

Ubuntu leadership and employee engagement in mining: The moderating role of safety culture



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Dates:

Received: 31 Mar. 2025
Accepted: 24 June 2025
Published: 28 July 2025

How to cite this article:

Nelwamondo, M.B., & Price, G.
(2025). Ubuntu leadership
and employee engagement in
mining: The moderating role
of safety culture. *SA Journal
of Human Resource
Management/SA Tydskrif vir
Menslikehulpbronbestuur*,
23(0), a3065.
[https://doi.org/10.4102/
sajhrm.v23i0.3065](https://doi.org/10.4102/sajhrm.v23i0.3065)

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Orientation: This study explored the influence of Ubuntu leadership on employee engagement in South Africa's mining industry, with a focus on the moderating role of safety culture.

Research purpose: The purpose was to examine whether Ubuntu leadership significantly predicts employee engagement and whether safety culture strengthens this relationship.

Motivation for the study: The mining sector faces persistent challenges such as hazardous working conditions and disengagement. Addressing these issues requires leadership models that are both effective and culturally relevant.

Research approach/design and method: A descriptive, cross-sectional quantitative design was employed. Data were collected from 351 mining employees using the Ubuntu Leadership Scale (ULS), Utrecht Work Engagement Scale (UWES) and a custom-developed safety culture scale. Statistical analysis included correlation and moderated regression.

Main findings: Ubuntu leadership was positively associated with employee engagement ($r = 0.633, p < 0.001$), and the interaction term with safety culture was statistically significant ($B = 0.187, p = 0.003$), confirming a moderating effect. The model explained 40.6% of the variance in engagement.

Practical/managerial implications: Integrating Ubuntu leadership with a strong safety culture can enhance employee engagement, and improve safety compliance.

Contribution/value-add: This study contributes to the understanding of culturally grounded leadership in high-risk industries and highlights the synergistic role of safety culture in enhancing leadership effectiveness.

Keywords: Ubuntu leadership; employee engagement; safety culture; demographics; South African mining industry.

Introduction

The South African mining industry presents unique challenges because of its hazardous working conditions, high accident rates and a socio-political context marked by gender inequality (Mangaroo-Pillay & Botha, 2020), exploitation of foreign labour and human rights violations (Abrahams, 2021). Despite regulatory frameworks for safety and sustainability, issues such as environmental degradation and labour disputes persist, highlighting the need for effective leadership to address these challenges (Igbayiloye & Bradlow, 2021). The industry's systemic challenges significantly impact employee well-being, productivity and safety standards (Pelders et al., 2021). Recent data reveal a turnover rate of approximately 15% annually within the mining sector, with nearly 40% of new hires leaving within the first 2 years, often because of high job stress and inadequate leadership support (Mining Council of South Africa, 2023).

In this high-risk and high-pressure environment, employee engagement becomes a critical organisational priority. Engaged employees are more likely to adhere to safety protocols, contribute to innovation and remain committed to their organisations (Kotzé & Nel, 2020). However, fostering engagement in such a context requires leadership approaches that are not only effective but also culturally resonant.

Ubuntu-inspired leadership, emphasising collective responsibility and communal well-being, could create a culture of mutual accountability (Nwozaku, 2023), enhancing safety standards and reducing accident rates (Marais, 2017). Previous studies have shown that Ubuntu leadership can strengthen the connection between social resources and work attitudes, improving engagement (Tauetsile, 2021).

This study investigates Ubuntu leadership as a culturally relevant framework for addressing employee engagement and safety culture in the South African mining sector. Rooted in African values, Ubuntu leadership promotes collective welfare and humanistic values, enhancing organisational performance and addressing governance challenges (Asamoah & Yeboah-Assiamah, 2019). This research addresses a gap in the literature by examining the interplay between Ubuntu leadership, employee engagement and safety culture in high-risk industrial context.

Literature review

Overview of the South African mining industry

The South African mining industry is a crucial part of the nation's economy, significantly contributing to gross domestic product (GDP), exports and employment (Ericsson & Löf, 2019). The South African mining sector is diverse, producing a range of commodities including Platinum Group Metals (PGMs), coal, gold, iron ore, manganese, chrome and diamonds. Platinum Group Metals account for approximately 39.5% of the mining workforce, while coal and gold contribute around 17% and 13%, respectively. Despite fluctuations in output, these commodities remain vital to both local and international markets (Minerals Council South Africa, 2023). Iron ore, primarily mined in the Northern Cape, also plays a significant role because of global steel demand.

Safety is a critical concern in the mining sector, given its hazardous nature. The industry has a history of high accident rates and fatalities, leading to stringent safety regulations (Nguyen & Nguyen, 2020). Despite improvements, challenges persist, including compliance with safety protocols and addressing workers' psychological well-being (Opoku et al., 2020). Labour relations are complex, influenced by historical factors like apartheid and the migrant labour system, impacting worker dependence on mines (Francis, 2021). The ongoing efforts to improve working conditions, wages and labour relations are vital for balancing worker welfare with operational efficiency (Mangaroo-Pillay & Botha, 2020).

The industry's socio-economic challenges include exacerbating inequalities and social vulnerabilities, impacting local communities through issues such as land rights and environmental sustainability (Abrahams, 2021). These challenges often manifest within the workforce as low morale, high turnover and disengagement, which could undermine safety compliance, productivity and organisational cohesion. In this context, employee engagement emerges as a critical lever for organisational resilience. Enhancing employee engagement is crucial, as engaged employees are more likely to adhere to safety protocols, innovate and exhibit higher job satisfaction, factors that directly contribute to addressing the operational challenges facing the mining sector (Kotzé & Nel, 2020).

Employee engagement

Employee engagement is a multidimensional construct that significantly influences productivity, performance and

overall success in organisations (Saks & Gruman, 2020). It encompasses job satisfaction, organisational commitment, motivation and discretionary effort, all of which are crucial for improving job performance, increasing productivity and enhancing customer satisfaction (Bulińska-Stangrecka & Iddagoda, 2020). Research consistently shows a strong link between engaged employees and improved organisational outcomes, such as business growth and enhanced productivity (Zeidan & Itani, 2020).

In the South African mining sector, which faces distinct challenges like health and safety risks, socio-demographic changes and the demands of the Fourth Industrial Revolution, employee engagement is particularly critical (Karolia-Hussain & Fourie, 2021). This is because high levels of engagement positively impact operational outcomes, including safety performance and job satisfaction, while reducing turnover intention (Quansah et al., 2023). A study by Schaufeli et al. (2006) has identified vigour, dedication and absorption as key components of engagement. Understanding these dimensions is essential for fostering engagement in the mining industry, where productivity and employee retention are particularly relevant (Govender & Bussin, 2020).

Work engagement is widely conceptualised as a positive, fulfilling, work-related state of mind characterised by three core dimensions: vigour, dedication and absorption (Schaufeli et al., 2006). This model, operationalised through the Utrecht Work Engagement Scale (UWES), has been validated across diverse cultural and occupational contexts and is strongly associated with improved organisational outcomes such as productivity, innovation and employee retention (Schaufeli et al., 2002). These three dimensions serve as the psychological engines that drive sustained employee performance and well-being, particularly in demanding environments like mining.

Employee engagement and the influence of leadership

Leadership plays a central role in shaping employee engagement, particularly in high-risk sectors like mining. Effective leadership fosters trust, motivation and a sense of belonging, key drivers of engagement (Saks & Gruman, 2020). In the South African mining context, where safety risks and socio-political legacies persist, leadership is critical for building inclusive, resilient workplaces.

Value-based leadership styles have been widely associated with positive engagement outcomes. Transformational leadership inspires through vision and growth opportunities, enhancing performance and commitment (Decuyper & Schaufeli, 2021). Authentic leadership promotes transparency and psychological empowerment, reducing stress and improving engagement (Towsen et al., 2020). Servant and ethical leadership styles emphasise humility, fairness and moral responsibility. These approaches share a focus on human dignity, collective well-being and prioritising people and relationships.

Ubuntu leadership offers a culturally grounded alternative. Rooted in African philosophy, it emphasises empathy, respect, interconnectedness and shared responsibility (Sibanda & Grobler, 2024). Ubuntu leadership promotes a sense of belonging and moral obligation, motivating employees to support one another and uphold safety standards (Marais, 2017; Tauetsile, 2021). It encourages leaders to view employees as interconnected human beings, fostering mutual care and accountability. This approach is particularly relevant in mining, where teamwork and safety are paramount.

Ubuntu leadership

Ubuntu leadership is underpinned by five interrelated principles: respect, inclusivity, empathy, interconnectedness and survival (Nwozaku, 2023). These principles are not isolated traits but mutually reinforcing values that shape how leaders engage with others and build community. Respect in Ubuntu leadership is demonstrated through active listening, consensus-building and valuing each person's dignity and voice. Leaders promote respect by ensuring that all members of the organisation are heard and considered in decision-making processes, thereby fostering trust and cohesion (Sibanda & Grobler, 2024).

Inclusivity is promoted through participatory leadership practices that seek to involve all stakeholders, regardless of status or background. Ubuntu leaders create space for diverse perspectives and encourage collaboration, reinforcing a sense of belonging and shared purpose (Adjo et al., 2021).

Empathy is cultivated through relational engagement, where leaders show genuine concern for others' experiences and well-being. Ubuntu leadership encourages understanding others' perspectives and responding with compassion, which strengthens interpersonal bonds and psychological safety (Pelders & Nelson, 2019).

Interconnectedness reflects the Ubuntu view that individuals are part of a larger whole. Leaders reinforce this by fostering teamwork, mutual support and a sense of community, recognising that success is collective rather than individual (Kholopa, 2022).

Survival in the Ubuntu context refers to the collective endurance and flourishing of the group. It is not merely about resilience in adversity but about sustaining the community through unity, cooperation and shared responsibility (Roper & Clarke, 2020).

This study proposes the following hypothesis:

Hypothesis 1: There is a statistically significant positive relationship between Ubuntu leadership principles and employee engagement in the South African mining industry.

Demographics

As this study transitions from examining the impact of Ubuntu leadership on employee engagement, it is crucial to

consider the diverse demographics of mining industry employees. The South African mining workforce exhibits diverse socio-demographic characteristics, including age, gender and work experience (Donkor et al., 2023).

Safety culture

Safety culture refers to the shared values, beliefs and practices within an organisation that prioritise safety at all levels (Sinha & Muduli, 2021). It is commonly understood to comprise three interrelated dimensions: psychological, behavioural and situational (Ismail et al., 2021; Nguyen & Nguyen, 2020). In the high-risk environment of the mining industry, a robust safety culture is essential for protecting employee well-being and ensuring operational continuity.

A systems approach to safety integrating organisational culture, risk perception and hazard recognition is essential for improving safety outcomes in high-risk industries like mining (Brown et al., 2022). Safety culture, which encompasses psychological, behavioural and situational dimensions, plays a foundational role in shaping how employees perceive and respond to risks (Ismail et al., 2021; Sinha & Muduli, 2021). Leadership commitment, supervisory engagement and accountability are key drivers of safety behaviour, and occupational health practitioners and managers are instrumental in reinforcing these behaviours and maintaining a safe working environment (Muthelo et al., 2022:8–10; Prinsloo & Hofmeyr, 2022).

Ubuntu leadership, with its emphasis on empathy, shared responsibility and interconnectedness, aligns closely with the values embedded in a strong safety culture. In environments where safety culture is well-established, Ubuntu leadership is more likely to be perceived as credible and consistent with organisational norms, thereby enhancing its impact on employee engagement.

This study will now assume the following hypothesis:

Hypothesis 2: Safety culture moderates the relationship between Ubuntu leadership and employee engagement in the South African mining industry.

Research design

Research approach

This study adopted a positivist paradigm to objectively examine the relationship between Ubuntu leadership and employee engagement in the South African mining industry, using a descriptive, cross-sectional design and a deductive approach. A mono-method quantitative strategy was employed, with data collected via structured online surveys using validated instruments, the Ubuntu Leadership Scale (ULS) (Muller et al., 2019) and the UWES (Schaufeli et al., 2006).

Snowball sampling was used to reach a diverse mining workforce, and data were analysed using descriptive

statistics, correlation and multiple regression, with demographic variables treated as controls and safety culture as a moderator (Quansah et al., 2023). Reliability and validity were ensured through Cronbach's alpha and construct validation (Tavakol & Dennick, 2011), and ethical standards, including informed consent and compliance with South Africa's *Protection of Personal Information Act (POPIA)*, were strictly followed.

Research participants

The target population for this study consisted of mining employees across various commodities in South Africa, including iron ore, coal, PGMs, gold, diamond, chrome and manganese. The target was to achieve at least 250 respondents, well distributed across commodities. However, the final sample size used in the study was 351 respondents. The sample included employees at various operational levels, from miners and machine operators to engineers, safety officers, administrative staff and managers. This diverse sample ensured that the study captured various perspectives and experiences within the mining industry.

Participants were selected using a snowball sampling method, starting with initial contacts from the researcher's and colleagues' professional networks. These initial participants were then asked to refer others within their networks, allowing the sample to grow organically.

Demographics

The demographic profile of the study's participants reveals a workforce predominantly aged between 35 years and 44 years, accounting for 51.7% of the sample. This is followed by individuals aged 25 years to 34 years (33.6%), while those under 25 years and over 45 years make up a smaller portion. The gender distribution shows a male-dominated workforce, with 67.2% identifying as male, 32.2% as female, and a small fraction (0.6%) preferring not to disclose their gender. In terms of work tenure, most employees have been with their organisations for 10 years to 20 years (40.7%), followed by those with 5 years to 10 years (34.5%) and less than 5 years (17.8%). Only a small percentage reported working for over 20 years.

Regarding job roles, more than half of the respondents (51.6%) are entry-level employees in the form of operators or general labourers, while supervisors and managers represent 12.0% and 16.6%, respectively. Artisans make up 12.8%, professionals 5.1% and graduates 1.7%. The mining commodity distribution is heavily skewed towards iron ore, with 80.2% of participants working in this sector. Coal follows at 13.1%, while platinum and other commodities each account for less than 5% of the sample. Most described themselves as operators or labourers, and most were from iron ore mining.

Measuring instruments

The primary measurement instruments used in this study were the ULS and the UWES. The ULS measuring instrument

for this study, based on Muller et al.'s (2019) ULS, was tailored to generate survey questions to assist with understanding the principles of Ubuntu leadership perception. The instrument was designed to capture perceptions of Ubuntu's leadership behaviours and its relationship with critical organisational outcomes (Muller et al., 2019).

Utrecht Work Engagement Scale is a widely used instrument to measure work engagement through three dimensions: vigour, dedication and absorption (Schaufeli et al., 2006). According to Schaufeli et al. (2006), the scale includes items that assess the extent to which employees feel energetic, enthusiastic and fully immersed in their work. In this study, the UWES demonstrated strong internal consistency, with a Cronbach's alpha of 0.832, confirming its reliability. This aligns with previous research that has validated the UWES across various occupational and cultural contexts, supporting its robustness as a measure of engagement (Schaufeli et al., 2006).

The ULS and UWES were administered using a Likert-type scale, with responses ranging from 'strongly disagree' to 'strongly agree' for the ULS and from 'never' to 'always' for the UWES. The safety culture scale was constructed using three Likert-type items that were specifically designed to capture perceptions of safety practices, reinforcement and the impact on engagement. These items were not adapted from existing scales but were directly formulated by the authors to align with the study's context and objectives, ensuring content relevance and clarity for respondents.

Instrument reliability

Table 1 provides the reliability coefficients for each instrument. Cronbach's alpha values above 0.7 are deemed acceptable, indicating reliable constructs (Tavakol & Dennick, 2011). All the three constructs' instruments measured above 0.7, showing good reliability.

Research procedure

Data were collected through an online survey distributed via email and WhatsApp to mining employees. The survey was designed to be accessible on various devices, including desktops, tablets and mobile phones, to facilitate participation across a wide workforce demographic.

Participants were provided with detailed information about the study's purpose, scope and potential risks and benefits. The participants were informed that participating in the survey was voluntary and that participants could withdraw at any time without repercussions. Confidentiality was maintained by anonymising responses and securely storing data.

TABLE 1: Instrument reliability test results.

Instruments	Cronbach's alpha	Cronbach's alpha based on standardised items	Number of items
Employee engagement	0.832	0.790	6
Ubuntu leadership	0.916	0.894	10
Safety culture	0.786	0.712	3

Statistical analysis

Descriptive and inferential statistics were performed using IBM SPSS Statistics software. Descriptive statistics, including mean scores and standard deviations, were calculated to summarise the demographic characteristics of the sample and the key variables.

Inferential statistics included Pearson correlation analysis to assess the relationship between Ubuntu leadership, employee engagement and safety culture. This analysis provided insights into the strength and direction of the relationship between these variables. Multiple regression analysis was performed to explore the role of safety culture in the relationship between Ubuntu leadership and employee engagement. An interaction term between Ubuntu leadership and safety culture was included in the regression model to test whether the strength of the relationship between leadership and engagement varied depending on the level of safety culture.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Gordon Institute of Business Science, University of Pretoria.

Results

Experiences of employee engagement, Ubuntu leadership and safety culture

Descriptive statistics for the key variables are presented in Table 2. Above-average engagement levels were observed, with mean scores for vigour, dedication and absorption indicating that employees generally feel energised, committed and immersed in the work. Ubuntu leadership principles were widely practised, with mean scores above average for respect, inclusivity, empathy, interconnectedness and survival. Safety culture was also well-regarded, with employees valuing safety protocols and reporting mechanisms.

Relationship between employee engagement, Ubuntu leadership and safety culture

The Pearson correlation analysis revealed significant positive relationships among all three constructs: Ubuntu leadership, employee engagement and safety culture (Table 3). Specifically, Ubuntu leadership demonstrated a strong association with safety culture ($r = 0.675$) and employee engagement ($r = 0.633$), while employee engagement also showed a moderate positive correlation with safety culture ($r = 0.513$), all statistically significant at $p < 0.001$. These findings suggest that Ubuntu leadership may play a central role in fostering both employee engagement and a strong safety culture, with all relationships exceeding the 0.5 threshold typically considered indicative of strong associations (Schober et al., 2018).

To further quantify Ubuntu leadership's impact on employee engagement, Cohen's f^2 was calculated, resulting in an effect size of approximately 0.67. Cohen's f^2 assesses the magnitude

of effect, with values above 0.35 considered large, supporting substantial practical impact (Lakens, 2013). According to Cohen's conventions, this value reflects a large effect size, indicating that Ubuntu leadership substantially influences employee engagement in this context. This strong effect size emphasises Ubuntu leadership's practical significance in enhancing employee engagement.

This, therefore, means that there is a statistically significant, positive relationship between Ubuntu leadership principles and employee engagement within the South African mining industry. This demonstrates that as Ubuntu leadership principles are perceived to be more effectively implemented, employee engagement levels also tend to increase correspondingly.

Moderating role of safety culture in the relationship between Ubuntu leadership and employee engagement

Table 4 presents the model summary of the regression analysis conducted to examine the moderating role of safety culture in the relationship between Ubuntu leadership and employee engagement. The R (correlation coefficient) value of 0.637 indicates a strong positive relationship between the predictors (Ubuntu leadership, safety culture and their interaction term) and the dependent variable (employee engagement). The R -squared value of 0.406 suggests that approximately 40.6% of the variance in employee engagement is explained by the model. The adjusted R -squared value of 0.401 confirms the model's stability when accounting for the number of predictors. The standard error of the estimate (0.490) indicates a relatively good fit, and the Durbin-Watson statistic of 1.811 suggests no significant autocorrelation in the residuals.

TABLE 2: Descriptive statistics for key variables.

Construct	Variable	Mean	SD
Employee engagement	Vigour	4.20	0.88
	Dedication	4.52	0.76
	Absorption	4.00	1.02
Ubuntu leadership	Respect	3.62	0.99
	Inclusivity	3.77	1.02
	Empathy	3.77	1.01
	Interconnectedness	3.98	0.83
	Survival	4.10	0.80
Safety culture	Safety culture	4.59	0.71

SD, standard deviation.

TABLE 3: Pearson correlation.

Relationship	Correlation (r)	Significance (p)
Employee engagement and Ubuntu leadership	0.633	$p < 0.001$
Employee engagement and safety culture	0.513	$p < 0.001$
Ubuntu leadership and safety culture	0.675	$p < 0.001$

TABLE 4: Model summary‡ for safety culture as a moderator.

Model	R	R square	Adjusted R square	SE of the Estimate	Durbin-Watson
1	0.637†	0.406	0.401	0.49030	1.811

SE, standard error.

†, Predictors: (Constant), Interaction term, Ubuntu Leadership, Safety Culture‡.

‡, Dependent Variable: Employee Engagement.

Table 5 provides the regression coefficients for each predictor, including the interaction term. The interaction between Ubuntu leadership and safety culture is statistically significant ($B = 0.187, p = 0.003$), confirming that safety culture moderates the relationship between Ubuntu leadership and employee engagement. This finding supports the hypothesis that the effect of Ubuntu leadership on engagement is influenced by the level of safety culture within the organisation.

Discussion

Outline of the results

This study confirmed a statistically significant positive relationship between Ubuntu leadership and employee engagement in the South African mining industry ($r = 0.633, p < 0.001$), with a large effect size (Cohen's $f^2 = 0.67$), indicating practical significance (Lakens, 2013). While Ubuntu leadership was positively associated with overall engagement, the study did not assess its relationship with the individual subcomponents of engagement vigour, dedication and absorption as measured by the UWES (Schaufeli et al., 2006).

The study also found that Ubuntu leadership remained a significant predictor of employee engagement. However, it did not aim to evaluate the alignment of Ubuntu leadership with the specific values or expectations of South African mining employees, and no such inference is made in the interpretation of results.

Importantly, the moderation analysis revealed that safety culture significantly moderates the relationship between Ubuntu leadership and employee engagement. The interaction term ($B = 0.187, p = 0.003$) was statistically significant, confirming that the strength of Ubuntu leadership's impact on engagement varies depending on the level of safety culture. This finding supports Hypothesis 2 and aligns with prior research suggesting that safety culture enhances leadership effectiveness in high-risk environments (Opoku et al., 2020; Quansah et al., 2023).

Practical implications

The findings offer several practical implications for leadership and organisational development in the mining sector. Ubuntu leadership, characterised by empathy, inclusivity and interconnectedness, can be a powerful tool for enhancing employee engagement across diverse demographic groups (Chetty & Price, 2024). This culturally grounded leadership style is particularly suited to the South African mining context, where relational dynamics and collective responsibility are critical for operational success.

The study highlights the importance of cultivating a robust safety culture. The moderating effect of safety culture suggests that Ubuntu leadership is more effective in environments where safety values, behaviours and systems are well-established. Mining organisations should therefore invest in strengthening safety culture through leadership

TABLE 5: Regression coefficients.

Predictor	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Constant	1.234	0.210	5.880	0.000
Ubuntu Leadership	0.456	0.085	5.360	0.000
Safety Culture	0.321	0.078	4.120	0.000
Ubuntu Leadership × Safety Culture	0.187	0.062	3.020	0.003

SE, standard error.

commitment, employee involvement and consistent reinforcement of safety practices (Ismail et al., 2021; Sinha & Muduli, 2021).

Together, Ubuntu leadership and a strong safety culture can create a synergistic effect, fostering a work environment that is not only safe but also inclusive, engaged and resilient.

Limitations

This study relied on self-reported data, which may be subject to social desirability bias. The cross-sectional design limits the ability to draw causal inferences about the relationships observed. The safety culture scale used consisted of three custom-developed items, which, although demonstrating acceptable reliability ($\alpha = 0.786$), were not drawn from a validated instrument.

The sample was predominantly drawn from the iron ore sector, which may limit the generalisability of the findings to other mining contexts. While Ubuntu leadership was conceptually compared to transformational and authentic leadership, the study did not empirically test it against other contemporary leadership models.

Recommendations

Future research should consider triangulating data using qualitative methods such as interviews or focus groups to gain deeper insights into employee perceptions and experiences. Longitudinal studies are recommended to assess the long-term effects of Ubuntu leadership on employee engagement and safety outcomes. Researchers are also encouraged to use or adapt validated safety culture instruments to enhance construct validity and comparability.

Broader sampling across different mining commodities and geographic regions is advised to improve generalisability. Future studies could explore the comparative effectiveness of Ubuntu leadership by empirically testing it alongside other modern leadership theories using multi-model designs.

Conclusion

This study investigated the influence of Ubuntu leadership on employee engagement within the South African mining industry, with a specific focus on the moderating role of safety culture. The findings confirmed a statistically significant positive relationship between Ubuntu leadership and overall employee engagement. Multiple regression analysis further demonstrated that Ubuntu leadership significantly predicts engagement.

The moderation analysis revealed that safety culture significantly strengthens the relationship between Ubuntu leadership and engagement, with the interaction term proving statistically significant. This suggests that a well-established safety culture enhances the effectiveness of Ubuntu leadership in fostering engagement. These findings highlight the value of integrating Ubuntu leadership principles with strong safety practices to improve employee well-being and organisational performance in high-risk environments. While the study did not assess subcomponent-level engagement or model alignment with employee values, it provides a foundation for future research into culturally relevant leadership models in the mining sector and beyond.

Acknowledgements

M.B.N. would like to acknowledge Nyamwe Ranganai who provided support in statistical analysis.

This article is partially based on the author, M.N.B.'s Master's dissertation entitled, 'Ubuntu Leadership Style Influence on Mining Employee Engagement', towards the degree of Master of Business Administration in the Gordon Institute of Business Science, University of Pretoria, South Africa, with supervisor Prof Gavin Price, received on the 4th of November 2024. It is available here, <http://hdl.handle.net/2263/102039>.

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

M.B.N. was the main researcher, analyser and writer. G.P. assisted with idea generation, supervision and editing.

Funding information

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability

The data that support the findings of this study are available from the corresponding author, M.B.N. upon reasonable request.

Disclaimer

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