

---

**FROM ADMINISTRATIVE TOOL TO STRATEGIC DECISION SUPPORT: A  
QUALITATIVE STUDY OF DIGITAL TRAINING NEEDS ANALYSIS**

**Desi Aprillia Herman<sup>1</sup>**

Universitas Islam Indonesia, Yogyakarta, Indonesia

[22311392@students.uii.ac.id](mailto:22311392@students.uii.ac.id)

**Majang Palupi<sup>2</sup>**

Universitas Islam Indonesia, Yogyakarta, Indonesia

[majang\\_palupi@uii.ac.id](mailto:majang_palupi@uii.ac.id)

**Novi Hery Yono<sup>3</sup>**

PPSDM Migas, Cepu, Indonesia

[novi.hery1983@gmail.com](mailto:novi.hery1983@gmail.com)

---

**Abstract**

This study examines how the Dashboard Executive Information System for Training Needs Analysis (DEIS AKD) supports digital training needs analysis at PPSDM Migas and identifies the conditions required for its transformation from an administrative tool into a strategic decision-support system. A descriptive qualitative approach was employed, with data collected through in-depth interviews and documentation studies. The informants consisted of four PPSDM Migas employees directly involved in training planning, implementation, standardization, and evaluation. Data were analyzed through data condensation, data display, and conclusion drawing or verification. The findings show that DEIS AKD has improved administrative efficiency through centralized employee data management, training history monitoring, scheduling, and participation tracking. However, the system has not yet fully supported competency-based analysis because training recommendations remain influenced by managerial judgment, job-based classifications, limited analytical features, and insufficient integration of competency, performance, and post-training evaluation data. Its effectiveness is also influenced by data quality, system limitations, and users' analytical capabilities. The study concludes that DEIS AKD currently functions primarily as an administrative tool rather than as a strategic decision-support system. Its transformation requires stronger data governance, competency-gap analysis, integrated performance and evaluation data, improved analytical features, and enhanced user capabilities.

**Keywords:** Digital Training Needs Analysis, DEIS AKD, Strategic Decision Support, Competency-Based Training, Digital HRM

## INTRODUCTION

Human resource development plays a strategic role in supporting organizational effectiveness, particularly through education and training management. Organizations need competent and reliable employees because human resources are a key factor in achieving organizational goals (Suryani et al., 2023). In this context, employee competency development is not only focused on technical skills but also includes soft skills needed to adapt to changing work environments. Systematic training and development programs are designed to strengthen employee knowledge and skills, reduce competency gaps, and improve measurable work performance (Vanitha, 2024). Previous studies also show that competency-based approaches can strengthen training implementation, employee development, and training effectiveness evaluation (Fejfarová & Fejfar, 2022).

In the public sector, competency development is also a formal obligation for civil servants. Government Regulation Number 11 of 2017 requires civil servants to undertake competency development for at least twenty learning hours each year. This policy emphasizes the importance of structured and planned training as part of human resource development strategies in government institutions. Effective training planning must be based on organizational, job, and individual needs to ensure that training programs are relevant to competency requirements and organizational productivity (Apriliana & Nawangsari, 2021). Furthermore, employee satisfaction and motivation are closely related to training effectiveness, as well-designed training can improve perceived competence, work motivation, and organizational performance (Alzahmi & Alshamsi, 2024; Loqmane, 2025).

Training programs should be developed based on a systematic training needs analysis. Training needs analysis, or Analisis Kebutuhan Diklat (AKD), is a process used to identify gaps between current employee competencies and the competencies required by the organization or job position. This process ensures that training programs are relevant, targeted, and measurable in addressing actual performance problems (Sholikhah et al., 2023; Cotes & Ugarte, 2021). However, previous findings indicate that many employees still experience difficulties in training planning, showing the need for a more efficient and structured system to support training needs analysis (Maliani & Sutrisno, 2022).

To improve training planning effectiveness, the Ministry of Energy and Mineral Resources, particularly through the Human Resource Development Center for Oil and Gas or PPSDM Migas, has implemented a digital training needs analysis system called the Dashboard Executive Information System Analisis Kebutuhan Diklat (DEIS AKD). This system is expected to support a more structured training planning process by providing accurate data on employee training needs, competency records, training history, and learning achievements. Nevertheless, the effectiveness of DEIS AKD still needs to be examined, especially in its ability to support competency-based training needs identification, planning, implementation, and evaluation.

The implementation of a digital system does not automatically transform training needs analysis into a strategic and competency-based process. A system may successfully centralize employee data, record training histories, and manage schedules while remaining limited to administrative functions. Strategic decision support requires the system to integrate actual employee competencies, job competency standards, performance information, unit-level needs, training histories, and post-training evaluation results. The distinction between administrative digitalization and strategic decision support therefore becomes important in

evaluating the current role and future development of DEIS AKD.

Based on this background, this study examines the current role of DEIS AKD in supporting digital Training Needs Analysis at PPSDM Migas. Specifically, the study analyzes the extent to which the system supports administrative efficiency, identifies the limitations that prevent it from functioning as a strategic decision-support system, and examines the organizational, technological, and human factors required for its further development. The study contributes to the Digital HRM and system-based Training Needs Analysis literature by explaining that digitalization does not automatically produce strategic decision support, particularly within a public-sector organizational context.

## REVIEW OF LITERATURE

### Training and Human Resource Development

Training and human resource development are essential components of human resource management because they are directly related to improving employee capacity, learning, and contribution to organizational goals. Training is not merely a process of transferring knowledge, but also a strategic investment to prepare employees to face changing work demands. Previous studies show that training and development contribute to the improvement of employee knowledge, skills, attitudes, and expertise, which ultimately support organizational performance (Obazuaye, 2024; Garavan et al., 2021; Hosen et al., 2024). In this context, training and development should be designed systematically and aligned with organizational needs so that employees can perform their duties more effectively.

Training also plays an important role in improving organizational performance. Effective training strengthens employee competencies, supports knowledge transfer, and encourages the application of learning outcomes in the workplace. Training that is relevant to job needs has a stronger impact on work efficiency, work quality, and employee productivity than general training programs (Akdere & Egan, 2020; Gegenfurtner & Ebner, 2022; Alzoubi et al., 2022). Therefore, training needs to be planned based on actual competency gaps and supported by organizational commitment to ensure that the results of training can be transferred into work practices.

### Training Needs Analysis

Training Needs Analysis (TNA), or Analisis Kebutuhan Diklat (AKD), is the initial and crucial stage in designing effective training programs. TNA is a systematic process used to identify the gap between employees' current competencies and the competencies required by the organization or job position. This process ensures that training programs are relevant, targeted, and able to address actual performance problems (Cotes & Ugarte, 2021). Goldstein and Ford (2018) explain that TNA is an integral part of a structured training system because it determines the direction, content, target participants, and effectiveness of training programs. Without proper needs analysis, training may become ineffective and fail to produce meaningful changes in employee performance (Salas, 2012).

TNA is commonly conducted at three levels: organizational analysis, task analysis, and individual analysis. Organizational analysis identifies training needs based on organizational goals, policies, and strategic priorities. Task analysis focuses on the knowledge, skills, and abilities required to perform specific jobs effectively. Individual analysis identifies competency gaps among employees and determines who needs training. These three levels

need to be integrated so that training programs are aligned with organizational objectives, job requirements, and individual development needs (McGehee & Thayer, 1961; Goldstein & Ford, 2018; Matlakala & Bezuidenhout, 2024).

### **Competency-Based Training**

Competency-based training is an approach that focuses on achieving specific work competencies according to job requirements. This approach emphasizes learning outcomes, namely the ability of participants to perform work tasks according to the standards needed by the organization (Misbah et al., 2020). In competency-based training, the identification of training needs is carried out by comparing the required job competencies with the actual competencies possessed by employees. The difference between these two conditions becomes the basis for designing relevant and targeted training programs (Nembaware et al., 2022; Janssens et al., 2023).

Competency gap analysis is an important part of competency-based training because it helps organizations identify areas of employee competence that need to be developed. This analysis includes setting competency standards, measuring actual competencies, comparing actual and required competencies, and determining development priorities. The results of competency gap analysis can be used to determine the type of training, training methods, and target participants more accurately (Rikala et al., 2024; Chang & Lu, 2025; Robert & Mori, 2025). Thus, competency-based training supports more efficient and measurable employee development.

### **Digital Transformation in Training Management**

Digital transformation has changed how organizations manage training and human resource development. Digitalization enables training management to become more integrated, data-based, and adaptive to changing organizational needs (Strohmeier, 2020; Bansal et al., 2023). In the context of training management, digital transformation includes the use of e-training systems, learning management systems, human resource information systems, and digital platforms that support training planning, implementation, monitoring, and evaluation.

Digital Human Resource Management (Digital HRM) integrates digital technology into HR functions, including training and development. Through digital systems, organizations can manage employee data, competency records, training history, and learning outcomes more systematically. Human Resource Information System (HRIS) also supports training needs analysis by integrating competency, performance, job, and training data into one information system (Strohmeier, 2020; Kavanagh & Johnson, 2018; Marler & Boudreau, 2017). Therefore, information systems do not only function as administrative tools, but also as strategic tools to support data-based decision-making in human resource development.

### **Information Systems for Training Needs Analysis**

Information systems for training needs analysis are increasingly important in modern organizations because they help identify competency gaps, set training priorities, and evaluate learning outcomes based on available data. Decision Support Systems (DSS) can support training decisions by integrating job competency data, performance assessment results, training history, and organizational priorities into more accurate training recommendations (Yigit, 2023; Edward et al, 2024; Cotes & Ugarte, 2021). In this context, system-based TNA can reduce dependence on manual judgment and improve the objectivity of training planning.

Learning Management Systems (LMS) and training analytics also contribute to training needs analysis. LMS records learning activities such as material access, attendance, module completion, assessments, and participant engagement. These data can be analyzed to understand learning behavior, evaluate training effectiveness, and improve future training programs (Ndou et al., 2023; Romero & Ventura, 2020; Simon et al., 2025). Therefore, LMS and training analytics provide richer and more measurable evidence than manual approaches in identifying and evaluating training needs.

### **Effectiveness of Technology-Based Training Systems**

The effectiveness of technology-based training systems can be understood as the ability of digital systems to support training processes, from data management and training implementation to monitoring, evaluation, and decision-making. The DeLone and McLean Information System Success Model explains that system success is influenced by system quality, information quality, service quality, system use, user satisfaction, and net benefits (DeLone & McLean, 2003). In training evaluation, the Kirkpatrick Model assesses training effectiveness through four levels: reaction, learning, behavior, and results (Kirkpatrick & Kirkpatrick, 2006). These models show that system effectiveness is not only measured by the existence of technology, but also by the quality of information produced and its usefulness for organizational decisions.

Several factors influence the effectiveness of system-based TNA, including data quality, human resource capability, system integration, and organizational support. Data quality is essential because training recommendations depend on accurate, up-to-date, relevant, complete, and consistent data. Human resource capability is also important because users need technical skills, data literacy, analytical ability, and understanding of training processes to interpret system outputs. System integration is needed so that training data can be connected with competency, performance, job, and post-training evaluation data. Organizational support, including leadership commitment, policies, resources, and data-based work culture, determines whether the system is used consistently and strategically (DeLone & McLean, 2003; Salas et al., 2012; Marler & Boudreau, 2017).

Based on the literature, this study views the DEIS AKD system as a digital support system for training needs analysis at PPSDM Migas. The conceptual framework explains that the AKD process supported by DEIS AKD can improve training planning effectiveness when supported by accurate data, adequate system features, capable human resources, system integration, and organizational support. Therefore, the effectiveness of DEIS AKD needs to be analyzed not only from the technical function of the application, but also from its role in supporting competency-based, data-driven, and strategic training planning.

## **RESEARCH METHOD**

This study employed a descriptive qualitative approach to obtain an in-depth understanding of the implementation of the Dashboard Executive Information System for Training Needs Analysis (DEIS AKD) at PPSDM Migas. This approach was selected because it enabled the researcher to explore the experiences, perceptions, and views of informants regarding the Training Needs Analysis process and the use of a digital system in supporting training planning. Qualitative research is appropriate for understanding the meanings constructed by individuals or groups in relation to social and organizational phenomena (Creswell & Creswell, 2018; Creswell & Poth, 2022).

The study was conducted at the Human Resources Development Center for Oil and Gas, or PPSDM Migas, located in Cepu, Blora Regency. The research was carried out during the internship period from February to May 2025. It focused on the Training Needs Analysis process, locally known as Analisis Kebutuhan Diklat (AKD), and the implementation of DEIS AKD as a digital system for supporting training planning.

The data used in this study consisted of primary and secondary data. Primary data were obtained through in-depth interviews with individuals directly involved in the AKD process and users of the DEIS AKD system. Primary data are original information collected directly from respondents to understand their experiences and perspectives on a particular phenomenon (Creswell & Poth, 2023). Secondary data were obtained from documents related to the AKD process, including training reports, previous training needs analysis documents, post-training evaluation documents, system documentation, standard operating procedures, books, journals, regulations, and other relevant references. Secondary data are data collected and published by other parties and can be reused as supporting material in new research.

The unit of analysis in this study consisted of individuals and the DEIS AKD system. The individual unit of analysis included PPSDM Migas employees who were directly involved in training planning, implementation, standardization, and evaluation. These informants were selected because they had direct experience with the AKD process and the use of DEIS AKD. The second unit of analysis was the DEIS AKD system itself, which was examined to understand its role, function, and effectiveness in supporting training planning, implementation, and evaluation at PPSDM Migas.

**Table 1.**  
**Research Informans**

| Code | Position                                                       | Role in the Training Process                                                                                           | Interview Date |
|------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------|
| NHY  | Sub-coordinator for Human Resource Development Planning        | Preparing annual training plans and identifying training needs for employees, instructors, industries, and communities | May 20, 2025   |
| SR   | Sub-coordinator for Human Resource Development Implementation  | Coordinating and implementing training programs for civil servants, industries, and communities                        | May 21, 2025   |
| EK   | Sub-coordinator for Human Resource Development Standardization | Preparing and standardizing curricula, modules, learning materials, and competency requirements                        | May 22, 2025   |
| YH   | Sub-coordinator for Evaluation                                 | Conducting post-training evaluation and providing feedback for future program development                              | May 23, 2025   |

Source: Research data, 2025.

Data were collected through in-depth interviews and documentation studies. Semi-structured interviews were conducted with four informants who were directly involved in the AKD process and the implementation of DEIS AKD. The interviews explored the

implementation of AKD, criteria for determining training priorities, limitations of human resources, user experience, system effectiveness, technical constraints, data accuracy, and recommendations for system development. Documentation studies included the examination of the DEIS AKD dashboard, employee training histories, training schedules, previous training planning documents, and the 2024 post-training evaluation document.

Data were analyzed using the interactive qualitative analysis model proposed by Miles, Huberman, and Saldaña (2014), which consists of data condensation, data display, and conclusion drawing or verification. Data condensation was conducted by selecting and categorizing information related to the AKD process, the implementation of DEIS AKD, and the factors influencing system effectiveness. The categorized data were then presented in descriptive narratives and tables to identify patterns and relationships among the findings. Conclusions were drawn and continuously verified by comparing data across informants and supporting documents.

The trustworthiness of the findings was maintained through source triangulation, technique triangulation, member checking, dependability, and confirmability. Source triangulation was conducted by comparing information from informants with different responsibilities in training management, while technique triangulation involved comparing interview results with organizational documents. Member checking was performed by reconfirming interview summaries and key findings with the informants. Dependability and confirmability were maintained through systematic documentation of the research process, the use of direct quotations, comparison across data sources, and the linkage of findings with relevant literature.

## RESULTS AND DISCUSSION

### The Training Needs Analysis Process at PPSDM Migas

The findings show that the Training Needs Analysis process, or Analisis Kebutuhan Diklat (AKD), at PPSDM Migas has been implemented through a relatively structured procedure. The process begins with employee data collection, task and responsibility analysis, preparation of a training grand design, identification of training needs, selection of relevant training programs, and formulation of training plans. This indicates that PPSDM Migas already has a basic workflow for preparing training needs. However, the findings also show that the process has not fully reflected an ideal competency-based Training Needs Analysis because the identification of training needs is still strongly influenced by job position, organizational priorities, talent management, and leadership direction.

The main issue identified in the AKD process is the limited use of competency gap analysis. SR explained, “The TNA process has largely relied on assumptions and managerial judgment without a clear competency basis” (SR, interview, May 21, 2025). This statement indicates that although the AKD process has followed a relatively structured procedure, the analytical basis for determining training needs remains insufficient. Training planning should integrate organizational, task, and individual analyses so that training programs reflect institutional objectives, job requirements, and actual employee competency gaps (McGehee & Thayer, 1961; Goldstein & Ford, 2018; Cotes & Ugarte, 2021).

### DEIS AKD as an Administrative Support Tool

The implementation of DEIS AKD has improved administrative efficiency in training management. SR stated, “The system helps manage data and schedules, but it does not

determine training needs” (SR, interview, May 21, 2025). This statement indicates that DEIS AKD has improved operational efficiency but has not yet performed substantive competency analysis. Therefore, the system currently functions more strongly as administrative support than as strategic decision support. However, its contribution remains concentrated on operational activities rather than substantive competency analysis. This finding is consistent with Digital HRM and HRIS literature, which emphasizes the role of digital systems in improving data management and administrative efficiency (Strohmeier, 2020; Kavanagh & Johnson, 2018; Marler & Boudreau, 2017).

Although DEIS AKD has improved administrative efficiency, the system has not fully functioned as a strategic analytical tool. The findings show that the system mainly supports data storage, training history monitoring, and schedule management, but does not yet determine training needs substantively. The system remains largely job-based and has not fully accommodated differences in unit-level needs or individual competency gaps. From the perspective of Decision Support Systems, an ideal system should be able to integrate competency data, job data, performance data, training history, and organizational priorities to generate more objective training recommendations (Yiğit, 2023). Therefore, DEIS AKD currently functions more as operational support than as strategic decision support.

#### **Factors Affecting the Effectiveness of DEIS AKD**

The effectiveness of DEIS AKD is influenced by several main factors: data quality, system limitations, human resource capability, and integration of training evaluation. Data quality is a critical factor in determining the effectiveness of DEIS AKD because the system depends on accurate and up-to-date employee information. EK emphasized, “Employee data must be continuously updated because changes such as transfers, study assignments, and retirements can affect the accuracy of training planning” (EK, interview, May 22, 2025). This statement shows that outdated employee data may result in training plans that no longer correspond to actual organizational conditions. Therefore, systematic data updating and verification are necessary to ensure that DEIS AKD produces relevant information. This finding is consistent with the Information System Success Model, which identifies information quality as a key determinant of system success (DeLone & McLean, 2003).

System limitations also affect the effectiveness of DEIS AKD. NHY stated, “The system is still position-based rather than work-unit-based, training selection remains manual, and specialization within particular positions has not yet been accommodated” (NHY, interview, May 20, 2025). This limitation means that employees holding the same position may receive similar training recommendations even though their work-unit responsibilities and individual competency gaps are different. Consequently, DEIS AKD has not yet fully supported competency-based training planning. The system therefore needs analytical features that integrate competency standards, performance data, unit-specific needs, and employee training histories.

Human resource capability remains an important factor because system outputs still require professional interpretation. EK explained, “Determining training needs still requires analysis by the administrators; it cannot rely solely on the system” (EK, interview, May 22, 2025). This statement demonstrates that DEIS AKD cannot automatically replace the judgment of training managers. Users must be able to interpret employee data, competency requirements, organizational priorities, and unit-level conditions before determining appropriate training programs. Therefore, the effectiveness of the system

depends not only on technical features but also on the analytical capability and data literacy of its users.

The integration of post-training evaluation into DEIS AKD remains limited. YH explained, “The TNA process is conducted first, while post-training evaluation is completed later, so its influence is limited. The evaluation results can only be used two years later and have not been fully utilized for subsequent training planning” (YH, interview, May 23, 2025). This time gap prevents evaluation results from functioning as immediate analytical input for the next training planning cycle. As a result, post-training evaluation tends to serve as a final report rather than as evidence for improving future training programs. DEIS AKD should therefore be developed as part of a continuous cycle connecting planning, implementation, evaluation, and program improvement. Post-training evaluation should not only measure competence and performance, but also consider employees’ psychological and behavioral outcomes. Attamimi and Palupi (2024) found that job satisfaction and affective commitment play important roles in explaining quiet quitting, while work stress is related to both factors. Therefore, integrating post-training evaluation results into DEIS AKD is important to support more comprehensive and human-centered training planning. In the Kirkpatrick Model, training evaluation should be used to assess reaction, learning, behavior, and results, and should support continuous improvement of training programs (Kirkpatrick & Kirkpatrick, 2006; Bahl et al., 2024). Therefore, DEIS AKD needs to be developed as part of a continuous learning cycle that connects training planning, implementation, evaluation, and improvement.

### Discussion

The central finding of this study is that the digitalization of Training Needs Analysis at PPSDM Migas has improved administrative efficiency but has not yet transformed DEIS AKD into a strategic decision-support system. The system has centralized employee data, organized training histories, supported scheduling, and reduced manual data processing. SR confirmed this benefit by stating, “Previously, many employees were required for manual data entry, whereas the current process is more efficient. The system helps manage data and schedules, but it does not determine training needs” (SR, interview, May 21, 2025). This finding is consistent with Digital HRM and HRIS literature, which emphasizes the role of digital technology in improving the efficiency and integration of human resource information (Strohmeier, 2020; Kavanagh & Johnson, 2018; Marler & Boudreau, 2017).

However, a gap remains between the current administrative functions of DEIS AKD and the requirements of strategic decision support. The system remains primarily position-based and has not fully integrated employee competencies, performance data, work-unit needs, training histories, and post-training evaluation results. NHY explained that “the system is still position-based rather than work-unit-based, training selection remains manual, and specialization within particular positions has not yet been accommodated” (NHY, interview, May 20, 2025). In addition, the interpretation of training needs still depends on training managers because the system cannot independently identify competency gaps or generate context-specific recommendations. This condition supports the view that the strategic value of HR analytics depends not only on technology but also on data quality, analytical capability, and managerial interpretation (McCartney & Fu, 2022).

Therefore, transforming DEIS AKD into a strategic decision-support system requires stronger data governance, competency-gap analysis, integration of performance and post-

training evaluation data, and improved user analytical capability. The findings demonstrate that digitalization alone is insufficient to create strategic value. Technology must be supported by integrated data, appropriate analytical features, capable users, and organizational commitment to evidence-based training planning. Through these developments, DEIS AKD can progress from an administrative tool into a strategic instrument for data-driven human resource development.

## CONCLUSION

This study concludes that DEIS AKD has successfully improved the administrative management of Training Needs Analysis at PPSDM Migas. The system supports centralized employee data management, training history monitoring, scheduling, participation tracking, and the reduction of manual spreadsheet-based work. However, DEIS AKD has not yet fully evolved into a strategic decision-support system because its current functions remain concentrated on organizing and displaying information rather than identifying competency gaps and generating evidence-based training recommendations.

The transformation of DEIS AKD from an administrative tool into a strategic decision-support system requires the integration of employee competency data, job competency standards, performance information, unit-level needs, training histories, and post-training evaluation results. This transformation also depends on stronger data governance, the development of analytical system features, improved user data literacy and analytical capability, cross-unit coordination, and organizational commitment to evidence-based training planning. Therefore, the strategic value of DEIS AKD will depend not only on technological development but also on the readiness of data, users, work processes, and organizational governance.

## REFERENCES

- Akdere, M., & Egan, T. (2020). Transformational leadership and human resource development: Linking employee learning, job satisfaction, and organizational performance. *Human Resource Development Quarterly*, 31(4), 393–421. <https://doi.org/10.1002/hrdq.21404>
- Alzahmi, A., & Alshamsi, S. (2024). The influence of applying human resource training needs analysis on employee's performance. *Journal of Human Resource and Leadership*, 9(1), 1–18. <https://doi.org/10.47604/jhrl.2302>
- Alzoubi, M., H., Ahmed, G., & Alshurideh, M. (2022). Impact of training and development on organizational performance. *Sustainability*. <https://doi.org/10.3390/su141912345>
- Apriliana, S. D., & Nawangsari, E. R. (2021). Pelatihan dan pengembangan sumber daya manusia (SDM) berbasis kompetensi. *Forum Ekonomi*, 23(4), 804–812. <https://doi.org/10.30872/jfor.v23i4.10155>
- Attamimi, I., & Palupi, M. (2024). Quiet Quitting Due to Work Stress, Mediated by Job Satisfaction and Affective Commitment. *Indonesian Interdisciplinary Journal of Sharia Economics*, 8(1), 1301–1321. <https://doi.org/10.31538/ijse.v8i1.5727>
- Bahl, K., Kiran, R., & Sharma, A. (2024). Evaluating the effectiveness of training of managerial and non-managerial bank employees using Kirkpatrick's model for evaluation of training. *Humanities and Social Sciences Communications*, 11(1), 1–14.

- Bansal, A., Panchal, T., Jabeen, F., Mangla, S. K., & Singh, G. (2023). A study of human resource digital transformation (HRDT): A phenomenon of innovation capability led by digital and individual factors. *Journal of Business Research*, 157.
- Chang, J.-C., & Lu, H.-Q. (2025). Competency and training needs for net-zero sustainability management personnel: Development and validation of a competency scale. *Sustainability*, 17(7).
- Cotes, J., & Ugarte, S. M. (2021, April). A systemic and strategic approach for training needs analysis for the International Bank.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. <https://doi.org/10.1080/07421222.2003.11045748>
- Edwards, M. R., Guenole, A. C., Nigel, & Marler, J. (2024). HR analytics: An emerging field finding its place in the world alongside simmering ethical challenges. *Human Resource Management Journal*, 34(2), 326–336. <https://doi.org/10.1111/1748-8583.12435>
- Fejfarová, M., & Fejfar, J. (2022). Employee training and development and competency-based approach: Any relationship? *Journal on Efficiency and Responsibility in Education and Science*, 15(4), 242–250. <https://doi.org/10.7160/eriesj.2022.150405>
- Garavan, T., McCarthy, A., Lai, Y., Murphy, K., Sheehan, M., & Carbery, R. (2021). Training and organisational performance: A meta-analysis of temporal, institutional and organisational context moderators. *Human Resource Management Journal*, 31(1), 93–119.
- Gegenfurtner, A., & Ebner, C. (2022). Webinars in higher education and professional training: A meta-analysis. *Educational Research Review*. <https://doi.org/10.1016/j.edurev.2021.100395>
- Goldstein, I. L., & Ford, J. K. (2018). *Training in organizations* (8th ed.). <https://www.cambridge.org/core/books/training-in-organizations/8B3E6C9E6F7D9C1E9F6B2E3D3B4E5A6C>
- Hosen, S., Hamzah, S. R., Ismail, I. A., Alias, S. N., Aziz, M. F. A., & Rahman, M. M. (2024). Training & development, career development, and organizational commitment as the predictor of work performance. *Heliyon*, 10(1).
- Janssens, O., Embo, M., Valcke, M., & Haerens, L. (2023). When theory beats practice: The implementation of competency-based education at healthcare workplaces. *BMC Medical Education*, 23.
- Kavanagh, M. J., & Johnson, R. D. (2018). *Human resource information systems*.
- Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating training programs: The four levels* (3rd ed.). Berrett-Koehler Publishers.
- Loqmane, H. (2025). The impact of employee training on job satisfaction. *International Journal of Sciences: Basic and Applied Research*, 77(1), 226–239. <https://gssrr.org/index.php/JournalOfBasicAndApplied/index>
- Maliani, A., & Sutrisno, T. (2022). Peran analisis diklat dalam perencanaan pelatihan di PPSDM Aparatur. *Jurnal Aparatur*, 6(1). <https://doi.org/10.52596/ja.v6i1.150>
- Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR analytics. *The International Journal of Human Resource Management*.
- Matlakala, H. N., & Bezuidenhout, A. (2024). Administrative staffs' training needs and talent development at a Health Sciences University. *SA Journal of Human Resource Management*,

22.

- McCartney, S., & Fu, N. (2022). Bridging the gap: Why, how and when HR analytics can impact organizational performance. *Management Decision*, 60(13), 25–47. <https://doi.org/10.1108/MD-12-2020-1581>
- McGehee, W., & Thayer, P. W. (1961). *Training in business and industry*.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Misbah, Z., Gulikers, J. T. M., Dharma, S., & Mulder, M. (2020). Evaluating competence-based vocational education in Indonesia. *Journal of Vocational Education & Training*, 72(4), 488–515.
- Ndou, K., Mashau, N. L., & Chigada, J. (2023). Learning management systems as a platform for information sharing during the COVID-19. *South African Journal of Information Management*, 25(1), 1–8.
- Nembaware, V., Glasser, S., Priest, A., Davies, A., Skelton, M., Bodzo, P., Lelong, O., Naidu, A., Masimirembwa, C., Mutambiranwa, A., Hay, A., Wonkam, A., & Dandara, C. (2022). Competency-based training needs assessment for research managers and administrators in Africa and the United Kingdom to strengthen equitable partnerships. *ASS Open Research*, 5.
- Obazuaye, C. O. (2024). Defining human resource development: An integrative literature review. *European Journal of Training and Development*, 48(10), 102–118. <https://doi.org/10.1108/EJTD-07-2024-0088>
- Peraturan Pemerintah Republik Indonesia Nomor 11 Tahun 2017 tentang Manajemen Pegawai Negeri Sipil.
- Rikala, P., Braun, G., Järvinen, M., Stahre, J., & Härmäläinen, R. (2024). Understanding and measuring skill gaps in Industry 4.0: A review. *Technological Forecasting and Social Change*, 201.
- Robert, N., & Mori, N. (2025). Effects of training needs assessment in enhancing employees' skills and firm performance. *Effects of Training Needs Assessment in Enhancing Employees' Skills and Firm Performance*, 17(1), 82–98.
- Romero, C., & Ventura, S. (2020). Educational data mining and learning analytics: An updated survey. *WIREs Data Mining and Knowledge Discovery*, 10(3). <https://doi.org/10.1002/widm.1355>
- Salas, E., Tannenbaum, S. I., Kraiger, K., & Smith-Jentsch, K. A. (2012). The science of training and development in organizations: What matters in practice. <https://journals.sagepub.com/doi/pdf/10.1177/152910061243666>
- Sholikhah, M., Stai, A., Krempyang, D., Nganjuk, T., & Munir, M. (2023). Manajemen diklat dalam menganalisis kebutuhan pelatihan. *INTIZAM: Jurnal Manajemen Pendidikan Islam*, 6(2).
- Simon, P. D., Jiang, J., Fryer, L. K., King, R. B., & Frondozo, C. E. (2025). An assessment of learning management system use in higher education: Perspectives from a comprehensive sample of teachers and students. *Technology, Knowledge and Learning*, 30, 741–767. <https://doi.org/10.1007/s10758-024-09734-5>
- Strohmeier. (2020). Digital human resource management: A conceptual clarification. *German Journal of Human Resource Management*.
- Suryani, Rindaningsih, I., & Hidayatulloh. (2023). Systematic literature review (SLR): Pelatihan dan pengembangan sumber daya manusia. *Jurnal Pendidikan dan Riset Ilmu Sains*, 2(3), 363–370. <https://jurnal.serambimekkah.ac.id/index.php/perisai>
- Vanitha, P. (2024). Impact of employee training and development on organizational performance, 51–54.



Yiğit, F. (2023). A three-stage fuzzy neutrosophic decision support system for human resources decisions in organizations. Decision Analytics Journal, 7.