

Educational Management Operations Research in Broadcasting: A SITOREM-Based Strategy for Training Optimization

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DOI: <http://doi.org/10.33650/al-tanzim.v10i3.14642>

Received: 26 February 2026

Revised: 12 May 2026

Accepted: 26 June 2026

Abstract:

This study aims to formulate priority strategies to improve the effectiveness of education and training in the production and broadcasting sector at a television station using the Scientific Identification Theory to Conduct Operation Research in Education Management (SITOREM) approach. The study used a quantitative descriptive method involving 164 employees selected through quota sampling from a population of 278 employees at 30 TVRI stations in Indonesia. Data were collected using a questionnaire measuring the effectiveness of education and training, competency development, transformational leadership, and communication and information technology literacy. Data analysis was conducted using path analysis and SITOREM analysis. The results showed that communication technology literacy had the strongest direct influence on the effectiveness of education and training ($\beta = 0.472$), followed by transformational leadership ($\beta = 0.182$), information technology literacy ($\beta = 0.150$), and competency development ($\beta = 0.137$). The SITOREM analysis identified 14 priority improvement indicators across communication, data management, evaluation, leadership, integration of learning technology, competency development, and optimisation of training results. Research findings show that strengthening technological literacy, transformational leadership, and competency development are key strategies in increasing the effectiveness of education and training and supporting digital transformation.

Keywords: *Education and Training, SITOREM, Technological Literacy, Transformational Leadership*

Abstrak:

Penelitian ini bertujuan merumuskan strategi prioritas untuk meningkatkan efektivitas penyelenggaraan pendidikan dan pelatihan bidang produksi dan penyiaran pada salah satu stasiun televisi dengan pendekatan Scientific Identification Theory to Conduct Operation Research in Education Management (SITOREM). Penelitian menggunakan metode deskriptif kuantitatif dengan melibatkan 164 pegawai yang dipilih melalui teknik quota sampling dari populasi 278 pegawai pada 30 stasiun TVRI di Indonesia. Data dikumpulkan melalui kuesioner yang mengukur efektivitas penyelenggaraan pendidikan dan pelatihan, efektivitas pengembangan kompetensi, kepemimpinan transformasional, literasi teknologi komunikasi, dan literasi teknologi informasi. Analisis data dilakukan menggunakan analisis jalur (path analysis) dan analisis SITOREM. Hasil penelitian menunjukkan bahwa literasi teknologi komunikasi memiliki pengaruh langsung paling kuat terhadap efektivitas penyelenggaraan pendidikan dan pelatihan ($\beta = 0,472$), diikuti oleh kepemimpinan transformasional ($\beta = 0,182$), literasi teknologi informasi ($\beta = 0,150$), dan efektivitas pengembangan kompetensi ($\beta = 0,137$). Analisis SITOREM menghasilkan 14 indikator prioritas perbaikan, meliputi aspek komunikasi, pengelolaan data, evaluasi,

kepemimpinan, integrasi teknologi pembelajaran, pengembangan kompetensi, serta optimalisasi hasil pelatihan. Temuan penelitian menunjukkan bahwa penguatan literasi teknologi, kepemimpinan transformasional, dan pengembangan kompetensi menjadi strategi utama dalam meningkatkan efektivitas pendidikan dan pelatihan serta mendukung transformasi digital.

Kata Kunci: Pendidikan dan Pelatihan, SITOREM, Literasi Teknologi, Kepemimpinan Transformasional

Please cite this article in APA style as:

Sifak, S., Hardhienata, S., & Wulandari, D. (2026). Educational Management Operations Research in Broadcasting: A SITOREM-Based Strategy for Training Optimization. *Al-Tanzim: Jurnal Manajemen Pendidikan Islam*, 10(3), 1077-1092.

INTRODUCTION

Digital transformation in broadcasting is no longer a technical agenda reserved for media companies; it is a public issue because citizens increasingly rely on digital media for information, education, culture, and democratic participation. The central point is that public broadcasters must remain accessible and credible while audiences move from linear television to mobile, streaming, and on-demand platforms. The reason is clear: when public media fails to adapt, society loses an inclusive source of verified content and cultural representation. Recent studies show that digital transformation depends not only on technology but also on leadership, agility, digital strategy, and human capability development (AlNuaimi et al., 2022; Bansal et al., 2023). In Indonesia, TVRI's shift toward TVRI Klik illustrates how legacy public broadcasters are pressured to integrate streaming technology with public service obligations (Sariyani et al., 2024; Sudarsono & Olivia, 2026). Therefore, improving employee training is essential to safeguarding the relevance of public broadcasting for all communities across Indonesia today.

The central problem of this study is the widening mismatch between the demands of digital broadcasting and the internal readiness of public broadcasting institutions. TVRI is expected to deliver informative, educational, cultural, and entertaining content across platforms, yet the digital migration shifts the workflow from conventional production to integrated, data-informed, multiplatform broadcasting. Empirical studies on TVRI indicate that employees' competence, autonomy, relatedness, and technostress influence performance expectations during digital transformation (Alfehaid et al., 2024; Saraswaty & Pusparini, 2023). Other Indonesian studies show that TVRI's digital transformation is supported by platform innovation and social media use but constrained by limited resources, a shortage of skilled personnel, uneven content management, and incomplete public service optimization (Fasta et al., 2026; Wulandari et al., 2024). This problem matters because weak human resource readiness can reduce content quality, slow institutional adaptation, and weaken TVRI's ability to serve audiences in a competitive digital media ecosystem, particularly younger audiences expecting interactive, trustworthy access in daily practice today.

Previous research has laid an important foundation for understanding the relationships among digital transformation, leadership, and employee capability. Studies in organizational management show that digital transformational leadership and organizational agility can strengthen transformation outcomes when aligned with digital strategy (AlNuaimi et al., 2022). Research on IT innovation adoption further confirms that transformational leadership encourages

employees to participate in technological change through shared leadership and supportive management innovation (van Dun & Kumar, 2023). In the field of human resource management, digital transformation is increasingly conceptualized as the integration of digital infrastructure, individual capability, and innovation capability within HR systems (Bansal et al., 2023). These findings are relevant to TVRI because the transformation of broadcasting requires employees who can operate digital tools, collaborate across production units, and respond quickly to audience changes. However, these studies remain broad and do not specify operational priorities for improving education and training in public broadcasting contexts and for policy design.

Research on training effectiveness also shows that training quality is influenced by instructional design, trainer competence, learning environment, training materials, motivation, digital literacy, and organizational support. A recent study found that instructor competence, training design, training environment, training materials, and achievement motivation significantly affect training effectiveness and that these factors can be analyzed using SITOREM to identify weak indicators requiring improvement (Ningsih et al., 2025). Another study on public sector employees demonstrates that digital literacy can mediate the relationship between technostress and training effectiveness, particularly in information retention and skill acquisition (Addai et al., 2025). Recent SITOREM-based research also shows that priority analysis can translate statistical findings into actionable improvement strategies rather than merely describing relationships among variables (Dasmo et al., 2026). Nevertheless, prior studies mostly examine education or public administration settings. In contrast, production and broadcasting training in a national public broadcaster remains underexplored, empirically, conceptually, and strategically, within complex media organizations today.

The state of the art of this study lies in connecting training effectiveness, competency development, transformational leadership, and communication and information technology literacy within a priority-based improvement framework for TVRI. Unlike studies that test only causal relationships, this research applies SITOREM to classify indicators into two strategic groups: those that must be improved immediately and those that should be maintained or strengthened. This position is important because public organizations often face resource limitations and cannot improve all training components simultaneously. Recent evidence suggests that digital transformation succeeds when leadership, human capability, digital literacy, and organizational agility work in tandem (Addai et al., 2025; AlNuaimi et al., 2022; Bansal et al., 2023). By locating these factors within TVRI's training system, this study contributes a more operational model for determining which training indicators have the greatest leverage to sustainably improve production and broadcasting performance at the institutional level amid ongoing institutional digital disruption.

The research problem addressed in this study is not simply whether education and training at TVRI are effective, but which specific indicators should be prioritized for improvement. The argument advanced here is that training effectiveness in production and broadcasting cannot be strengthened solely by

expanding generic training. It requires a precise diagnosis of competency development, leadership support, and communication and information technology literacy as interdependent factors shaping employee readiness. If these factors are assessed only through descriptive evaluation, improvement programs may become fragmented, repetitive, and poorly aligned with the needs of institutional transformation. Therefore, a priority-based approach is more logical because it helps management focus on the most influential and weakest indicators first. This study assumes that the most strategic training policy is one that balances empirical contribution, expert judgment, urgency, cost, and organizational benefit in a coherent managerial decision cycle across annual planning, implementation, evaluation, and alumni utilization.

Based on this argument, this study aims to formulate priority strategies for improving the effectiveness of education and training programs in production and broadcasting at TVRI. The study examines how competency development effectiveness, transformational leadership, communication technology literacy, and information technology literacy contribute to training effectiveness, and then translates the findings into practical improvement priorities. Its contribution is twofold. Theoretically, it strengthens the discussion of strategic human resource development in public broadcasting by integrating capability, leadership, and literacy into a single analytical framework. In practice, it provides TVRI with a decision-making basis for designing training policies that are more focused, measurable, and aligned with digital transformation. The expected outcome is a set of evidence-based recommendations that enable TVRI to improve employee competence, optimize training investment, and sustain its public service role within a rapidly changing digital broadcasting environment, with stronger organizational learning capacity and clearer post-training utilization for future institutional development planning.

RESEARCH METHODS

This study employed a quantitative survey design with a descriptive-explanatory orientation and SITOREM-based priority analysis. This design was selected because the study aimed to measure employees' perceptions numerically, examine the direct effects among research variables, and formulate operational improvement priorities based on empirical findings. The dependent variable was the effectiveness of education and training programs in production and broadcasting. In contrast, the independent variables consisted of competency development effectiveness, transformational leadership, communication technology literacy, and information technology literacy. A quantitative survey design is appropriate when research variables are measured using standardized indicators and analyzed statistically to explain relationships among variables. Path analysis was used to examine the hypothesized direct effects, while SITOREM was applied to translate statistical findings into practical recommendations for organizational improvement (Barroga et al., 2023; Chen, 2022).

The research was conducted at TVRI regional stations across Indonesia, involving employees engaged in production and broadcasting functions. This location was selected because TVRI, as Indonesia's public broadcasting institution,

is directly affected by digital transformation, changes in audience behavior, and the need to improve employee competence in multiplatform broadcasting. The population consisted of 278 employees distributed across 30 TVRI regional stations. From this population, 164 respondents were selected using quota sampling to ensure that the sample reflected the distribution of employees across the regional stations. Quota sampling was considered suitable because the population was spread across several organizational units, and the study required proportional representation from each unit while maintaining practical feasibility in data collection. This sampling approach is commonly used in survey research when researchers need controlled representation of specific subgroups within a defined population (Futri et al., 2022; Stratton, 2023).

Data were collected using structured questionnaires developed from the indicators for each research variable. The questionnaire measured five main constructs: the effectiveness of education and training programs, the effectiveness of competency development, transformational leadership, communication technology literacy, and information technology literacy. Each item was arranged using a Likert-type scale to capture respondents' perceptions in a measurable form. Before distribution, the instrument was examined by experts to establish content validity, ensuring that the items were relevant, clear, and aligned with the theoretical construct being measured. Construct validity was then assessed using item-total correlation analysis, while instrument reliability was examined using Cronbach's alpha. The use of expert validation, construct validity testing, and reliability analysis is important in questionnaire-based research because it strengthens the accuracy and consistency of the measurement instrument (Elangovan & Sundaravel, 2021; Koo & Yang, 2025; Madadzadeh & Bahariniya, 2025).

Data analysis was conducted in two stages. The first stage used path analysis to examine the direct effects of competency development effectiveness, transformational leadership, and communication and information technology literacy on the effectiveness of education and training programs. This analysis provided empirical information on the strength of each independent variable's contribution to the dependent variable. The second stage used SITOREM analysis to determine priority indicators for improvement. The SITOREM procedure consisted of contribution analysis, indicator score analysis, expert-based indicator weighting, and indicator classification. Indicator weighting was based on four criteria: cost, benefit, urgency, and importance. Based on these results, indicators were classified into two strategic categories: those requiring immediate improvement and those that should be maintained or further strengthened. This approach enabled the study to move beyond statistical explanation toward practical decision-making for improving training effectiveness at TVRI (Boyd et al., 2023; Mokkink et al., 2025).

RESULTS AND DISCUSSION

Results

The path analysis results indicate that communication technology literacy exerted the strongest direct effect on the effectiveness of production and broadcasting education and training programs ($\beta = 0.472$), compared with

competency development effectiveness ($\beta = 0.137$), transformational leadership ($\beta = 0.182$), and information technology literacy ($\beta = 0.150$). All direct effects were statistically significant ($p < 0.05$). The analysis also produced a coefficient of determination (R^2) of 0.469, indicating that the four independent variables jointly explained a substantial proportion of the variance in the effectiveness of production and broadcasting education and training programs. Based on the path analysis findings, a SITOREM analysis was subsequently conducted to translate the effects identified at the variable level into strategic priorities at the indicator level. While path analysis focuses on the strength of relationships among variables, SITOREM identifies specific indicators to prioritize for improvement or maintenance based on their relative importance and empirical performance. For the effectiveness of production and broadcasting education and training programs (Table 1), the indicators utilization of training alums and development of training methods emerged as the highest priorities for improvement. In contrast, the comprehensiveness of training planning, the regularity of training program evaluation, the appropriateness of training implementation, and the consistency of post-training follow-up were classified as indicators that should be maintained or further strengthened.

Table 1. SITOREM Analysis Results for the Effectiveness of Training Implementation

Initial Indicator	Indicator After Expert Judgment (Rank & Weight)	Indicator Score
Comprehensiveness of training planning	1st comprehensiveness of training planning (17%)	4.04
Accuracy of training implementation	2nd regularity of training implementation evaluation (17%)	4.03
Regularity of training implementation evaluation	3rd Empowerment of training alums (17%)	3.70
Consistency of follow-up on training results	4th accuracy of training implementation (15%)	4.05
Development of training methods	5th consistency of follow-up on training results (15%)	4.08
Empowerment of training alumni	6th development of training methods (15%)	3.77

Table 1 indicates that the expert judgment results show that training planning, routine evaluation, and alum empowerment are the most strategic indicators, as each received the highest weight of 17%. However, the indicator scores reveal a gap between strategic importance and actual performance, especially in alum empowerment, which received the lowest score of 3.70. This means that TVRI's training system is relatively strong in implementation and follow-up, but still needs improvement in utilizing training alums and developing more adaptive training methods to ensure that training outcomes contribute more directly to organizational transformation.

For the competency development effectiveness variable (Table 2), knowledge development, performance improvement, the application of work experience, and leadership development were identified as priority indicators requiring immediate improvement. In contrast, the remaining indicators, including skills enhancement, improved adaptability, the development of positive

work attitudes, the reinforcement of organizational values, and interest development, demonstrated relatively stronger empirical performance. They were therefore classified as indicators that should be maintained or further strengthened.

Table 2. SITOREM Analysis Results for Competency Development Effectiveness

Initial Indicator	Indicator After Expert Judgment (Rank & Weight)	Indicator Score
Knowledge development	1st Knowledge development (12%)	3.92
Skill improvement	2nd Skill improvement (11%)	4.06
Improvement of positive attitudes	3rd Performance improvement (11%)	3.97
Performance improvement	4th improvement of adaptability (11%)	4.09
Improvement of adaptability	5th improvement in the application of work experience (11%)	3.88
Leadership improvement	6th improvement of positive attitudes (10%)	4.08
Improvement in the application of work experience	7th Leadership improvement (10%)	3.89
Strengthening of values	8th Strengthening of values (10%)	4.16
Interest development	9th Interest development (10%)	4.18

Table 2 indicates that competency development effectiveness has a positive but relatively modest contribution to training effectiveness, as reflected by $\beta = 0.137$ and Rank IV. Expert judgment prioritizes knowledge development, indicating that strengthening employees' conceptual and technical understanding remains fundamental. However, the scores show that interest development, strengthening of values, adaptability, and positive attitudes are already relatively strong. The weaker areas are the application of work experience, leadership improvement, and knowledge development. This suggests that employees may be motivated and value-oriented, but training outcomes still need to be more effectively translated into workplace practice, leadership capacity, and job-relevant knowledge. Therefore, improvement should focus on connecting training content with real production and broadcasting tasks so that competency development produces measurable performance gains.

For the transformational leadership variable (Table 3), intellectual stimulation, inspirational motivation, and individualized consideration were identified as the primary indicators requiring immediate improvement. In contrast, idealized influence demonstrated stronger empirical performance and was therefore classified as an indicator that should be maintained or further strengthened.

Table 3. SITOREM Analysis Results for Transformational Leadership

Initial Indicator	Indicator After Expert Judgment (Rank & Weight)	Indicator Score
Role modeling	1st Role modeling (28%)	4.08
Inspirational motivation	2nd Intellectual stimulation (26%)	3.38
Intellectual stimulation	3rd Inspirational motivation (24%)	3.93
Individualized consideration	4th Individualized consideration (21%)	3.46

Table 3 shows that transformational leadership has a positive direct effect on training effectiveness ($\beta = 0.182$) and ranks second among the influencing variables, showing that leadership plays an important strategic role in strengthening education and training outcomes. Expert judgment ranks role modeling as the highest-priority indicator, with a weight of 28% and the highest score of 4.08, indicating that leaders are generally perceived as capable of setting positive examples. However, intellectual stimulation receives a high weight of 26% but records the lowest score of 3.38, revealing a major gap between its strategic importance and actual practice. Individualized consideration also scores low at 3.46, suggesting that personal mentoring and attention to individual employee development remain weak. Therefore, improvement should prioritize leaders' ability to stimulate innovation, critical thinking, and problem solving, while also strengthening individualized support for employee growth in production and broadcasting activities.

For the communication technology literacy variable (Table 4), communication, data management, and evaluation were identified as priority indicators requiring immediate improvement. In contrast, needs identification, content creation, access, and integration demonstrated relatively strong empirical performance and were therefore classified as indicators that should be maintained or further strengthened.

Table 4. SITOREM Analysis Results for Communication Technology Literacy

Initial Indicator	Indicator After Expert Judgment (Rank & Weight)	Indicator Score
Needs identification	1st Needs identification (15%)	4.48
Access	2nd Creation (14%)	4.13
Data management	3rd Communication (14%)	3.57
Integration	4th Access (13%)	4.43
Evaluation	5th Data management (13%)	3.63
Creation	6th integration (13%)	4.35
Communication	7th evaluation (13%)	3.58

Table 4 shows that communication technology literacy has the strongest contribution to training effectiveness, as indicated by $\beta = 0.472$ and Rank I. Expert judgment places needs identification as the top priority, and its high score of 4.48 indicates that TVRI employees are already strong at recognizing communication technology needs. However, communication, evaluation, and data management show relatively lower scores, indicating that the main issue is not access or awareness but the ability to use communication technology analytically, evaluatively, and interactively. Therefore, improvement should focus on strengthening practical communication skills, data-based use of technology, and evaluation of digital communication processes.

For the information technology literacy variable (Table 5), technology integration in learning and the creative application of technology were identified as priority indicators requiring immediate improvement. In contrast, fundamental technological proficiency and the use of educational applications demonstrated relatively strong empirical performance and were therefore classified as indicators that should be maintained or further strengthened.

Table 5. SITOREM Analysis Results for Literasi Teknologi Informasi

Initial Indicator	Indicator After Expert Judgment (Rank & Weight)	Indicator Score
Basic technology mastery	1st Technology integration in learning (27%)	3.84
Use of educational applications	2nd Basic technology mastery (25%)	4.35
Creative application of technology	3rd use of educational applications (23%)	4.17
Technology integration in learning	4th Creative application of technology (23%)	3.53

Table 5 shows that information technology literacy has a moderate contribution to training effectiveness, as indicated by $\beta = 0.150$ and Rank III. Expert judgment ranks technology integration in learning as the most strategic indicator, with a weight of 27%. Still, its score is only 3.84, while creative application of technology has the lowest score of 3.53. This shows that TVRI employees are relatively strong in basic technology mastery and the use of educational applications, but still need improvement in integrating technology meaningfully into training processes and applying it creatively. Therefore, the main priority is shifting from merely operating technology toward using technology as a strategic tool for interactive, adaptive, and innovation-oriented training.

Overall, the analysis established a comprehensive ranking of indicators to prioritize for immediate improvement and those to maintain or further strengthen (Table 6). The findings indicate that 14 indicators were identified as priorities for immediate improvement, while 16 were classified as requiring maintenance or further development. This integrated analysis demonstrates that the SITOREM approach extends path analysis by translating statistical relationships into operational decision-making at the indicator level.

Table 6. Priority Order of Indicator Improvement

Immediate Improvement Priorities	Indicators to be Maintained/Developed
1st Communication	1st Needs identification
2nd Data management	2nd Creation
3rd Evaluation	3rd Access
4th Intellectual stimulation	4th Integration
5th Inspirational motivation	5th Role modeling
6th Individualized consideration	6th Basic Technology Mastery
7th Technology integration in learning	7th use of educational applications
8th Creative application of technology	8th Skill improvement
9th Knowledge development	9th Adaptability improvement
10th Performance Improvement	10th Positive attitude improvement
11th improvement of work experience implementation	11th Strengthening of values
12th Leadership improvement	12th Interest development
13th Empowerment of training alumni	13th comprehensiveness of training planning
14th development of training methods	14th Routine evaluation of training implementation
	15th accuracy of training implementation
	16th consistency of follow-up on training results

The SITOREM results indicate that the most urgent improvement priorities are concentrated in communication technology literacy, transformational leadership, technology integration, competency development, and post-training utilization. Communication, data management, and evaluation appear as the top three priorities, suggesting that TVRI's training effectiveness is constrained more by the practical and evaluative use of technology than by basic access or awareness. Leadership-related indicators such as intellectual stimulation, inspirational motivation, and individualized consideration also require improvement, meaning that training success depends not only on technical competence but also on leaders' ability to encourage innovation, guide employees, and support individual development. Meanwhile, indicators such as needs identification, creation, access, basic technology mastery, training planning, implementation accuracy, and follow-up consistency should be maintained because they already function relatively well and can serve as a foundation for strengthening the weaker indicators.

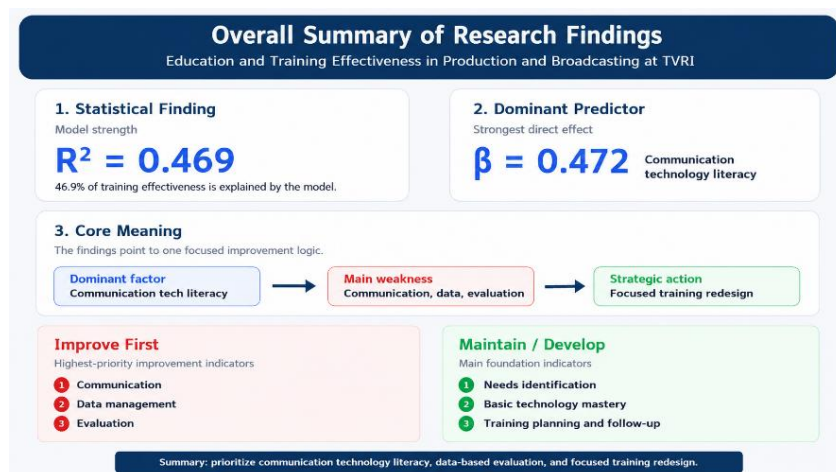


Figure 1. Integrated Findings on Training Effectiveness Improvement

Based on figure 1, the effectiveness of education and training in the field of production and broadcasting at TVRI is explained by the research model, which accounts for 46.9% of the variation in training effectiveness ($R^2 = 0.469$), indicating a fairly good clarity power. The variable with the strongest direct influence on training effectiveness was communication technology literacy ($\beta = 0.472$), confirming that improving communication technology competence is a key factor in the success of the training program. These findings lead to one key strategy: prioritizing improvements in communication, data management, and training evaluation, as these three indicators are major weaknesses that need to be addressed immediately. On the other hand, aspects of identifying training needs, mastering basic technology, and planning and following up on training need to be maintained and continued to be developed as the foundation for program success. Overall, the study's results recommend a more focused redesign of training programs, with an emphasis on strengthening communication technology literacy and implementing data-driven evaluations to improve training effectiveness on an ongoing basis.

Discussion

The findings of this study demonstrate that communication technology literacy is the most decisive determinant of the effectiveness of production and broadcasting education and training programs at TVRI, as indicated by the strongest direct effect ($\beta = 0.472$) compared with transformational leadership ($\beta = 0.182$), information technology literacy ($\beta = 0.150$), and competency development effectiveness ($\beta = 0.137$). This result is theoretically consistent with recent digital transformation literature, which argues that organizational transformation is not driven merely by technology ownership but by the capability of human resources to communicate, collaborate, interpret data, and adapt digital tools to work processes. (AlNuaimi et al., 2022) found that digital transformational leadership and organizational agility significantly shape digital transformation outcomes, while Bansal et al. (2023) conceptualized human resource digital transformation as the integration of digital and individual capabilities into organizational innovation capacity. Carter et al. (2024) further emphasized that public-sector digital transformation requires strategic information systems that create public value, improve service accessibility, and strengthen institutional readiness for future-oriented digital operations. In this respect, the present study extends prior literature by showing that, in a public broadcasting context, communication technology literacy is more influential than general information technology literacy. This distinction is important because broadcasting work is inherently communicative, collaborative, and audience-oriented; therefore, employees' ability to use communication technology for data management, evaluation, and interactive production processes becomes a core condition for effective training outcomes.

The dominance of communication technology literacy also aligns with recent studies on digital literacy and workplace training. Still, this study provides a more specific contribution by locating the weakest indicators within the communication technology domain. (Addai et al., 2025) found that digital literacy mediates the relationship between technostress and training effectiveness, particularly regarding information retention and skill acquisition, while studies on digital literacy in Indonesia emphasize that digital learning environments and collaborative digital practices are critical to strengthening learning outcomes. Tinmaz et al. (2022) explained that digital literacy is a multidimensional construct involving technical, cognitive, social, and operational competencies required to function effectively in digital environments. Deschênes (2024) also found that digital literacy strengthens the use of collaborative technologies and the perception of social proximity in hybrid work settings, indicating that digital competence is inseparable from communication and collaboration capabilities. The present findings support the literature but sharpen it by demonstrating that TVRI employees are already relatively strong in needs identification, access, creation, and integration.

In contrast, communication, data management, and evaluation remain the most urgent priorities for improvement. This indicates that the primary problem is not digital exposure, but digital maturity. Employees may know what technologies are needed and may have access to them, yet still require stronger

capability to use communication technologies analytically, evaluatively, and strategically. This finding contributes to training effectiveness theory by suggesting that digital literacy should not be treated as a single, general construct but should be disaggregated into operational competencies with varying levels of strategic urgency.

The finding that transformational leadership has the second-strongest direct effect on training effectiveness is consistent with the leadership and technology adoption literature, particularly the view that leaders shape employees' willingness to engage with innovation. Bunjak et al. (2022) showed that transformational leadership predicts employees' adoption of IT innovation through shared leadership and organizational support, while AlNuaimi et al. (2022) emphasized the role of digital transformational leadership in enabling organizational agility. Schiuma et al. (2024) further argued that digital transformation requires transformative leadership competencies that enable leaders to integrate digital knowledge, mobilize people, and guide organizational change. The present study confirms this relationship but also reveals a critical gap: role modeling is relatively strong, whereas intellectual stimulation, inspirational motivation, and individualized consideration require immediate improvement. This means that leaders at TVRI may already demonstrate positive examples, but they still need to more actively stimulate critical thinking, encourage experimentation, and provide individualized developmental support. Theoretically, this finding refines transformational leadership theory in public broadcasting by showing that symbolic leadership is insufficient in the face of digital disruption. In practice, TVRI's leadership development programs should move beyond administrative supervision and emphasize coaching, facilitating innovation, fostering problem-solving dialogue, and mentoring linked to real production and broadcasting challenges. The impact of this shift would be the emergence of training environments that are not only technically competent but also intellectually adaptive and innovation-oriented.

The relatively modest contribution of competency development effectiveness and information technology literacy does not imply that these variables are unimportant; rather, it indicates that their current influence depends on how effectively they are translated into workplace practice. Recent research on workplace learning and training transfer emphasizes that training effectiveness is achieved when knowledge, skills, and attitudes acquired during training are applied in actual work settings. A systematic scoping review of workplace training transfer highlights that it concerns the extent to which learned competencies are implemented in the workplace. At the same time, other studies show that training and development affect employee performance when supported by needs assessment, resources, and organizational commitment. Hairunisya & Narmaditya (2025) found that digital literacy training can improve performance outcomes when linked to human resource development, confirming that digital training is more impactful when embedded in broader employee development systems. The present study is consistent with this literature because SITOREM identifies knowledge development, performance improvement, application of work experience, leadership improvement, technology integration in learning,

and creative technology application as indicators requiring improvement. The implication is that TVRI's training programs should not be evaluated solely by participation, satisfaction, or completion, but by the extent to which training produces observable changes in production quality, digital workflow, leadership behavior, and innovation practices. This provides a practical contribution by shifting the training agenda from input-based administration toward transfer-based performance improvement.

The novelty of this study lies in its integration of path analysis and SITOREM to move from variable-level explanation to indicator-level strategic prioritization in the context of a national public broadcaster undergoing digital transformation. Prior studies on digital transformation, leadership, and training effectiveness have generally identified significant relationships among variables. However, they often stop at statistical explanation and do not specify which operational indicators should be improved first. By contrast, this study identifies 14 immediate improvement priorities and 16 indicators to maintain or further develop, thereby translating empirical findings into a structured managerial agenda. This contributes theoretically by enriching strategic human resource development literature with a priority-based model that combines competency, leadership, communication technology literacy, and information technology literacy. It also contributes in practical terms by providing TVRI with a clearer basis for allocating training resources to high-impact areas, particularly communication, data management, evaluation, intellectual stimulation, technology integration, creative technology use, alum empowerment, and training method development. The broader impact is that TVRI can strengthen its institutional readiness for digital broadcasting, improve the efficiency of training investments, enhance employee adaptability, and sustain its public service role in an increasingly competitive media ecosystem.

CONCLUSION

This study concludes that the effectiveness of education and training programs in production and broadcasting at TVRI is primarily shaped by communication technology literacy, which emerged as the strongest determinant compared with transformational leadership, information technology literacy, and competency development effectiveness. The central lesson of the study is that training effectiveness in a digitally transforming public broadcasting institution cannot be improved merely by expanding training activities or providing access to technology; rather, it requires the ability of employees and leaders to use communication technology analytically, evaluatively, creatively, and strategically in real production and broadcasting work. The main scientific contribution of this study lies in its integration of path analysis and SITOREM, which enables the research to move beyond identifying significant variable relationships toward formulating indicator-level improvement priorities. This offers a more operational model for strategic human resource development by linking competency development, leadership, communication technology literacy, and information technology literacy within a priority-based decision-making framework. Practically, the findings provide TVRI with a clearer basis for redesigning training programs by prioritizing communication, data management, evaluation,

intellectual stimulation, technology integration, creative technology use, alumni empowerment, and training method development, while maintaining indicators that already show stronger performance. However, this study is limited by its quantitative survey design, reliance on employee perceptions, and focus on TVRI regional stations, which may not fully capture deeper organizational dynamics, long-term training transfer, or audience-level impacts. Future research should therefore employ longitudinal, mixed-method, or comparative designs to examine how priority-based training improvements influence actual employee performance, digital production quality, organizational innovation, and public service outcomes across different broadcasting institutions.

ACKNOWLEDGMENT

We want to express our sincere gratitude to TVRI and all participating employees from regional stations across Indonesia for their valuable time, cooperation, and contributions to this study. Appreciation is also extended to the experts who provided judgment and input in the SITOREM analysis, as well as to all parties who supported the completion of this research.

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