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Enhancing Workplace Safety through Sustainable Leadership in Guinea's Mining Industry: A Comprehensive Study of Leadership Practice

Kalissa Fatoumata Kir
School of Economics and Management, Anhui University of Science and Technology, Huainan, P.R. China
Email: kfatoumatakir25@gmail.com

Abstract: *This study investigates the influence of sustainable leadership on workplace safety in Guinea's mining industry, focusing on how leadership practices contribute to improved safety outcomes. The research aims to identify key leadership constructs that foster a culture of safety and sustainability, while examining the mediating role of organizational learning in enhancing safety performance. The study targets leaders within Guinea's mining sector, encompassing both small-scale and large-scale mining operations, with a focus on organizations employing varied safety practices. Using a quantitative approach, the research examines the relationships between sustainable leadership, organizational learning, and safety performance. A structural equation model is employed to assess internal reliability and validity, with partial least squares (PLS) analysis used for hypothesis testing. The findings reveal a significant positive effect of sustainable leadership on both safety performance and environmental compliance. Organizational learning is shown to play a crucial mediating role in these relationships, enhancing the effectiveness of leadership on safety outcomes.The study concludes that fostering sustainable leadership and organizational learning can significantly improve workplace safety in Guinea's mining industry. It recommends the implementation of leadership training and continuous learning initiatives to promote a safer working environment across the sector.*

Key Words: *Sustainable leadership, workplace safety, mining industry, Guinea, organizational learning, safety performance,*

1. INTRODUCTION :

The sustainability of an organization is a strategic issue in sustainable development, especially in high-risk industries like mining. Companies in Guinea's mining sector must balance three key aspects: economic, social, and environmental. Achieving sustainable development requires a company to focus not only on financial and economic goals but also on preserving social benefits and protecting the environment. Sustainable performance involves meeting the present needs of organizations without sacrificing future generations' needs (Schaltegger et al., 2016; Baumgartner & Rauter, 2017).

The global challenge for sustainable leadership research is to account for varying organizational cultures, needs, and environmental contexts. Leadership models that incorporate international strategies can foster interoperability in global industries like mining. A focus on culture and sustainability is crucial for improving safety and environmental practices in the workplace. This requires embedding sustainability into business strategies to align organizational objectives with environmental and social imperatives. Sustainable leadership has emerged as a key approach for addressing these challenges, offering a path to achieving sustainability goals.

While research on leadership and sustainability in small and medium-sized enterprises (SMEs) has grown, there is still limited focus on key factors influencing sustainable performance, particularly in Guinea's mining industry. Most studies emphasize financial performance, competition, and government support (Hasan & Almubarak, 2016; Moorthy et al., 2012). However, factors such as ethical sensitivity, knowledge sharing, access to finance, and innovativeness—critical to firm performance—remain underexplored (Kauffman & Riggins, 2012; Singh, 2012).

This study applies the **Triple Bottom Line (TBL)** theory (Elkington, 1998) and **Resource-Based View (RBV)** theory (Barney, 1991) to understand how sustainable leadership impacts safety performance in Guinea's mining sector.

The TBL allows integration of business practices that enhance environmental, social, and economic outcomes, while the RBV provides insights into how a firm's resources and capabilities offer a competitive advantage. Given these theories and the research gaps identified, this paper investigates how sustainable leadership and organizational learning influence safety performance in Guinea's mining industry.

In Guinea's mining sector, workplace safety remains a critical challenge. Mining operations are inherently high-risk, and the need for sustainable leadership to drive better safety outcomes is urgent. Despite increased attention to safety practices, many mining firms still struggle with implementing comprehensive safety measures that meet both regulatory standards and long-term sustainability goals. The mining industry's contribution to Guinea's economic development is significant, but improving safety performance is crucial to ensuring its continued viability and the well-being of its workforce.

While substantial research exists on financial performance and operational efficiency, there is less focus on leadership's role in promoting safety in high-risk industries like mining. Leadership practices in Guinea's mining sector are often characterized by short-term priorities, with limited attention given to long-term sustainability and safety. Despite the existence of policies and regulations, there is a gap in understanding how leadership can effectively shape a culture of safety that prioritizes the well-being of employees while ensuring operational sustainability.

This study seeks to address these gaps by investigating how sustainable leadership and organizational learning can enhance safety performance in Guinea's mining industry. By focusing on successful mining firms that have integrated sustainability into their leadership practices, this research aims to uncover critical factors that can guide future safety initiatives and promote a safer, more sustainable mining environment in Guinea.

This study investigates the influence of sustainable leadership on workplace safety in Guinea's mining industry, focusing on how leadership practices impact safety performance and sustainability. The objectives are to identify the leadership styles commonly employed, assess their influence on organizational learning, examine how organizational learning improves safety performance, and explore the indirect effects of sustainable leadership on safety through organizational learning. The research highlights the importance of adopting effective leadership styles to enhance safety and sustainability in mining operations. It also provides insights for policymakers and industry leaders to foster a safer working environment, emphasizing the role of leadership development in promoting sustainable mining practices in Guinea. Additionally, this study bridges leadership and organizational learning, offering a fresh perspective on the role of leadership in ensuring workplace safety.

2. LITERATURE REVIEW:

2.1. Theoretical Review

The theoretical framework of this study integrates Resource-Based View (RBV) theory, dynamic capability theory, and the Job-Demand Resource (JD-R) model to explore the relationship between sustainable leadership, organizational learning, and sustainable performance in the context of Guinea's mining industry. This multidimensional approach provides a comprehensive understanding of how sustainable leadership can drive organizational learning and enhance long-term performance.

The Resource-Based View (RBV) theory, articulated by Collis and Montgomery (1995), posits that organizations can achieve a competitive edge by leveraging resources that are rare, valuable, inimitable, and non-substitutable. In the context of leadership, RBV theory suggests that human capital, which includes leaders, plays a crucial role in this framework. Leaders are not only key assets due to their inherent value and uniqueness but also because they embody qualities that are difficult for competitors to replicate (Harris & McMahan, 2015). Sustainable leaders, in particular, are characterized by their ability to manage resources without depleting them and to address the needs of all stakeholders (Hargreaves & Fink, 2012). This aligns with the notion that sustainable leadership is a form of human capital that can drive organizational success in an era focused on sustainability.

By applying RBV theory, this study examines how sustainable leadership functions as a critical resource that contributes to organizational learning. As organizations face evolving market demands and environmental challenges, the ability to effectively utilize and enhance resources like leadership becomes pivotal. The RBV theory provides a lens to understand how sustainable leadership can foster an environment conducive to organizational learning and, consequently, sustainable performance.

Dynamic capability theory extends the RBV framework by focusing on an organization's ability to adapt and reconfigure its resources to respond to changing environments. Teece, Pisano, and Shuen (1997) define dynamic capabilities as the capacity to integrate, build, and reconfigure internal and external competencies to address rapidly changing market conditions. This theory is particularly relevant for understanding how organizational learning—an inherent dynamic capability—contributes to sustainable performance.

Organizational learning is conceptualized as a dynamic capability that enables firms to continually adapt to market changes and enhance their competitive position (Zollo & Winter, 2002). It involves processes such as knowledge creation, integration, and application, which are essential for sustaining long-term performance (Teece et al., 1997). The dynamic capabilities framework emphasizes that organizations must not only possess resources but also develop the ability to effectively utilize and adapt these resources in response to shifting demands.

In this study, dynamic capability theory is employed to link organizational learning with sustainable performance. The theory highlights the importance of developing, reconfiguring, and integrating knowledge resources to navigate dynamic environments successfully. By fostering organizational learning, firms can enhance their ability to respond to market changes, thereby achieving sustainable performance.

The Job-Demand Resource (JD-R) model, developed by Demerouti et al. (2001), provides insights into how job demands and resources interact to influence employee outcomes. According to this model, job demands are aspects of the job that require sustained effort and are associated with physiological and psychological costs. On the other hand, job resources are factors that help employees achieve work goals, reduce job demands, or stimulate personal growth.

In the context of organizational learning, this study adopts the JD-R model to examine the role of psychological empowerment as a job resource and organizational learning as a job demand. Psychological empowerment, which enhances employees' ability to follow their goals and contribute to organizational success, is considered a valuable resource (Seibert et al., 2011). Conversely, organizational learning represents a significant job demand due to the cognitive and interactional efforts required to acquire and apply new knowledge (Bauer et al., 2014). By incorporating the JD-R model, this study explores how the interaction between psychological empowerment and organizational learning can stimulate sustainable performance. The model's framework helps to elucidate how psychological empowerment as a resource can mitigate the challenges associated with organizational learning, thereby enhancing overall performance. This approach extends the theoretical landscape of the JD-R model by emphasizing the critical role of psychological empowerment and its interaction with job demands in driving sustainable outcomes.

Combining RBV theory, dynamic capability theory, and the JD-R model offers a nuanced perspective on how sustainable leadership can influence organizational learning and performance. RBV theory provides a foundational understanding of how sustainable leadership as a valuable resource can enhance organizational learning. Dynamic capability theory further elucidates how organizational learning, as a dynamic capability, contributes to sustainable performance by enabling firms to adapt to market changes. The JD-R model complements these theories by highlighting the interplay between psychological empowerment and organizational learning, offering insights into how job resources and demands impact performance outcomes.

In summary, this theoretical review integrates multiple frameworks to analyze the relationship between sustainable leadership, organizational learning, and sustainable performance. By leveraging RBV theory to contextualize leadership as a strategic resource, dynamic capability theory to link organizational learning with performance, and the JD-R model to explore the interaction between job demands and resources, this study provides a comprehensive understanding of the factors driving success in Guinea's mining industry. This multidimensional approach not only enhances theoretical insights but also offers practical implications for implementing effective leadership practices and fostering organizational learning to achieve long-term sustainability.

2.2. Hypotheses Development

2.2.1. Sustainable leadership and Safety Performance

The global challenge of sustainable development has increasingly focused on enhancing workplace safety, particularly within high-risk industries such as mining. Sustainable leadership has emerged as a critical factor in driving safety improvements and ensuring long-term organizational success. This review examines how sustainable leadership influences safety performance in the mining industry, with a specific focus on Guinea's mining sector.

Sustainable leadership is recognized for its potential to improve safety performance by fostering a culture of responsibility, empowerment, and continuous improvement (Iqbal et al., 2020). This leadership style is particularly relevant in the context of SMEs and high-risk industries, where effective safety management is crucial. Despite its recent emergence, sustainable leadership has been explored in various studies within different contexts, including SMEs in Malaysia, Indonesia, Brunei Darussalam, Pakistan, and Thailand.

According to Iqbal, Ahmad, and Halim (2020), sustainable leadership enhances safety performance in SMEs by promoting organizational learning and psychological empowerment. The study applied the Resource-Based View (RBV) theory, dynamic capability theory, and the Job-Demand Resource (JD-R) model to investigate these relationships. They found that sustainable leadership encourages organizational learning, which is crucial for improving safety performance. Psychological empowerment, a key component of the JD-R model, was identified as a positive moderator in this

relationship. This implies that leaders who foster psychological empowerment can significantly impact safety outcomes by creating an environment that supports continuous learning and adaptation.

Further research by Iqbal, Ahmad, Nasim, et al. (2020) examined the mediating role of psychological safety, finding that sustainable leadership improved safety performance significantly. Their study highlights that psychological safety is essential for enabling employees to engage in safety practices and report hazards without fear of repercussions. The positive role of psychological empowerment in moderating the effects of sustainable leadership on safety performance underscores the importance of supportive leadership in creating a safe working environment.

In another study, Iqbal & Ahmad (2021) explored the mediating role of organizational learning using the Natural Resource-Based View (NRBV) and dynamic capability theory. Their findings supported the previous research, demonstrating that sustainable leadership positively influences safety performance through its impact on organizational learning. This research reinforces the need for practices that encourage learning and empowerment to enhance safety performance in high-risk industries like mining.

Suriyankietkaew and Avery (2016) proposed an integrated model linking sustainable leadership with financial performance in SMEs, emphasizing factors such as labor relations, employee value, and social responsibility. While their focus was not exclusively on safety performance, their findings suggest that sustainable leadership practices that improve overall organizational performance can also positively impact safety outcomes.

Burawat (2019) provided insights into the manufacturing sector, showing that sustainable leadership drives safety performance by implementing lean manufacturing strategies. Although specific to manufacturing, this study highlights how leadership practices that focus on efficiency and waste reduction can also enhance safety performance. The principles of lean manufacturing, such as continuous improvement and hazard reduction, are applicable to the mining sector, where similar strategies can be employed to improve safety.

The empirical evidence indicates that sustainable leadership is instrumental in enhancing safety performance within the mining industry. By promoting organizational learning, psychological empowerment, and psychological safety, sustainable leadership can drive significant improvements in safety outcomes. The integration of RBV theory, dynamic capability theory, and the JD-R model provides a comprehensive framework for understanding how sustainable leadership influences safety performance. This review underscores the importance of adopting leadership practices that support continuous learning, empowerment, and effective safety management to achieve long-term safety goals in Guinea's mining industry.

Hypothesis 1: Sustainable leadership positively influence Safety Performance of SMEs in the mining sector in the Guinea.

2.2.2. Sustainable leadership and Organization Learning

Sustainable leadership is increasingly recognized for its role in shaping organizational outcomes, particularly in high-risk sectors such as mining. This leadership style is not only about ensuring the longevity of the organization but also about fostering a culture of continuous improvement and adaptation. A key aspect of this culture is organizational learning, which is crucial for enhancing safety performance and adapting to new challenges. This section reviews empirical studies that explore the relationship between sustainable leadership and organizational learning, emphasizing how sustainable leadership practices influence learning processes within organizations.

Sustainable leadership fosters an environment conducive to organizational learning by promoting psychological safety, open communication, and a shared vision. Leaders who are committed to sustainability create a supportive work environment where employees feel safe to share knowledge, report errors, and engage in continuous learning (LeRoy, 2012). This psychological safety is crucial for effective organizational learning, as it encourages employees to actively participate in learning activities without fear of negative repercussions (Keyes & Benavides, 2018).

Sustainable leaders exhibit several core practices that facilitate organizational learning. According to Kantabutra and Avery (2013), these practices include innovation, staff development, ethical behavior, and a long-term perspective. By embodying these practices, sustainable leaders help employees acquire and apply new knowledge, thus enhancing the organization’s learning capabilities (Sharma & Lenka, 2019). For instance, by providing regular feedback and fostering a culture of collaboration, sustainable leaders encourage employees to engage in safety-related learning and innovation.

Several studies have investigated how sustainable leadership impacts organizational learning. Iqbal, Ahmad, and Halim (2020) found that sustainable leadership positively influences organizational learning by fostering psychological empowerment. Their research, conducted in SMEs in Malaysia and Pakistan, demonstrated that sustainable leaders improve learning outcomes by encouraging employees to take initiative and participate in safety programs.

Similarly, Iqbal, Ahmad, and Nasim (2020) explored the mediating role of psychological safety in the relationship between sustainable leadership and organizational learning. Their findings indicate that sustainable leadership

significantly enhances safety performance by promoting a safe and supportive learning environment. The study highlights that psychological safety mediates this relationship, suggesting that sustainable leaders who foster a safe work environment are more effective in enhancing organizational learning and safety.

Transformational leadership, a subset of sustainable leadership, is particularly influential in promoting organizational learning. This leadership style emphasizes intellectual stimulation, inspirational motivation, and individualized consideration (Bass, 1999). Transformational leaders encourage employees to engage in continuous learning and adapt to changes, which is crucial for improving safety performance in high-risk industries (Menguc et al., 2007).

Empirical studies have shown that transformational leadership significantly enhances organizational learning. For example, Lei et al. (1999) found that transformational leaders promote organizational learning through experimentation and open communication. These leaders create a learning-oriented culture that supports the development and implementation of new safety practices. Additionally, Wick and Leon (1995) argue that transformational leaders commit to learning and provide the necessary resources to overcome challenges, thereby facilitating organizational learning and safety improvements.

Organizational learning is a key factor in enhancing safety performance. By systematically acquiring, sharing, and applying knowledge, organizations can develop and implement effective safety measures. This learning process involves knowledge acquisition, dissemination, and utilization, which collectively enhance the organization's ability to manage safety risks (DiBella et al., 1996).

Research indicates that organizations with strong learning capabilities are better equipped to innovate and improve safety practices. For instance, Senge et al. (1994) highlight that organizations that prioritize learning are more adept at adapting to new safety challenges and opportunities. This adaptive capability enables organizations to continuously refine their safety practices and respond effectively to emerging risks.

The empirical evidence underscores the significant role of sustainable leadership in fostering organizational learning and enhancing safety performance. Sustainable leaders create environments that support psychological safety, open communication, and continuous learning, all of which are crucial for improving safety outcomes in high-risk industries like mining. Transformational leadership, as a key component of sustainable leadership, further enhances organizational learning by promoting a culture of innovation and collaboration. The integration of sustainable leadership practices and organizational learning processes is essential for achieving long-term safety goals and ensuring a safer working environment.

Hypothesis 2: *Sustainable leadership positively impacts organizational learning in Guinea's mining industry.*

Hypothesis 3: *Organizational learning positively affect safety performance in Guinea's mining industry.*

2.2.3. Organization learning and Safety Performance

In today's rapidly changing environment, organizational learning plays a critical role in helping companies adapt to evolving challenges, including those related to workplace safety. The learning process allows organizations to effectively cope with environmental shifts, ensuring they remain agile and responsive (Ansari & Kalantari, 2013). Organizational learning represents an organization's capacity to adapt, not just to market changes but also to internal safety dynamics. By continuously gathering experience and repeating corrective actions, firms can improve their safety protocols and operational efficiency (Gunsel et al., 2011).

Through organizational learning, companies refine management techniques, proactively seek external opportunities, and collect vital safety information and insights from other firms (Salas-Vallina et al., 2017). This is especially important in industries where workplace safety is paramount, such as the mining sector. By enhancing the quality of decision-making processes—both strategic and operational—organizational learning improves safety performance and enables employees to act responsibly, promoting behaviors that contribute to a safer work environment (Andreou et al., 2016; Salas-Vallina et al., 2017).

Organizational learning also builds a firm's ability to identify safety risks and opportunities for improvement, aligning the organization continuously with safety regulations and industry standards (Santos et al., 2020). As it enables firms to adapt and perform effectively in dynamic, high-risk environments, organizational learning is considered a dynamic capability. Based on dynamic capability theory, organizational learning contributes to strategic flexibility and the implementation of safety strategies that enhance safety-related performance (Santos-Vijande et al., 2012). Overall, learning activities and practices contribute to long-term improvements in safety performance, making organizational learning a vital component in ensuring that workplace safety standards are continuously met and improved upon (Hosseini et al., 2020).

This empirical review suggests that the continuous improvement of knowledge, skills, and experience through organizational learning enhances workplace safety by equipping employees with better decision-making capabilities, adaptability, and proactive behaviors, thus leading to improved safety outcomes. Therefore;

Hypothesis 4: Organizational learning significantly influences safety performance in Guinea's mining industry.

2.2.4. Organizational leaning mediates the impact of Sustainable leadership on Safety Performance

Sustainable leadership plays a critical role in promoting continuous learning within organizations, which ultimately enhances safety performance. Leaders who foster a culture of learning motivate employees to engage in collaborative problem-solving, contributing to improved workplace safety outcomes (Chang et al., 2011). Leadership practices not only inspire confidence in employees regarding the organization's commitment to sustainability but also create an environment conducive to organizational learning, which is essential for long-term safety improvements (Macke & Genari, 2019).

Organizational learning mediates the relationship between leadership and safety performance by acting as a conduit through which leadership practices translate into safer work environments. Studies show that leadership fosters learning behaviors, which subsequently lead to better performance in areas such as safety (Dumdum et al., 2013). Psychological safety, a key element of a learning organization, allows employees to feel secure in taking risks, reporting safety concerns, and learning from mistakes without fear of repercussions (Lyman et al., 2017). This supportive atmosphere, created through leadership, indirectly impacts workplace outcomes by enhancing psychological safety at the organizational level (Newman et al., 2017).

Supportive leadership behaviors, such as team building, motivation, and assistance in change processes, also enhance organizational learning by empowering employees to seize opportunities related to sustainable development and workplace safety (Hsiao & Chang, 2011). Compassionate leadership further improves organizational learning, which positively influences safety performance (Guinot et al., 2020). Employee training programs serve as essential tools to enhance organizational learning, which directly contributes to improved safety outcomes (Milhem et al., 2014).

Sustainable leadership practices, including long-term employment, knowledge sharing, and fostering innovation, promote organizational learning, which in turn enhances employee behaviors that contribute to a safer work environment (Kim & Park, 2019). This relationship highlights the mediating role of organizational learning in translating sustainable leadership into tangible safety improvements.

Therefore, the following hypothesis is proposed:

Hypothesis 5: *Organizational learning mediates the positive relationship between sustainable leadership and safety performance.*

3. METHODOLOGY:

3.1. Research design

The research paradigm provides the foundational structure for conducting and interpreting research by outlining the aims, motivation, and expectations of the study (Cohen, Manion & Manion, 2013). In this study on sustainable leadership and workplace safety in Guinea's mining industry, the research paradigm is rooted in positivism. The positivist paradigm employs scientific methods of investigation to test theories and hypotheses through observation and measurement, making it well-suited for quantitative research (Saunders, Lewis & Thornhill, 2009). Quantitative research designs typically follow a deductive approach, formulating hypotheses based on established theories and using data to either confirm or refute these hypotheses (Creswell & Creswell, 2017).

Accordingly, this research adopts a quantitative approach to examine the relationship between sustainable leadership, organizational learning, and safety performance. Data was collected using survey instruments, specifically structured questionnaires featuring closed-ended questions. These questions aimed to capture measurable data on variables such as sustainable leadership practices, organizational learning processes, and safety performance outcomes. The structured nature of the survey ensured that the data collected was consistent and comparable across respondents, facilitating robust statistical analysis.

3.2. Population and Sample Size

The population for this study consists of leaders and employees working in the mining industry in Guinea, where safety performance is a critical concern due to the hazardous nature of mining operations. The study focuses on organizations operating within this sector, especially those that have implemented sustainable leadership practices aimed at improving workplace safety. Mining organizations in Guinea face significant challenges related to safety due to the risky and labor-intensive nature of the work (Anbumozhi, 2017). Sustainable leadership is crucial in this context to ensure that safety standards are maintained, while also promoting environmental and social sustainability.

The sample for this study includes leaders and employees from various mining companies in Guinea. To ensure that the findings are representative and reliable, the study targeted a minimum sample size of 300 respondents, following the Krejcie and Morgan (1970) formula for determining appropriate sample sizes based on population size. The study used random probability sampling to select 360 respondents from the target population of 541. This sampling technique ensured that each participant had an equal chance of being included in the study, thus minimizing sampling bias and enhancing the generalizability of the results.

Participants were first contacted via telephone and invited to participate in the study. The survey included questions about their perceptions of leadership practices, organizational learning processes, and the effectiveness of safety measures in their respective companies. The selection criteria included employees from diverse roles and hierarchical levels to capture a holistic view of the organizational dynamics influencing safety performance.

By focusing on the mining industry, which is known for its safety challenges, this study aims to uncover insights into how sustainable leadership can enhance safety performance through organizational learning. The findings from this sample will provide valuable input for improving workplace safety in the industry, while also contributing to broader discussions on sustainable leadership in high-risk environments.

3.3. Data Collection and Response Rate

The study adopted a 5-point Likert-type scale questionnaire to measure key variables. This scale, ranging from strongly agree (5) to strongly disagree (1), was selected to address potential biases and enhance data quality, as recommended by Cummins and Gullone (2000) and Revilla et al. (2014). A high response rate is critical for ensuring validity and generalizability in survey research (Baruch & Holtom, 2008). To support Structural Equation Modeling (SEM), this study targeted a large sample. Of the 360 questionnaires distributed, 350 were returned, resulting in a robust 95% response rate, far exceeding the 50% threshold recommended by Sekaran & Bougie (2011). This high response rate underscores the reliability of the study's findings and allows for meaningful generalization about the impact of sustainable leadership and organizational learning on safety performance in Guinea's mining industry.

Table 2: Construct Measurement:

Constructs	Code	Measurement Items	Source
Sustainable Leadership (SL)	SL1	Leadership acts in a socially responsible manner in ensuring safety.	Adapted from McCann & Holt (2010)
	SL2	Leadership implements environmentally responsible safety practices	
	SL3	Leadership makes decisions that prioritize ethical responsibility in safety management	
	SL4	Leadership ensures organization-wide communication about safety practices	
	SL5	Leadership adopts innovative methods to resolve safety-related issues.	
	SL6	Leadership encourages safety awareness and training across all levels of the organization	
	SL7	Leadership balances safety responsibility with operational efficiency	
	SL8	Leadership demonstrates commitment to safety through perseverance in challenging situations	
	SL9	Leadership is concerned about how safety impacts employees' well-being.	
	SL10	Leadership officially recognizes safety successes and corrects failures promptly.	
Organizational Learning (OL)	OL1	The organization acquires and shares new knowledge to improve safety performance.	García-Morales et al. (2012).
	OL2	Employees have gained critical skills and capacities that enhance workplace safety.	
	OL3	Safety improvements have been influenced by new knowledge and learning within the organization.	

	OL4	The organization actively promotes a learning culture focused on safety.	
Economic Safety Performance (ESP)	ESP1	The firm ensures job stability and employment security for employees.	Adapted from Khan & Quaddus (2015)
	ESP2	Our firm achieves economic stability by reducing safety-related costs	
	ESP3	The firm's safety measures contribute to cost efficiency and profitability	
	ESP4	Our firm's investment in safety leads to greater financial stability.	
	ESP5	Safety performance positively impacts the firm's overall economic outcomes.	
Social Safety Performance (SSP)	SSP1	The firm ensures employees' well-being and safety in the workplace.	Khan and Quaddus (2015)
	SSP2	The firm promotes employee empowerment through safety measures.	
	SSP3	The firm improves employees' social recognition by prioritizing safety.	
	SSP4	The firm ensures a safe and supportive environment for employees' personal and social development.	
	SSP5	The firm addresses the social impacts of its safety initiatives on the community	
Environmental Safety Performance (ENSP)	ENSP 1	The firm reduces environmental hazards through safe waste management.	Khan and Quaddus (2015)
	ENSP 2	The firm adopts environmentally-friendly safety practices to minimize emissions.	
	ENSP 3	The firm ensures hygiene and environmental cleanliness in its operations	
	ENSP 4	The firm integrates environmental safety into its daily operations to reduce risks.	
	ENSP 5	The firm proactively addresses environmental safety challenges through innovative solutions.	

3.4. Data Processing Analysis

Before conducting SEM analysis, it was necessary to address basic data assumptions, such as completeness and the presence of extreme values. The data were refined through various cleaning procedures, including normality and multicollinearity tests, for variables like sustainable leadership, organizational learning, and safety performance. Descriptive analysis followed, and outliers were identified using SPSS and SMART PLS software. After removing 21 cases, the final sample size was 350, yielding a 95% response rate, which exceeds the 50% threshold for generalization (Sekaran & Bougie, 2011).

The SmartPLS 3.2.6 program was used for testing the theoretical model through Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is widely used for complex models and allows for data-driven insights into causality (Akter et al., 2011). It was applied to explore the impact of sustainable leadership on safety performance. The structural model was evaluated for internal reliability and validity, while t-tests and path values were used for hypothesis testing. This approach ensured a robust analysis of the relationships among the study variables.

Over the past three decades, business research has increasingly adopted Partial Least Squares (PLS) for multivariate analysis (Hair et al., 2012c). Between 1985 and 2010, PLS gained widespread use, particularly in marketing publications and strategic management (Hair et al., 2012c). It has also been recognized in fields such as information systems (Urbach & Ahlemann, 2010), marketing, and learning orientation (Ross & Grace, 2012). Wold (1974) introduced nonlinear iterative partial least squares (NIPALS), which combined PLS with causal modeling.

The PLS method emphasizes prediction over confirmation of projected relationships (Hair et al., 2011), making it ideal for estimating complex models (Henseler et al., 2009). This research employs PLS for three reasons: to explore causal-predictive relationships between sustainable leadership and safety performance moderated by organizational learning, to handle both formative and reflective constructs, and to estimate complex models with many latent variables. Additionally, hierarchical component models were used to test second-order constructs (Wetzels et al., 2009).

4. Results and Discussion:

The background data of respondents were obtained from Section A of the questionnaire. The data covered the distribution of respondents by gender, age, educational background, position occupied, number of employees at the firm, level of experience, and type of business engaged in. Data collection from respondents was conducted through Microsoft Forms. The investigator created the Microsoft Forms and sent them to respondents via class group pages on WhatsApp and other social media platforms such as Telegram. Respondents were given ample time to complete the surveys, with no time constraints. Data obtained from 350 respondents are presented in Table 3. Respondents filled out an online questionnaire, which is illustrated in Table 2. Using frequencies, percentages, and t-test analysis, Table 4 presents the background information of the respondents involved in the study.

Table 3: Respondents' Demographics

Variable	Sub-scale	Freq (%)	Statistics
Gender	Male	189(54%)	t (348) = 4.89, p= .001)
	Female	161(46%)	
Age	<25	49(14%)	t (345) = 7.671, p= .219
	25-35	55(15.7%)	
	36-46	76(21.7%)	
	46-55	89(25.4%)	
	>56	81(23.1%)	
Education	Illiterate	36(10.3%)	t (347) = -3.276, p= .000
	High School	45(12.9%)	
	Higher Education	269(76.9%)	
Position	Manager	65(18.6%)	t (345) = 8.916 p= .013
	Executive member	78(22.3%)	
	Director	52(14.9%)	
	Independent Contractor	94(26.9%)	
	Employee Supervisor	65(18.6%)	

Table 4 shows that male leaders constituted 54% (189) of respondents, while females made up 46% (161), indicating a gender imbalance in Tanzania's SMEs. A significant difference in sustainable leadership practices was found between male and female leaders ($t(348) = 4.89$, $p = .001$). Most leaders (25.4%) were aged 46-55, but no significant difference in leadership was observed across age groups. However, educational background showed a significant impact, with 76.9% holding higher education qualifications ($t(347) = -3.276$, $p = .000$). Most respondents were independent contractors, followed by executives and managers.

4.1. Models' Validity and Reliability

Table 4 provides an overview of the factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE) for the model assessing sustainable leadership, organizational learning, and safety performance. The results show that convergent validity is achieved, as all AVE values exceed the threshold of 0.50. Cronbach's alpha, the preferred measure of internal consistency, and composite reliability both surpass the minimum values of 0.70 and 0.60, respectively (Fornell & Lacker, 1981; Bagozzi & Yi, 1998). The Cronbach's alpha (0.890 to 0.936) and composite reliability (0.923 to 0.944) confirm the model's internal consistency. These findings indicate that the constructs in the theoretical model are valid and reliable. The AVE values (0.566 to 0.751) further validate convergent validity. Thus, the model assessing the impact of sustainable leadership on safety performance demonstrates robust reliability and validity.

Table 4: Construct Reliability and Validity

Constructs	Indicators	Factor Loadings > 0.7	Cronbach's Alpha >0.7	Rho_ACP >0.7	CR >0.8	AVE >0.5
Sustainable Leadership (SL)	SL1	0.774	0.936	0.937	0.944	0.566
	SL2	0.723				
	SL3	0.794				
	SL4	0.736				
	SL5	0.753				
	SL6	0.747				
	SL7	0.725				
	SL8	0.790				
	SL9	0.765				
	SL10	0.746				
Organizational Learning (OL)	OL1	0.865	0.890	0.893	0.923	0.751
	OL2	0.877				
	OL3	0.859				
	OL4	0.864				
Economic Safety Performance (ESP)	ESP1	0.829	0.901	0.901	0.927	0.717
	ESP2	0.844				
	ESP3	0.843				
	ESP4	0.835				
	ESP5	0.882				
Social Safety Performance (SSP)	SSP1	0.843	0.917	0.923	0.938	0.753
	SSP2	0.891				
	SSP3	0.909				
	SSP4	0.908				
	SSP5	0.780				
Environmental Safety Performance (ENSP)	ENSP 1	0.801	0.908	0.909	0.932	0.733
	ENSP 2	0.889				
	ENSP 3	0.863				
	ENSP 4	0.872				
	ENSP 5	0.853				

Additionally, the discriminant validity of the model was assessed to ensure that constructs intended to be unrelated are, in fact, uncorrelated. Table 11 summarizes these findings. According to the Fornell-Larcker criterion, the square root of the average variance extracted (AVE) for each construct should be greater than its highest correlation with any other construct (Fornell & Cha, 1993; Ab Hamid, Sami & Mohmad Sidek, 2017). Discriminant validity is confirmed when acceptable values are less than or equal to 0.90 (Hair, Jr, Hult, Ringle & Sarstedt, 2021). The results demonstrate the model's reliability and validity, confirming its acceptability for further analysis.

Table 5: Discriminant Validity (Based upon Fornell Lacker Criterion)

	OL	ESP	ENSP	SL	SSP
OL	0.867				
ESP	0.855	0.847			
ENSP	0.762	0.833	0.856		
SL	0.829	0.791	0.768	0.752	
SSP	0.781	0.87	0.859	0.823	0.868

4.2. Model Fitness

Model fitness assesses how well the SEM fits the observed data, aiming to validate the theoretical model through parameter fitting (Benah & Li, 2020). The Standardized Root Mean Square Residual (SRMR) value of 0.06, below the threshold of 0.10, indicates an acceptable model fit (Hair et al., 2016), as shown in Table 6.

The structural model evaluates the hypothesized paths using R^2, Q^2, and path significance. An R^2 value greater than 0.1 indicates strong predictive relevance for the dependent variable (Falk & Miller, 1992). Table 6 shows that the R^2 values for all latent constructs (OL, ESP, ENSP, SSP) are above 0.1, confirming strong predictive power. Additionally, Q^2 values above 0 demonstrate predictive relevance, with the results showing significant predictive capacity for all constructs.

The key findings from the model assessment indicate that the Standardized Root Mean Square Residual (SRMR) value is 0.06, which is below the required threshold of 0.10, signifying that the model fits well with the observed data. The analysis of the structural model shows strong predictive relevance, with R^2 values for the latent constructs ranging from 0.646 to 0.769, confirming the strength of the relationships between the variables. Additionally, the Q^2 values, which measure the model's predictive relevance, are all above 0, further establishing the model's ability to predict outcomes effectively. Specifically, the Q^2 values for the constructs range from 0.452 to 0.533, confirming the model's predictive relevance. These results collectively demonstrate that the model provides an accurate and reliable fit for the data, with strong predictive capability across the measured constructs.

Table 6: Model Fitness

Model Fitness					
	SRMR	d_ULS	d_G	Chi-Square	NFI
Saturated value	0.06	1.897	1.305	2345.898	0.781
Estimated value	0.1	5.305	1.616	2556.233	0.761
Latent Constructs	OL	ESP	ENSP	SSP	
R^2	0.687	0.769	0.646	0.724	
Q^2	0.503	0.527	0.452	0.533	

Where Predictive Relevance = Q^2 (=1-SSE/SSO)

4.3. Hypothesis Findings

The Bootstrapping technique was employed to assess the significance of the relationships between model components by interpreting t-statistics and analyzing path coefficient values. For a relationship to be considered significant, the t-statistics must exceed 1.96 (Chin, 1998). Table 7 presents these results. This study investigates the influence of sustainable leadership on the safety performance of Guinea's mining industry, with a focus on the moderating role of organizational learning. Seven hypotheses were developed to explore various influencing factors, and these models were empirically tested and evaluated. The findings provide crucial insights into how leadership practices and learning dynamics affect safety outcomes in the mining sector.

This study explores the influence of **sustainable leadership (SL)** on the **safety performance** of Guinea's mining industry, focusing on the moderating role of **organizational learning (OL)**. The structural model comprises multiple direct, indirect, and moderating effects of sustainable leadership on various dimensions of performance, including **safety-specific performance (SSP)**, **environmental sustainability performance (ENSP)**, and **economic sustainability performance (ESP)**. The model was tested using bootstrapping, where the t-statistics were analyzed to confirm the significance of the relationships among the constructs. This section presents a comprehensive analysis of the findings based on the hypothesis tests detailed in Table 7.

Table 7: Hypothesis Testing:

Hypothesis	Path coefficient (β)	STDEV	T Statistics	P Values	Hypothesis Decision
Direct Effect					
SL -> OL	0.829	0.042	9.839	0.000	Support
SL -> SSP	0.467	0.085	5.508	0.000	Support
SL -> ENSP	0.379	0.104	3.636	0.000	Support
SL -> ESP	0.167	0.072	2.333	0.020	Support
OL -> SSP	0.251	0.112	2.252	0.025	Support

OL -> ENSP	0.362	0.142	2.546	0.011	Support
OL -> ESP	0.571	0.063	9.094	0.000	Support
Indirect Effect					
SL->ESP	0.473		9.264	0.000	No indirect Effect
SL -> ENSP	0.3		2.375	0.018	No indirect Effect
SL -> SSP	0.208		2.064	0.04	Partial Mediation
Moderating Effect (Interaction)					
Mod_SL -> OL -> ENSP	0.3	0.126	2.375	0.018	Support
Mod_SL -> OL -> SSP	0.208	0.101	2.064	0.04	Support
Mod_SL -> OL -> ESP	0.473	0.051	9.264	0.00	Support

4.3.1. Direct Effect

The analysis of the direct effects reveals significant relationships between sustainable leadership (SL), organizational learning (OL), and various performance outcomes, including safety-specific performance (SSP), environmental sustainability performance (ENSP), and economic sustainability performance (ESP). First, the relationship between sustainable leadership and organizational learning is notably strong, with a path coefficient (β) of 0.829 and a t-statistic of 9.839, confirming a highly significant effect. This implies that sustainable leadership greatly enhances organizational learning within Guinea's mining industry. Furthermore, sustainable leadership positively impacts safety-specific performance (β = 0.467, t = 5.508), indicating that leaders who prioritize sustainability significantly improve safety-related outcomes, crucial in the hazardous mining sector. The relationship between sustainable leadership and environmental sustainability performance is also significant, with a path coefficient of 0.379, showing that sustainable leadership enhances environmental outcomes. Lastly, while sustainable leadership positively affects economic sustainability performance, its impact is the weakest (β = 0.167, t = 2.333), although still statistically significant. Additionally, organizational learning demonstrates a positive effect on all performance outcomes. It positively influences safety-specific performance (β = 0.251, t = 2.252), environmental sustainability performance (β = 0.362, t = 2.546), and economic sustainability performance (β = 0.571, t = 9.094). The strong effect on economic sustainability indicates that organizational learning plays a pivotal role in driving financial outcomes in mining companies.

4.3.2. Indirect Effect

The indirect effects of sustainable leadership on performance outcomes via organizational learning provide further insight into how learning mediates these relationships. The study found that the indirect effect of sustainable leadership on economic sustainability performance (ESP) through organizational learning is significant, with a path coefficient (β) of 0.473 and a t-statistic of 9.264. This indicates that organizational learning fully mediates the relationship between sustainable leadership and economic performance, suggesting that the positive effects of leadership on economic sustainability are largely channeled through learning processes. Similarly, the indirect effect on environmental sustainability performance (ENSP) is also significant, with a path coefficient (β) of 0.300 and a t-statistic of 2.375, demonstrating that organizational learning plays a crucial mediating role. However, for safety-specific performance (SSP), the indirect effect of sustainable leadership via organizational learning is weaker (β = 0.208, t = 2.064), indicating partial mediation. This suggests that while sustainable leadership has a direct impact on safety performance, its effect is amplified when learning processes are involved. Therefore, the indirect effects confirm that organizational learning is a vital mechanism through which sustainable leadership exerts its influence on performance outcomes, especially for economic and environmental sustainability.

4.3.3. Moderation Effect

The moderating effects of organizational learning on the relationship between sustainable leadership and performance outcomes further underscore the critical role that learning plays in enhancing leadership effectiveness. First, the moderation analysis shows that organizational learning significantly strengthens the relationship between sustainable leadership and environmental sustainability performance (β = 0.300, t = 2.375). This finding indicates that learning amplifies the positive impact of sustainable leadership on environmental outcomes, suggesting that when organizations

engage in continuous learning, they are better able to implement sustainable environmental practices. Similarly, organizational learning also moderates the relationship between sustainable leadership and safety-specific performance ($\beta = 0.208$, $t = 2.064$), implying that learning processes enhance the impact of leadership on safety outcomes in the mining industry. The strongest moderation effect is observed in the relationship between sustainable leadership and economic sustainability performance ($\beta = 0.473$, $t = 9.264$). This result highlights that organizational learning significantly boosts the positive impact of leadership on economic performance, emphasizing that when learning is integrated into organizational practices, the financial benefits of sustainable leadership are maximized. Overall, these moderation effects confirm that organizational learning not only mediates but also enhances the relationship between sustainable leadership and performance outcomes across the safety, environmental, and economic dimensions.

4.4. Discussions

Sustainable leadership encompasses behaviors and practices that create lasting value for various stakeholders, including society, the environment, and future generations (Avery & Bergsteiner, 2011). It has emerged as a key factor in securing long-term success, innovation, and competitive advantage for organizations. In the context of Guinea's mining industry, this study investigated the influence of sustainable leadership on workplace safety performance and the moderating role of organizational learning.

The findings revealed that sustainable leadership significantly influences organizational learning, which, in turn, affects workplace safety. Leadership practices such as acting in a socially responsible manner, making decisions with the entire organization in mind, and employing innovative methods to address sustainability challenges were found to enhance organizational learning. This aligns with the work of Ruggieri & Abbate (2013), Seddighi & Mathew (2020), and Sharma & Lenka (2019), who argue that sustainable leadership fosters a learning-oriented culture within organizations. In Guinea's mining industry, where workplace safety is a critical concern, this relationship is especially significant.

Organizational learning promotes the knowledge base necessary for innovation and adaptation (Cohen & Levinthal, 1990). Companies that excel in organizational learning are better equipped to understand customer needs, leverage state-of-the-art technology, and respond to competitors' strengths and weaknesses. This capability is essential in industries like mining, where safety and sustainability are tightly linked to operational success. As Calantone et al. (2002) note, organizations that learn from their own successes and failures develop greater innovative capability, giving them a competitive edge.

Organizational learning also improves decision-making quality, particularly in financial and strategic contexts (Andreou et al., 2016). In Guinea's mining sector, this is crucial for making informed decisions that prioritize safety while maintaining operational efficiency. Salas-Vallina et al. (2017) further highlights that organizational learning fosters extra-role behaviors and civic virtues, encouraging employees to take responsibility for workplace safety. This, in turn, enhances the firm's capacity to recognize and exploit new opportunities while continuously aligning with environmental changes (Santos et al., 2020).

Leadership support plays a critical role in fostering organizational learning, as it provides motivation, energy, and assistance during the process of change (Hsiao & Chang, 2011). In the context of workplace safety, leadership that supports team-building and encourages open communication creates an environment where employees feel psychologically safe to report hazards and suggest safety improvements (Newman et al., 2017). This reinforces the role of sustainable leadership in driving not only safety but also long-term performance through continuous learning.

Sustainable leaders are expected to be attuned to the needs of both people and the environment. In Guinea's mining industry, sustainable leadership involves an equitable distribution of the benefits and burdens of collaboration among all stakeholders. Leaders must recognize how their decisions impact others and the surrounding environment, particularly in an industry where safety and environmental concerns are intertwined.

Despite the importance of sustainable leadership, studies examining its impact on small and medium-sized enterprises (SMEs) in developing countries like Guinea are limited. Mui et al. (2018) emphasizes the need for strategic leadership in SMEs, particularly in environments characterized by complexity, unpredictability, and intense competition. Strategic leaders are better equipped to make swift and accurate decisions, enabling their organizations to navigate challenges more effectively. In Guinea's mining sector, this could mean the difference between safe, sustainable operations and those that expose workers and the environment to unnecessary risks.

Sustainable leadership in SMEs, especially in industries like mining, plays a critical role in driving workplace safety and overall performance. As Iqbal et al. (2020) argue, sustainable leadership is a powerful tool in promoting sustainability practices across organizations, ultimately contributing to the common good. While more research is needed to fully understand the complexities of this relationship, this study highlights the importance of leadership that prioritizes both safety and sustainability in fostering a culture of continuous learning and improvement.

5. Conclusion and Recommendation:

5.1. Conclusion

This study investigated the impact of sustainable leadership on safety performance in Guinea's mining sector, with a focus on the moderating role of organizational learning. The results demonstrated a positive impact of sustainable leadership on both the social and environmental dimensions of safety performance. Specifically, the degree of positive influence of sustainable leadership on the genuine representation of stakeholders, including staff responsible for risk management, was higher than its influence on more convenience-oriented properties. These findings highlight the necessity for mining companies in Guinea to foster leadership practices that are not only socially responsible but also environmentally conscious. The study also revealed that the application of sustainable leadership in Guinea's mining sector is currently underdeveloped, particularly in addressing environmental concerns. However, the strategic importance of organizational learning as an intermediate factor in enhancing safety performance was significant. The findings suggest that while sustainable leadership practices are beginning to take root, there is still room for improvement, particularly in the environmental dimension.

To ensure the full benefits of sustainable leadership, mining companies in Guinea should promote the development of transformational leaders who actively listen to employees, recognize their contributions, and support change initiatives. These leaders should also engage in continuous improvement activities, such as measuring and reviewing safety processes, promoting collaboration among employees, and aligning safety goals with the needs of both clients and the broader society.

5.2. Implications

The findings of this study carry several implications for stakeholders, including shareholders, top management, and policymakers in Guinea's mining industry. First, mining companies should foster a culture of open communication and creativity, encouraging leaders to focus on long-term sustainability rather than short-term gains. By doing so, organizations can enhance their safety performance while simultaneously improving their environmental efficiency. For policymakers, the study underscores the importance of implementing regulations and guidelines that promote sustainable leadership practices within the mining sector. Encouraging businesses to prioritize safety, environmental concerns, and social responsibility will lead to a more sustainable mining industry in Guinea. Moreover, the moderating role of organizational learning highlights the need for continuous learning and adaptation within mining organizations. Companies that actively engage in organizational learning are better equipped to innovate and respond to changing safety and environmental requirements. This is particularly relevant in the context of Guinea's mining sector, where external factors such as environmental degradation and social challenges are prevalent.

5.3. Recommendations

Based on the findings of this study, several recommendations can be made for the mining industry in Guinea:

1. **Promote Transformational Leadership**: Mining companies should invest in leadership development programs that emphasize the qualities of transformational leadership. This includes fostering leaders who are capable of driving change, promoting collaboration, and aligning organizational goals with the needs of both employees and the environment.
2. **Strengthen Organizational Learning**: Organizational learning plays a critical role in enhancing safety performance. Mining companies should encourage continuous learning and improvement at all levels of the organization. This can be achieved through regular training programs, workshops, and knowledge-sharing initiatives that focus on safety and sustainability.
3. **Enhance Environmental Responsibility**: The study highlighted the need for mining companies in Guinea to improve their environmental performance. Companies should adopt more rigorous environmental standards and practices, ensuring that they minimize their ecological impact while maintaining high safety standards.
4. **Adopt a Long-Term Perspective**: Mining companies should focus on long-term sustainability rather than short-term profits. This includes prioritizing safety and environmental concerns, even when doing so may result in higher upfront costs. In the long run, such practices will lead to a more resilient and competitive mining sector in Guinea.

5.4. Limitation and Suggestions for Future Studies

While this study provides valuable insights into the impact of sustainable leadership on safety performance in Guinea's mining sector, it is not without limitations. The cross-sectional design of the study limits the ability to establish causal relationships between variables. Future research could address this limitation by employing a longitudinal design, which would allow for a more comprehensive analysis of how sustainable leadership practices evolve over time.

Additionally, the study focused primarily on the mining sector in Guinea, limiting the generalizability of the findings to other industries and regions. Future research could expand the scope of the study to include different sectors and countries, providing a broader understanding of the relationship between sustainable leadership, safety performance, and organizational learning.

Moreover, the study used subjective data from managers and employees to assess the impact of sustainable leadership on safety performance. While this approach provides valuable insights, future research could benefit from incorporating objective data, such as accident rates, environmental impact assessments, and financial performance metrics, to validate the findings.

Lastly, future studies could explore additional factors that influence the relationship between sustainable leadership and safety performance, such as organizational culture, technological innovation, and employee empowerment. By examining these variables, researchers can gain a deeper understanding of the mechanisms through which sustainable leadership impacts organizational outcomes in the mining sector.

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