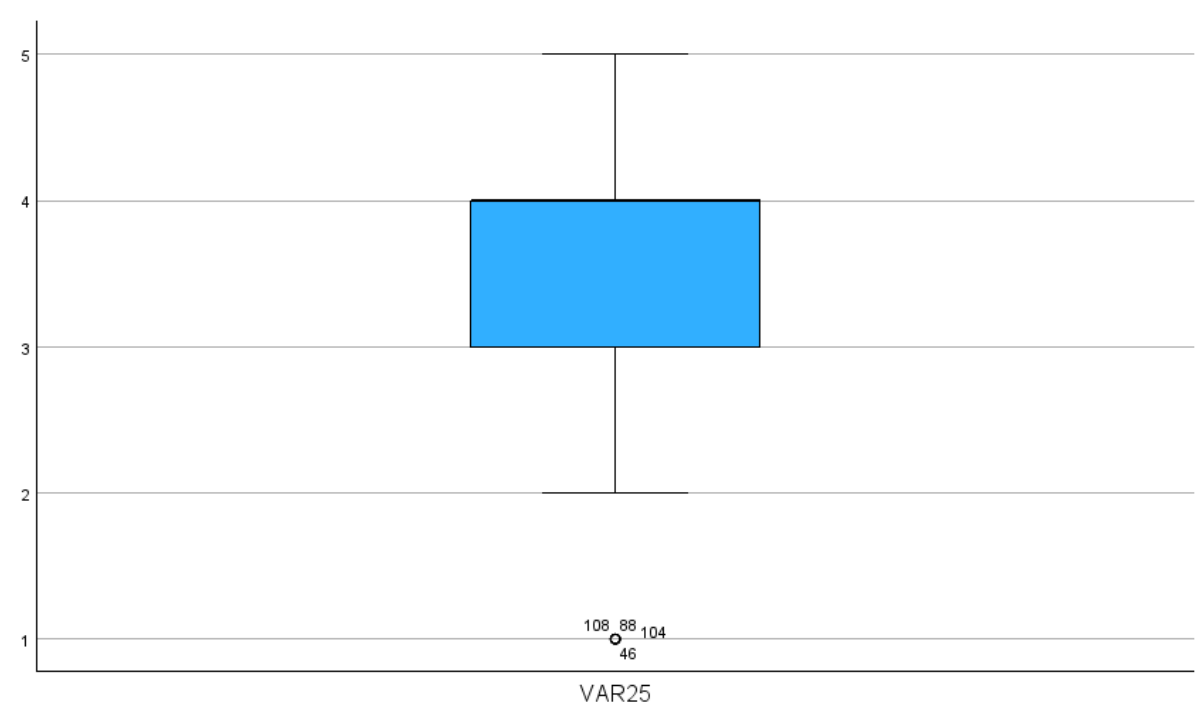
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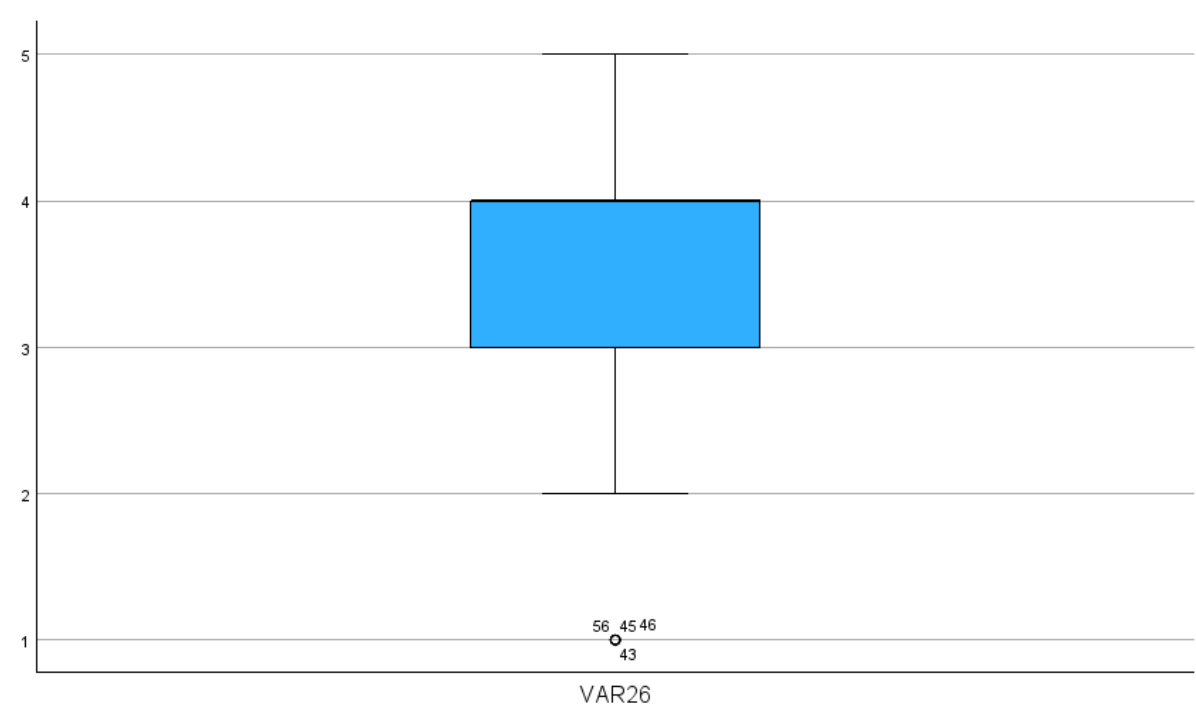
VAR24



VAR25



VAR26



VAR27

