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Human Resource Productivity: Integrating Resilience Engineering, Motivation, and Health Safety

Ida Bagus Udayana Putra^{1*}, Sebastian Kot^{2*}, Abdul Halil Hi Ibrahim³, Ismi Rajiani⁴¹ Universitas Warmadewa, Jl. Terompong 24 Tanjung Bungkak Denpasar Bali, Indonesia; udayanaputra10@gmail.com² Czestochowa University of Technology, Czestochowa, Poland and Faculty of Economics and Management Sciences, North-West University, South Africa; sebastian.kot@pcz.pl³ Universitas Muhammadiyah Maluku Utara, Jl. KHA. Dahlan, Ternate, Indonesia; rajiani@ulm.ac.id⁴ Lambung Mangkurat University, Jl. Brigjen H. Hasan Basri, Banjarmasin, Indonesia; rajiani@ulm.ac.id*Correspondence: udayanaputra10@gmail.com; sebastian.kot@pcz.pl

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Abstract

This study investigated the multifaceted relationship between resilience engineering practices, work motivation factors, health, safety, and environment (HSE) management to achieve employee productivity within a mining company in South Kalimantan, Indonesia. Employing structural equation modelling (SEM) on data from 178 workers, intriguing results are diverged from established research. While resilience engineering practices and work motivation factors significantly enhanced productivity, robust HSE management demonstrated a surprisingly insignificant association. This unexpected finding necessitates a closer examination of the unique context of Indonesian mining culture and HSE implementation practices. Several potential explanations emerge, including ingrained communal responsibility for safety, limited applicability of imported frameworks, prioritisation of immediate needs over long-term safety due to competitive pressures, and possible erosion of trust in bureaucratic systems. These factors highlight the need to consider cultural nuances and industry challenges when designing effective HSE interventions. Moving forward, research and practice must prioritise developing culturally sensitive HSE practices, fostering trust and employee engagement, bridging the gap between formal systems and daily realities, and gathering qualitative data to understand employee perspectives. By addressing these considerations, future interventions can effectively align HSE efforts with employee productivity, contributing to a safer, more productive, culturally relevant work environment for Indonesian miners.

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1. Introduction

In the global economy's ever-changing and competitive landscape, human capital is a crucial driver of economic growth and societal advancement, transcending geographical boundaries (Xia et al., 2022; Sychacka et al. 2023, Ulewicz et al. 2023). The optimisation of workforce productivity holds paramount importance not only for emerging economies but also on a global scale. As nations worldwide strive for progress and improved living standards, understanding and enhancing the multifaceted aspects of productivity becomes essential (Maqsoom et al., 2023; Buchynskyi et al., 2023; Kuzior et al. 2023). Traditional approaches to productivity enhancement often narrowly focus on quantitative output metrics (Pan et al., 2022), disregarding the pivotal roles played by

resilience, motivation (Mehdizadeh-Somarin et al., 2022), and health, safety, and environment (HSE) (Zhang et al., 2023).

Current productivity practices in Indonesia often prioritise output maximisation over the well-being of workers (e.g., Suhariadi et al., 2023; Adhiatma et al., 2023; Tarigan et al., 2022), leading to unsustainable and potentially detrimental long-term consequences. Overlooking factors like stress, burnout, and inadequate HSE measures can significantly hinder productivity and increase absenteeism, accidents, and employee turnover (Novin et al., 2022; Ulewicz and Lazar, 2019). Furthermore, intrinsic motivators such as autonomy, purpose, and opportunities for growth are frequently disregarded (Masinde and Coetzee, 2021), leading to a disengaged workforce with limited capacity for innovation and sustained performance. It also causes job losses (Kuzior et al, 2022).

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This underscores the critical need for a paradigm shift in productivity management that prioritises employees' well-being and intrinsic motivation alongside quantitative output measures.

Indonesia boasts a young and rapidly growing population, presenting a demographic dividend that can be harnessed for economic growth (Priyambodo, 2023). However, the challenge lies in developing a workforce that is skilled and efficient but also resilient, motivated, and healthy. This requires adopting a holistic approach to human resource management that integrates resilience engineering principles, motivation theories, and best practices in HSE. This research seeks to provide a comprehensive framework for assessing and enhancing the productivity of Indonesia's workforce, ultimately contributing to the nation's economic and social progress.

The primary objective of this research is to conduct a holistic assessment of human resource productivity by integrating insights from resilience engineering, motivation, and health safety perspectives. A comprehensive study on this topic needs to highlight a significant oversight in the Indonesian HRM landscape. This gap must be addressed through rigorous research that explores the synergistic effects of RE, WMFs, and HSE on HR productivity. Such research will provide valuable insights for organisations seeking to optimise their HR practices and unleash the full potential of their workforce, ultimately contributing to Indonesia's economic growth and prosperity.

Specifically, we seek to unravel the interconnected effects of these factors within the context of the Indonesian workforce. Through a comprehensive analysis, the study is aimed at identifying strategies that can effectively enhance productivity, contributing to the sustainable development of the workforce and the nation. Ultimately, this research aspires to provide actionable recommendations for organisations and policymakers, fostering a conducive environment for heightened human resource productivity in Indonesia.

2. Literature review

2.1. Resilience Engineering

Resilience engineering (RE) emerges as a transformative approach to safety management, marking a significant shift from error prevention to fostering adaptability and resilience within organisations. Unlike traditional risk management methods focusing on counting errors and analysing past failures, RE takes a proactive stance. It aims to enhance the system's ability to adjust and respond effectively to disruptions, unexpected events, and persistent stressors (Mehdizadeh-Somarin et al., 2022; Lee et al., 2022). This dynamic approach sets RE apart from conventional methods, which are often reactive and rely on static risk models that offer little guidance for navigating unforeseen challenges. RE redefines safety not as the absence of incidents but as the inherent ability of a system to adapt its functioning and maintain essential operations even in the face of significant disruptions, disasters, or persistent stresses (Samieinasab et al., 2022). This perspective highlights the crucial need to understand everyday functioning as

a foundation for achieving safety performance. It recognises that incidents are often inevitable, and proper safety lies in the system's capacity to recover and thrive despite them.

One of RE's key contributions is its focus on managing and understanding performance variability. It recognises that efficiency, safety, and resilience are not static states but rather emergent properties arising from an organisation's complex interplay of factors (Arcuri et al., 2022). This shifts the focus from achieving a fixed resilient state to cultivating resilient performance as an ongoing process. While specific RE definitions may differ across fields, Zarrin (2022) proposed a framework encompassing six core elements: Top Management Commitment (TMC), Reporting Culture (RC), Learning (LR), Preparedness (PR), Flexibility (FL), and Awareness (AW). TMC sets the tone by demonstrating genuine dedication to RE initiatives. This involves allocating resources, fostering a culture of safety and resilience, and empowering employees to participate actively (Lee et al., 2022). A robust RC encourages open communication about safety concerns, near misses, and potential hazards. This valuable data allows for proactive identification and mitigation of risks, preventing incidents before they occur (Mehdizadeh-Somarin et al., 2022).

RE emphasises continuous LR, drawing insights from both successes and failures. Analysing everyday work practices and incident reports helps identify patterns, best practices, and areas for improvement, leading to a culture of continuous learning and enhanced resilience (Steen et al., 2023). Effective PR mitigates the impact of disruptions before they escalate. This includes comprehensive emergency response plans, regular drills and simulations, and ensuring access to necessary resources and expertise (Samieinasab et al., 2022). FL empowers front-line personnel to make informed decisions and take necessary actions without waiting for cumbersome bureaucracy. This promotes agility and adaptability within the organisation, allowing for real-time responses to unforeseen challenges (Kamalahmadi et al., 2021). Maintaining situational AW through clear communication channels, monitoring key performance indicators, and regular safety procedure reviews allows for better anticipation and management of potential disruptions (Thomas and Suresh, 2022). By integrating these RE principles into HRM practices, organisations can create a safer, more resilient, and ultimately more successful workplace. This enhances safety outcomes, promotes employee well-being, and optimises overall organisational performance by fostering a proactive, adaptable, and learning-oriented culture (Gu et al., 2023).

2.2. Work Motivational Factors

In the dynamic world of organisational behaviour, work motivational factors (WMFs) reign supreme as drivers of employee performance and a thriving workplace (Soliman et al., 2022). These multifaceted catalysts, encompassing intrinsic and extrinsic elements, are the secret sauce behind individual excellence (Shahzad et al., 2023). Recognising their critical role, Mehdizadeh-Somarin et al. (2022) urge organisations to carefully consider WMFs when crafting work environments,

ensuring fertile ground for motivation and productivity to flourish.

Four WMFs stand out as key players: job satisfaction (JST), job security (JSC), work stress (WS), and overall workload (OWL). When effectively managed, these factors become a symphony of success, propelling employees and organisations to soar (Mehdizadeh-Somarin et al., 2022). JST, as Aung et al. (2023) define it, reflects an individual's upbeat assessment of their job experience. A vibrant JST melody increases motivation and engagement and boosts productivity (Anselmus Dami et al., 2022). On the other hand, JSC is the steady beat of stability and continuity. Secure employees are more likely to be motivated, engaged, and committed organisational citizens (Bazzoli and Probst, 2022). However, Saeed et al. (2021) paint a stark picture: job insecurity disrupts the rhythm, leading to dampened performance, diminished satisfaction, and weakened organisational ties. However, organisations can become conductors of JSC by fostering clear communication, robust performance management systems, and blossoming career development opportunities (Abri et al., 2021).

WS, the complex maestro, plays a double-edged role. When skillfully managed, it becomes the driving force for optimal performance, but excessive or prolonged exposure can trigger burnout, reduced productivity, and adverse health consequences (Alsulami et al., 2021; Danauskè et al., 2023). Omeje et al. (2022) emphasise the importance of collaborative WS management, a shared responsibility between employees and employers. OWL, the volume of work entrusted to an employee, is another crucial factor (Liu et al., 2022). As Nino et al. (2023) aptly point out, evaluating employee workload during system design is the ultimate preventive measure against bottlenecks and overload. This proactive approach ensures compatibility between systems and the team's capabilities, creating a sustainable and efficient work environment where motivation flourishes.

2.3. Health, Safety, Environment

Health, Safety, and Environment (HSE) management is crucial for a resilient and productive work environment (Ahmadi et al., 2022). This comprehensive approach encompasses identifying and prioritising HSE aspects, regular self-assessments and audits, and meticulous performance measurements, ultimately aiming to eliminate or minimise potential harm at the operational level (Wijesinghe et al., 2023; Jalil Al-Bayati et al., 2023). Strengthening relationships with their workforce and prioritising their human resources' health, safety, and satisfaction are top priorities for industrial managers today (Jones et al., 2023). HSE factors like system performance, guideline implementation, management commitment, job satisfaction, security, workload, and stress are particularly crucial in this pursuit (Zara et al., 2023). These directly connect to organisational resilience (RE): fostering a supportive environment, promoting employee well-being, and enhancing adaptability to change are vital contributors (Owida et al., 2022). HSE management plays a vital role in building a resilient and sus-

tainable organisation by mitigating risks, promoting well-being, fostering a safety culture, encouraging learning, and improving adaptability.

2.4. Integrating RE, WME, HSE, and HR Productivity

Resilience engineering (RE) has traditionally been fixated on pinpointing and ranking the best RE elements in safety-critical systems (Arcuri et al., 2022), neglecting the intricate dance they perform together. This tunnel vision has limited our grasp of RE's true power to transform how we approach safety. Bertoni et al.'s (2022) model, while hinting at the resilience-safety link, needs to include the dynamic interplay. Their intervention strategies, solely driven by finances and legal pressures, ignore the vital roles of human factors, culture, and adaptive learning in building resilience. Similarly, the study of work motivational factors (WMFs) has been stuck in a rut of identifying the "usual suspects" – socio-psychological, organisational, and economic factors (Adam et al., 2023; Soliman et al., 2022; Bendickson et al., 2021) – while missing the hidden motivators that truly drive us. Martela et al.'s (2022) exploration of "basic" motivators, while offering a basic framework, falls short of capturing workforce motivation's nuanced and dynamic nature. Their conclusion that psychological factors rule supreme disregards the intricate interplay between individual needs, aspirations, and the broader organisational context. Although contributing to the technology adoption discussion, Satispi et al.'s (2023) analysis of HRIS on workforce satisfaction overlooks the deeper human factors that genuinely influence job fulfilment and retention. Their focus on work-related consequences as success variables fails to acknowledge the emotional, psychological, and social dimensions that shape employee engagement.

HSE management has often been relegated to a compliance check box, missing the potential of a truly empowered workforce. Studies like Mehdizadeh-Somarin et al. (2022) and Samieinasab et al. (2022) exemplify this, focusing on optimal decision-making styles and team dynamics while ignoring the critical fuel of individual motivation and engagement. Sujan et al.'s (2023) obsession with best operators and high efficiency reveals a mechanical view of workforce optimisation, blind to human complexities and intrinsic motivation. While their findings offer resource allocation insights, they must dive into workforce excellence's deeper drivers. While highlighting regulatory alignment, Pilanawithana et al.'s (2023) assessment must address the fundamental disconnect between compliance and worker safety. Their conclusion that the system resilience reflects the safety performance of buildings ignores the harsh reality: workers in high-risk environments are not always adequately protected.

Despite Indonesia's dynamic economy, its HRM landscape needs to be more cohesive (Rajiani and Kot, 2020). Essential concepts like resilience engineering (RE), work motivational factors (WMFs), and health, safety, and environment (HSE) management are often overlooked, hindering a holistic understanding of their combined impact on HR productivity. This gap in research leaves Indonesian organisations needing help

to unlock the full potential of these concepts, potentially jeopardising their competitiveness and sustainability.

Up to this point, there needs to be a thorough investigation into evaluating and examining human resources productivity while simultaneously considering these three management concepts. Empowering organisations to nurture a high-performing and resilient workforce – the engine of innovation, productivity, and sustainable success (Beer, 2022) – is precisely why integrating these concepts into a unified framework becomes crucial. This integrated approach is especially vital in Indonesia, where natural disasters, economic fluctuations, and rapid technological advancements demand a workforce adept at navigating diverse challenges.

Among these critical concepts, RE is a powerful tool for building productive human resources. This approach, focused on managing complex systems to withstand disruptions and maintain essential functions, has demonstrably positive links to HR productivity (Karlton et al., 2023; Mehdizadeh-Somarin et al., 2022; Lee et al., 2022). This connection stems from resilience engineering's ability to foster a supportive and safe work environment, empower employees, and cultivate a continuous learning culture. RE contributes to productive HR by creating a conducive work environment (Svensson et al., 2023) and encouraging continuous learning and adaptation (Alderson et al., 2022). This observation leads us to hypothesise:

Hypothesis 1: Resilience engineering practices are positively related to productive human resources.

Work motivation, which propels individuals to exert effort and achieve organisational goals, has been a central focus in organisational behaviour research (Singh and Ramdeo, 2023). Mountains of evidence consistently point to the positive and potent link between work motivation factors and productive human resources (Straus et al., 2022); (Pereira et al., 2022). When employees feel empowered, valued, given growth opportunities, and connected to their work's purpose, they are more likely to engage, create, and be deeply committed. Empirical studies echo this, revealing a strong correlation between work motivation and individual performance. However, the benefits go beyond individual performance. The positive impact of work motivation factors ripples outwards, boosting organisational outcomes like performance, creativity, and commitment, ultimately fueling organisational success. This leads us to hypothesise.

Hypothesis 2: Work motivation factors are positively related to productive human resources.

HSE management – the umbrella for policies, procedures, and practices that protect employee health, safety, and the environment – emerges as another key player in productive human resources (Ciecińska and Oleksiak, 2023). Effective HSE management fosters a healthier and more resilient workforce by reducing stress, anxiety, and depression while boosting job satisfaction and well-being. Safety-focused HSE programs, in particular, can significantly reduce workplace accidents and

injuries, leading to lower absenteeism costs. Moreover, vital HSE programs enhance an organisation's reputation, attracting and retaining top talent, a crucial advantage in today's competitive landscape. The available evidence paints a clear picture: HSE management is positively linked to productive human resources by nurturing a healthier, more productive, and more engaged workforce. This compelling observation leads us to hypothesise:

Hypothesis 3: Health, safety, and environmental management positively relate to productive human resources.

3. Materials and Methods

At a general level, productivity, the total output divided by employees' inputs (Samuelson and Nordhaus, 1989), indicates how much a firm's human resources efficiently create output. Our study of 178 Banjarese Indonesia mining workers examines resilience, motivation, and safety dynamics while remaining productive. Human resource productivity is a person's feeling of effectiveness, efficiency, and capability in an organisation. It involves the optimal utilisation of workforce skills and talents. Hersey and Goldsmith's ACHIEVE model identifies seven factors impacting individual productivity: ability, clarity, help (organisational support), incentive, evaluation, validity, and environment (Vinu and Bright, 2020). The demanding nature of mining jobs necessitates bolstering employee morale and engagement, which the ACHIEVE model achieves through its emphasis on incentive and evaluation. Additionally, the often harsh and dynamic environment demands adaptability and clear support, both addressed by the model's focus on validity and environmental factors. Considering the individual's internal fire and the external context, the ACHIEVE model may emerge as a powerful tool for optimising human resource productivity in the unique and challenging mining world.

In resilience engineering assessment, six key elements are considered: top management commitment, which is assessing leadership's prioritisation of safety and resource allocation; reporting culture, exploring employee empowerment to voice concerns openly; learning, assessing a culture of continuous learning from past incidents; preparedness, assessing robust plans and drills for addressing potential disruptions; flexibility, assessing organisational adaptability to changing circumstances, and risk awareness, employee risk understanding, and safety communication (Lee et al., 2022). The study examines four job motivation drivers: job satisfaction, job security, work stress, and overall workload are measured to determine employees' satisfaction with their work and its perceived meaningfulness (Mehdizadeh-Somarin et al., 2022). Three lenses examine health, safety, and environment (HSE): Health, assessing initiatives to improve employee well-being and reduce health incidents; Safety, assessing accident rates and safety protocols as indicators of a solid commitment to employee protection; and Environment, assessing the organisation's sustainability and ecological footprint reduction (Ahmadi et al., 2022). Two-pronged analysis is used to find patterns in these varied materials. Factor analysis uncovers latent

dimensions in resilience engineering, work motivation variables, and HSE constructs (Hair et al., 2020). Regression analysis can examine complex correlations between resilience engineering components, work motivation factors, and HSE outcomes. A 7-point Likert scale was used. We calculate Cronbach's alpha for each scale to verify our measurements' internal consistency and lay the groundwork for further investigation (Bonett and Wright, 2014). Table 1 displays the study questions.

Table 1. List of questions

Construct	Items	Questions
Resilience engineering	TMC	I can easily communicate with managers and supervisors.
	RC	I report incident occurs in the workplace, to my supervisor.
	LR	Special training related to my tasks is provided.
	PR	The dimensions of the machines are compliant with my body.
	FL	I do not have a problem with the regulations in emergencies.
	AW	A written instruction about my task is clearly stated.
Work motivation factors	JST	I and those around are happy with our job position.
	JSC	My role is vital to the organisation's overall success.
	WS	The pressure caused by the urgency in my work is manageable.
	OWL	The amount of work I have is equitable.
Health, safety, environment	H	The health and safety management system has been effective.
	S	Personal protective equipment is crucial in my workplace.
	E	The level of illumination at my office is adequate.
Productivity	A	I possess a comprehensive understanding of responsibility.
	C	The jobs align with my traits and skills.
	H	The process and methodology of working are explicitly outlined.
	I	I am adequately compensated for my work.
	E	I receive continuous comments regarding my performance.
	V	Information systems ensure the dependability of information.
	E	The favourable working environment enhances my productivity.

4. Results and discussion

4.1. Case Study

One of the largest mining operators in South Kalimantan, Indonesia, is presented as a case study in this paper. This plant started its commercial operation in 1990 (Idris, 2021). Its success fuels Indonesia's energy sector, but lurking beneath its economic engine is the ever-present peril of coal mining

(Arisanty et al., 2020). Roof collapses, methane leaks, equipment malfunctions - any seemingly innocuous event can trigger a domino effect, jeopardising the environment and miners' lives.

The company recognises that safety is about people, not just protocols. Mental well-being is prioritised with support groups, counselling, and on-site recreational facilities, acknowledging the immense pressure and fatigue inherent in the job. This relentless pursuit of proactive risk mitigation has yielded impressive results, boasting a commendable safety record. Nevertheless, complacency is a predator they continuously outrun. This company readily adopts best practices, invests in research, and fosters a culture of learning and adaptation, understanding that progress and peril are forever intertwined. The survey was distributed to 200 personnel across multiple facility departments engaged in mining operations for morning and evening. Of these, 178 completed the questionnaire, resulting in an approximate 89% response rate. Table 2 provides a comprehensive account of the respondents' demographic.

Table 2. Respondents' demographic characteristics

Characteristics	Numbers	
Age	<18	0
	19–25	26
	26–35	58
	36–45	56
	46–55	36
>55	2	
Gender	Male	160
	Female	18
Work experience	<5	39
	5–10	29
	11–15	54
	16–20	50
	>20	6
Education	Vocational High School	15
	Associate degree	65
	Bachelor degree	86
	Master's degree or higher	12
Department	Extraction	50
	Processing	46
	Maintenance	38
	Engineering	30
	HRD	14
Roles	Operator	100
	Supervisor	63
	Manager	15

By function, this mining operation relies on five interconnected elements. At its core is the extraction department, responsible for physically retrieving materials through processes like blasting and excavation. This sets the stage for the processing department, where the extracted ore undergoes crushing, milling, and separation to unlock its full potential. The maintenance department works behind the scenes to keep the machinery running smoothly, while the engineering department designs layouts, optimises methods, and ensures both feasibility and safety. The HRD department focuses on the

workforce's development, management, and well-being, ensuring the organisation has the skilled and motivated personnel needed for efficient and safe mining operations. Together, these departments play crucial roles in the success of any mining venture.

4.2. Statistical Calculation

Table 3 displays the study's instrument validity and reliability. Principal Component Analysis (PCA) affirmed that all factor loadings surpassed the recommended 0.50 threshold, confirming the instrument's accuracy in measuring the intended constructs. Furthermore, Cronbach's alpha coefficients for each observed variable exceeded established thresholds of 0.70, demonstrating high internal consistency and reliability.

Table 3. Validity and reliability measurement

Constructs	Items	Factors Loading	Cronbach Alpha
Resilience engineering	TMC	0.740	0.770
	RC	0.736	0.773
	LR	0.748	0.771
	PR	0.720	0.769
	FL	0.740	0.771
	AW	0.730	0.773
Work motivation factors	JST	0.837	0.786
	JSC	0.798	0.789
	WS	0.712	0.791
	OWL	0.783	0.792
Health, safety, environment	H	0.787	0.792
	S	0.876	0.793
	E	0.849	0.793
Productivity	A	0.740	0.776
	C	0.730	0.776
	H	0.715	0.778
	I	0.750	0.774
	E	0.791	0.795
	V	0.752	0.797
	E	0.750	0.799

The condensed outcome of the regression analysis is presented in Table 4.

Table 3. Summary of relationship among construct

Constructs	Estimate	t-test	Sig.
RE → Productivity	0.304	4.731	0.000
WMF → Productivity	0.518	8.072	0.000
HSE → Productivity	0.073	1.438	0.152
R = 0.744	R ² = 0.554		

The obtained t-test values of 4.731 and 8.072, accompanied by highly significant significance levels of 0.000, respectively, substantiate the research hypotheses. The first hypothesis, positing that resilience engineering practices are positively related to productive human resources, receives empirical validation. Similarly, the statistical evidence strongly supports the second hypothesis, proposing that work motivation factors are positively related to productive human resources. However, the reported t-test value of 1.438 and

a significance level of 0.152 does not support the third hypothesis. Consequently, within the framework of this model, it can be inferred that health, safety, and environment management are not demonstrably positively related to productive human resources. This nuanced interpretation underscores the intricate dynamics within the examined relationships and warrants a deeper exploration of the contextual factors influencing these associations.

4.3. Discussion

In an unforeseen turn of events, the findings of the research conducted in Indonesia have brought to light a noteworthy revelation: despite the acknowledged substantial impact of resilience engineering practices and motivational factors on augmenting employee productivity (Mehdizadeh-Somarin et al., 2022; Lee et al., 2022; Soliman et al., 2022; Shahzad et al., 2023), the salience of robust HSE management appears remarkably inconspicuous, as indicated by a t-test value of 1.438 and a p-value of 0.152. This departure from established research paradigms necessitates more intricate scrutiny, particularly within the contextual framework of Indonesian cultural realities. The positive correlation discerned between resilience engineering practices and productivity is in concordance with extant scholarly investigations, exemplified by the works of Gue et al. (2023); Petrovský et al. (2023). Highlighting the emphasis on adaptability in the face of disruptions, these practices contribute to the overall well-being of employees and mitigate productivity losses arising from unforeseen events. This nexus resonates cogently with the ethos prevalent in Indonesian workplaces, wherein resourcefulness and adept navigation of unpredictability emerge as foundational values, as elucidated by Rajiani and Kot (2020).

Consistently, the discovery that work motivation factors significantly contribute to heightened productivity aligns seamlessly with well-established principles in organisational practices (Singh and Ramdeo, 2023). The interplay of intrinsic and extrinsic motivators, propelling engagement and exertion, directly influences overall output. This observation attains particular relevance in Indonesia, where ingrained cultural traits, such as a strong work ethic and a fervent pursuit of advancement, underscore the potency of motivational factors (Soliman et al., 2022). Paradoxically, the absence of a statistically significant relationship between health, safety, and environment (HSE) management and productivity introduces a distinctive anomaly in the observed dynamics. This aberration prompts a nuanced examination, highlighting the need to delve into the intricacies of the specific contextual factors shaping this atypical relationship within the Indonesian work environment.

Contrary to the prevailing trend observed in numerous studies that accentuate the positive impact of health, safety, and environment (HSE) practices (Adam et al., 2023; Soliman et al., 2022; Bendickson et al., 2021), the findings of this research unveil a distinctive narrative within the Indonesian context. Unravelling the complexities of this discrepancy necessitates exploring potential explanations deeply rooted in local cultural nuances and the implementation of HSE protocols.

One plausible explanation is discerned in Indonesia's culturally embedded notions of safety and environmental stewardship. The indigenous concept of "*gotong royong*" exemplifies a collective commitment to well-being (Rajiani, 2023), potentially alleviating the imperative for stringent external regulatory mandates. Intertwined with environmental sustainability principles, traditional practices contribute to a perceptible blending of formal HSE programs with deeply ingrained cultural behaviours. Consequently, the lines between prescribed protocols and organic cultural practices become blurred, offering a multifaceted lens through which to comprehend the intricate relationship between HSE management and productivity in the Indonesian context. This nuanced exploration emphasises the importance of cultural intricacies in shaping organisational dynamics and the effectiveness of safety and environmental initiatives.

Moreover, the transplantation of formal HSE systems from Western contexts may encounter challenges in effectively assimilating into the intricate fabric of the Indonesian workplace (Passakonjaras et al., 2019; (Widyanti, et al., 2020). The imposition of top-down implementation, coupled with limited employee engagement and bureaucratic overheads, often fosters a sense of detachment from the daily operational realities. Consequently, these imported systems may need help to resonate with the workforce, diminishing their perceived impact on productivity (Satispi et al., 2023). Furthermore, the prevailing emphasis on immediate needs and the pursuit of short-term gains within the competitive and often informal Indonesian work environment can induce employees to prioritise immediate outputs over long-term safety considerations. This prioritisation contributes to a discernible disjunction between HSE regulations and their practical application, exacerbating the perceived gap between health, safety, and environmental practices and their potential influence on productivity. This nuanced analysis underscores the imperative of aligning HSE initiatives with the contextual intricacies of the local work milieu to foster a more effective integration and realisation of their intended benefits.

Ultimately, a pervasive lack of trust in bureaucratic systems, stemming from historical experiences marked by corruption and inefficiency in mining sectors (Fernando et al., 2023), serves as a potent catalyst for employee scepticism towards formal health, safety, and environment (HSE) programs. The enduring apprehension rooted in past encounters can significantly undermine the credibility of such initiatives. A prevalent inclination towards informal networks and social relationships within the Indonesian workplace exacerbates this scepticism. The preference for these informal structures further diminishes the perceived value of formal HSE programs.

Because of Satispi et al. (2023), organisational policy adoption is driven by tripartite pressures: coercive (mandatory compliance enforced by states), mimetic (imitating successful practices), and normative (adherence to expert/academic standards). Coercion dominates policy communication in developing nations (Rajiani, 2023), fostering compliance through perceived external pressure rather than intrinsic motivation. Therefore, individuals are more likely to comply with HSE when they perceive external pressure.

Consequently, the interplay of historical distrust in formal systems and a preference for informal networks engenders an environment where the perceived impact of HSE initiatives on productivity is compromised. Recognising and addressing these underlying factors is paramount for cultivating a workplace culture where HSE programs are implemented and embraced as integral components contributing to the overall well-being and productivity of the workforce.

The research underscores the importance of incorporating cultural contexts into evaluating management practices. Departing from the conventional "one-size-fits-all" approach, the study illuminates the intricacies of health, safety, and environment (HSE) practices when viewed through the prism of Indonesian cultural values and realities. This departure from a universal perspective enriches academic understanding and provides actionable insights for practical implementation.

In moving forward, developing culturally sensitive HSE practices that transcend adherence to standardised models is imperative. Emphasis should be placed on cultivating trust and fostering robust employee engagement within the unique cultural landscape. Bridging the perceptual gap between formal HSE systems and the daily intricacies of workplace realities is paramount for the efficacy of these initiatives. This necessitates an agile approach that recognises and integrates cultural nuances into the design and implementation of HSE protocols.

Moreover, a shift towards qualitative data collection becomes essential to grasp employee perspectives and experiences comprehensively. By delving into the qualitative dimensions of employee perceptions, organisations can gain a nuanced understanding of the cultural dynamics shaping the reception and impact of HSE practices. This multifaceted approach not only aids in refining management strategies but also contributes to establishing a more harmonious and productive work environment in the Indonesian context.

5. Conclusion

In conclusion, this study has shed light on the nuanced relationship between resilience engineering, motivational work factors, health, safety, and environment (HSE) practices, and productivity within the specific context of mining companies operating in South Kalimantan, Indonesia. Departing from prevailing norms that assert a universal positive correlation between HSE and productivity, our findings underscore the imperative of considering cultural contexts. The interplay of ingrained cultural values, such as "*gotong royong*," historical mistrust in bureaucratic systems, and a preference for informal networks, introduces complexities that warrant a departure from the conventional "one-size-fits-all" management approach. The study advocates for a paradigm shift in the design and implementation of HSE practices in Indonesia. Culturally sensitive approaches prioritising trust-building, robust employee engagement, and the seamless integration of formal systems with daily work realities are crucial steps towards aligning HSE initiatives with enhanced productivity. Qualitative data collection emerges as an essential tool for comprehensively understanding employee perspectives, offering a

more holistic view of the cultural dynamics shaping the reception and impact of HSE practices. However, it is crucial to acknowledge the limitations of this study. The research focused predominantly on a specific industry or sector within Indonesia, so the generalizability of the findings to other sectors or regions may be constrained.

Additionally, the study primarily utilised quantitative methodologies. While valuable insights were gained, a more in-depth exploration through qualitative research could further enrich the understanding of cultural nuances and their implications on HSE practices. For future studies, it is recommended to expand the scope of investigation to encompass diverse industries and regions within Indonesia. Employing a mixed-methods approach that integrates both quantitative and qualitative methodologies can offer a more comprehensive understanding of the cultural intricacies influencing the relationship between HSE practices and productivity. Moreover, longitudinal studies can capture evolving cultural dynamics and their impact on the sustainability of HSE initiatives over time. Such endeavours will contribute to refining management strategies and fostering a resilient and culturally attuned approach to health, safety, and environmental practices in the Indonesian workplace.

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