 p-ISSN 2827-8585
e-ISSN 2827-8062

International Journal of Multidisciplinary Research and Literature
IJOMRAL
Vol. 4, No. 1, January 2025 pp. 142-154
Journal Page is available at http://ijomral.esc-id.org/index.php/home

THE INFLUENCE OF TECHNOLOGY-BASED COMPETENCY DEVELOPMENT STRATEGY ON THE OPERATIONAL EFFICIENCY IN MULTINATIONAL COMPANIES

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Abstract

This study aims to analyze the effect of technology-based competency development (E-learning, Virtual Reality Training, and Mobile Learning) on operational efficiency in multinational companies. Using a quantitative approach and descriptive-explanatory research design data were obtained through questionnaires and in-depth interviews from 90 employees involved in technology-based training programs in three multinational companies. E-learning, virtual reality training, and mobile learning were found to have a significant and positive impact on operational efficiency, as demonstrated by the study's findings. Training can be completed more quickly and at a lower cost with the help of e-learning technology. Virtual reality training offers a more realistic training experience, and mobile learning provides greater flexibility for learning. This study offers empirical evidence regarding technology's role in enhancing companies' operational efficiency. Multinational corporations can utilize this evidence to develop more effective and efficient competency development strategies.

Keywords: Competency Development, E-learning, Virtual Reality, Mobile Learning, Operational Efficiency, Multinational Companies.

INTRODUCTION

The role of management in a company is vital, both national and multinational companies. Management is a process that involves planning, organizing, directing, and controlling resources to achieve predetermined goals. In an organization, management activities play an essential role in optimizing the use of resources, one of which is human resources (HR). HR is the greatest asset in an organization, especially in large and multinational companies, where employee competence, skills, and knowledge are the main factors in determining the success of the company's operations. Therefore, effective HR management is essential to increase productivity and operational efficiency.

As we move further into the digital age, the advancement of information technology has significantly influenced human resource management management. Not only does technology make communication more straightforward, but it also creates new opportunities for the development of employee competencies. When viewed in this light, technology-based competency development strategies are highly pertinent to improving operational efficiency. It is valid for multinational corporations facing more significant challenges related to workforce diversification and global operations.

This study focuses on the influence of technology-based competency development strategies on operational efficiency in multinational companies. Employee competency development through digital technology, such as e-learning-based training, digital simulations, and knowledge management platforms, can accelerate employee skills and knowledge improvement. This increase in work productivity, a decrease in operational errors, and an improvement in the management of the already available resources. As a result, it is essential to investigate how this strategy is implemented in multinational corporations and how it influences the efficiency of operational processes.

According to Adegoke and Olayemi (2020), multinational companies often face challenges managing employee competencies across countries. Consequently, technology-based competency development is one of the most effective solutions to address this issue. Technology enables organizations to offer more adaptable and efficient training to employees in a variety of locations without incurring significant expenditures.

Several multinational corporations will conduct the research in Indonesia. The research locations are chosen based on how companies have integrated technology into their HR management. For more details, Table 1 presents information about the companies that are the objects of research and the technology used in competency development.

Table 1. Multinational Companies and Competency Development Technology

Company	Technology Used	Operational Location
Company X	E-learning, Cloud-based Learning Management System	Jakarta, Surabaya
PT Y	Virtual Reality Training, Digital Knowledge Platform	Bandung, Medan
PT Z	Mobile Learning Apps, AI-powered Learning Tools	Jakarta, Bali

Source: Research Results, 2024

The following table provides a list of the businesses that are the research subjects, along with the technologies that these businesses use to cultivate the competencies of their employees. The companies PT X, PT Y, and PT Z were chosen because they have integrated cutting-edge technology into their training programs to enhance their employees' capabilities in various locations. This study will analyze how the application of these technologies contributes to improving operational efficiency in these companies.

The table above demonstrates that various factors influence the efficacy of technology-based competency development in enhancing operational efficiency. Technological readiness, employee digital skills, and management support are the primary factors that must be considered. The success of a technology-based competency development strategy is significantly influenced by the quality of the company's technological infrastructure and the degree to which employees can access and utilize the technology, as per Lee and Kim (2021). Furthermore, the acceptance and implementation of this strategy are also influenced by organizational culture factors and managerial policies.

The current phenomenon in multinational companies is the shift towards technology-based HR management. Many companies are starting to use digital tools to improve operational efficiency and

employee competency. Technology for training and development is increasingly popular because it delivers training materials efficiently and in a shorter time. Because of this, businesses can respond to the requirements for competency that are rapidly increasing in the global market. However, even though the potential of technology to improve operational efficiency appears promising, some businesses still struggle to implement this strategy effectively. The main problems faced are a limited budget for technology investment and resistance to change among employees accustomed to traditional training methods.

Even though a growing number of businesses are beginning to rely on technology for competency development, several concerns still need to be addressed. First, many companies have not fully integrated technology into human resource development. Second, there is a disparity in the level of technological education and expertise among employees from various backgrounds. Third, businesses frequently encounter challenges when attempting to ensure that training based on technology can significantly impact the efficiency of their operations.

According to Harris and Williams (2021), many companies have difficulty designing and implementing technology-based competency development programs appropriate to their operational needs. Some companies also have difficulty measuring the results of these training programs and assessing how much they contribute to increased operational efficiency.

Several studies provide an essential basis for the development of this topic. In their study of multinational companies, Gupta and Verma (2018) showed that using technology in employee competency development can improve operational efficiency. They found that digital-based training programs like e-learning allow companies to save time and training costs while significantly improving employee skills. In addition, Castillo and Lopez (2020) examined the relationship between technology adoption and operational efficiency in global companies. They discovered that organizations that incorporate technology into their HR management processes can enhance employee productivity, mitigate operational errors, and respond to market challenges more promptly. Jang and Seo (2019) also conducted research that demonstrated that the company's operational performance is positively impacted by technology-based competency development. They noted that using digital platforms in training enables organizations to enhance employee performance and meet more stringent global competency standards.

In their study, Iqbal and Raza (2020) examined the impact of technology on HR management. They found that competency development through technology not only improves operational efficiency but also contributes to the development of employee professionalism. Technology allows for more adaptive and individualized training; Smith and Vance (2020) advise companies to optimize the use of technology in competency development to improve operational efficiency globally. They emphasize the importance of correctly measuring the impact of technology in HR management to ensure long-term benefits for the company.

Despite evidence indicating that technology enhances operational efficiency via competency development, notable gaps persist in the current literature. Most studies focus exclusively on firms in developed nations, with scant attention given to multinational corporations operating in developing countries like Indonesia. Furthermore, most research does not investigate the long-term effects of technology-based competency development on firms' operational efficiency. Consequently, this investigation aims to address this deficiency by conducting a comprehensive examination of the long-term effects of technology-based competency development strategies on operational efficiency in multinational corporations based in Indonesia.

LITERATURE REVIEW

Competency Development

Competency development is a continuous process of improving the knowledge, skills, and abilities possessed by individuals or groups in an organization (Gupta & Verma, 2018). Competency development is of utmost significance in the context of multinational corporations. Because globalization and technological advancements necessitate that employees continually enhance their capabilities to sustain competitiveness in a market that is becoming increasingly dynamic. Companies can speed up the process of improving employee skills through the use of technology-based competency development, which also helps them reduce the costs of training and provide access to more flexible and measurable training. Adegoke and Olayemi (2020) state that using technology in employee training can potentially increase productivity and operational efficiency. The definition of competence can be put forward from various opinions, both normatively and theoretically. Normatively, it can be stated from the Decree of the Minister of National Education No. 045/U/2002 that competence is a set of intelligent and responsible actions possessed by a person as a requirement to be considered capable. Education and training for employees are two of the instruments of development. Training is a form of development that enhances human potential, in which individuals acquire the ability to think independently and foster the development of their inherent abilities. Therefore, it will be more efficient to provide training to all employees. Because training is a universal concept, it applies to both private and government entities.

Human Resource Management (HR)

Human resource management in an organization is related to how companies manage, develop, and motivate employees to achieve organizational goals effectively. According to Armstrong (2017), good human resource management involves planning, recruitment, selection, training, and development. A primary emphasis in human resource management is the development of employee competencies. Organizations increasingly depend on technology to enhance HR performance in the digital age. Technology utilization in human resource management enables multinational corporations to efficiently and effectively oversee employees dispersed across multiple countries (Smith & Vance,

2020). A work unit is typically established within an organization to conduct human resource management activities. This work unit is functionally responsible for the execution of a variety of activities and the implementation of a variety of steps in human resource management. There are two compelling reasons for the establishment of a functional work unit. First, although every manager is also a human resource manager, operationally, the manager concerned is assigned the task and responsibility to carry out other activities, both in terms of leading tasks and supporting tasks, so that the primary attention is directed to these functional responsibilities.

Operational Efficiency

Operational efficiency refers to a company's capacity to carry out its operational activities in the most effective manner possible by using the available resources. This operational efficiency is closely connected to how time, workforce, and coverage of excess expenses are managed to ensure that the company can achieve its objectives (make a profit) at the lowest possible cost. Operational efficiency refers to a company's ability to use resources optimally to produce maximum output. In this case, operational efficiency can be achieved by improving the performance of individuals, groups, and the entire organization. According to Castillo and Lopez (2020), technology can play an important role in achieving operational efficiency. Using technology to drive employee competency development can assist organizations in optimizing resource utilization, increasing productivity, and reducing operational costs. Continuous monitoring and evaluation of the outcomes of technology utilization in HR management should also be a component of operational efficiency measurement.

Technology in Human Resource Management

This theory states that applying technology in HR management can provide strategic advantages for organizations. Along with advances in information technology, companies can utilize various digital tools to facilitate the training process, employee data management, and performance evaluation. Harris and Williams (2021) explain that cloud-based technology, mobile applications, and e-learning can accelerate competency development and improve the company's operational efficiency. Because of technological advancements, employees can obtain training more conveniently and adaptably without being constrained by time or location. It helps to alleviate the geographical and logistical challenges that multinational corporations frequently encounter.

Framework of thinking

The research framework refers to technology-based competency development as a strategy to improve multinational companies' operational efficiency.

1. This study examines the significant influence of technology-based competency development strategies (E-learning, Virtual Reality, Mobile Learning) on the operational efficiency of

multinational companies. Competency development technology is expected to improve the quality of employee learning and skills effectively and efficiently. The application of this technology allows for more flexible and interactive training, reduces training time and costs, and accelerates adaptation to changes in the company. Thus, this strategy is expected to improve overall operational efficiency.

H_1: There is a significant influence between technology-based competency development strategies (E-learning, Virtual Reality, Mobile Learning) on increasing operational efficiency in multinational companies.

2. This hypothesis tests whether the use of E-learning in competency development strategies has a positive effect on the operational efficiency of multinational companies. E-learning allows employees to access training materials anytime and anywhere without being physically present. It reduces the time required for training and allows companies to train more employees quickly. Therefore, using E-learning is expected to increase the operational efficiency of companies by accelerating the training process and improving employee skills.

   H_2: The use of E-learning in competency development strategies has a positive impact on operational efficiency in multinational companies.

3. This hypothesis tests the effect of Virtual Reality Training and Mobile Learning technology on operational efficiency in multinational companies. Virtual reality technology provides a more immersive and realistic training experience, while mobile learning provides flexibility in various places. Both technologies can increase training effectiveness by providing employees with a more engaging and immersive experience. Thus, both technologies can significantly improve employee skills, improving the company's operational efficiency.

   H_3: The use of Virtual Reality Training and Mobile Learning technology in employee competency development positively impacts operational efficiency in multinational companies.

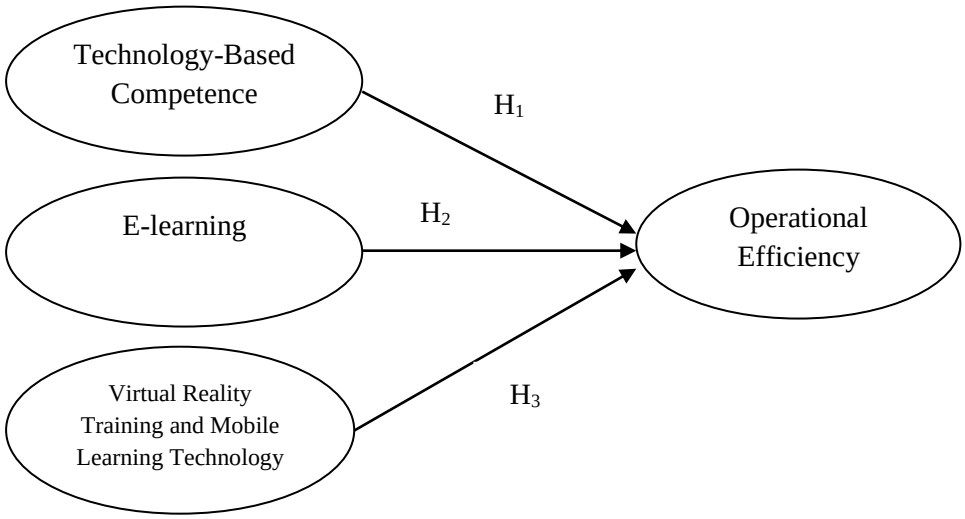

Figure 1 Thinking Framework

Hypothesis and Research Variables

This study divides variables into independent and dependent variables based on the hypothesis.

1. Hypothesis 1 (H_1): *There is a significant influence between technology-based competency development strategies (E-learning, Virtual Reality, Mobile Learning) on increasing operational efficiency in multinational companies.*
   - Independent variables: Technology-based competency development strategies (E-learning, Virtual Reality, Mobile Learning).
   - Dependent variable: Operational efficiency in multinational companies.
2. Hypothesis 2 (H_2): *Using E-learning in competency development strategies positively impacts operational efficiency in multinational companies.*
   - Independent variable: Use of E-learning in competency development strategies.
   - Dependent variable: Operational efficiency in multinational companies.
3. Hypothesis 3 (H_3): *Using Virtual Reality Training and Mobile Learning technology to develop employee competency positively impacts operational efficiency in multinational companies.*
   - Independent variables: Use Virtual Reality Training and Mobile Learning technology in employee competency development.
   - Dependent variable: Operational efficiency in multinational companies.

METHOD

Research methods

The quantitative approach employed in this research is characterized by a descriptive and explanatory research design. This approach enables researchers to assess the relationship between variables objectively, resulting in results that apply to the research context and can be generalized (Sugiyono, 2018). This method is often used in research that aims to test hypotheses and find the influence between variables, such as in the study of technology's influence on companies' operational efficiency (Creswell, 2014).

Types of research

The type of research used is descriptive-explanatory research. Descriptive research aims to describe the characteristics of multinational companies in developing technology-based competencies. In contrast, explanatory research aims to explain the relationship between technology-based competency development and operational efficiency.

Population and Sample

Population is the entire subject or object that is the focus of the research. At the same time, the sample is part of the population that is taken to be analyzed to provide conclusions that apply to the

entire population (Sugiyono, 2018). The population of this study encompasses all multinational corporations currently operating in Indonesia and have implemented technology to enhance the competencies of their employees. The research sample was taken from three multinational companies, namely PT X, PT Y, and PT Z, with 30 employees participating in a technology-based training program. The sample selection used a purposive sampling technique based on specific criteria relevant to the research objectives (Sekaran & Bougie, 2016). The total sample analyzed in this study was 90 people. The following is a table of the population and sample in this study:

Table 2. Population and Research Sample

Company	**Technology Used**	**Operational Location**	**Number of Samples**
Company X	E-learning, Cloud-based Learning Management System	Jakarta, Surabaya	30 people
PT Y	Virtual Reality Training, Digital Knowledge Platform	Bandung, Medan	30 people
PT Z	Mobile Learning Apps, AI-powered Learning Tools	Jakarta, Bali	30 people
Total			**90 people**

This sample selection is intended to obtain representative data so that the analysis's results can be used to draw conclusions that generally apply to multinational companies that use technology in employee competency development.

Data Collection Procedure

Data is collected in two main ways:

1. Questionnaire Survey

   The questionnaire was distributed to employees and HR managers of selected multinational companies. The survey was conducted online and offline using a secure survey platform.

2. In-depth Interview

   In addition to the questionnaire, in-depth interviews were conducted with several HR managers to gain a deeper understanding of implementing technology-based competency development and evaluating operational efficiency.

Data analysis

Descriptive and inferential statistical methods will be utilized to analyze the data gathered through questionnaires and interviews. Descriptive analysis is utilized to describe the characteristics of technology use in competency development as well as the profile of the respondents. Multiple linear regression analysis will be employed to investigate the impact of technology-based competency

development strategies on the company's operational efficiency. This test is carried out with the assistance of statistical software, specifically SPSS.

RESEARCH RESULTS AND DISCUSSION

Research result

1. The Impact of Technology-Based Competency Development on Operational Efficiency

Table 3

Multiple Linear Regression Results for the Effect of Technology-Based Competency Development on Operational Efficiency

Dependent Variable: Operational Efficiency	**Coefficient**	**Standard Error**	**t-statistic**	**Sig.**
Intercept	1,524	0.205	7,438	0.000
E-learning	0.657	0.089	7,389	0.000
Virtual Reality Training	0.543	0.093	5,838	0.000
Mobile Learning	0.398	0.082	4,850	0.000

Source: Data Processing, 2024

The table above shows the results of multiple linear regression to test the effect of technology-based competency development (E-learning, Virtual Reality, Mobile Learning) on the operational efficiency of multinational companies. All independent variables show a significant positive effect on operational efficiency, with a significance value of less than 0.05. It proves that technology-based competency development strategies can significantly improve the operational efficiency of multinational companies.

2. The Impact of E-learning Usage on Operational Efficiency

Table 4 Linear Regression Results for the Effect of E-learning Usage on Operational Efficiency

Dependent Variable: Operational Efficiency	**Coefficient**	**Standard Error**	**t-statistic**	**Sig.**
Intercept	1,437	0.212	6,772	0.000
E-learning	0.765	0.091	8,417	0.000

Source: Data Processing, 2024

The table above shows the results of linear regression that tests the effect of E-learning usage on operational efficiency. With a coefficient of 0.765 and a t-statistic value of 8.417, E-learning is proven to affect the operational efficiency of multinational companies significantly. E-learning allows employees to obtain flexible training, which positively impacts the company's operational efficiency, according to the expectations in the second hypothesis.

3. The Impact of Using Virtual Reality Training and Mobile Learning on Operational Efficiency

Table 3

Linear Regression Results for the Effect of Using Virtual Reality Training and Mobile Learning on Operational Efficiency

Dependent Variable: Operational Efficiency	**Coefficient**	**Standard Error**	**t-statistic**	**Sig.**
Intercept	1.123	0.205	5.478	0.000
Virtual Reality Training	0.612	0.094	6,517	0.000
Mobile Learning	0.452	0.087	5.188	0.000

Source: Data Processing, 2024

The table above shows the linear regression results that test the effect of Virtual Reality Training and Mobile Learning on operational efficiency. Both variables show positive and significant coefficients, with t-statistic values greater than 5, which confirms that using these two technologies can significantly improve the operational efficiency of multinational companies. These results support the third hypothesis that these two technologies significantly contribute to operational efficiency.

DISCUSSION

This investigation aims to investigate the impact of technology-based competency development on the operational efficiency of multinational corporations. The study's findings suggest that virtual reality training, mobile learning, and e-learning substantially impact operational efficiency. This discussion will examine the impact of this technology on the company's operational efficiency and compare the results of this study to those of previous studies.

1. The Impact of Technology-Based Competency Development on Operational Efficiency

   The results of this study indicate that technology-based competency development, including E-learning, Virtual Reality Training, and Mobile Learning, significantly impacts the operational efficiency of multinational companies. This study supports the findings of Adegoke and Olayemi (2020), which revealed that technology in competency development can increase productivity and efficiency. In addition, research by Harris and Williams (2021) also shows that cloud-based technology and e-learning can accelerate employee competency development, which increases the company's operational efficiency. Such technologies reduce training time and operational costs and increase training accessibility, which leads to increased operational efficiency.

   However, this study adds a new element by testing Virtual Reality and Mobile Learning technologies as part of competency development. Previous studies have focused more on E-learning or cloud-based technologies. Hence, this finding provides a new perspective on understanding how other advanced technologies can accelerate employee competency development.

2. The Impact of E-learning Usage on Operational Efficiency

The results of this study indicate that the use of E-learning has a positive effect on the operational efficiency of multinational companies. E-learning allows employees to access training flexibly, without time and place constraints. Research by Castillo and Lopez (2020) shows that E-learning significantly reduces training costs and allows employees to access relevant training materials more efficiently. It supports the findings of this study, which confirm that E-learning can reduce training costs and increase the operational efficiency of multinational companies.

Research by Purnama & Syafrudin (2022) also highlights the importance of E-learning in an increasingly digital workplace, showing that employees involved in E-learning programs show increased efficiency and productivity. Using E-learning, companies can train more employees at a lower cost, increasing operational efficiency.

3. The Impact of Using Virtual Reality Training and Mobile Learning on Operational Efficiency

The results of this study indicate that Virtual Reality Training and Mobile Learning technologies significantly impact operational efficiency in addition to e-learning. Virtual reality provides an immersive and realistic training experience, allowing employees to learn through simulations of real-world situations. Research by Gupta and Verma (2018) shows that using Virtual Reality can improve practical skills and operational efficiency by reducing errors in direct training. In addition, Mobile Learning allows employees to learn on their mobile devices, providing more flexibility in accessing training materials.

Previously, research by Johnson & Lee (2019) has shown that Virtual Reality is able to create a more realistic training experience, which is more effective than conventional training methods. Mobile Learning has also been shown to increase training efficiency by providing easier and faster access to learning materials, which is in line with the results of research by Smith & Vance (2020), which revealed that mobile applications can increase employee engagement and productivity.

This study supports previous studies showing that technology-based competency development can improve operational efficiency. For example, studies by Adegoke and Olayemi (2020) and Harris and Williams (2021) show that technology can accelerate competency development and reduce operational costs. However, this study introduces a new perspective by focusing on using Virtual Reality and Mobile Learning technologies, which have not been widely applied in previous studies.

In the context of multinational corporations, the utilization of technology in competency development not only enhances the efficiency of operational procedures but also makes it possible for employees to improve their skills more comprehensively. This research's findings show that implementing cutting-edge technology can assist businesses in becoming significantly more efficient in their operations and performance.

CONCLUSION

This investigation aims to investigate the impact of technology-based competency development on operational efficiency in multinational corporations, with a particular emphasis on the utilization of E-learning, Virtual Reality Training, and Mobile Learning. The results indicate that these three technologies significantly and positively impact the company's operational efficiency.

E-learning significantly contributes to improving operational efficiency by accelerating the training process and reducing operational costs. In addition, Virtual Reality Training offers a more realistic and immersive training experience, which can improve employees' practical skills. Mobile Learning provides flexibility in accessing training materials, increasing employee engagement and productivity.

The findings of this study are corroborated by various previous studies, which demonstrate that a company's operational efficiency can be enhanced by developing technology-based competencies. Furthermore, this investigation adds a novel dimension by testing Virtual Reality and Mobile Learning technologies, which have been demonstrated to enhance operational efficiency but have not been extensively implemented in prior research. Thus, the application of technology in employee competency development in multinational companies has been shown to improve operational efficiency, which has implications for cost reduction, skill improvement, and training effectiveness. Consequently, firms should contemplate integrating this technology into their competency development strategy to bolster their operational success and competitiveness in the global market.

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