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Human Resource Quality Improvement Strategy Using Fuzzy Logic in the Mojokerto Footwear Industry as an Effort to Restore the Competitiveness of Local Brands

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Abstract

Objective – This study aims to develop a strategy for improving HR quality in the Mojokerto footwear industry using a fuzzy logic approach as the analytical method, in order to identify priority competency dimensions that most significantly influence the competitiveness of local brands.

Design/methodology/approach – A quantitative approach was employed, utilizing fuzzy logic to analyze the prioritization of HR dimensions.

Findings – The findings indicate that the implementation of fuzzy logic enables a more precise mapping of HR competencies, both strengths and weaknesses, compared to traditional evaluation methods.

Research limitations/implications – This research was only conducted in the local footwear industry in Mojokerto. as a further study recommends the need for integrated human resource development policies between local governments, industry associations, and shoe business players in Indonesia.

Practical implications – This study offers practical contributions by providing evidence-based recommendations for improving training strategies, designing vocational curricula, and implementing competency development programs aligned with the needs of the local footwear industry.

Originality/value – These findings underscore that strengthening HR capacity through practical skills and innovation is essential for restoring the competitiveness of local brands in both domestic and international markets.

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INTRODUCTION

The footwear industry in Mojokerto has long been recognized as one of Indonesia's major footwear production centers, with a rich history and significant contribution to the local economy (Maulana, 2022). Despite its strong foundation in traditional craftsmanship, the competitiveness of local footwear brands from Mojokerto has declined over the past two decades. This situation has been exacerbated by the growing penetration of imported products, particularly from China, which offer lower prices and superior quality. This phenomenon reflects a structural challenge commonly faced by labor-intensive industries—namely, weak non-price competitiveness rooted in the limited quality of human resources (HR), particularly in the areas of production, design, and innovation.

In an increasingly competitive global economy, the quality of human resources is no longer determined solely by technical skills, but also by adaptability to technology, creativity in design, and innovation in production (Segantini, 2024; Muñoz-Pascual et al., 2021; Ogbeibu et al., 2020). In other words, the competitiveness of local footwear industries is not merely driven by production costs, but also by the capacity of human resources to generate high value-added products (Rua & Santos, 2022; Adulyanukosol & Silpcharu, 2020; Mbatha, 2021). Traditional approaches based on manual skills are no longer sufficient to cope with market dynamics shaped by rapidly shifting consumer preferences, advanced manufacturing technologies, and the integration of global supply chains (Randhawa et al., 2020; Prüfer & Prüfer, 2019).

The primary challenge faced by the Mojokerto footwear industry lies in the low quality of human resources, particularly in terms of modern technical skills, technological proficiency, and innovation capacity. Although workers are capable of replicating designs from well-known brands, there remains a significant quality gap, making it difficult for local brands to compete in both national and international markets. This issue is further compounded by existing human resource development strategies, which remain conventional, data-insensitive, and poorly adapted to uncertainty and the dynamic nature of market demands. Therefore, a scientific, decision-based approach is needed—one that can capture the complexity, uncertainty, and multidimensional aspects involved in improving human resource quality.

Studies on the application of fuzzy logic across various fields have developed considerably, as evidenced by a wide range of previous research. However, there remains a significant gap in the application of fuzzy logic for improving human resource (HR) quality within the local footwear industry, particularly in Mojokerto. Research conducted by Dutta et al. (2022) and Ain et al. (2022) demonstrates how fuzzy logic has been utilized to enhance visual experience quality and user comfort through intelligent control systems. Although these studies highlight the effectiveness of fuzzy logic in managing uncertainty, they primarily focus on digital technical aspects and individual comfort, rather than on HR development within industrial contexts.

Ge et al. (2023) and Chen et al. (2019) developed fuzzy logic-based models for multi-criteria evaluation in the contexts of the sports industry and green supplier selection. Both studies emphasize decision-making under uncertainty, yet their focus remains limited to organizational or supply chain aspects, rather than the transformation of workforce quality in traditional manufacturing industries such as footwear. Similarly, Wankhede and Vinodh (2022) and Caiado et al. (2021) proposed readiness and maturity models for Industry 4.0 using fuzzy logic approaches. While their findings highlight the strength of fuzzy logic in assessing organizational preparedness for digitalization, they do not address the fundamental issue of human resource quality as the key enabler in the implementation of industrial technologies.

Erdoğdu et al. (2025) and Lamamra et al. (2020) highlighted the integration of fuzzy logic with evolutionary algorithms (such as genetic algorithms and NSGA-II) for optimizing cost, time, and quality in the agricultural sector and nonlinear system control. These studies have enriched the methodological landscape of fuzzy logic; however, their focus remains on technical optimization and production processes, without directing attention to human resource development strategies as a source of competitive advantage. Similarly, Ciani et al. (2021) and Burduk et al. (2024) introduced fuzzy logic in the context of human reliability analysis within railway systems and risk assessment in manufacturing. While both studies contribute significantly to evaluating human factors using linguistic variables, their emphasis lies primarily on safety and operational reliability, rather than on enhancing

workforce competencies, creativity, or innovation.

Li and Pahlevanzadeh (2021) as well as Rao et al. (2022) demonstrated the application of fuzzy logic in the context of cloud computing security and power quality improvement in microgrids. While these studies broaden the spectrum of fuzzy logic applications, they remain far removed from socio-economic contexts such as local brand competitiveness driven by human resource quality. In the footwear industry, Shobana et al. (2019) and Akhtar et al. (2023) have employed fuzzy logic for supply chain development—specifically through fuzzy QFD in the Indian leather footwear industry—and for global outsourcing partner selection in the shoe industry. Although relevant to the footwear sector, these studies focus on supply chain and outsourcing aspects rather than on strengthening local HR quality as a key differentiator of competitiveness. Finally, Wei (2022) explored human resource performance evaluation in the tourism sector using fuzzy data mining. While this study is thematically closer to HR development, its application remains limited to performance evaluation and does not extend to strategic enhancement of HR quality within creative manufacturing industries such as footwear.

Based on a comprehensive review of previous studies, several research gaps remain unaddressed, both in academic scholarship and managerial practice. Most fuzzy logic research to date has been concentrated in the domains of technology, energy, agriculture, and supply chains, while its application in the context of human resource development within the local footwear industry has received very limited attention. Studies that have applied fuzzy logic to human resource domains—such as Wei (2022)—have primarily focused on performance evaluation, without proposing strategic frameworks aimed at enhancing HR quality to strengthen local brand competitiveness. Moreover, the integration of fuzzy logic with strategic initiatives to build competitive advantage through HR quality has rarely been explored. This is particularly critical given that, from the perspectives of the Resource-Based View (RBV) and Dynamic Capabilities Framework, human capital is a key asset that determines the sustainability and competitive edge of firms.

Previous research related to the footwear industry, such as by Shobana et al. (2019) and Akhtar et al. (2023), has primarily focused on supply chains and outsourcing practices, rather than on transforming the quality of the local workforce to produce innovative and competitive products. To date, there is no identified Fuzzy Logic-Based Decision-Making (FLBDM) model specifically designed to formulate strategies for improving HR quality in traditional manufacturing sectors—particularly in the footwear industry in Mojokerto. This study therefore contributes by offering novel theoretical insights and expanding the scope of fuzzy logic applications within the context of local brand competitiveness.

In doing so, the research addresses a critical gap in the literature by developing a fuzzy logic-based strategic framework for enhancing human resource quality in the Mojokerto footwear industry. This approach not only holds practical relevance for strengthening the competitiveness of local brands, but also enriches academic literature by providing a new perspective that integrates fuzzy decision-making, human resource development, and theories of competitive advantage.

This study proposes a solution by implementing a Fuzzy Logic-Based Decision Making (FLBDM) approach to formulate strategies for enhancing human resource (HR) quality in the Mojokerto footwear industry. FLBDM enables a more adaptive, holistic, and precise analysis of the factors influencing HR quality—such as technical skills, innovation capability, and market orientation. Through this method, a decision-making model can be developed that accounts for the interaction of multiple criteria, resulting in strategies that are realistic, flexible, and practically applicable to strengthening the competitiveness of local brands.

The motivation behind this research arises from the urgent need to revitalize the Mojokerto footwear industry, which is currently facing a decline due to intensifying global competition. The considerable potential of the local workforce—traditionally focused on imitative skills—must be transformed into innovative capabilities with strong competitive value. Moreover, this study is driven by the need to introduce a new theoretical model in human resource management research, particularly within creative manufacturing industries, by applying fuzzy logic as a strategic analytical tool. As such, this study is not only practically relevant but also contributes to the academic literature by offering a novel and integrative persp

This study aims to improve the quality of human resources in the Mojokerto footwear industry in order

to restore the competitiveness of local brands through the Fuzzy Logic-Based Decision Making (FLBDM) approach. The specific objectives of this research are as follows: To identify the key factors that influence human resource quality in the Mojokerto footwear industry; To design a fuzzy logic-based decision-making model for mapping the priority areas in human resource quality improvement; and to provide implementable strategic recommendations for enhancing local brand competitiveness through human resource development.

This study holds both strategic and academic significance. Practically, it provides a roadmap for footwear industry stakeholders in Mojokerto to enhance human resource (HR) quality, enabling local brands to compete more effectively in national and international markets. Theoretically, the study introduces a new theoretical insight by integrating fuzzy logic into HR development studies within traditional manufacturing sectors—an area that has rarely been explored through soft computing approaches.

The strength of this research lies in its ability to offer a flexible analytical framework, deliver precise insights under uncertainty, and generate contextually relevant and actionable recommendations. Accordingly, this study is expected to make a meaningful contribution to the revitalization of Mojokerto's footwear industry while enriching the academic literature on HR development strategies in the context of global competition.

Although fuzzy logic has been widely applied in domains such as technology, supply chain management, and human resource performance evaluation, its specific application through Fuzzy Logic-Based Decision Making (FLBDM) to formulate strategies for enhancing human resource quality in the local footwear industry is notably understudied. The extant literature predominantly employs fuzzy logic as an evaluative tool, not as a core instrument for strategic decision-making to bolster industry competitiveness through human capital development. It is this identified research lacuna that motivates the current investigation.

The contributions of this study are threefold. Firstly, it proposes a novel Fuzzy Logic-based decision-making model designed to prioritize interventions for human resource quality improvement in the local footwear sector. Secondly, it advances theoretical integration by incorporating the Resource-Based View and Dynamic Capabilities perspectives into a unified, fuzzy-based framework for human resource quality assessment. Thirdly, on a practical level, the study yields data-driven insights to inform evidence-based policy formulation for local government and industry practitioners, supporting the development of targeted strategies to enhance local brand competitiveness.

RESEARCH METHODS

This study employs a quantitative approach with Fuzzy Logic as the primary analytical method. This method is chosen due to its ability to capture the complexity of human resource (HR) quality assessment, which is inherently multidimensional and often cannot be accurately represented using conventional scales. Fuzzy Logic allows for the integration of both quantitative and qualitative data into more flexible scoring systems, thereby providing a more accurate reflection of the actual conditions of human resources (Wei, 2022; Ciani et al., 2021; Guo, 2022). The focus of the research is directed at comparing HR dimensions across different categories within the Mojokerto footwear industry, with the aim of identifying key strengths and weaknesses that need to be addressed in order to restore the competitiveness of local brands.

The study population consists of the entire workforce within Mojokerto's footwear industry, while the sample was selected using a purposive sampling method. The sampling criteria include employees with a minimum of two years of work experience, production managers and supervisors involved in HR decision-making, as well as local footwear business owners striving to improve product competitiveness. A total of 150 respondents from various small and medium-sized footwear companies in Mojokerto participated in this study.

Purposive sampling was employed to ensure respondents possessed direct knowledge of production processes and HR decision-making. The respondent distribution comprised production workers (58%), design and innovation staff (22%), and managers/supervisors (20%).

Data were collected in two main stages. First, primary data were gathered by distributing structured questionnaires to selected workers in the Mojokerto footwear industry, using purposive sampling that considered their involvement in key stages of the production process. The questionnaire was designed to measure various HR dimensions, including technical skills, work motivation, adaptability, discipline, and innovation capability. Second, secondary data were obtained from relevant academic literature to strengthen the analytical context.

The variables used in this study include Technical Competence, Innovation, Work Ethic, and Organizational Support. Data analysis was carried out in four stages: Respondent Description through descriptive statistics of the HR assessment dimensions; Frequency Distribution of Respondent Scores for each dimension; Categorization of HR Based on Defuzzification Values, to evaluate the quality of human resources by considering the four key dimensions; and Comparison of Dimensions Across HR Categories, to identify significant differences among the categorized HR groups.

The dimension weights were adopted based on literature reviews covering the four main variables: Technical Competence, Innovation, Work Ethic, and Organizational Support. The aggregation of each respondent's Triangular Fuzzy Number (TFN) was performed using scalar multiplication of the weights and summation of TFNs, based on the following formula:

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$$TFN_{total} = \sum_{j=1}^{4} \quad wjx\underline{TFN}_{dimj} = \left(\sum_{j} \quad w_j a_j, \sum_{j} \quad w_j b_j, \sum_{j} \quad w_j c_j \right)$$

The defuzzification method employed in this study is the centroid method (the average of the triangular points). For a Triangular Fuzzy Number (TFN) denoted as (a, b, c), the crisp value is calculated as follows:

$$S_{crisp} = \frac{a + b + c}{3}$$

The overall defuzzification score for each respondent is calculated using the following formula:

$$S = \frac{\sum_j \quad w_j a_j + \sum_j \quad w_j b_j + \sum_j \quad w_j c_j}{3}$$

The comparison of mean dimension scores across categories was conducted to test differences in dimension performance. If the assumptions of normality and homogeneity are met, a One-Way ANOVA using the F-statistic is employed, with the formula as follows:

$$F = \frac{SS_{between}/(k-1)}{SS_{within}/(N-k)}$$

The research instrument was validated using Pearson's item-total correlation, and its reliability was confirmed with Cronbach's alpha coefficient ($\alpha > 0.70$). A fuzzy linguistic scale with corresponding membership functions was applied across five levels: Very Low (1,1,2), Low (1,2,3), Medium (2,3,4), High (3,4,5), and Very High (4,5,5). The weights for each dimension were derived from a synthesis of prior literature, which consistently identifies technical competence and innovation as dominant factors in enhancing manufacturing competitiveness.

ANALYSIS AND RESEARCH RESULTS

Respondent Description

This study involved 150 respondents from the footwear industry in Mojokerto. The respondents comprised employees with a minimum of two years of work experience, supervisors, production managers, and business owners. The majority of respondents worked in the production sector (58%), design and innovation (22%), and management and supervision (20%). This distribution indicates a fairly representative sample across the entire value chain of the local footwear industry. To provide an overview of human resource quality, a descriptive analysis was conducted on the four main dimensions, as presented in Table 1

Table 1.
DESCRIPTIVE STATISTICS OF HR ASSESSMENT DIMENSIONS

Dimensions	Mean	Min	Max	Std. Dev.
Technical Competence	3.72	2.0	5.0	0.64
Innovation	3.41	1,8	4.9	0.71
Work Ethic	3.68	2.1	5.0	0.58
Organizational Support	3.12	1.7	4.8	0.66

Source: Processed primary data (2025)

The descriptive analysis results indicate that technical competence received the highest mean score (3.72), suggesting that the basic skills of the workforce are relatively strong and constitute an important asset in maintaining productivity within the Mojokerto footwear industry. However, the low score for organizational support (3.12) reflects a weak managerial role, training systems, and HR development policies, which may hinder the optimization of existing competencies. Meanwhile, the dimensions of innovation (3.41) and work ethic (3.68) are at a moderate level, indicating untapped potential that has yet to be fully leveraged to enhance the competitiveness of local brands.

Frequency Distribution of Respondents' Scores

The distribution of respondents' answers for each dimension is presented in Table 2 below.

Table 2.
FREQUENCY DISTRIBUTION OF RESPONDENTS' SCORES PER DIMENSION (%)

Score	Technical Competence	Innovation	Work Ethic	Organizational Support
1	2,0%	4,7%	1,3%	5,3%
2	6,0%	12,7%	8,0%	15,3%
3	32,0%	37,3%	34,7%	41,3%
4	38,0%	31,3%	40,0%	28,0%
5	22,0%	14,0%	16,0%	10,0%

Source: Processed primary data (2025)

Frequency distribution indicates that the majority of respondents rated technical competence and work ethic at a high level (score of 4), confirming that the workforce possesses adequate skills as well as strong dedication. In contrast, the dimensions of innovation and organizational support were concentrated at a moderate level (score of 3), indicating limitations in the ability to generate breakthroughs and weaknesses in institutional support systems. This pattern suggests that although the technical foundation and work ethic are relatively solid, suboptimal innovation and organizational support may pose strategic obstacles in restoring the competitiveness of the local footwear brand.

The most striking difference is seen between the dimensions of technical competence and organizational support. Although technical competence is relatively high, weak organizational support has the potential to hinder the transformation of this competence into sustainable product innovation.

Defuzzification Results and HR Categorization

The FLBDM method was employed to assess the quality of human resources (HR) by considering four main dimensions: technical competence, which encompasses expertise in production, manufacturing techniques, and quality control; innovation, reflecting the ability to create new designs and adapt to market trends; work ethic, including discipline, perseverance, and consistency in work; and organizational support, related to training, facilities, and company policies for HR development. Each dimension was assigned a weight according to its importance: technical competence (0.30), innovation (0.30), work ethic (0.25), and organizational support (0.15).

Table 3.
DISTRIBUTION OF HUMAN RESOURCE CATEGORIES BASED ON DEFUZZIFICATION SCORES

HR Category	Defuzzification Value	Number of Respondents	Percentage
Low	≤ 2,9	18	12,0%
Medium	3,0 – 3,5	67	44,7%

High	> 3,5	65	43,3%
Total	-	**150**	**100%**

Source: Processed primary data (2025)

Determination of the boundaries of HR quality categories is based on a five-point Likert scale range that has been transformed into defuzzification values, with intervals divided proportionally to represent low, medium, and high levels.

The analysis results indicate that the majority of human resources (HR) in the Mojokerto footwear industry fall into the medium category (44.7%) and high category (43.3%), while only 12% remain in the low category. These findings carry several important implications. First, technical competence is relatively strong, with most workers possessing fundamental shoe manufacturing skills. This aligns with Mojokerto's reputation as a footwear production center capable of replicating designs of well-known brands. Next, innovation remains a primary challenge. Despite its potential, creativity in design and adaptation to global trends are not yet optimal, adversely affecting product differentiation. Furthermore, work ethic is rated fairly high, indicating that local workers demonstrate strong motivation and dedication; however, a more consistent quality management system is needed. Lastly, organizational support is relatively low compared to other dimensions, highlighting the necessity for interventions such as continuous training, modern facilities, and more structured HR development policies.

Overall, these results confirm that the FLBDM-based human resource quality improvement strategy is effective in mapping development priorities. Efforts should be concentrated on enhancing innovation and organizational support to strengthen the competitiveness of Mojokerto's local footwear brands in both national and international markets.

Comparison of Dimensions Across HR Categories

To deepen the analysis, a comparison of the mean scores for each dimension was conducted based on HR categories.

Table 4.
COMPARISON OF MEAN DIMENSION SCORES ACROSS HR CATEGORIES

Dimensions	Low (n=18)	Medium (n=67)	High (n=65)
Technical Competence	2,41	3,52	4,32
Innovation	2,18	3,28	4,11
Work Ethic	2,56	3,47	4,20
Organizational Support	2,08	2,95	3,79

Source: Processed primary data (2025)

The comparative results reveal a significant distinction among HR categories, with the high-quality group achieving superior scores across all dimensions, particularly in technical competence and work ethic, both exceeding a score of 4.0. This finding reflects that the enhancement of technical skills and discipline constitutes the primary differentiating factors in determining HR quality. Conversely, the low-quality category demonstrates substantial limitations across all aspects, especially in organizational support, which averages only 2.08, indicating a pressing need for managerial interventions and more systematic development policies

DISCUSSION

According to the Resource-Based View (RBV) theory (Barney, 1991), an organization's internal resources, including the quality of human resources (HR), are key factors in creating sustainable competitive advantage. The findings that technical competence and work ethic of Mojokerto's workforce are relatively strong (means of 3.72 and 3.68, respectively) indicate the presence of potential resources that could serve as the basis for competitive advantage. However, the relatively low organizational support (mean of 3.12) and moderate level of innovation (mean of

3.41) reveal limitations in converting these resources into a sustainable competitive advantage.
Meanwhile, the Dynamic Capabilities Theory (Teece et al., 1997) emphasizes the importance of an organization's ability to adapt, integrate, and reconfigure competencies in response to external environmental dynamics. In the context of this study, although the workforce possesses basic production skills, the limited innovation capacity and weak organizational support reflect suboptimal dynamic capabilities of the Mojokerto footwear industry in facing the surge of more innovative imported products. Therefore, this study affirms that the competitiveness of local brands not only depends on resources such as technical skills but also on the organization's ability to foster innovation and support HR through policies, training, and modern facilities.
This study contributes to filling the literature gap by emphasizing the context of human resources (HR) within the local footwear industry. While previous studies in the footwear sector, such as those by Shobana et al. (2019) and Akhtar et al. (2023), predominantly focused on supply chain management and outsourcing aspects, this research distinctly centers on internal resources—specifically HR—as the primary determinant of competitive advantage. Furthermore, this study expands the application of fuzzy logic in HR development. Although Wei (2022) utilized fuzzy logic to evaluate HR performance, the scope was limited to the tourism sector. This study advances beyond by applying fuzzy logic-based decision making (FLBDM) in the footwear manufacturing sector, enabling the mapping of priorities for improving HR quality.
Moreover, this research contributes to the integration of theory and methodology. While much of the prior research, such as Ge et al. (2023) and Wankhede & Vinodh (2022), emphasized the use of fuzzy logic in technical assessments, industry readiness, or supplier selection, this study offers a novel perspective by combining the Resource-Based View (RBV) and Dynamic Capabilities frameworks within the FLBDM approach. This integration results in a more comprehensive understanding of the strategic role of HR as a resource that can drive competitiveness in the global market. Thus, this study successfully addresses a significant gap in the literature concerning the strengthening of local brand competitiveness through a fuzzy logic-based strategy for enhancing HR quality—an area that has received limited attention until now.
This study enriches the literature on human resource management and industrial strategy by demonstrating that Fuzzy Logic-Based Decision Making (FLBDM) can be utilized not only as a technical evaluation tool but also as a strategic analytical instrument in HR management. Furthermore, the integration of the Resource-Based View (RBV) and Dynamic Capabilities frameworks within the fuzzy logic approach offers a novel perspective that improving HR quality should not merely be viewed as an investment in human capital, but also as a strategic step in building an organization's dynamic capabilities to compete in the global market. Additionally, this research extends theoretical scope by emphasizing the critical role of organizational support as a mediating factor that strengthens the transformation of technical competence and work ethic into sustainable competitive advantages.
For the Mojokerto footwear industry, the findings carry important practical implications to bolster competitiveness. Efforts to enhance innovation should be directed through design training programs, broader access to global trends, and strategic collaborations with educational institutions and local designers. Strengthening organizational support is a crucial aspect that can be realized through continuous training policies, provision of modern production facilities, and implementation of more structured quality management systems. Optimizing technical competence should also be pursued by encouraging skill certification, quality control standardization, and the adoption of simple technologies that can significantly boost productivity. Moreover, the application of FLBDM serves as a managerial tool that helps companies prioritize HR development interventions in a measurable, systematic, and sustainable manner.
For local governments and stakeholders, this study provides a strategic foundation for formulating human resource development programs aligned with the actual needs of the footwear industry. The findings also encourage the formation of synergy among business actors, industry associations, and educational institutions to strengthen a sustainable innovation ecosystem. Furthermore, this research serves as a basis for policy formulation that functions not only as a protective instrument but also as a systematic effort to enhance the competitiveness of local

brands through capacity building based on human resource development.

This study offers significant contributions both academically and practically. Academically, it presents a novel analytical model by integrating FLBDM with the Resource-Based View (RBV) and Dynamic Capabilities theories to explain strategies for improving human resource quality in the traditional manufacturing sector. Methodologically, this research demonstrates the effectiveness of fuzzy logic in addressing uncertainties and the complexity of human resource assessments that conventional quantitative methods often struggle to capture. Practically, it provides a strategic roadmap for the Mojokerto footwear industry players to prioritize human resource development, particularly in the dimensions of innovation and organizational support, thereby strengthening local brand competitiveness in the face of global competition.

The findings of this study successfully address the research objectives that were initially formulated. The identification of key factors influencing human resource quality reveals that workers' technical competencies and work ethic are relatively strong, whereas innovation and organizational support remain weak. Furthermore, the development of the FLBDM (Fuzzy Logic-Based Decision Making) model has proven effective in mapping strategic priorities for improving human resource quality. Based on these findings, strategic recommendations are proposed that emphasize the need to strengthen innovation and organizational support, while also maintaining the existing strengths in technical competencies and work ethic. Through this approach, the competitiveness of Mojokerto's local footwear brands is expected to improve sustainably over time.

Since the main weaknesses are found in the organizational support dimension, HR policies should focus on strengthening mentoring systems and innovative performance-based incentives. Further research can integrate a longitudinal approach, as well as develop a SEM-based structural model to test the causal relationships between dimensions.

CONCLUSION

This study aims to enhance the quality of human resources (HR) in the footwear industry in Mojokerto as a means to restore the competitiveness of local brands through the application of a Fuzzy Logic-Based Decision Making (FLBDM) approach. The findings indicate that the implementation of fuzzy logic enables a more precise mapping of HR competencies, both strengths and weaknesses, compared to traditional evaluation methods. Fuzzy-based analysis allows decision-making under conditions of uncertainty, variation in skill levels, and subjective aspects such as creativity and innovation capabilities. Thus, this study demonstrates that the FLBDM approach can serve as a strategic tool for formulating capacity-building initiatives, ranging from technical production skills to design and product innovation competencies. Furthermore, the study confirms that improving HR quality not only enhances product quality but also directly contributes to strengthening the competitive position of local footwear brands in both national and global markets.

Based on these findings, the study recommends the development of an integrated HR development policy involving local government, industry associations, and footwear entrepreneurs in Mojokerto. Technology-based training programs—such as digital design and production automation—should be combined with managerial approaches that emphasize continuous innovation. Moreover, the establishment of local footwear research and innovation centers is essential to serve as incubators for young talent to foster creativity and improve product competitiveness. Policy interventions should also be directed toward providing incentives for industry players who invest in HR capacity development. With such a strategy, the competitiveness of Mojokerto's footwear industry can be strengthened not only through cost advantages, but also through quality, innovation, and product differentiation—key foundations for local brands to confront the dominance of imported products.

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