



Analysis Of The Influence Of Digital Competency On The Effectiveness Of Technology Based Training

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Abstract

This study analyzes the influence of digital competencies on the effectiveness of technology-based training for operator-level employees. The adoption of Industry 4.0 technology significantly enhances the operator learning process, as shown in training at quality inspection stations. Operators supported by I4.0 technology demonstrate a higher learning rate than those without such support. This survey research collects data through questionnaires distributed to respondents selected using purposive sampling. The questionnaire consists of demographic data and research variables Digital Competence and Technology-Based Training Effectiveness measured using a 5-point Likert scale. The findings indicate that digital competence, including technological literacy, application mastery, and the ability to operate devices, positively affects training effectiveness. However, its influence is smaller than other factors, such as position level. This study implies that companies should enhance digital competency programs, integrate advanced technology into training modules, and tailor training methods based on employees' digital proficiency levels for optimal results.

Keywords: Digital Competence, Training Effectiveness, Industry 4.0 Technology

Introduction

An analysis of the influence of digital competencies on the effectiveness of technology-based training in employees at the operator level shows that the adoption of Industry 4.0 (I4.0) technology has a significant impact on the operator learning process. Studies conducted on the training of new operators at quality inspection stations show that operators supported by I4.0 technology have a higher learning rate compared to those who perform the same tasks without I4.0 support. While there was no significant difference in the level of final performance between the two groups, these results suggest that digital support can accelerate the process of operator training in a manufacturing environment. In addition, this study provides an argument to support managerial decisions regarding I4.0 adoption at the operational level, allowing organizations to prioritize their digitalization efforts (Kesuma Wardati & Hapzi Ali, 2023).

Digital competencies also play an important role in the effectiveness of training in the digital era. Empirical studies on bank employees show that pre- and post-training factors, such as the training environment, coach quality, trainee motivation, and authentic leadership, have a significant influence on training effectiveness. This research highlights the importance of digital competencies in improving training effectiveness, especially in facing the



challenges of the fourth industrial revolution. Thus, the development of employees' digital competencies is crucial to ensure that technology-based training can provide optimal results and support the development of human resources in the digital era (Gegenfurtner et al., 2014).

The phenomenon of analyzing the influence of digital competencies on the effectiveness of technology-based training for employees at the operator level has become very relevant at PT Frisian Flag Indonesia, especially in the era of digitalization that requires employees to adapt to new technologies. Digital competencies that include the ability to use software, utilize the internet, and understand technology-based systems are proven to increase training effectiveness, because employees who have better digital competencies will be faster to adapt to digital training methods and can maximize the implementation of training results in the workplace. Thus, digital competencies not only support the learning process, but also improve employee performance and ability to understand the material delivered through technology. Based on the results of pre-observation through Google Form carried out, the employees at PT. Frisian Flag Indonesia has considerable interest and enthusiasm for technology-based training.

Technology-based training supported by adequate digital competencies can create an interactive and more accessible learning environment. For employees at the operator level, this is an opportunity to improve their skills without having to leave their workplace, so that the company's efficiency and productivity increase. Good digital competence also helps employees adapt to technological changes in the production process and minimize errors in work that often arise due to lack of understanding of technology. Thus, the effectiveness of the training provided can be measured by how quickly and appropriately employees can apply the knowledge gained in daily tasks.

In the current era of industrial digitalization, digital competence is an important need in supporting the success of technology-based training, especially for employees at the operator level. Digital competencies include various skills such as understanding software, the ability to use web-based applications, and other technical skills that support technology-based work (Ng, 2012). At PT Frisian Flag Indonesia, increasing efficiency and productivity through technology-based training is the main focus in developing employee competencies. However, challenges arise due to the varying levels of digital competence among operator employees, which often impacts the successful implementation of such training. This raises the need to evaluate the extent to which employees' digital competencies affect the effectiveness of applied technology-based training.

The effectiveness of technology-based training is also influenced by the extent to which employees are able to adopt and apply the skills acquired during the training in their daily work. If employees have low digital competence, the process of adapting to new technologies can be slow and potentially reduce the effectiveness of training. In contrast, high digital competence allows employees to understand the training content better and quickly, thereby driving an increase in overall productivity. Therefore, this study aims to analyze the influence of digital competence on the effectiveness of technology-based training at PT Frisian Flag Indonesia, as well as provide recommendations for companies in designing training programs that are in accordance with the level of digital competency of employees.

Digital competencies play an important role in determining the effectiveness of technology-based training, especially since these competencies include basic to advanced abilities in utilizing technology for daily work. High digital competence allows employees to absorb and apply training materials more efficiently and on target, which in turn improves



learning outcomes and work productivity. Research shows that workers with higher digital competencies are able to adapt more quickly to technology-based training materials compared to those with low competencies. This shows that digital competencies serve as an important foundation for training effectiveness, as it allows employees to better understand the technology applied in training.

On the other hand, research by Martin (Martin et al., 2020) also revealed a positive relationship between digital competence and training effectiveness. Their study shows that employees with good digital competence tend to understand instructions more easily and have a higher sense of confidence in using new technologies. This allows them to be more responsive to the learning process and the application of new skills in their daily work. However, there are also studies that show the opposite result, such as the one by Chen, which found that digital competencies have no significant influence on training effectiveness in organizations with highly structured, hands-on, guidance-based training approaches. In this context, even employees with low digital competence can still take part in the training well because of the customized training approach.

The relationship between job title level and training effectiveness has been the focus of various human resource management research. Job titles in an organization often affect how individuals respond to and utilize training. Research shows that higher job titles are usually associated with greater commitment to training, as they often have greater leadership roles or responsibilities in the implementation of training outcomes. For example, research conducted by Noe (1986), (Sitzmann et al., 2008), and (Salas et al., 2012) found that individuals at the managerial level are more likely to apply training skills effectively, because they have greater authority to implement changes or knowledge gained. In addition, according to research (Aguinis & Kraiger, 2009), the effectiveness of training is also influenced by the ability to tailor training to specific needs at the managerial level, which increases the relevance of training to daily work.

Some studies show that the effect of job titles on training effectiveness is not always significant. For example, research conducted by (Ely, 2004) shows that the effectiveness of training is not significantly influenced by the level of position, but rather depends more on individual factors such as personal motivation and learning ability. In fact, in some organizations, employees at lower levels show significant improvement after training because they are more often directly involved in technical tasks relevant to the training material. These results are consistent with research (Tharenou et al., 2007) and (Cheng & Hampson, 2008), which states that the effectiveness of training depends on the context of the individual and the work environment, not just at the job level.

In a meta-analysis conducted by (Blume et al., 2010), training transfer is influenced by several factors that affect an individual's ability to apply the skills learned to their work environment. The study found that individual characteristics, training design, and work environment support play an important role in the effectiveness of training transfers. Factors such as participant motivation, commitment to self-development, and support from superiors significantly strengthen training transfer, especially for employees in managerial positions who have greater autonomy in implementing the skills learned. In the context of the job title, these findings show that those with higher positions in the organization tend to have more opportunities to put the training results into practice, which has a positive impact on the effectiveness of training transfers. However, Blume et al. also emphasized the importance of a supportive environment and the relevance of training to daily work, which is a crucial factor for all job levels in order to achieve effective training transfer.



Colquitt et al. (2000) through a meta-analysis of 20 years of research found that training motivation plays a key role in the effectiveness of training and the transfer of skills to the work environment. They develop a theory of motivation for training that includes aspects such as individual characteristics (e.g., self-confidence, need to develop), perception of training relevance, as well as social support from superiors and co-workers. Training motivation was found to have a positive correlation with training effectiveness, especially in employees at higher job levels, who are often more committed to developing their skills in line with greater responsibility. On the other hand, in employees with lower job titles, training motivation can be influenced by how they perceive the potential of training for their career advancement. These findings suggest that strong training motivation, supported by a development-driven work environment, can increase training transfers at all job levels, although higher levels tend to have greater opportunities to apply skills that have been learned. Based on these problems, it is necessary to hold an effective digital competency development strategy so that employees remain productive and do not have an impact on taking over employee duties at work. Therefore, the researcher is interested in conducting a study entitled "Analysis of the Influence of Digital Competence on the Effectiveness of Technology-Based Training in Employees at the Operator Level at PT Frisian Flag Indonesia".

Methods

This study employs a survey research method, collecting data through questionnaires to gather opinions or information about the current status of the research subject. It utilizes both descriptive and quantitative analyses, focusing on relationships between variables without making comparisons, as described by Sugiyono (2017). The research population comprises operator-level employees at PT Frisian Flag Indonesia, who play a key role in applying technology-based training. Sampling was conducted using a non-probability purposive sampling method, dividing the population into strata based on digital competence levels (low, medium, and high) to ensure proportional representation. A sample size of at least 150 respondents was determined based on Hair et al.'s (2010) formula, aligning with the study's 30 questionnaire indicators. Data were collected through structured questionnaires distributed both directly and online, comprising demographic questions and statements on Digital Competence and Technology-based Training Effectiveness, measured on a 5-point Likert scale. This dual distribution approach ensured broader participation, and the collected data were processed and analyzed quantitatively to meet the research objectives. The data analysis tool used in this research is smart-PLS, which aims to conduct direct testing on the independent variable against the dependent variable.

Results and Discussion

Respondent Profile

Table 1. Respondent Profile

Items	Type	Respondents	Percentage
Types of Kelamines	Man	15	42,9%
	Woman	20	57,1%
Age	18-24 Years	12	37,3%



25-30 Years	16	45,6%
31-35 Years	6	17,3%

Source: Questionnaire Data (2024)

Based on the survey results, the distribution of respondent profiles in this study shows quite diverse variations based on gender and age. In terms of gender, the majority of respondents were women with a total of 20 people (57.1%), while men amounted to 15 people (42.9%). Although this difference is not very significant, these results suggest that the survey successfully involved the participation of both genders, with little dominance from female respondents. In terms of age, the most respondents came from the age group of 25-30 years, which was 16 people (45.6%). Followed by the age group of 18-24 years with a total of 12 respondents (37.3%). The age group of 31-35 years is the least, only as many as 6 people (17.3%). This data indicates that the majority of respondents are of productive age, which is very relevant for research topics regarding digital competencies and the effectiveness of technology-based training. These findings provide important insights into the characteristics and needs of respondents, especially in the context of analyzing the influence of digital competencies on the effectiveness of technology training for operator-level employees. Given that the majority of respondents are aged 18-30 years, the development of technology-based training can be focused on the digital preferences and abilities of this age group. Thus, the designed training strategy can be more optimal and in accordance with the demographics of the target respondents.

Validity Test

Table 2. Validity Test

Variable	Statement	Outer Loadings	Information
Y	Y.1	0,719	Valid
	Y.2	0,850	Valid
	Y.3	0,759	Valid
	Y.4	0,842	Valid
	Y.5	0,818	Valid
	Y.10	0.801	Valid
X1	X1.1	0,788	Valid
	X1.3	0,721	Valid
	X1.4	0,754	Valid
	X1.5	0,788	Valid
	X1.10	0,779	Valid
X2	X2.2	0,756	Valid
	X2.3	0,746	Valid
	X2.4	0,755	Valid
	X2.10	0,861	Valid

Source: SmartPLS 4 Ouput Data

The results of the validity test conducted using SmartPLS in a study entitled "Analysis of the Influence of Digital Competency on the Effectiveness of Technology-Based Training in Employees at the Operator Level at PT Frisian Flag Indonesia" showed that all indicators in



each variable met the specified validity criteria. This is evidenced by the Outer Loading value of each indicator that is above 0.7, indicating that these indicators are able to represent the variable construct significantly and relevantly. For the Training Effectiveness (Y) variable, the Y.1 to Y.10 indicator has an Outer Loadings value that ranges from 0.719 to 0.850. All of these indicators have been declared valid, which means that the statements on these variables have successfully identified the factors that affect the effectiveness of technology-based training. This validity corroborates that aspects such as material understanding, performance improvement, and technology application have been accurately measured in this study. In the Digital Competency variable (X1), the indicator X1.1 to X1.10 shows an Outer Loadings value between 0.721 to 0.788. These results ensure that all indicators are valid, indicating that elements of digital competence, such as technological literacy, application mastery, and the ability to operate technological devices, have been well represented. This confirms that employee digital competencies have a significant role in increasing the effectiveness of technology-based training. Meanwhile, the Position Level variable (X2) has an Outer Loadings value in the X2.1 to X2.10 indicator which is in the range of 0.729 to 0.861. These results prove that all indicators are valid, indicating that factors such as job responsibilities and hierarchical positions in the organization have been measured appropriately. These findings emphasize that job title level is an important element that affects the effectiveness of technology-based training.

Overall, the results of this validity test provide evidence that all the instruments used in this study have met the standards required to accurately measure each variable. All indicators consistently make a significant contribution to the constructed representation. The next stage is to conduct reliability analysis and hypothesis testing to understand the relationship between digital competence, job level, and training effectiveness. The results of this validity are a solid foundation for further analysis, which is expected to provide strategic recommendations for the company.

Reliability Test

Table 3. Reliability Test

	Cronbach's Alpha	(rho_a)	Composite Reliability	AVE
X1	0,918	0,929	0,931	0,601
X2	0,904	0,909	0,923	0,601
Y	0,938	0,941	0,948	0,645

Source: SmartPLS 4 Ouput Data

Based on the results of the reliability test on the research instrument, Cronbach's Alpha value showed very satisfactory results on all variables analyzed. For the variables of Digital Competency (X1), Position Level (X2), and Training Effectiveness (Y), Cronbach's Alpha values were 0.918, 0.904, and 0.938, respectively. The value exceeded the minimum threshold of 0.70, which indicates that the instrument has an excellent level of internal consistency in measuring the construct being studied. This means that the items in each variable have a strong relationship and are able to consistently represent the same concept.

In addition, the Composite Reliability (rho_c) value also showed high results, namely 0.931 for X1, 0.923 for X2, and 0.948 for Y. All of these values are above the minimum threshold of 0.70, which confirms that the research instrument has excellent reliability.



Therefore, the data obtained from this instrument can be relied on for further analysis purposes. In terms of convergence validity, the Average Variance Extracted (AVE) values for variables X1, X2, and Y are 0.601, 0.601, and 0.645, respectively. An AVE value greater than 0.50 indicates that the instrument is able to explain most of the variances of the measured construct, thus meeting the convergence validity criteria well. Overall, the results of the reliability and validity tests show that the research instruments are of excellent quality to be used in the next stage of analysis. High scores on Cronbach's Alpha, Composite Reliability, and AVE ensure that the instrument is consistent, reliable, and relevant for measuring the variables studied. Thus, this instrument is ready to be used to support data analysis and hypothesis testing in this study.

R Square Test

Table 4. R Square Test

	R-Square	R-Square Adjusted
Y	0,733	0,714

Source: SmartPLS 4 Ouput Data

The results of the analysis show that the R Square value of 0.733 means that the regression model used is able to explain 73.3% of the variation in the dependent variable (Y). That is, most of the changes in the dependent variables can be explained by the independent variables included in the model. This shows that the model has a good degree of match to describe the relationship between the variables analyzed. In addition, the R Square Adjusted value of 0.714 reflects an adjustment to the number of independent variables in the model. This adjustment is important to reduce the risk of overfitting, especially when the model involves many independent variables. The small difference between the R Square and R Square Adjusted values indicates that the model is quite efficient and does not include independent variables that contribute less. However, there were still 26.7% (100% - 73.3%) of variations in dependent variables that could not be explained by the model. This shows the possibility of other factors outside the independent variables used in this study that also affect the dependent variables. Therefore, although this model is good enough in explaining the relationship between variables, further evaluation is still needed. This step can include reviewing the independent variables used as well as testing regression assumptions to ensure the model has better quality and accuracy.

Test Path Coefficients

Table 5. Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistic (O/STDEV)	P-Values
X1 -> Y	0.216	0.237	0.099	2.179	0.029
X2 -> Y	0.715	0.707	0.106	6.767	0.000

Source: SmartPLS 4 Ouput Data

The results of data analysis in the table show a significant relationship between the variables studied. In the relationship between Digital Competency (X1) and Training Effectiveness (Y), the original sample value of 0.216 indicates a relatively small positive



influence. This is reinforced by a t-statistics value of 2.179, which surpasses the critical value of 1.96 at a significance level of 5%, as well as a p-value of 0.029, which is smaller than 0.05. Thus, it can be concluded that Digital Competency has a significant impact on Training Effectiveness. Digital competency also plays a crucial role in enhancing training effectiveness, as it equips individuals with the necessary skills to navigate, understand, and utilize technology-based learning tools efficiently. Employees with strong digital competencies can quickly adapt to digital training platforms, interact seamlessly with learning materials, and apply acquired knowledge more effectively in their work environment. Furthermore, proficiency in technological literacy, software applications, and digital tools fosters a more engaging and interactive learning experience, ultimately leading to improved knowledge retention and skill development. Meanwhile, the relationship between Position Level (X2) and Training Effectiveness (Y) showed an original sample value of 0.715, which reflects a very strong positive influence. This result is supported by a t-statistics value of 6.767, which far exceeds the critical value of 1.96, as well as a p-value of 0.000, which indicates a very high level of significance (below 0.01). The reason why the level of position has a significant impact on training effectiveness is because employees at different organizational levels have distinct roles, responsibilities, and skill requirements that influence how they absorb and apply training. Higher-level employees, such as managers or supervisors, often require training that focuses on strategic thinking, leadership development, and complex decision-making, enabling them to guide teams and drive organizational goals. Their prior experience and broader understanding of the organization allow them to more easily grasp advanced concepts and implement them effectively. On the other hand, employees in lower-level positions typically need training that is more task-oriented, focusing on technical skills, operational procedures, and specific job-related tasks. These findings confirm that the Position Level has a much greater influence on Training Effectiveness than Digital Competencies. Overall, both relationships provide empirical evidence that both Digital Competencies and Job Titles play a significant role in improving Training Effectiveness. However, the contribution of the Position Level to Training Effectiveness is clearly more dominant than Digital Competence, as reflected in the original sample value and t-statistics.

Conclusion

This study concludes that digital competence significantly and positively influences the effectiveness of technology-based training for operator-level employees at PT Frisian Flag Indonesia, as competencies like technological literacy and application mastery enhance the absorption of training materials. However, the impact of digital competence is less dominant compared to job position level, as employees with higher roles demonstrate greater ability to implement training outcomes due to increased responsibilities and access to development opportunities. To improve training effectiveness, companies should focus on enhancing digital competencies at the operator level by tailoring training materials to their capabilities and fostering a supportive work environment that aligns training relevance with daily tasks. However, this study has certain limitations. First, the research focused only on operator-level employees at one company, limiting the generalizability of the findings to other industries or organizational settings. Second, the study relied on self-reported data, which could be subject to bias or inaccuracies. Additionally, other external factors, such as organizational culture, training delivery methods, or the availability of technological tools, were not thoroughly explored, even though they may also play a significant role in shaping



training effectiveness. Additionally, other factors, such as work environment support and individual motivation, also influence training outcomes, highlighting the need for future research to explore these aspects for a more comprehensive understanding.

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