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The Impact of Information Technology Innovation in Human Resource Management in The Digital Era Using The Ishikawa Method Case Study at PT Semanggi 3

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ABSTRACT

Rapid digital transformation requires companies to strengthen human resource management (HRM) governance by effectively leveraging information technology. However, gaps often occur between the expected benefits of digital systems and their actual implementation, particularly in infrastructure readiness, employee capability, and organizational acceptance. This study aims to examine the impact of information technology innovation on HRM governance and to identify key factors influencing the success and constraints of HRIS implementation at PT. Semanggi 3. The research employs a qualitative descriptive approach using the Ishikawa (fishbone diagram) analysis to identify root causes affecting technology adoption. The analysis categorizes influencing factors into six major variables: Man, Method, Material, Machine, Environment, and Management. The findings indicate that HRIS implementation generally performs well, with the Customer Satisfaction Index (CSI) showing "Excellent" and "Very Good" ratings across most service aspects. Nevertheless, several gaps remain, particularly in infrastructure readiness, technical training, and employee adaptability to digital transformation. Strengthening digital competencies, improving IT infrastructure, and ensuring continuous managerial support are identified as essential strategies for optimizing technology utilization in HRM governance.

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1. INTRODUCTION

Today, the world has entered an era of massive digitalization, with a wave of massive change. This has also brought changes to information and communication technology, which has become a crucial part of human life [1]. The increasingly massive technological developments over time began with the invention of the computer in the mid-20th century [2]. Rapid technological advancements have had a significant impact on many aspects of our lives, including our workplaces [3]. Technology now simplifies tasks, increases productivity,

and creates new opportunities for companies to grow faster. Information and communication technology now plays a crucial role in transforming the way companies operate. Companies that can adapt to technological changes and leveragthem optimally will have a competitive advantage in the market [4].

Human Resource Management (HRM) has undergone a significant transformation in the digital era. Digital transformation has enhanced HR efficiency through employee development, training, and effective data management [5]. Organizations must understand and adopt current technologies to manage their workforce effectively. HRM plays a crucial role in identifying workforce needs, developing relevant skills, and ensuring the availability of competent human resources to respond to rapid technological changes [6].

Digitalization has fundamentally reshaped HR functions, including recruitment, training, performance evaluation, and employee engagement [7]. Technologies such as artificial intelligence (AI), big data, the Internet of Things (IoT), and cloud computing act as key enablers of automation, data-driven decision-making, and operational efficiency [8]. According to Shukla et al. [9], digital platforms supported by analytics, AI, and cloud systems have shifted roles from administrative to more strategic functions [10].

Advances in information and communication technologies, including the internet and AI, have transformed how organizations interact with employees and manage human resources. These technologies improve communication, recruitment, performance measurement, and skill development processes [11]. AI enables advanced candidate screening, cultural fit prediction, and long-term contribution analysis, enhancing recruitment effectiveness [12].

The rise of remote work, supported by platforms such as AnyDesk, has increased flexibility but also introduced challenges in communication, engagement, and team cohesion. Organizations must develop strategies to maintain productivity and inclusivity among geographically dispersed teams. Additionally, e-learning has become a vital tool for employee development, offering flexible, individualized training, though it requires adequate technical support and innovative instructional design to remain effective.

Data analytics in HRM provides deeper insights into workforce trends, employee performance, training needs, and turnover risks, enabling more accurate and responsive decision-making. A clear example of digital transformation in HRM is the shift from manual to digital attendance systems. Digital attendance systems improve accuracy, transparency, and integration with payroll and performance evaluation, though they also pose challenges related to infrastructure, employee digital literacy, and system oversight[13].

Overall, technological advancement not only offers efficiency and convenience but also demands continuous adaptation and innovation from HRM. Organizations that effectively leverage digital technologies are more likely to achieve higher efficiency, productivity, and employee satisfaction [14].

The rapid development of digital applications has influenced various aspects of human life, including social, economic, governmental, and business sectors. Digital documents and data are becoming more organized and accessible, improving efficiency in organizational processes. In the field of Human Resource Management (HRM), technological advancement plays a crucial role in enhancing competitiveness and

effectiveness in managing human capital. Digital platforms enable individuals, organizations, and even governments to interact more efficiently, significantly impacting the modern workplace [15].

Advances in information technology have fundamentally transformed the business environment, requiring organizations to adapt in order to remain competitive. One notable example is the growing adoption of Human Resource Information Systems (HRIS) in Indonesia. HRIS supports HR functions such as payroll, benefits administration, attendance tracking, and performance evaluation, while also improving data analysis and communication between HR departments and employees. This dynamic business environment highlights the urgency of digital transformation as a strategic necessity [16].

The digital era has also reshaped HRM practices, including recruitment, workforce management, and employee utilization. A literature-based approach supported by prior studies demonstrates that technological innovation significantly affects HRM effectiveness. A study published in *Economics and Digital Business Review* shows that students hold positive perceptions toward the use of technology in HRM, believing that social media, mobile technology, and HRM applications enhance efficiency and productivity [17].

However, successful technology implementation in HRM requires alignment with multiple factors, as described in the [18] framework, including man, methods, materials, machines, environment, and management. Human resources ("man") often struggle to adapt to new technologies due to limited training, resulting in inefficiencies and resistance to change. Poorly planned implementation methods, inappropriate technological tools, inadequate IT infrastructure, restrictive regulations, unsupportive organizational culture, and lack of top management commitment further hinder effective digital transformation [19].

Overall, while digital technology offers significant opportunities to improve HRM performance, its successful adoption depends on comprehensive planning, workforce readiness, supportive infrastructure, conducive organizational culture, and strong managerial commitment. Organizations that address these factors strategically are more likely to achieve sustainable transformation and improved organizational performance.

PT Semanggi 3 is a company engaged in human resource management and security services, providing effective and efficient workforce management and systematic, integrated security solutions. The company supports businesses in improving productivity, enabling clients to focus on their core business activities. PT Semanggi 3 collaborates with various state-owned enterprises such as PLN and BNI, as well as government institutions and private companies, including local and provincial governments. Its services include security, cleaning services, drivers, and banking administration, supported by representative offices across Indonesia. According to HRD data, PT Semanggi 3 employs approximately 60 staff at headquarters and representative offices, managing more than 6,000 workers nationwide.

Despite the widespread adoption of information technology in Indonesia, where over 82.3% of companies have implemented IT systems (BPS, [20]only 46.7% of the workforce possesses basic digital competencies, indicating a significant digital skills gap (Ministry of Manpower of Indonesia). This condition is reflected at PT Semanggi 3, which has not yet fully optimized information technology in its human resource management system. This study adopts a qualitative approach through in-depth interviews with HRD personnel and

operational management, direct observation, and documentation of HR processes such as attendance, recruitment, training, and performance evaluation. The analysis applies the Ishikawa (fishbone) method to identify the root causes of ineffective technology implementation across six dimensions: man, method, machine, material, environment, and management.

Previous studies support the importance of digital competence in HRM. Hartono [21] emphasizes that future HR managers require strong analytical and technological skills to adapt to automation, particularly in recruitment, performance management, and transactional processes. Furthermore, social media has become a critical recruitment tool in the digital era [22]. Darajatun [23] highlights the need to integrate technological and analytical literacy into HRM education to maintain organizational competitiveness.

This study aims to provide an in-depth understanding of human resource management in the digital era by identifying essential HR competencies and analyzing the opportunities and challenges associated with technological innovation. Challenges include high implementation costs, the need for digitally skilled labor, and the risk of losing young talent if organizations fail to adapt. Additionally, data protection has become a major concern, as increased use of cloud computing and big data analytics heightens the risk of personal data breaches, requiring stronger cybersecurity [24].

To address this issue, the present study proposes using the Ishikawa (fishbone) method to identify root causes affecting the effectiveness of information technology utilization in Human Resource Management at PT Semanggi 3. The research aims to analyze the impact of information technology innovation on HR governance, identify factors influencing implementation success across six dimensions (man, method, material, machine, environment, and management), and formulate improvement strategies to enhance digital HR performance. By applying a qualitative descriptive approach through interviews, observation, and documentation analysis, the study seeks to provide a comprehensive understanding of operational challenges and organizational readiness in digital HR transformation.

The findings of this research are expected to contribute both theoretically and practically. Theoretically, the study enriches the literature on HR digital transformation by providing a root-cause analytical perspective using the Ishikawa framework. In practice, the results are expected to support organizations, particularly service-based companies, in designing strategic initiatives to improve digital competencies, strengthen IT infrastructure, and enhance managerial commitment to ensure sustainable HR digitalization and organizational competitiveness.

Overall, digital transformation in HRM offers significant benefits, such as faster access to information, improved human resource quality, and innovation-driven efficiency. However, it also demands continuous adaptation, ethical data management, and strategic investment in education and training to ensure sustainable organizational performance.

Based on the problems described above, the researcher is interested in conducting a study titled "The Impact of Information Technology Innovation in Human Resource Management in the Digital Era Using the Ishikawa Method (Case Study at PT Semanggi 3)."

2. METHOD

Type of Research and Description of the Research Population (Object)

The type of research used in this study is descriptive qualitative research. Descriptive qualitative research is a method used by researchers to discover knowledge or theory related to a particular phenomenon at a specific point in time (Mukhtar, 2013: 10). This study adopts a descriptive qualitative research design because it aims to provide an in-depth understanding of the role of information technology innovation, particularly the implementation of online attendance systems, at PT Semanggi 3 and its impact on improving human resource management (HRM).

This research employs a descriptive approach to comprehensively explain and describe the role of information technology innovationespecially digitalization and automation, in HRM practices, which have undergone significant changes. According to [25], descriptive research seeks to provide accurate and comprehensive descriptions of activities, objects, processes, and human elements. Therefore, it can be concluded that descriptive qualitative research is an appropriate method for addressing the research problems in this study. This method presents data in numerical form, which are then tabulated and evaluated.

Research Location

This research was conducted at PT Semanggi 3 in November 2024. PT Semanggi 3 is a company operating in the outsourcing sector.

Data Collection Techniques

The data collection method used in this study is a questionnaire method. A questionnaire is a data collection technique that provides a set of written questions or statements for respondents to answer[26]. The data were collected by distributing questionnaires to employees of PT Semanggi 3. The measurement instrument consisted of structured questions designed to assess the research variables. Each item was measured using a Likert scale ranging from 1 to 5. Respondents were asked to express their opinions on each statement; although the response formats varied according to operational definitions, the scoring range remained consistent.

Data Sources

1. **Primary Data**
   Primary data are data obtained directly from sources and collected by researchers to addressesearch problems through direct interaction with respondents, either via interviews or questionnaires [26]. In this study, primary data include information on **workload (X1), adversity intelligence (X2), work motivation (M), and job performance (Y)**, obtained through questionnaires distributed to employees of PT Semanggi 3.
2. **Secondary Data**
   Secondary data are data obtained indirectly through reviewing and analyzing existing materials from other sources, such as company documents [26]. In this study, secondary

data were collected from books, academic journals, previous research studies, printed and electronic media, and other relevant sources. Secondary data serve as supporting information for the research.

3. Population

Population refers to a generalization area consisting of objects or subjects with specific quantities and characteristics determined by the researcher for analysis and conclusion drawing [26]. The population size is denoted by (N). Based on size, a population can be classified as a limited, unlimited, or target population. The population in this study consists of 60 staff members of PT Semanggi 3.

4. Sampling Technique

The sampling method, also known as the sampling technique, is used to determine the number of samples and ensure that the sample accurately represents the population characteristics. Given the relatively small population, this study employs a saturated sampling technique (also known as a census), in which all members of the population are included as the research sample.

The research data were collected through structured questionnaires distributed to respondents. A rating scale was used to measure respondents' levels of agreement or disagreement with each statement or item.

3. RESULTS AND DISCUSSION

Man (Human Resources)

Based on the results of data processing in Table 4.1, the Man factor or human resources in the implementation of information technology at PT Semanggi 3 shows a generally high level of satisfaction. This is reflected in the Customer Satisfaction Index (CSI) values, which are predominantly categorized as "Excellent", particularly in aspects A1, A3, A5, A6, and A7. The aspect with the highest CSI value is A1 (*All employees have adequate digital skills*) with a score of 95%, indicating that the majority of employees already possess basic digital competencies. This is followed by aspects A6 and A7, both of which reflect employee involvement in digital training programs; each records a CSI value of 91%, indicating that the programs have been well implemented and positively received by employees.

However, there are two aspects classified as priorities for improvement, namely A2 (*Employees can operate the implemented information technology system*) and A4 (*There is no resistance to new digital-based systems*), with CSI values of 82% and 83%, respectively. These values fall under the "Good" category but have the highest GAP values (-0.73 and -0.68), indicating a significant discrepancy between expectations and actual conditions. This suggests that although training has been provided, challenges remain in operating new systems and in employee acceptance of IT-based changes.

On the priority scale, aspects A2 and A4 require attention and strategic improvement actions, such as advanced training, technical assistance, or more effective change communication approaches. Meanwhile, aspects A1 and A6 should be maintained because they already meet expectations and contribute significantly to the implementation's success. Aspect A7 is categorized as a low priority because although its value is high, it is not urgently

in need of improvement at this time. Meanwhile, A5 (*The company routinely conducts digital technology training*) falls into the efficiency category, meaning it can be further optimized to remain effective without overburdening resources.

Overall, these results indicate that the company has successfully created a work environment that supports digital transformation, although adjustments are still required in certain technical areas and in employees' attitudes toward technology-based system changes.

Methods

The results of the analysis of the Methods factor in the implementation of information technology at PT Semanggi 3 indicate that most aspects have been implemented very well, with customer satisfaction levels (CSI) ranging from 85% to 89%. The assessment covered four main aspects: the needs analysis process prior to technology implementation, and the suitability of the implementation to organizational needs. Comparisons between expectation and actual performance values were used to determine the extent to which employee expectations were met, supported by calculations of MIS, MSS, GAP, IR, and CSI.

Aspect B1, which assesses whether the company conducts a needs analysis before implementing technology, obtained a CSI value of 88% and falls into the “Excellent” category. This indicates that the company is fairly consistent in conducting preliminary evaluations before adopting new systems. Similarly, aspect B2, which evaluates the suitability of the technology implementation process with organizational needs, achieved a CSI value of 89%. These two aspects indicate that the methods used in IT implementation have been well planned and aligned with organizational needs.

Aspect B4, which evaluates whether the technology implementation process aligns with the organization’s actual needs, also obtained a CSI value of 89%, with a relatively small GAP of -0.42. This shows that employee perceptions regarding the alignment between implemented systems and operational needs are quite positive. Overall, these three aspects (B1, B2, and B4) fall under the “maintain” priority scale, as they meet employee expectations well and contribute to the effectiveness of IT implementation.

However, it should be noted that aspect B3 (*Needs analysis is conducted comprehensively before technology is implemented*) has the highest GAP value of -0.65 and the lowest CSI among the four aspects, at 85%. Although it still falls under the “Very Good” category, this indicates room for improvement. The large GAP suggests that employees feel the needs analysis process has not been fully comprehensive or in-depth. This aspect should be placed under the low-priority scale, meaning it remains important, but its urgency for improvement is lower than that of other, more critical aspects [26].

In general, the methods used by PT Semanggi 3 in implementing information technology are quite good and have received positive appreciation from employees. This success is evident from the dominance of the “Excellent” category in CSI results and relatively small GAP values, indicating a high level of alignment between expectations and actual conditions. Nevertheless, management still needs to conduct regular evaluations of the needs analysis process during the early stages of implementation to continue improving alignment between systems and organizational needs. These efforts are expected to enhance the long-term effectiveness of technology use and increase overall employee satisfaction.

Materials

The Materials factor in this study reflects the quality and suitability of the technology the organization uses to support work requirements and operational processes. Based on data processing results in Table 4.3, overall material aspects show good results, with Customer Satisfaction Index (CSI) values ranging from 83% to 93%. Four aspects were assessed within this factor, including the suitability of technology to job requirements, the ability of technology to meet functional needs, and the integration of technology with other systems within the organization [27].

Aspect C1, which states that *"The technology used is appropriate for job requirements and organizational processes"*, recorded the lowest CSI value of 83%, with the highest GAP value of -0.68. Although it still falls within the "Good" category, this value indicates a significant difference between user expectations and actual performance. This suggests that the implemented technology has not fully supported work processes and should therefore be a top priority for improvement efforts [28].

Aspect C2, concerning the ability of technology to meet the organization's functional needs, obtained a CSI value of 88% and falls into the "Excellent" category. Although the GAP value is still -0.50, this indicates that the technology used is sufficiently capable of performing the organization's core functions. With an IR value of 1.14 and an MSS value of 3.52, this aspect remains important but is more appropriately placed within the efficiency scale, as its benefits are already evident but can still be further optimized.

Furthermore, aspect C3, which assesses whether the technology system should be integrated with other systems, obtained a CSI value of 92%, indicating that respondents view system integration as important within the company. Meanwhile, aspect C4, which evaluates the extent to which current technology has been integrated with systems such as HRIS or ERP, achieved the highest CSI of 93% and the smallest GAP of -0.27. These two aspects reflect that system integration has been implemented effectively and has received very positive responses from employees [29].

Based on the overall results, it can be concluded that PT Semanggi 3 has successfully provided a fairly good and relevant technological infrastructure, particularly in terms of system integration. However, there are shortcomings in the suitability of technology for daily work process needs, which constitute the main priority for improvement. Therefore, management needs to re-evaluate the alignment between the implemented technology and field technical requirements, ensuring that the IT implementation is not only systemically strong but also practical and functional for end users.

Machines

The Machines factor in this study evaluates the quality of technological infrastructure in the form of hardware, networks, servers, and internet connections used in the working environment of PT Semanggi 3. Based on data from six assessment aspects, it is evident that, in general, respondents provided relatively high evaluations of the company's technological infrastructure. However, several negative GAP values between expectations and actual conditions were still observed, indicating differences in perceptions of the ideal standards employees expect.

Aspect D1, which assesses the quality of hardware within the company, obtained a CSI value of 90% and falls into the “Excellent” category. This indicates that the hardware used is considered sufficiently adequate to support operations. A similar result is shown in aspect D6, concerning overall internet connection stability, which achieved a CSI value of 89% and was categorized as “Excellent”. Both aspects fall under the maintain priority scale, as they have met user expectations.

However, attention needs to be given to aspects D2 and D3. Aspect D2, which evaluates network and server speed, recorded a GAP value of -0.63 with a CSI of 85%, classified as “Very Good”. Meanwhile, aspect D3, namely internet connection stability during working hours, recorded the highest GAP value of -0.67 and the lowest CSI within this group, at 84%, which falls into the “Good” category. These two aspects indicate that network performance and connection stability during working hours are not yet fully satisfactory, making them the main priorities for improvement.

Aspect D4, which assesses the quality of current hardware, also requires attention. Although classified as “Very Good” with a CSI of 85%, it has a relatively large GAP value of -0.58. This indicates that although the hardware is considered good, user expectations for its quality are still higher than the experience delivers. Therefore, D4 is also included among the aspects that need improvement. Meanwhile, D5, which concerns current network speed, obtained a CSI value of 88% with a GAP of -0.50, classified as “Excellent”, but placed in the efficiency scale, meaning it is already good but can still be optimized in terms of functionality and cost.

Overall, the technological infrastructure at PT Semanggi 3 has been operating quite well but still requires improvement in several areas, particularly internet connection stability and speed during operations. By strengthening these technical aspects, it is expected that technology-based work processes can run more smoothly and optimally support improvements in employee performance.

Environment

The Environment factor, or work environment, plays an important role in supporting employee comfort, productivity, and well-being. Based on data processing results across eight aspects (E1–E8), the majority of respondents reported high levels of satisfaction with the working environment at PT Semanggi 3. The Customer Satisfaction Index (CSI) values range from 85% to 92%, indicating that the company has paid serious attention to environmental issues, though several areas still need improvement to meet employee expectations fully.

Aspect E1, related to compliance with government regulations, achieved a CSI of 90%, indicating the company is considered very good at adhering to applicable regulations. This aspect falls into the “Excellent” category and should be maintained. Similar results are shown in aspects E2 and E4, with CSI values of 91% and 92%, respectively. E2 reflects adequate lighting and ventilation conditions, while E4 indicates that cleaning services within the company are highly satisfactory. These three aspects demonstrate that the basic elements of the physical work environment have been well fulfilled and have received positive responses from employees.

However, several aspects show relatively high GAP values and require further attention. Aspect E3, which states that the company provides a comfortable working environment, has a GAP value of -0.53 with a CSI of 87%. Although still categorized as "Excellent", this value indicates a gap between expectations and reality, making it a priority for improvement. Meanwhile, aspect E5, related to the availability of separate rest facilities, recorded the largest GAP value of -0.60 and a CSI of 85%, placing it in the "Very Good" category. This indicates that such facilities are not yet fully satisfactory and need enhancement.

In addition, aspects E6 and E7 are also included in the improvement scale, despite being categorized as "Very Good". Aspect E6 reflects that facilities supporting work comfort are still not optimal (CSI 86%, GAP -0.57), while aspect E7 indicates that the company's innovative culture has not yet fully met employee expectations (CSI 86%, GAP -0.60). Both aspects are important because they directly affect employee motivation and creativity. Meanwhile, aspect E8, concerning the influence of social changes on company innovation, recorded a CSI value of 87% and is categorized as "Excellent", but can be placed within the efficiency scale, considering the relatively large GAP value (-0.53).

Overall, the working environment at PT Semanggi 3 has met most employee expectations, particularly in terms of compliance, cleanliness, and basic physical comfort. However, the company needs to strengthen non-physical aspects such as work culture and more holistic comfort-supporting facilities. By improving the prioritized areas for enhancement, the company can create a more conducive working environment, encourage innovation, and increase employee satisfaction and loyalty in the long term.

Management

The Management factor is a crucial aspect in supporting the success of technological transformation and human resource management within an organization. Based on the ten indicators (F1–F10) analyzed, the company generally demonstrates good management performance, as reflected in relatively high Customer Satisfaction Index (CSI) values ranging from 80% to 94%. However, several aspects still show gaps between expectations and actual conditions that should be the main focus of improvement.

Aspect F1, concerning budget support for technology development, shows a GAP value of -0.57 and a CSI of 86%. Although categorized as "Excellent", this aspect still requires attention to ensure efficiency in fund allocation. This is reinforced by aspects F3 and F6, which show the highest GAP values of -0.78 and -0.83, respectively. Aspect F3 evaluates leadership experience, while F6 relates to career planning; both indicate an urgent need to enhance managerial capability and strategic human resource planning. In particular, F6, which obtained the lowest CSI value of 80%, becomes the most critical indicator in this group.

Furthermore, aspects F5 and F7 are also included in the priority improvement scale. Aspect F5 highlights the company's attention to employee career development, with a GAP value of -0.65 and a CSI of 84%, indicating that employee expectations have not yet been fully met. Aspect F7, which evaluates the employee recruitment system based on job specifications, recorded a GAP value of -0.55 and a CSI of 86%, categorized as "Borderline".

This indicates that the recruitment system has not yet been optimally implemented and needs improvement to be more accurate and competency-based.

On the other hand, aspects F2, F8, F9, and F10 show very good management performance. Aspect F2, which evaluates company leadership, recorded a CSI value of 93% with a small GAP (-0.28) and should be maintained. Aspects F8 and F9, related to career alignment with talent and retirement preparation, also obtained high CSI values (92% and 94%), indicating the company's success in career management. Meanwhile, aspect F10, which measures the clarity of technology vision communication, achieved the highest CSI value of 94% with the smallest GAP (-0.23), reflecting highly effective strategic communication.

Overall, the management aspects at PT Semanggi 3 have shown fairly satisfactory performance, particularly in terms of vision communication, leadership, and end-of-career management. However, the company needs to pay greater attention to aspects related to long-term career development, recruitment systems, and the quality of leadership experience. By addressing the still significant GAPs in several aspects, management effectiveness can be further optimized and have a positive impact across all organizational lines.

Formulation of Research Problems

From the extensive discussion above, the findings can be outlined into four research problem formulations as follows:

1. The impact of technological development on human resource management at PT Semanggi 3 is clearly evident through improvements in work efficiency, data accuracy and quality, and information transparency. Digitalization also simplifies various processes, ranging from recruitment and training to career management and employee performance evaluation. High respondent satisfaction with training, system integration, and the company's technology vision communication serves as positive evidence of this implementation.
2. Challenges in implementing digital technology persist, particularly around discrepancies between expectations and reality regarding network quality, internet connection stability, and the limited technical readiness of some employees. In addition, gaps in career planning and the lack of a strong innovation culture indicate that the company needs to conduct comprehensive evaluations across infrastructure and organizational culture.
3. The use of the Ishikawa method in this study has proven effective in mapping factors that influence the success of HR digitalization. From the five main categoriesman, method, material, machine, and environment, it was found that human factors (digital competencies and training), method factors (implementation planning), and environmental factors (comfort and work culture) are the most influential elements in determining the effectiveness of technology implementation.
4. Digital technology optimization strategies that PT Semanggi 3 can implement include enhancing technical training, strengthening an innovation culture among employees, improving network infrastructure and supporting systems, and developing career development programs based on individual potential. Equally important, management

needs to consistently communicate the company's technology vision and prepare an integrated digital roadmap aligned with strategic needs, so that the transformation process runs effectively and sustainably.

4. CONCLUSION

Referring to the results of the analysis that led to the formulation of the research problems and objectives, the following conclusions can be drawn regarding PT Semanggi 3 in Surabaya:

a. The impact of technological development on human resource management (HRM) at PT Semanggi 3 indicates that digitalization has a positive influence on improving work efficiency, HR data quality, and information transparency. The implementation of technology has facilitated processes such as recruitment, training, career management, and employee performance evaluation. This is reflected in the majority of respondents reporting high levels of satisfaction with aspects of training, system integration, and the company's communication of its technology vision.
b. The main challenges PT Semanggi 3 faces in implementing digital technology include discrepancies between expectations and reality across several areas, including network quality, internet connection stability, and the technical readiness of some employees. In addition, gaps still exist in employee career planning, and an innovation culture has not yet fully developed. This indicates the need for a comprehensive evaluation of both infrastructure readiness and organizational culture.
c. The Ishikawa method was successfully applied to identify and analyze the factors influencing the success of technology implementation in HRM. Based on the five main categoriesMan, Method, Material, Machine, and Environment, it was found that human factors (digital skills and training), method factors (implementation planning), and environmental factors (comfort and work culture) have a significant influence on the success of digitalization.
d. Strategies for optimizing the use of digital technology at PT Semanggi 3 include enhancing technical training, strengthening an innovation culture, improving network infrastructure and supporting systems, and developing career development programs focused on individual potential. In addition, it is important for management to consistently communicate the technology vision to all employees and to develop a digital roadmap that aligns with the company's strategic needs.

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