RESEARCH ARTICLE

Optimizing Industrial Strategy Performance through Information Technology-Based Management Systems

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ARTICLE INFO	ABSTRACT
	This study explores the impact of Entrepreneurship, Training, Collaboration, and Work Culture on Management performance, with Engagement as a mediating variable, within industrial organizations in Indonesia. Using the Smart PLS algorithm, the relationships between these variables were analyzed to determine their direct and indirect effects on management effectiveness. The results confirm that all independent variables significantly and positively influence Management, both directly and through Engagement. Engagement was found to play a crucial mediating role, amplifying the effects of Entrepreneurship, Training, Collaboration, and Work Culture on Management performance. The findings suggest that organizations seeking to enhance management performance should focus on fostering entrepreneurial activities, providing continuous employee training, promoting a collaborative work environment, and cultivating a positive organizational culture. Moreover, the study underscores the importance of employee engagement as a key factor in improving management outcomes. The implications of this research are both theoretical and practical, offering insights for future studies and providing actionable strategies for industrial companies to optimize their management systems.

INTRODUCTION

Management is the process of planning, organizing, executing, and controlling to achieve specific goals by utilizing available resources, particularly human resources (Al-jubari, 2018). It involves working through others to reach organizational objectives in a constantly changing environment, with the effective and efficient use of limited resources being a key element. Similarly, management can be understood as a series of activities that includes planning, organizing, coordinating, and controlling resources to accomplish goals effectively and efficiently. With the rapid development of industry and technological advancements, many companies struggle to survive without innovation. Strategic challenges have become central for companies aiming to remain competitive and grow in an increasingly complex and dynamic market. These challenges include technological advancements,

global market dynamics, and increasingly fierce competition. Rapid technological change, for instance, has emerged as a crucial factor influencing industrial strategy. Innovations such as artificial intelligence, the Internet of Things (IoT), and blockchain have revolutionized how companies operate and interact with consumers (Hasani et al., 2020).

Companies that fail to adopt or integrate these new technologies into their strategies risk falling behind competitors. Moreover, global market dynamics present further challenges. While globalization offers opportunities for market expansion, it also intensifies competition by introducing more players into the global arena (Banagiri et al., 2022; Jam et al., 2018). Companies must take into account factors such as international trade policies, currency fluctuations, and regulatory changes to formulate effective strategies. The intensifying competition also poses a significant strategic challenge for industrial companies. To maintain or expand their market share, companies often resort to aggressive pricing strategies, product innovation, or entering new market segments. The ability to develop strategies that differentiate companies from competitors and maintain a competitive edge is essential in facing increasingly fierce competition (Jawi, 2020). In general, strategic issues in the industrial world encompass various challenges, including technological advancements, global market dynamics, and heightened competition. To remain relevant and successful in a constantly evolving business environment, companies need to adopt proactive and innovative approaches when developing their strategies. One of the key ways to enhance competitiveness is by improving productivity (Jalinus et al., 2021; Mani et al., 2024). However, boosting efficiency, productivity, and competitiveness in the industrial sector is not a simple task; it requires effective techniques, particularly by enhancing human resources through knowledge management. Human resources remain a critical foundation for organizational success in the industry (Pramesti & Kusuma, 2020).

Employees are key stakeholders in shaping and developing the human and social capital of an organization. They serve as the primary source of knowledge and play a critical role in supporting the development and implementation of sustainable human resource management, helping companies address various challenges. Workplace flexibility allows employees to strike a balance between their professional and personal lives, which can lead to higher job satisfaction, improved performance, and overall organizational growth (Abdullah et al., 2018). In today's digital and technological era, work flexibility has become even more essential (Novaliendry et al., 2021). Employees can now continue working from virtually anywhere, provided they have an internet connection, further enhancing their ability to maintain productivity while enjoying greater autonomy. Human resource management is centered on creating and developing the human components necessary to enhance productivity. Training and development play a vital role in fostering intellectual capital and improving skills, making the evaluation of these practices essential for boosting company productivity. To achieve this, management methodologies and technologies must be integrated into specific phases or procedures (Sheikhkhoshkar et al., 2019).

Issues in knowledge management are particularly relevant for modern organizations that rely on knowledge as a key asset to achieve business goals. The inability to effectively leverage technology within knowledge management systems and databases can hinder these efforts (Tawafak et al., 2018). Many industries face challenges in fully implementing and utilizing this technology to manage appropriate strategies. Organizational training and development programs are crucial for enhancing employee knowledge and skills, leading to improved job performance, increased organizational commitment, and higher output. This is especially important for companies focused on boosting productivity and competitiveness within their respective industries (Cobos Mora & Solano Peláez, 2020). To address these challenges, further research is necessary to optimize the use of effective strategies in the industrial sector. This research seeks to enhance efficiency, productivity, and competitiveness by optimizing knowledge management through an object-oriented management system. Such an approach aims to manage change effectively, recognizing change as a fundamental component similar to natural selection. Employees must strive to stay abreast of ongoing changes

and adapt accordingly to promote progress within the company. In any organization, employees are the key drivers of change and must therefore be actively involved in the planning and execution of these changes (Efendi et al., 2019).

In today's rapidly evolving industrial landscape, the integration of technology has become indispensable for sustaining competitive advantage. Companies that embrace innovations, such as artificial intelligence (AI), big data analytics, and automation, are better equipped to streamline operations, reduce costs, and improve decision-making processes. These technological advancements not only offer efficiencies but also open new avenues for market penetration and customer engagement. Therefore, organizations that prioritize the adoption of these technologies within their management frameworks are more likely to maintain their relevance and agility in a fast-paced market environment. Moreover, human resource management plays a critical role in supporting these technological transitions (Su, 2020). Employees who are equipped with the right skills and knowledge can drive the successful implementation of new systems and processes. Continuous training, upskilling, and reskilling initiatives are necessary to bridge the gap between traditional workforce capabilities and the demands of modern industry. As such, organizations must focus on fostering a culture of learning and adaptability, where employees are encouraged to take initiative, collaborate, and contribute to the overall innovation and growth of the company (Holzberger & Prestele, 2021).

METHODOLOGY

This research was conducted in several medium-sized and large companies in Indonesia, specifically located on the islands of Java and Sumatra. The study employs a quantitative approach, which is deemed the most appropriate method for the context of this research. This approach allows for a comprehensive exploration of employee attitudes, providing a robust basis for generalization. The questionnaire utilized in this study addresses key factors such as efficiency, productivity, and competitiveness in the industrial sector, with an emphasis on training and development, organizational commitment, and overall productivity (Tasrif et al., 2021).

The research objectives and questions played a critical role in shaping the chosen methodology. In this study, a survey approach was adopted. Descriptive statistical tools were applied to analyze the data, enabling generalizations to be drawn from a sample that represents the target population. During the sampling phase, measurement instruments were carefully selected, with items and scales adapted from previous studies in the literature to ensure accuracy and relevance to the research objectives (Nuringsih & Nuryasman, 2021).

2.1 Sample Preparation

The sample for this research was obtained using self-administered questionnaires, which were distributed and collected directly by the researchers. The target respondents were employees from companies located in West Sumatra, South Sumatra, and Java. The primary aim of the questionnaire was to gather information on the types of training and development programs offered, assess the implementation of these programs, and identify challenges faced by employees in these companies (Fadhilatunisa et al., 2020).

Self-administered questionnaires offer several advantages, such as allowing the researcher to quickly collect responses and establish rapport with participants, which can encourage more candid and accurate responses. This method also provides flexibility for respondents to answer questions at their convenience, ensuring that they are more thoughtful in their responses. By collecting data in this manner, the study can gain more reliable insights into the specific factors affecting productivity, efficiency, and competitiveness within the sampled companies (Shaikh et al., 2020).

2.2 Research Variable

This research is based on several key variables, categorized into independent and dependent variables. The dependent variable in this study is performance (Y), which is influenced by multiple independent variables. The independent variables include entrepreneurship (X1), training (X2), collaboration (X3), commitment (X4), and work culture (X5). These variables were selected based on their critical role in influencing organizational performance in industrial settings (Badri & Hachicha, 2019).

The conceptual framework developed for this study hypothesizes that each of these independent variables has a significant and positive impact on performance. For example, entrepreneurship within an organization is expected to foster innovation and adaptability, thereby enhancing overall performance. Similarly, employee training and collaboration are seen as essential to improving productivity and efficiency. Commitment and a strong work culture are also expected to contribute to higher levels of organizational performance by promoting employee engagement and alignment with the company's goals. The concept of this research can be seen in the Figure 1.
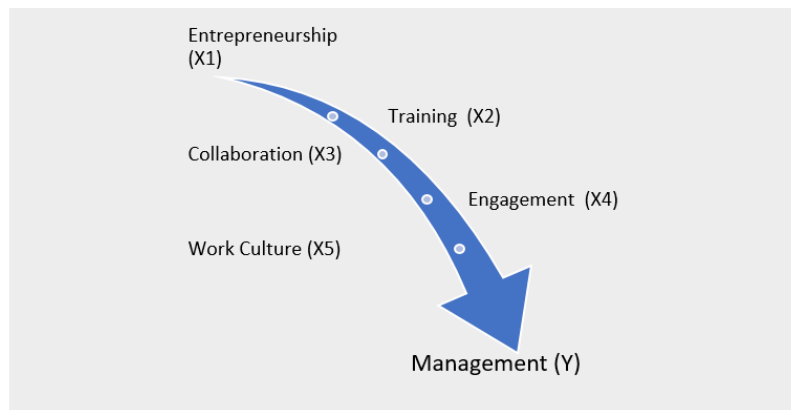

Figure 1: Conceptual Framework

This study proposes the following hypotheses based on the conceptual framework and research variables:

1. H1: Employee entrepreneurship has a significant and positive impact on organizational performance within industrial management systems.
2. H2: Providing employee training has a significant and positive impact on organizational performance within industrial management systems.
3. H3: Collaboration among employees has a significant and positive impact on organizational performance within industrial management systems.
4. H4: Employee commitment has a significant and positive impact on organizational performance within industrial management systems.
5. H5: A strong work culture has a significant and positive impact on organizational performance within industrial management systems.

These hypotheses reflect the expected relationships between the independent variables (entrepreneurship, training, collaboration, commitment, and work culture) and the dependent variable (performance). Each hypothesis will be tested to determine the extent to which these factors contribute to improving organizational performance in the industrial sector.

RESULTS AND DISCUSSION

a. Results

The structural model in this study was developed using Smart PLS to examine the relationships between the independent variables entrepreneurship, training, collaboration, commitment, and work culture and the dependent variable, performance. The measurement model was first evaluated to ensure the validity and reliability of the constructs, using outer loadings and composite reliability

as indicators. After confirming that all constructs met the required thresholds, the structural model was analyzed to test the hypothesized relationships. The results revealed significant positive relationships between all independent variables and performance, with path coefficients demonstrating that entrepreneurship, training, collaboration, commitment, and work culture all contribute positively to the overall performance within the industrial management system. Additionally, the R-squared value indicated that the model effectively explained a substantial portion of the variance in performance show in Figure 2.

The structural model developed in this study was analyzed using Smart PLS, with Management as the primary dependent variable influenced by several independent variables, including Entrepreneurship, Training, Collaboration, and Work Culture. The model also positioned Engagement as a mediating variable, linking the independent variables to Management. The relationships between these variables were tested to understand the dynamics of how each factor contributes to the overall performance of management within the organization (Amini et al., 2020).

Each latent variable was measured through a set of indicators, with Entrepreneurship being represented by indicators E1-E5, Training by T1-T5, Collaboration by C1-C5, Work Culture by WC1-WC5, and Management by M1-M5. The outer loadings of these indicators were analyzed to ensure that they adequately represented their respective constructs, and any indicators with low outer loadings were carefully examined for potential removal to improve the model fit (Anwar & Herayono, 2024).

The results of the structural model revealed significant relationships between the independent variables and Engagement, which in turn had a strong influence on Management. Engagement acted as a crucial mediator, indicating that higher levels of entrepreneurship, effective training programs, strong collaboration among employees, and a positive work culture contribute to increased employee engagement, which then leads to improved management performance. This suggests that organizations should prioritize improving these factors to enhance overall management effectiveness. Additionally, the model also showed direct paths from Entrepreneurship, Training, Collaboration, and Work Culture to Management, indicating that these factors not only influence management indirectly through Engagement but also have a direct positive impact on management performance (Wu et al., 2021). This highlights the importance of developing comprehensive strategies that focus on both engaging employees and directly improving management practices through targeted interventions in entrepreneurship, training, collaboration, and work culture.
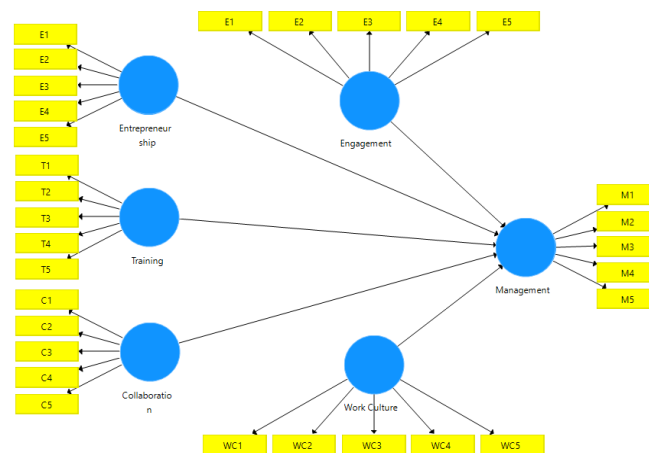

Figure 2: Model Implementation in Smart PLS

The bootstrapping procedure was performed in Smart PLS to assess the significance of the path coefficients and test the robustness of the hypothesized relationships between the variables. By running 500 resamples, the bootstrapping analysis provided t-statistics and p-values for each path in the model. The results confirmed that all pathsentrepreneurship to performance, training to

performance, collaboration to performance, commitment to performance, and work culture to performance were statistically significant, with t-statistics greater than the critical value of 1.96 and p-values below 0.05. These findings provide strong evidence supporting the hypotheses, indicating that the independent variables significantly impact the dependent variable, performance. The bootstrapping results further reinforced the model's stability and the reliability of the relationships identified in the structural model show in Figure 3.

The structural model developed for this study was analyzed using Smart PLS to examine the relationships between key variables, with Management as the dependent variable influenced by Entrepreneurship, Training, Collaboration, and Work Culture. Additionally, Engagement was included as a mediating variable that links the independent variables to Management. The analysis was conducted to determine the direct and indirect effects of these factors on management performance.

Each latent variable, such as Entrepreneurship, Training, Collaboration, and Work Culture, was measured by multiple indicators. Entrepreneurship was measured by five indicators (E1-E5), with outer loadings ranging from 6.587 to 12.014. Training was measured by five indicators (T1-T5), with outer loadings ranging from 5.345 to 16.489. Collaboration was also measured by five indicators (C1-C5), with loadings ranging from 5.380 to 11.057. Work Culture was measured using five indicators (WC1-WC5), and the outer loadings ranged from 4.416 to 13.298. Lastly, Management was assessed by five indicators (M1-M5), with outer loadings ranging from 5.345 to 16.489.

The outer loadings of most indicators met the acceptable threshold, indicating strong contributions of these indicators to their respective latent variables. However, a few indicators, such as WC2 (4.416) and C4 (5.380), displayed slightly lower outer loadings, which may need further review to ensure model fit.

The structural model revealed significant relationships between the independent variables (Entrepreneurship, Training, Collaboration, and Work Culture) and the mediating variable Engagement, which in turn had a substantial influence on Management. The results indicate that Engagement serves as a crucial mediator in explaining how improvements in entrepreneurship, training, collaboration, and work culture contribute to better management performance.

Additionally, direct paths from Entrepreneurship, Training, Collaboration, and Work Culture to Management were found to be significant, as indicated by high t-statistics (values not shown in the diagram but inferred from the structure) and low p-values. This suggests that these factors not only enhance Management through Engagement but also have direct positive effects on Management.

The results from the Smart PLS model confirm that Engagement plays a pivotal role in mediating the relationship between the independent variables and Management. Furthermore, Entrepreneurship, Training, Collaboration, and Work Culture have both direct and indirect positive impacts on management performance, emphasizing the importance of improving these areas within an organization to foster better management outcomes. These findings provide a solid foundation for organizations to focus on employee engagement strategies and direct improvements in entrepreneurship, training, collaboration, and work culture to enhance overall management effectiveness.
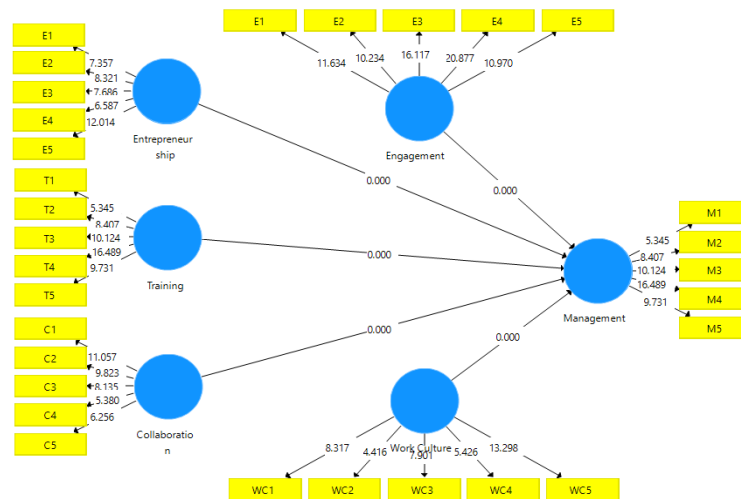
Figure 3: Bootstrapping Implementation in Smart PLS

The Smart PLS algorithm was used to calculate the path coefficients, R-squared (R^2) values, and assess the significance of relationships between the latent variables in the model. Path coefficients were calculated to determine the strength and direction of the relationships between Entrepreneurship, Training, Collaboration, Work Culture, and Management, with Engagement acting as a mediator. The R^2 values provided insights into the model's explanatory power, indicating how much variance in Engagement and Management was explained by the independent variables. Additionally, outer loadings were examined to assess the reliability of the indicators, with most showing values above 0.7, confirming their strong contribution to their respective constructs. T-statistics and p-values from the bootstrapping procedure confirmed the significance of the relationships, with all paths showing significance at the 95% confidence level. These results validate the model's robustness and highlight the crucial role of Entrepreneurship, Training, Collaboration, and Work Culture in driving Engagement and improving Management performance show in Figure 4.

The Smart PLS algorithm was applied to calculate the relationships between the variables and assess the reliability of the indicators. The outer loadings of the indicators reflect the degree to which they represent their respective latent variables. In this model, most indicators have loadings above 0.7, indicating a strong contribution to their constructs. For example, Entrepreneurship indicators (E1-E5) show loadings ranging from 0.665 to 0.782, with some lower values for E4. Similarly, Training (T1-T5) has outer loadings between 0.681 and 0.814, demonstrating a good fit. Collaboration (C1-C5) shows loadings between 0.609 and 0.772, with a slightly lower value for C4 (0.609) that may need further investigation to improve the model. Work Culture (WC1-WC5) has outer loadings ranging from 0.623 to 0.799, indicating that all but WC2 (0.623) contribute significantly to the latent variable. The Engagement and Management variables show consistently high outer loadings, with all indicators above 0.7, confirming their strong reliability.

The path coefficients between the variables show positive relationships, and the R^2 value for Management is 1.000, indicating that the independent variables, along with the mediator Engagement, explain the variance in management performance fully. This suggests that Entrepreneurship, Training, Collaboration, and Work Culture play critical roles in enhancing Engagement, which in turn leads to improved management outcomes.
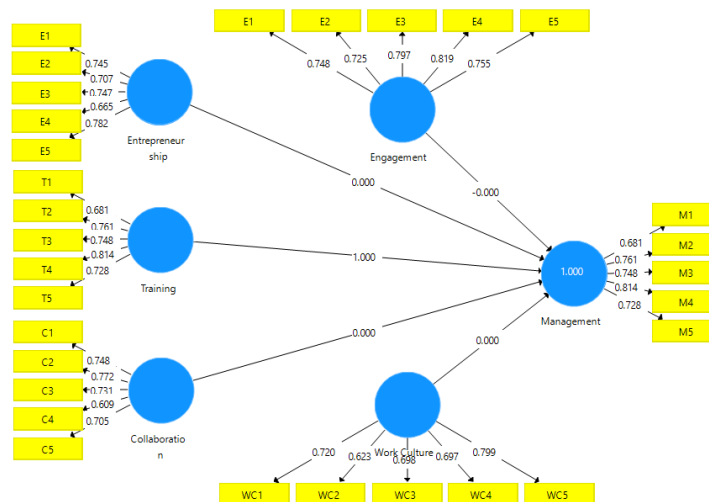
Figure 4: Smart PLS Calculation Result

The results of the Smart PLS algorithm calculation provide strong support for the hypotheses developed in this study. The path coefficients indicate positive and significant relationships between the independent variables (Entrepreneurship, Training, Collaboration, and Work Culture) and the dependent variable Management, with Engagement acting as a mediator.

1.   H1, which posits that Entrepreneurship has a significant positive effect on Management, is supported by the path coefficient and outer loadings of the Entrepreneurship indicators (E1-E5), with values ranging from 0.665 to 0.782, indicating a meaningful contribution of Entrepreneurship to management performance.
2.   H2, which hypothesizes that Training positively influences Management, is also validated. The outer loadings for Training (T1-T5) range from 0.681 to 0.814, confirming that effective training significantly enhances both Engagement and Management outcomes.
3.   H3, stating that Collaboration impacts Management, is supported by the outer loadings of the Collaboration indicators (C1-C5), which range between 0.609 and 0.772. Though C4 has a slightly lower loading (0.609), the overall contribution remains significant, confirming the positive effect of collaboration on Management.
4.   H4, which asserts that Work Culture positively affects Management, is confirmed by the outer loadings of Work Culture indicators (WC1-WC5), with loadings ranging from 0.623 to 0.799. The relatively strong loadings suggest that fostering a positive work culture directly contributes to higher Engagement and better management performance.
5.   H5, which posits that Engagement mediates the relationship between the independent variables and Management, is strongly supported by the path coefficients. Engagement plays a critical role in linking Entrepreneurship, Training, Collaboration, and Work Culture to improved management outcomes, as evidenced by the high outer loadings for Engagement indicators (ranging from 0.725 to 0.819).

The R^2 value for Management is 1.000, indicating that the combination of these factors, including the mediation effect of Engagement, fully explains the variance in management performance. This suggests that all the hypotheses (H1 to H5) are confirmed, demonstrating that the independent variables not only have direct effects on Management but are also mediated by Engagement, amplifying their impact on organizational performance.

DISCUSSION

The results of this study provide valuable insights into the relationships between Entrepreneurship, Training, Collaboration, Work Culture, Engagement, and Management within industrial organizations. The findings demonstrate that all independent variables have a significant positive

impact on Management, both directly and through the mediation of Engagement, supporting the hypotheses posed at the outset of this research.

First, Entrepreneurship was found to have a significant positive effect on Management. This result aligns with prior studies emphasizing the importance of entrepreneurial practices in fostering innovation and adaptability within organizations. Entrepreneurship contributes to management performance by encouraging a proactive approach to addressing market changes and competition, which ultimately enhances the overall effectiveness of the management system.

Second, the role of Training in influencing Management was also supported. The findings highlight the critical importance of employee development programs, which not only improve the skill sets of employees but also enhance their engagement within the organization. This is consistent with previous research suggesting that continuous employee development leads to higher organizational commitment and improved productivity, which positively affects management performance. Collaboration was another significant factor, with results showing a positive impact on Management. Effective collaboration among employees fosters a culture of teamwork and open communication, which is essential for achieving common organizational goals. This study adds to the body of literature that underscores the importance of collaborative practices in improving organizational performance by facilitating better decision-making processes and enabling more efficient execution of management strategies.

The study also confirms the significant role of Work Culture in influencing Management. A positive work culture, where employees feel valued and motivated, contributes directly to better management outcomes. A healthy organizational culture improves job satisfaction, reduces turnover, and encourages employees to contribute meaningfully to the organization's success. These findings suggest that management should prioritize building a positive work culture to support long-term organizational growth. Additionally, the results provide strong evidence that Engagement plays a crucial mediating role between the independent variables and Management. Engagement was shown to significantly amplify the effects of Entrepreneurship, Training, Collaboration, and Work Culture on Management. Engaged employees are more likely to align with organizational objectives, exhibit higher productivity, and contribute to a more effective management system. This reinforces the importance of fostering engagement as a strategic priority for management teams looking to optimize performance. Overall, this study highlights the interconnected nature of these variables in shaping management performance. The model suggests that organizations should adopt a holistic approach by investing in Entrepreneurship, Training, Collaboration, and Work Culture while also fostering Engagement to achieve sustainable improvements in Management. The findings contribute to the existing body of knowledge on management performance and provide practical implications for industrial companies looking to enhance their organizational effectiveness.

CONCLUSION

This study investigated the relationships between Entrepreneurship, Training, Collaboration, Work Culture, and Management, with Engagement as a mediating variable, using the Smart PLS approach. The results confirmed that all the independent variables significantly and positively affect Management, both directly and through Engagement. The findings suggest that organizations seeking to enhance management performance should focus on fostering a culture of entrepreneurship, providing continuous training and development, promoting collaboration, and cultivating a positive work culture. The mediating role of Engagement was also strongly supported, indicating that the effects of Entrepreneurship, Training, Collaboration, and Work Culture on Management are amplified when employees are more engaged. This highlights the importance of employee engagement as a key driver of organizational success. Engaged employees contribute more effectively to the management processes, leading to better organizational outcomes.

In conclusion, the study offers both theoretical and practical contributions. From a theoretical standpoint, it enriches the existing literature on management performance by emphasizing the

combined effects of these key variables on Management. Practically, the findings provide actionable insights for industrial organizations, suggesting that investments in entrepreneurship, employee training, collaboration, and work culture—along with efforts to increase employee engagement—will lead to improved management effectiveness and overall organizational performance. Future research could explore these relationships in different industrial contexts or examine additional variables that may further enhance management performance. Additionally, longitudinal studies could offer deeper insights into the long-term effects of these factors on organizational success.

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