

Evidence-based Employee Performance Evaluation: Integration of Analytical Methods, Digital, and Organizational Perspectives

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Abstract - Employee performance evaluation is a critical component of human resource management, serving as a foundation for strategic organizational decision-making. This study aims to analyze the effectiveness of various performance appraisal methods, including Grey Relational Analysis (GRA), Entropy, Fuzzy Analytical Hierarchy Process (F-AHP), Balanced Scorecard (BSC), and Human Resources Scorecard (HRSC). In addition to quantitative approaches, the study also examines the influence of individual and organizational factors such as self-efficacy, job satisfaction, employee loyalty, and gender mainstreaming on employee performance. The findings reveal that data-driven methods like GRA and F-AHP reduce subjectivity in evaluations, while BSC and HRSC successfully align performance metrics with organizational strategy. Psychosocial factors are also found to significantly contribute to performance improvement. Thus, the implementation of integrated and technology-based evaluation systems is essential for adaptive and strategic human resource performance management.

Keywords: Performance Evaluation, Grey Relational Analysis, Balanced Scorecard, Employee Loyalty, Human Resources Scorecard.

I. INTRODUCTION

Employee performance is one of the crucial aspects in achieving the organization's strategic goals. Evaluation of employee performance not only acts as a managerial control tool, but also as a basis for making strategic decisions for human resource development. In today's competitive era, organizations are required to have an accurate, objective, and comprehensive performance evaluation system in order to answer the challenges of productivity and organizational effectiveness. Various approaches have been developed to improve the quality of performance appraisal. One of them is the Grey Relational Analysis (GRA) method combined with the Entropy method for weighting criteria, as applied by (Setiawansyah, 2024) in assessing individual performance based on the degree of grayness against reference variables. This approach provides a solution to the imprecision and subjectivity in conventional evaluation, and supports systematic decision-making. On the other hand, organizational factors such as work climate, self-efficacy, and job satisfaction also have a significant influence on employee performance. (Roni et al., 2024) stated that organizational climate contributed 44.7% to performance improvement, while self-efficacy contributed 24.9%. In addition, performance is also influenced by the physical work environment and work discipline, as shown by (Anggariani et al., 2024). which found that all of these variables simultaneously have a positive effect on employee performance in the hospitality sector. Other aspects that are no less important are employee loyalty and gender mainstreaming, which have been shown to simultaneously affect employee performance by 77.4% in a study conducted by (Lestari & Stiaharti, 2024). This reinforces the understanding that the managerial approach to HR must be holistic and inclusive, covering structural, psychological and sociological aspects.

As the organization's need for a more integrated system grows, approaches such as the Balanced Scorecard (BSC) and Human Resources Scorecard (HRSC) become solutions that can bridge the company's vision with individual achievements. (Haryadi, 2024) successfully designed a BSC-based assessment application capable of evaluating performance from four main organizational perspectives: financial, customer, internal processes, and learning and growth. Similarly, (Setiawan, 2024) and (Ayomi & Cahyawati, 2024) also utilized the HRSC method combined with Analytical Hierarchy Process (AHP) and Objective Matrix (OMAX) to overcome the challenges of objectivity and measurement strategies in

industrial companies. In the context of government and public services, the Fuzzy Analytical Hierarchy Process (F-AHP) method has also been applied to evaluate the performance of honorary staff more adaptively to information uncertainty, as developed by (Abdillah et al., 2022). In addition, the reward and punishment approach mediated by motivation has also proven effective in improving employee performance, as shown in a study by (Jabo & Sunaryanto, 2021) in the agribusiness sector. Through these various approaches, it can be seen that performance evaluation can no longer rely solely on subjective or traditional methods, but must be data-driven, systematic, and adaptive to the specific context of the organization. Therefore, it is important for each organization to choose the evaluation method that best suits its strategic objectives, HR characteristics, and operational complexity.

There are several things that need to be considered to determine employee performance appraisal, namely 1. Basic concepts that explain the meaning and purpose of performance evaluation in human resource management by conducting Employee Performance Evaluation because it is an important activity in human resource management that aims to assess the contribution, achievement, and development of an individual in an organization. This evaluation not only assesses work results, but also provides feedback for employee career improvement and development (Setiawansyah, 2024), and this basic concept of performance evaluation is part of human resource management strategy. 2. Internal and External Factors by reviewing elements that affect performance, such as self-efficacy, organizational climate, and job satisfaction. By studying the factors that affect performance, several internal and external factors affect employee performance. Study by (Roni et al., 2024) revealed that organizational climate and self-efficacy affect job satisfaction which in turn has a direct impact on employee performance. Similar findings were also revealed by (Anggariani et al., 2024), which stated that self-efficacy, work discipline, and the physical work environment have a significant influence on employee performance. Internal and external factors can affect performance, including self-efficacy, organizational climate, and job satisfaction. 3. Quantitative Evaluation Methods with a performance appraisal system approach, this is To answer the challenges of subjectivity and inaccuracy of conventional performance evaluation, various modern methods have been developed. One of them is the Grey Relational Analysis (GRA) and Entropy method which is used to assign weights to criteria and determine performance ratings objectively (Setiawansyah, 2024).

On the other hand, the Fuzzy-AHP method was applied by (Abdillah et al., 2022) to handle data uncertainty in evaluating the performance of honorary staff. 4. Managerial Strategy and Integrated System to Explain managerial tools that align performance appraisal with the vision and strategy of the organization by using the Balances Scorecard and Human Resource Scorecard. The Balanced Scorecard (BSC) method was introduced to assess performance from various perspectives, namely financial, customer, internal business processes, and learning & growth. This approach was applied in the development of appraisal applications at PT ForIT Asta Solusindo and successfully improved the quality of data-based appraisals and key performance indicators (Yusuf Haryadi, 2024). Meanwhile, the Human Resources Scorecard (HRSC) method was combined with Analytical Hierarchy Process (AHP) and Objective Matrix (OMAX) in a study by (Ayomi & Cahyawati, 2024) to evaluate and map overall HR performance. The study identified development strategies based on the priority value and accuracy of performance indicators. 5. Social and Psychological Aspects with social dimensions in Performance based on loyalty and Gender. The social dimension is also an important factor in employee performance. (Lestari & Stiaharti, 2024) shows that employee loyalty has a positive and significant influence on performance, while gender mainstreaming has a positive correlation although not partially significant. This emphasizes the importance of an inclusive and equitable approach in organizational HR policies. And this aspect is an important element in improving performance in a sustainable manner.

II. METHOD

This research is a quantitative study with descriptive and associative approaches. The aim is to analyze the application of employee performance evaluation methods and identify the relationship between factors that affect employee performance. Some of the methods analyzed in this study include: Grey Relational Analysis (GRA), Entropy, Fuzzy Analytical Hierarchy Process (F-AHP), Balanced Scorecard (BSC), and Human Resources Scorecard (HRSC). The research object includes various case studies from companies and institutions that have been researched in references: 1. PT ForIT Asta Solusindo (BSC application development). 2. PT Inka Multi Solusi Trading (HR performance measurement with HRSC). 3. PT Shaftindo Energi (HRSC-AHP-OMAX based evaluation). 4. Population and Family Planning Office of North Sumatra Province (evaluation of honorary

performance with F-AHP). 5. Bank Aceh Syariah and Ubud Raya Resort (analysis of motivational and organizational factors). The research object and research location can be seen in table 1 below:

Table 1. Object and Location of Research

Object and Location of Research	Description
PT. ForIT Asta Solusindo	Balanced Scorecard-based application development
PT. Inka Multi Solusi Trading	Implementation of Human Resources Scorecard (HRSC)
PT. Shaftindo Energi	HRSC-based performance evaluation combined with AHP and OMAX
Population and Family Planning Office of North Sumatra Province	Application of Fuzzy AHP method for honorary workers
Bank Aceh Syariah and Ubud Raya Resort	Analysis of psychosocial factors affecting performance

Source: Nofiyanti (2025)

Data collection techniques were conducted through two approaches: 1. Primary Data: Obtained through the distribution of questionnaires and interviews to respondents (employees and management) as applied in most field studies. 2. Secondary Data: In the form of company performance documents, HRD reports, observation results, and previous journals relevant to the methods used. Data analysis is carried out in accordance with the performance evaluation method used: 1. Entropy-GRA: Used for computational weighting and performance assessment with a gray scale between criteria. 2. F-AHP: Used to handle uncertainty in performance assessment and generate criteria priority weights. 3. Balanced Scorecard (BSC): Analyzes performance from financial, customer, internal business process, and learning & growth perspectives. 4. HRSC and OMAX: Linking HR strategy with actual performance, and scoring with Traffic Light System to detect critical areas. 5. Statistical Test (SPSS): Validity, reliability, multiple linear regression, t-test and F-test were used to examine the influence of social factors such as loyalty, self-efficacy, and organizational climate on performance. The study population included employees from various organizational units (e.g., production, marketing, accounting). The sample was determined using simple random sampling techniques as in the study (Lestari & Stiaharti, 2024) involving 81 respondents, or saturated sampling as in the study (Anggariani et al., 2024) at Ubud Raya Resort.

III. RESULT AND DISCUSSION

A. Result

The research results of this study are: 1. Performance Evaluation Results with GRA and Entropy Methods Research by (Setiawansyah, 2024) shows that the use of the Gray Relational Analysis (GRA) method combined with Entropy is effective in evaluating employee performance based on objective criteria. The best employee is obtained with the highest GRA value of 0.1638. This method reduces subjectivity and provides transparent and accountable performance rating results. 2. The Effect of Organizational Climate and Self-Efficacy on Performance, Study by (Roni et al., 2024) states that organizational climate contributes 44.7% to performance, self-efficacy is 24.9%, and job satisfaction is 21.7%. The relationship between these variables is significant and indicates that the organizational environment and employee self-efficacy have a strategic role in shaping performance. 3. Individual Factor Analysis: Self-efficacy, Discipline, and Work Environment, Research at Ubud Raya Resort (Anggariani et al., 2024) shows that self-efficacy, work discipline, and physical work environment simultaneously have a significant influence on performance. This indicates that psychological and physical factors in the work environment contribute directly to employee productivity. 4. Use of F-AHP Method in Honorary Performance Appraisal. The study by (Abdillah et al., 2022) proves that Fuzzy AHP can accommodate uncertainty in the performance assessment of honorary staff in government agencies. This method allows more flexible criteria weighting for variables that are qualitative and difficult to measure directly. 5. Development of Balanced

Scorecard-Based Performance Appraisal Applications, (Haryadi, 2024) developed a web-based application using the Balanced Scorecard which was tested using Agile and Scrum methods. The application shows the results of the User Acceptance Test (UAT) with user satisfaction of 78% and ease of use of 96%. The four main perspectives used are: financial, customer, internal process, and learning and growth. 6. Designing HR Scorecard and Strategy Map in the Company, Study by (Setiawan, 2024) at PT. Inka Multi Solusi Trading (Setiawan, 2024) dan (Ayomi & Cahyawati, 2024) Shaftindo Energi shows success in designing the Human Resources Scorecard (HRSC). At PT Shaftindo, the final performance index of 6.9 indicates that performance has not been maximized. HRSC combined with AHP and Objective Matrix successfully identified weak points in HR strategy and provided directions for improvement. 7. The Effect of Loyalty and Gender Mainstreaming, (Lestari & Stiaharti, 2024) found that employee loyalty has a positive and significant effect on performance. Although gender mainstreaming is not partially significant, simultaneously gender and loyalty variables explain 77.4% of the variation in employee performance. 8. Reward, Punishment, and Motivation as Performance Drivers, Research by (Jabo & Sunaryanto, 2021) shows that the provision of rewards and punishments simultaneously has a significant effect on motivation, which in turn has an impact on employee performance. Companies that implement morning briefings and discipline control more consistently tend to produce high-performing employees.

B. Discussion

The results show that employee performance appraisal now demands a more holistic approach, data-driven, and integrated with organizational strategy. The application of quantitative methods such as Grey Relational Analysis (GRA) and Entropy has proven effective in producing objective evaluations. Research by (Setiawansyah, 2024) shows that the combination of GRA and Entropy is able to avoid subjective bias and provide transparent and logical performance rating results. Meanwhile, technology integration in the evaluation system as implemented by (Haryadi, 2024) through Balanced Scorecard (BSC)-based applications is a strategic solution in dealing with the complexity of employee performance evaluation. With four main perspectives (financial, customer, internal process, and learning growth), this system not only assesses work results, but also links them directly to the direction of organizational goals. The Human Resources Scorecard (HRSC) approach combined with the Analytical Hierarchy Process (AHP) and Objective Matrix (OMAX) methods as conducted by (Ayomi & Cahyawati, 2024), also underlines the importance of bottom-up strategies in building evaluation systems. HRSC enables the identification of cause-and-effect relationships between activities, strategic goals, and actual performance. Through strategy mapping, organizations can identify weak points and make improvements based on data priorities.

In addition to systematic and technology-based approaches, this study also reinforces that psychosocial and organizational factors have a significant contribution to employee performance. Studies by (Roni et al., 2024) and (Anggariani et al., 2024) show that organizational climate, self-efficacy, job satisfaction, work discipline, and physical work environment have a strong correlation and influence on performance improvement. Interestingly, social dimensions such as loyalty and gender mainstreaming (PUG) are also important determinants. Although PUG has no significant effect partially, in a simultaneous model with loyalty it can explain up to 77.4% of the variability in performance, as evidenced by (Lestari & Stiaharti, 2024). This suggests that the integration of the values of fairness, equality and respect for personal contributions plays an important role in creating a conducive and productive work climate. As for rewards and punishments, based on the study (Jabo & Sunaryanto, 2021), directly affects motivation which ultimately improves performance. Providing incentives, disciplinary supervision, and persuasive communication are very impactful strategies, especially in work environments that emphasize discipline and short-term work results. Thus, it can be concluded that employee performance appraisal cannot only rely on a single approach, but requires a combination of: 1. objective quantitative methods (GRA, F-AHP, Entropy), 2. strategic managerial systems (BSC, HRSC), 3. behavioral and psychological factors (loyalty, self-efficacy, job satisfaction), 4. and social values in the organization (gender equality, rewards). The implementation of this comprehensive system not only improves the quality of appraisals, but also has a positive impact on employee retention, motivation, and long-term performance. The discussion of the research results that have been summarized by the author can be seen in table 2 below.

Table 2. Key Conclusions from the Research

No.	Aspects Discussed	Key Findings	Academic Interpretation	Reference
1.	GRA & Entropy	The highest GRA value of 0.1638 indicates the	The combination of GRA and Entropy effectively reduces subjectivity in	Setiawansyah (2024)

No.	Aspects Discussed	Key Findings	Academic Interpretation	Reference
		identification of the best employee objectively.	multidimensional criteria-based performance evaluation.	
2.	Organizational Climate & Self-Efficacy	Organizational climate contributed 44.7% to performance; self-efficacy was 24.9%.	Organizational and psychological factors significantly influence employee performance through increased job satisfaction.	Roni et al. (2024)
3.	Discipline and Physical Work Environment	Self-efficacy, work discipline, and physical work environment simultaneously have a significant effect on performance.	An organized work environment and high discipline create a productive and professional work base.	Anggariani et al. (2024)
4.	Fuzzy AHP	Provides flexibility in performance appraisal based on qualitative criteria and not directly measurable.	F-AHP is particularly suitable for the public sector and honorary workers who have many subjective variables.	Abdillah et al. (2022)
5.	Balanced Scorecard (BSC)	Web-based application with a user satisfaction level of 78% and convenience of 96%.	Technology supports the accuracy of performance evaluation with a cross-perspective strategic approach.	Haryadi (2024)
6.	HRSC + AHP + OMAX	A performance index of 6.9 indicates weaknesses in HR strategy; mapping strategy shows points of improvement.	The integration of HRSC with AHP-OMAX is able to identify critical areas and design corrective actions systemically.	Setiawan (2024); Ayomi & Cahyawati (2024)
7.	Loyalty & Gender Mainstreaming	Loyalty is positively significant; gender is not partially significant but contributes simultaneously by 77.4%.	Social values and gender equity play a role in shaping an inclusive and high-performing organizational culture.	Lestari & Stiaharti (2024)
8.	Reward, Punishment, and Motivation	Rewards and punishments increase motivation, which has a positive impact on performance.	Pendekatan behavioral dengan kontrol disiplin yang baik dapat memperkuat motivasi intrinsik dan kinerja dalam konteks operasional.	Jabo & Sunaryanto (2021)

Source: Nofiyanti (2025)

CONCLUSION

Based on the analysis of various methods and factors that influence employee performance evaluation, the following conclusions can be drawn: 1. Modern evaluation methods such as Grey Relational Analysis (GRA), Entropy, Fuzzy AHP, Balanced Scorecard (BSC), and Human Resources Scorecard (HRSC) are proven to provide more objective, systematic, and accurate performance appraisals compared to conventional approaches. These methods can reduce subjectivity in assessment and support data-driven decision-making. 2. Individual and organizational factors such as self-efficacy, work climate, loyalty, work discipline, and job satisfaction are proven to have a significant influence on employee performance. Performance increases when the work environment is conducive, employees feel valued, and have high confidence in their work. 3. Implementation of HR development strategies through performance mapping and strategy maps is very important in formulating directed and sustainable employee management policies.

Organizations that adopt strategic frameworks and measurable performance indicators tend to be better prepared to face competitive challenges and dynamic changes in the business environment.⁴ Social dimensions such as loyalty and gender equality contribute to employee performance, although its implementation requires an approach that is inclusive, communicative, and based on a strong organizational culture. Overall, the results of this study confirm that effective employee performance appraisal can no longer rely on a single or subjective approach. The combination of quantitative analytical methods with structured managerial strategies and consideration of the psychological and social aspects of employees has proven to result in a more fair, accurate and relevant evaluation system. By integrating technology, data, and an understanding of human dynamics in organizations, companies can create appraisal systems that not only increase productivity, but also strengthen employee loyalty, motivation, and well-being in a sustainable manner. Therefore, it is important for organizations to continue to innovate in performance management systems, in order to be able to adapt to changes in the business environment and remain competitive in the long term. The author realizes that the preparation of this journal still has limitations both in terms of the scope of study, methodological approach, and depth of analysis. as for the main conclusions of this employee performance evaluation research are described in table 3 below.

Table 3. Key Conclusions from the Research

Aspects of Evaluation	Key Findings	Managerial Implications
Quantitative Analytical Methods	GRA, Entropy, and Fuzzy AHP methods can reduce subjectivity and increase objectivity in performance evaluation.	The use of data-driven methods in performance appraisal is recommended, especially in large-scale organizations.
Integrated Evaluation System	The Balanced Scorecard (BSC) and Human Resources Scorecard (HRSC) successfully link organizational strategy with individual performance in a systematic way.	Organizations need to develop a digital assessment system that is aligned with the company's vision and mission.
Individual & Organizational Factors	Self-efficacy, job satisfaction, discipline, and organizational climate contribute significantly to improving employee performance.	Strengthening the work climate and individual development programs based on motivation and job satisfaction is needed.
Social and Psychological Aspects	Employee loyalty has a positive and significant effect, while gender mainstreaming shows a positive contribution simultaneously.	Inclusive and fair HR policies are important to create a productive and harmonious work environment.
Sustainable Development Strategy (HR)	Performance mapping through strategy maps and performance indicators helps with long-term, targeted HR planning.	It is important for organizations to design employee development policies based on data mapping and analysis.

Source: Nofiyanti (2025)

With full openness, the author sincerely hopes for suggestions, constructive criticism, and scientific input from readers, academics, and practitioners as part of efforts to improve this study in the future. The input provided will be a valuable foundation in the development of further research, as well as a reflection to improve the quality of writing and academic contributions to the field of human resource management.

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