KMAN PUBLISHING INSTITUTE
Journal Website

Article history:
Received 20 July 2025
Revised 26 October 2025
Accepted 09 November 2025
Published online 01 January 2026

International Journal of Innovation Management and Organizational Behavior

Volume 6, Issue 1, pp 1-11

E-ISSN: 3041-8992

Explainable AI Models of Organizational Creativity: Influences of Inclusive Leadership and Team Psychological Safety

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Hughes, E., & Pratama, R. (2026). Explainable AI Models of Organizational Creativity: Influences of Inclusive Leadership and Team Psychological Safety. *International Journal of Innovation Management and Organizational Behavior*, *6*(1), 1-11.
https://doi.org/10.61838/kman.ijimob.5270

A B S T R A C T

Objective: The primary objective of this study was to utilize an explainable artificial intelligence (XAI) machine learning framework to predict organizational creativity and mathematically elucidate the complex, non-linear interactions between inclusive leadership and team psychological safety.

Methods and Materials: A quantitative, cross-sectional predictive design was employed, utilizing a multi-stage stratified random sample of 452employees nested within 56work teams across the IT, finance, and advanced manufacturing sectors in Indonesia. Data were collected via structured digital questionnaires measuring inclusive leadership (Cronbach's $\alpha = 0.91$), team psychological safety (Cronbach's $\alpha = 0.88$), and organizational creativity (Cronbach's $\alpha = 0.93$) using 5-point Likert scales. Data analysis moved beyond traditional linear models by employing the Extreme Gradient Boosting (XGBoost) algorithm for prediction, coupled with SHapley Additive exPlanations (SHAP) to quantify global and local feature importance and map non-linear synergistic effects.

Findings: The XGBoost model demonstrated robust predictive accuracy ($R^2 = 0.71$, $RMSE = 0.41$), significantly outperforming traditional multiple linear regression ($R^2 = 0.52$). SHAP analysis identified team psychological safety as the paramount global predictor of creativity (Mean $|SHAP| = 0.38$), followed by inclusive leadership (Mean $|SHAP| = 0.29$). Crucially, SHAP dependence plots revealed a distinct non-linear threshold: inclusive leadership only yielded a positive, synergistic impact on organizational creativity when team psychological safety scores exceeded approximately 3.4on a 5-point scale, with veteran employees showing the highest sensitivity to these dynamics.

Conclusion: Cultivating a baseline threshold of team psychological safety is a mandatory structural prerequisite that must be mathematically satisfied before inclusive leadership behaviors can effectively catalyze organizational creativity.

Keywords: *Organizational Creativity; Inclusive Leadership; Team Psychological Safety*

1 Introduction

Organizational creativity, fundamentally defined as the generation of novel, highly original, and practically useful ideas, processes, or products by employees working within a complex structural system, has unequivocally emerged as a primary driver of sustainable competitive advantage in the contemporary global economy (Agars et al., 2012). The rapid evolution of market demands, coupled with the relentless pace of technological advancement, dictates that firms must constantly innovate to survive and thrive in highly competitive ecosystems. Consequently, organizational creativity is frequently conceptualized by scholars and practitioners alike as the critical and indispensable precursor to long-term market performance, profitability, and operational efficiency (Barimani & Alizadeh Paji, 2020; Boso et al., 2017). Within the broader spectrum of corporate strategy, the successful translation of creative ideation into tangible new product development requires not only execution speed but also a deeply ingrained corporate culture that continuously supports and rewards creative process engagement from top management down to frontline employees (Cheng & Yang, 2019). Empirical evidence across various industries consistently demonstrates that when an organization effectively harnesses the latent creative capacities of its human capital, it significantly augments its overall organizational learning capabilities and dramatically accelerates the pace of organizational innovation (Hilmiyanti & Kusumastuti, 2021). Furthermore, modern intellectual capital models strongly emphasize the role of organizational creativity as a core intangible asset that directly contributes to the structural resilience and hidden wealth of institutions, elevating it far beyond a mere human resources metric (Māhī Jāghra et al., 2018). Fostering a dynamic work environment where divergent thinking and creative problem-solving are both intrinsically motivated and structurally supported is, therefore, paramount for contemporary management seeking to secure future viability.

Understanding the multidimensional antecedents of organizational creativity requires a comprehensive, holistic framework that rigorously spans individual, team, and systemic levels of organizational analysis (Yue, 2022). Extensive meta-analytical reviews of drivers and barriers within various global and regional organizational contexts underscore that workplace creativity is rarely an isolated or spontaneous phenomenon; rather, it is the deliberate result of a highly complex interplay of structural, environmental, and psychological factors (Motavalli et al., 2022; Motavalli Jafarabadi et al., 2021). At the systemic level, entrepreneurial management practices that actively encourage calculated risk-taking, tolerate ambiguity, and promote proactive strategic orientations have been widely identified as vital infrastructural elements that organically support creative endeavors (Modarresi & Modarresi, 2015). Simultaneously, creating a robust, continuous learning organization is essential, though corporate leaders must be acutely aware of the inherent bureaucratic barriers to organizational learning that can quickly stifle job innovation and diminish creative output if left unaddressed (Soleimani & Afrouz, 2023). The trajectory of individual and organizational creativity is also deeply intertwined with the density of social network connections and the depth of emotional organizational commitment exhibited by the workforce (Haji Agha et al., 2018). To systematically optimize these intricate social and structural networks, modern human resource paradigms increasingly rely on diversity-based talent management models, recognizing fundamentally that a demographically and cognitively heterogeneous workforce inherently possesses a much wider repertoire of mental frameworks necessary for breakthrough divergent thinking (Shakoori et al., 2020).

The locus of organizational creativity frequently resides within collaborative work teams, where the synergistic combination of diverse cognitive processes actively occurs and shapes final outcomes. The structural composition of these teams, alongside the informal social processes that govern their daily interactions, fundamentally dictates the extent to which innovative, boundary-pushing ideas are generated, refined, and implemented (Reiter-Palmon et al., 2017). A critical, underlying mechanism facilitating this synergistic team-level creativity is the establishment of a robust, transparent knowledge-sharing culture. The seamless integration of both explicit procedural knowledge and implicit, tacit knowledge sharing serves as a potent psychological mediator that transforms individual, siloed expertise into scalable collective creative outputs (Yıldız et al., 2025). The deliberate implementation of high-performance work systems (HPWS) has been shown to be particularly effective in promoting such high-level organizational creativity, precisely because these formalized systems structurally mandate and financially reward extensive knowledge sharing among all tiers of employees (Zarei, 2024). This dynamic is further corroborated in fast-paced, knowledge-intensive service sectors, such as the global hotel industry, where advanced knowledge

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E-ISSN: 3041-8992

management practices directly enhance overarching innovation performance through the dual mediating channels of organizational learning and group creativity (Patwary et al., 2024). Effective, omni-directional organizational communication is essentially the lifeblood of this continuous learning process, ensuring that critical, timely information permeates rigid cross-functional boundaries in high-tech and manufacturing industries alike (Huang & Yao, 2017). Moreover, dedicated corporate interventions, such as formalized and rigorous training programs based heavily on creative problem-solving (CPS) methodologies, can significantly elevate the baseline of creative thinking among employees, equipping them with the analytical and cognitive tools necessary to successfully challenge the status quo (Shabani 2017).

While systemic structural factors and careful team composition are undoubtedly critical, day-to-day leadership behavior remains one of the most proximal, immediate, and influential determinants of an employee's creative engagement. Historically, various established leadership paradigms, including transformational and ethical leadership, have been strongly linked to positive creative workplace outcomes. For instance, transformational leadership fosters creativity by elevating broad organizational trust, providing inspirational motivation, and positively modulating an individual's organization-based self-esteem (Shokrkon et al., 2015). Conversely, ethical leadership provides a highly moral and transparent structural framework that minimizes interpersonal friction, reduces operational ambiguity, and encourages ethical risk-taking (Yılmaz, 2010). However, in recent years, contemporary organizational psychology has increasingly and emphatically pivoted towards the concept of inclusive leadership as a uniquely potent driver of workplace creativity. Inclusive leadership is defined and characterized by a specific set of behaviors that ensure team members feel a deep, authentic sense of belongingness to the group while simultaneously feeling deeply valued for their unique individual attributes and divergent perspectives (Randel et al., 2018). This distinct, modern leadership style is utterly crucial for navigating the multifaceted complexities of modern, highly diverse corporate workforces. For example, recent empirical investigations have decisively demonstrated that college students' and young professionals' perceptions of green inclusive leadership significantly enhance their green creativity, a complex cognitive process that is fundamentally mediated by their internal intrinsic motivation to engage in sustainable, forward-thinking innovation (Liu & Huang, 2024). Inclusive leaders actively and intentionally dismantle rigid hierarchical barriers, warmly invite dissenting opinions without judgment, and demonstrate a genuine commitment to integrating varied viewpoints, thereby creating an optimal psychological environment where creative ideation is not just passively permitted, but actively and enthusiastically solicited.

The primary, underlying psychological mechanism through which inclusive leadership successfully translates into measurable organizational creativity is the careful cultivation of team psychological safety. Psychological safety refers to a shared, collective belief among team members that the interpersonal work environment is completely safe for interpersonal risk-taking, characterized by mutual respect, trust, and a total lack of fear regarding negative professional consequences for expressing wild ideas or admitting honest mistakes. Direct managerial influence is the single most critical variable in establishing this delicate psychological safety, particularly within high-stakes, high-performance teams where the intense pressure to deliver immediate results can otherwise severely inhibit candid communication and idea generation (V, 2025). A robust psychological safety culture not only fosters deep personal resilience among employees operating in high-stress, critical environments, such as emergency medical services, but also serves as the absolute foundational bedrock for continuous operational improvement and uninhibited creative problem-solving (Thielmann et al., 2025). Conversely, the glaring absence of psychological safety almost inevitably leads to the highly deleterious phenomenon of organizational silence, where employees deliberately and consciously withhold valuable operational information, critical concerns, or potentially game-changing novel ideas. Organizational silence acts as a profound, often invisible barrier to creativity and is very frequently symptomatic of deep-seated perceived organizational injustice (Ölçer & Çoşkun, 2022). Furthermore, when such silence becomes structurally endemic within a firm, it rapidly erodes organizational commitment and directly suffocates creative potential, often culminating in the broader, devastating disengagement of the workforce (Sadeghi & Razavi, 2020). Proactive, empathetic leadership that heavily prioritizes psychological safety is therefore absolutely essential for actively preventing modern phenomena such as "silent resignation," thereby ensuring that employees remain both cognitively and emotionally invested in the organization's long-term innovative goals (Ts

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E-ISSN: 3041-8992

& Sasikumar, 2025). When a positive, inclusive organizational or school culture successfully dismantles these deeply entrenched barriers of silence, it significantly and measurably enhances daily job engagement and intrinsic motivation, which in turn further catalyzes holistic organizational creativity (Adel-Babalan et al., 2021).

As organizations increasingly digitize their operations and workflows, the critical intersection of advanced technological capability and human psychological factors has become a major focal point of modern creativity research. The foundational adoption of new information technologies and the continuous enhancement of employees' IT skills have long been recognized as strong predictors of heightened organizational creativity, primarily as these digital tools exponentially expand the boundaries of human information processing and cross-geographic collaborative potential (Alavi et al., 2017; Smith, 2019). In the contemporary corporate landscape, this technological paradigm has shifted heavily and irreversibly towards the integration of Artificial Intelligence (AI). The precise conceptualization, metric measurement, and empirical calibration of organizational AI capabilities represent an exciting new frontier in understanding exactly how modern firms achieve sustainable competitive advantage through machine-augmented human creativity (Mikalef & Gupta, 2021). However, these AI capabilities do not operate in a standalone vacuum; their ultimate positive impact on organizational creativity is heavily and fundamentally contingent upon robust human knowledge sharing networks and strong underlying organizational cohesion (Li et al., 2022). Furthermore, AI-focused enterprises that effectively and strategically integrate intellectual property management with novel value creation strategies demonstrate substantially higher baseline levels of organizational creativity compared to their technologically lagging peers (Pınarbaşı et al., 2023). Because the underlying behavioral dynamics between human psychological factors—such as team psychological safety and inclusive leadership—and these highly advanced, algorithmic technological environments are immensely complex, traditional linear research methodologies often fall drastically short in accurately mapping these relationships. Consequently, forward-thinking researchers are increasingly turning to advanced computational simulations, algorithmic frameworks, and machine learning techniques to logically reason with and accurately predict the highly non-linear emergence of breakthrough innovation within modern work teams (Sosa, 2018).

Despite the extensive, well-documented literature definitively identifying inclusive leadership and team psychological safety as highly critical antecedents of organizational creativity, the vast majority of existing empirical studies in the behavioral sciences rely almost exclusively on traditional, linear regression models, mathematically characterized by standard parametric equations such as $Y = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n + \epsilon$. These conventional analytical approaches, while undeniably useful for establishing basic baseline correlations and broad general trends indicated by standard $p < 0.05$thresholds and simple R^2metrics, fundamentally fail to capture the highly complex, non-linear, and mathematically synergistic interactions inherent in real-world human organizational behavior. For instance, specific behavioral threshold effects—where a strict minimum mathematical level of psychological safety must be achieved before inclusive leadership can exert any statistically significant positive impact on predicted creativity scores—remain largely hidden and obscured within standard Pearson correlation matrices and linear regression outputs. To directly address this profound methodological and theoretical limitation in the current literature, this research purposefully leverages the cutting-edge predictive capabilities of advanced machine learning, specifically integrating highly interpretable Explainable Artificial Intelligence (XAI) frameworks. By utilizing complex tree-based algorithms like Extreme Gradient Boosting alongside SHapley Additive exPlanations (SHAP)—a methodology deeply grounded in cooperative game theory mathematics—this study successfully moves beyond the opaque "black box" nature of traditional predictive models to mathematically quantify the exact, non-linear marginal contributions of specific leadership and psychological dynamics. Therefore, the aim of this study is to utilize an explainable artificial intelligence machine learning framework to predict organizational creativity and mathematically elucidate the complex, non-linear interactions between inclusive leadership and team psychological safety.

2 Methods and Materials

This research employed a quantitative, cross-sectional predictive design to investigate the complex non-linear relationships between inclusive leadership, team psychological safety, and organizational creativity. The target population comprised professional employees working in diverse corporate sectors, including information

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technology, finance, and advanced manufacturing, geographically centered in the metropolitan business districts of Jakarta and Bandung, Indonesia. A multi-stage stratified random sampling technique was utilized to ensure adequate representation across different organizational hierarchies and functional team structures. Data were gathered from exactly 452valid respondents nested within 56distinct work teams across the selected geographic regions. Among the final sample of 452participants, approximately 54%were male and 46%were female, with a mean age of 34.5years and a standard deviation of 6.2years. The average organizational tenure of the sampled respondents was 4.8years.

The data collection process relied on a structured, self-administered digital questionnaire comprising well-established psychometric scales that were carefully translated into Bahasa Indonesia using a rigorous forward and backward translation protocol to preserve precise semantic equivalence. Inclusive leadership was measured utilizing a comprehensive nine-item scale adapted from established leadership literature, where participants rated their direct supervisors on core attributes such as openness, availability, and accessibility using a 5-point Likert scale ranging from 1representing strongly disagree to 5representing strongly agree. The internal consistency for this leadership scale in the current study was highly robust, yielding a Cronbach's alpha of $\alpha = 0.91$. Team psychological safety was assessed through a seminal seven-item instrument designed to capture the extent to which team members feel secure in taking interpersonal risks, making mistakes, and voicing dissenting opinions without fear of professional retaliation. This construct utilized the identical 1to 5Likert scale framework and demonstrated a strong internal reliability coefficient of $\alpha = 0.88$. Organizational creativity was evaluated as the primary continuous target variable using a comprehensive thirteen-item scale that asks employees to report the frequency of generating novel and highly useful operational ideas, achieving a Cronbach's alpha of $\alpha = 0.93$. In addition to these primary psychological constructs, the survey instrument collected demographic control variables, including chronological age, gender classification, educational attainment level, and organizational tenure in years, to meticulously isolate the specific predictive power of the leadership and safety variables within the algorithmic models.

The data analysis phase leveraged advanced machine learning techniques heavily augmented by Explainable Artificial Intelligence frameworks to move beyond the limitations of traditional linear regression modeling and successfully uncover complex, interactive behavioral patterns. Missing data imputation was initially conducted using a k-nearest neighbors algorithm where $k = 5$, followed by the strict normalization of all continuous psychometric features to a standard mathematical scale ranging from 0to 1. The complete empirical dataset of 452instances was subsequently partitioned randomly into an 80%training set and a 20%testing set to rigorously evaluate the out-of-sample predictive performance of the algorithms. An Extreme Gradient Boosting model, commonly referred to in computational literature as XGBoost, was trained to predict organizational creativity scores based exclusively on the multidimensional input features of inclusive leadership and team psychological safety, alongside the aforementioned demographic controls. Overall model performance and algorithmic accuracy were evaluated using the Coefficient of Determination, represented mathematically as R^2, and the Root Mean Square Error, denoted as $RMSE$. To address the inherent black-box opacity of complex tree-based machine learning algorithms and fulfill the core explanatory objective of the study, SHapley Additive exPlanations, denoted broadly as SHAP, were applied to the fully trained XGBoost model. The mathematical SHAP methodology, grounded deeply in cooperative game theory, calculated the exact marginal contribution of each predictive feature to the final algorithmic output, providing both global feature importance rankings and local, instance-level visual explanations. This specific explainable artificial intelligence approach allowed for the precise mathematical quantification of how distinct quantitative thresholds of team psychological safety and inclusive leadership uniquely and synergistically drive organizational creativity, thereby generating highly interpretable, data-driven insights suitable for strategic organizational interventions.

3 Findings and Results

The empirical findings of this study provide a comprehensive understanding of the predictive relationships between inclusive leadership, team psychological safety, and organizational creativity. The analytical process began with an initial evaluation of the descriptive statistics and zero-order correlations among the primary study variables and demographic controls. As presented in Table 1, the respondents reported moderately high levels of perceived inclusive leadership ($M = 3.85$, $SD = 0.72$), team

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psychological safety ($M = 3.62$, $SD = 0.81$), and organizational creativity ($M = 3.74$, $SD = 0.76$). The correlation matrix reveals significant positive linear associations among the primary psychological constructs. Specifically, inclusive leadership demonstrated a strong, positive correlation with organizational creativity ($r = 0.58$, $p < .01$) and a similarly robust association with team psychological safety ($r = 0.62$, $p < .01$). Furthermore, team psychological safety was significantly positively correlated with organizational creativity ($r = 0.65$, $p < .01$). Among the demographic control variables, organizational tenure showed a weak but statistically significant positive correlation with organizational creativity ($r = 0.14$, $p < .05$), indicating that employees with longer tenure within their respective Indonesian firms reported slightly higher frequencies of creative outputs. Age and gender (0 = Male, 1 = Female) did not display strong significant correlations with the primary outcome variable.

Table 1

Descriptive Statistics and Zero-Order Correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Age (Years)	34.50	6.20	–				
2. Tenure (Years)	4.80	2.15	0.45**	–			
3. Gender	0.46	0.50	−0.03	0.05	–		
4. Inclusive Leadership	3.85	0.72	0.08	0.11	0.04	–	
5. Team Psychological Safety	3.62	0.81	0.06	0.09	0.02	0.62**	–
6. Organizational Creativity	3.74	0.76	0.10	0.14*	0.06	0.58**	0.65**

Following the descriptive analysis, the dataset was subjected to the machine learning pipeline to evaluate the predictive capacity of the models. To establish the superior capability of the chosen Extreme Gradient Boosting (XGBoost) algorithm in capturing complex, non-linear organizational dynamics, its performance on the 20%hold-out testing dataset ($n = 90$) was benchmarked against two standard predictive algorithms: Multiple Linear Regression and Random Forest. The evaluation metrics, detailed in Table 2, demonstrate that the XGBoost model outperformed both the baseline linear model and the Random Forest model. The XGBoost model achieved the highest Coefficient of Determination ($R^2 = 0.71$) and the lowest Root Mean Square Error ($RMSE = 0.41$). This indicates that the combination of inclusive leadership, team psychological safety, and demographic controls, when modeled through an advanced gradient boosting framework, accounts for approximately 71%of the variance in organizational creativity among the sampled employees. The superior performance of the XGBoost model over the Multiple Linear Regression model ($R^2 = 0.52$) strongly suggests the presence of significant non-linear relationships and complex interaction effects between the independent variables that traditional linear paradigms fail to capture.

Table 2

Machine Learning Model Performance Metrics on the Testing Dataset

Predictive Model	*RMSE*	R^2	*MAE*
Multiple Linear Regression	0.53	0.52	0.42
Random Forest	0.45	0.64	0.35
Extreme Gradient Boosting (XGBoost)	0.41	0.71	0.31

To unpack the “black box” of the highly accurate XGBoost model and understand the underlying theoretical mechanisms, SHapley Additive exPlanations (SHAP) were applied. The global feature importance was determined by calculating the mean absolute SHAP values across all instances in the dataset, effectively quantifying the average marginal contribution of each feature to the model’s prediction of organizational creativity. As detailed in Table 3, Team Psychological Safety emerged as the most critical predictor of organizational creativity, yielding the highest mean absolute SHAP value ($|SHAP| = 0.38$). Inclusive Leadership was the second most important feature ($|SHAP| = 0.29$). The demographic variables possessed substantially lower predictive importance, confirming that the psychological environment and leadership behaviors are the primary drivers of creative output.

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Table 3

Global Feature Importance based on Mean Absolute SHAP Values

Feature	Mean SHAP Value	Relative Importance Rank
Team Psychological Safety	0.38	1
Inclusive Leadership	0.29	2
Tenure	0.05	3
Age	0.03	4
Gender	0.01	5

Beyond global importance, the application of SHAP generated intricate dependence plots that revealed profound non-linearities and threshold effects not captured by standard correlation matrices. While detailed visual plots are excluded here, the underlying numerical SHAP calculations indicate a distinct inflection point for team psychological safety at a threshold value of approximately 3.4on the 5-point scale. Below this threshold, improvements in inclusive leadership yielded negligible positive impacts on predicted organizational creativity (average SHAP interaction value $= -0.04$). However, once team psychological safety surpassed the 3.4threshold, the positive marginal contribution of inclusive leadership to organizational creativity increased exponentially, reflecting an average SHAP interaction value of $+0.22$. This signifies a potent synergistic effect, mathematically proving that inclusive leadership behaviors require a baseline foundation of psychological safety to effectively translate into enhanced employee creativity. Furthermore, instance-level local explanations generated by the SHAP framework revealed that for employees with high organizational tenure (greater than 7years), the absence of inclusive leadership had a disproportionately negative penalty on their predicted creativity scores ($SHAP$ value $= -0.45$) compared to newer employees ($SHAP$ value $= -0.15$), indicating that veteran employees are highly sensitive to leadership behaviors when engaging in creative endeavors within the analyzed Indonesian corporate sectors.

4 Discussion

The primary objective of this empirical investigation was to utilize an advanced, explainable artificial intelligence (XAI) machine learning framework to accurately predict organizational creativity and rigorously mathematically elucidate the complex, non-linear interactions between inclusive leadership and team psychological safety. The deployment of the Extreme Gradient Boosting (XGBoost) algorithm yielded a highly robust predictive model, accounting for a substantial portion of the variance in the target variable with a Coefficient of Determination of $R^2 = 0.71$and a minimized Root Mean Square Error of $RMSE = 0.41$. This algorithmic performance significantly outpaced traditional multiple linear regression baselines ($R^2 = 0.52$), definitively confirming that the behavioral drivers of workplace creativity operate through intricate, non-linear mechanisms rather than simple additive pathways. The application of SHapley Additive exPlanations (SHAP) mathematically unpacked this complexity, revealing that team psychological safety is the single most critical global predictor of organizational creativity ($|SHAP| = 0.38$), followed closely by inclusive leadership ($|SHAP| = 0.29$). Most importantly, the SHAP dependency analysis uncovered a profound threshold effect: inclusive leadership behaviors mathematically failed to generate positive marginal contributions to creativity until team psychological safety surpassed a distinct quantitative threshold of approximately 3.4on a 5-point scale. Furthermore, local instance-level explanations indicated that veteran employees (tenure $>$ 7years) are disproportionately penalized in their creative output by the absence of inclusive leadership compared to junior staff.

The paramount importance of team psychological safety identified by the SHAP algorithm aligns flawlessly with extensive prior literature emphasizing the necessity of a secure interpersonal environment for fostering organizational innovation. When team members feel psychologically safe, they are far more likely to engage in the vulnerable process of explicit and tacit knowledge sharing, which acts as a crucial mediator for organizational creativity (Yıldız et al., 2025; Zarei, 2024). Conversely, when the work environment lacks this foundational safety, organizations frequently fall victim to the highly destructive phenomenon of organizational silence (Ölçer & Çoşkun, 2022). This silence directly stifles organizational commitment and paralyzes creative ideation (Sadeghi & Razavi, 2020). In high-performance and high-stress environments, managerial influence over psychological

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E-ISSN: 3041-8992

safety is the absolute bedrock of team resilience and operational success (Thielmann et al., 2025; V, 2025). By proactively cultivating this safety, leaders effectively prevent "silent resignation" and ensure continuous cognitive engagement (Ts & Sasikumar, 2025). Our results confirm that a safe organizational or school culture is fundamentally a prerequisite for daily job engagement and subsequent creative output (Adel-Babalan et al., 2021). Without this safety net, individuals retreat into defensive postures, severely limiting the cognitive flexibility required for divergent thinking and problem-solving.

The significant predictive power of inclusive leadership further corroborates contemporary organizational psychology paradigms that stress the importance of belongingness and valuing uniqueness (Randel et al., 2018). Just as green inclusive leadership has been proven to significantly drive intrinsic motivation and green creativity among young professionals (Liu & Huang, 2024), general inclusive leadership provides the essential encouragement required for broader creative process engagement and accelerated new product development (Cheng & Yang, 2019). This style of leadership shares critical theoretical overlaps with transformational and ethical leadership models, which similarly elevate organizational trust, organization-based self-esteem, and moral operational frameworks to facilitate creativity (Shokrkon et al., 2015; Yılmaz, 2010). The active dismantling of hierarchical barriers by inclusive leaders is especially vital when managing demographically and cognitively diverse talent pools, as diversity-based talent management is practically useless if minority or divergent voices are not actively solicited and integrated (Shakoori et al., 2020). However, our SHAP threshold finding (> 3.4 safety requirement) profoundly advances this literature by demonstrating that even the most well-intentioned inclusive leadership behaviors are mathematically rendered ineffective in a vacuum; they absolutely require a pre-existing structural foundation of psychological safety to activate employee creativity. This highlights the multidimensional antecedent systems and complex structural drivers that govern creative environments (Motavalli et al., 2022; Motavalli Jafarabadi et al., 2021; Yue, 2022).

The integration of Explainable AI in this behavioral context directly answers the growing call for more sophisticated methodological approaches, such as computational simulations, to reason with and map the highly non-linear emergence of innovation in teams (Sosa, 2018). As modern corporate landscapes increasingly digitize and integrate complex information technology skills (Alavi et al., 2017; Smith, 2019), understanding the exact conceptualization and empirical calibration of AI capabilities becomes critical (Mikalef & Gupta, 2021). However, as our literature review and empirical findings suggest, technological and AI capabilities do not operate independently; their successful translation into intellectual property and value creation is deeply contingent upon human knowledge sharing, organizational cohesion, and supportive leadership structures (Li et al., 2022; Pınarbaşı et al., 2023). Thus, using an AI algorithm to model human AI interaction and creative output creates a powerful meta-analytical layer.

Finally, the SHAP finding regarding veteran employees underscores the critical intersection of leadership, knowledge management, and intellectual capital. Experienced employees possess vast reserves of tacit knowledge, which is a core component of an organization's hidden wealth and intellectual capital models (Māhī Jāghra et al., 2018; Patwary et al., 2024). To successfully transform this individual expertise into scalable organizational innovation, rigid barriers to the learning organization must be removed, and optimal organizational communication must be maintained (Huang & Yao, 2017; Soleimani & Afrouz, 2023). If inclusive leadership is absent, veteran employees withhold this critical knowledge, mathematically penalizing the firm's creative capacity. To counteract this, organizations must actively foster social network connections and organizational commitment (Haji Agha et al., 2018), leverage entrepreneurial management practices (Modarresi & Modarresi, 2015), and potentially implement formal creative problem-solving (CPS) training (Shabani 2017). Only through this holistic alignment of leadership, safety, and continuous organizational learning capability can firms drive market performance and achieve sustainable creative success (Agars et al., 2012; Barimani & Alizadeh Paji, 2020; Boso et al., 2017; Hilmiyanti & Kusumastuti, 2021).

5 Conclusion

Despite the robustness of the machine learning pipeline and the highly interpretable nature of the SHAP explanations, this study is subject to several methodological limitations that must be transparently acknowledged. First, the research utilized a cross-sectional predictive design, meaning that all empirical data were collected at a single point in time. While the XGBoost model mathematically establishes strong predictive relationships and complex non-

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E-ISSN: 3041-8992

linear associations, it cannot definitively prove strict temporal causality between inclusive leadership, psychological safety, and organizational creativity. It remains theoretically possible that highly creative teams naturally elicit more inclusive behaviors from their managers over time in a bidirectional feedback loop. Second, the reliance on self-administered digital questionnaires introduces the inherent risk of common method bias and social desirability effects. Although strict anonymity was guaranteed, respondents may still have unconsciously inflated their self-reported frequencies of creative ideation or provided overly favorable ratings of their direct supervisors. Finally, the geographic and cultural scope of the sample was strictly limited to professional employees operating within specific corporate sectors in the metropolitan districts of Jakarta and Bandung, Indonesia. The unique sociopolitical history, cultural dimensions, and distinct corporate hierarchical traditions of this specific Southeast Asian region may inherently limit the immediate generalizability of these exact numerical SHAP thresholds to Western corporate environments or distinctly different industrial sectors.

To continuously advance the understanding of organizational creativity through computational modeling, future research endeavors should purposefully address these limitations through expanded methodological designs. Longitudinal studies, utilizing repeated measures across multiple financial quarters, are absolutely essential to establish true causal trajectories and track how fluctuations in inclusive leadership over time directly impact the latency and frequency of creative outputs. Furthermore, future investigations should actively incorporate a wider array of diverse predictor variables into the machine learning models. Including objective, non-self-reported metrics, such as peer-reviewed patent filings, successful new product launch rates, or supervisor-rated creativity scores, would significantly enhance the criterion validity of the models. Additionally, integrating detailed psychometric profiles of the employees, including personality traits like openness to experience or tolerance for ambiguity, alongside strict measurements of team demographic and cognitive diversity, would provide a much richer, high-dimensional dataset for the algorithms to process. Methodologically, researchers should also explore other advanced Explainable Artificial Intelligence frameworks beyond SHAP, such as Local Interpretable Model-agnostic Explanations (LIME) or counterfactual explanation generation, to provide managers with multiple, complementary perspectives on exactly how algorithmic predictions are formulated. Expanding the sampling frame to include cross-cultural comparisons between Eastern and Western corporate environments would also validate whether the mathematical non-linear thresholds discovered in this study are universal psychological phenomena or culturally specific artifacts.

The empirical findings generated by this explainable AI model offer profound and highly actionable insights for contemporary human resource practitioners and corporate leadership teams. The mathematical proof of a distinct psychological safety threshold fundamentally dictates that organizational interventions aimed at boosting creativity must be strictly sequenced. Organizations should not invest heavily in advanced inclusive leadership training programs until they have first rigorously audited and successfully established a foundational baseline of team psychological safety. Human resource departments must proactively design and implement structural feedback mechanisms, such as anonymous pulse surveys and strict anti-retaliation policies, to dismantle organizational silence and ensure employees feel entirely secure in taking interpersonal risks. Once this baseline safety is firmly established, leadership development initiatives should focus intensely on training middle and senior managers in the specific behavioral markers of inclusive leadership: actively soliciting dissenting opinions, demonstrating public vulnerability, and deliberately integrating diverse viewpoints into strategic decision-making processes. Furthermore, the revelation that veteran employees are disproportionately sensitive to a lack of inclusive leadership suggests that retention and engagement strategies for senior staff must be highly personalized. Management should utilize internal predictive analytics and localized data to continuously monitor team dynamics, intervening swiftly when safety metrics drop, thereby ensuring that the immense tacit knowledge held by tenured employees is continuously leveraged for sustainable organizational innovation.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

IJIMOB
E-ISSN: 3041-8992

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

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