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Analysis of the Effect of the Use of *a Learning Management System* on the Improvement of Human Resource Competence Using the " " Method, *Partial Least Squares*, and *Structural Equation Modeling*

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ABSTRACT

Digital transformation drives companies to continuously develop human resource (HR) competencies to remain relevant and competitive. One of the main challenges is ensuring that technology-based learning systems, such as Learning Management Systems (LMS), are truly effective in supporting employee competency development. This study aims to analyze the impact of the use of the TAMARA LMS at PT IDStar Cipta Teknologi on improving HR competencies and formulate improvement strategies based on the evaluation of the Technology Acceptance Model 2 (TAM2). The approach used is a mixed methods approach, with quantitative analysis using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) technique, and qualitative analysis through in-depth interviews. The results indicate that Perceived Ease of Use and Attitude Toward Using have a significant effect on Actual Usage, while several external constructs in TAM2, such as Job Relevance and Result Demonstrability, do not show a strong influence on Perceived Usefulness. Qualitative findings support the contribution of LMS to improving soft skills and digital skills, but also highlight challenges such as the lack of regular evaluation, limited content, and minimal managerial support. A synthesis of the two approaches concludes that the TAM2 model remains relevant but needs to be refined to suit the organizational context. This study provides strategic recommendations for optimizing the role of the LMS as an effective and sustainable HR development tool.

Keywords: Learning Management System (LMS), HR competency, TAM 2, PLS-SEM, IT consultant.

INTRODUCTION

Rapid technological advancements and the dynamic global industry landscape demand that companies continuously innovate and adapt, particularly in the highly competitive information technology (IT) sector. *PT IDStar Cipta Teknologi*, as an IT consulting company specializing in manpower outsourcing, plays a strategic role in providing talent that is not only technically competent but also adaptable to various technology ecosystems used by clients, such as those in the banking and insurance sectors. In addressing these challenges, technological readiness is an absolute requirement. This aligns with the Technology Acceptance Model 2 (TAM2) theory explained by Maita & Majid (2022), which states that the success of technology adoption heavily depends on the perceived ease of use and perceived usefulness of the implemented system.

To ensure that learning through an LMS truly contributes to competency improvement, companies implement Key Performance Indicators (KPIs) as a measure of success. KPIs are considered effective if they meet the criteria of being measurable, relevant, and actionable (Franco-Santos et al., 2012). However, the effectiveness of KPIs in the context of an LMS is influenced by various factors. Based on findings (Al-Fraihat et al., 2020), there are six main factors that influence the success of an LMS, which also impact the achievement of KPIs: system quality, information quality, service quality, perceived usefulness, user satisfaction, and net benefits or the final benefits felt by users. If these factors are not met, performance indicators become irrelevant or difficult to achieve. Additionally, measurement should not rely solely on quantitative data such as evaluation scores or the number of modules completed but must also consider emotional engagement and user perceptions. In this context, qualitative

approaches such as interviews and in-depth discussions play a crucial role in capturing the context of LMS usage. Wang et al. (2007) demonstrated that this approach can uncover psychological and structural dimensions not reflected in numbers, resulting in a more comprehensive system evaluation.

At *PT IDStar*, the KPIs implemented include Customer Performance Complaints, Self Development (Training), Customer Satisfaction, and Delivery Excellence. All of these indicators are designed to ensure that talent performance meets client standards and needs. To support this, the company implements an LMS as an internal learning medium, where each talent can access training modules tailored to their respective roles. The content includes theory, practice, and project-based evaluations, with the assessment process directly supervised by technical supervisors such as tech leads or supervisors. Learning activities are monitored through the LMS dashboard, enabling real-time tracking. The LMS also accommodates various learning styles through diverse delivery formats such as videos, interactive simulations, and quizzes, while offering flexibility in access without time or location restrictions. However, several challenges remain, such as low consistency in completing training and delays in updating materials. These conditions have the potential to reduce the perceived usefulness of the LMS, as emphasized by Prakarsa et al. (2023), who note that the availability and relevance of materials are crucial in maintaining motivation and ensuring the sustainability of digital learning system usage.

To understand the effectiveness of the system more comprehensively, the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was used in this study. PLS-SEM is considered appropriate because it can handle complex models and data with non-normal distribution characteristics or small samples (Zeng et al., 2021). This method was used to explore the relationship between LMS usage and improvements in technical and managerial competencies, as well as how learning factors such as gamification, user satisfaction, and intrinsic motivation influence engagement. Gamification has been proven effective in increasing user engagement in LMS through elements such as points, badges, and leaderboards (Huang & Hew, 2021), while experiential learning, which emphasizes learning based on real-world experiences, has also been shown to enhance conceptual understanding and problem-solving skills (Saragih et al., 2022; Susiloningsih et al., 2023).

In addition, a combination of quantitative and qualitative approaches is important to capture dimensions that cannot be fully measured through numerical data. Interviews with users or experts enable organizations to gain a deeper understanding of perceptions and contexts regarding LMS usage. As stated by Wang et al. (2007), this method is effective in revealing psychological and structural factors that influence the success of learning systems in organizational environments. By integrating this approach, organizations can design more targeted KPIs and learning strategies, as well as strengthen the role of the LMS as a key tool in developing excellent human resources that are adaptive to the challenges of the digital industry.

The study has several limitations that need to be acknowledged. First, the research focuses exclusively on IT consulting companies, which means the findings may not be generalizable to organizations in other sectors. Second, the assessment of the Learning Management System (LMS) effectiveness is confined to technical and managerial competencies of employees, omitting other critical aspects such as work motivation, job satisfaction, or employee loyalty. Third, the sample is restricted to employees who participated in LMS training during a specific timeframe, limiting the scope of the results to short-term effects of LMS usage.

Building on this context, the study aims to achieve three primary objectives. First, it seeks to identify the key factors that significantly influence learning outcomes and competency improvement among employees through the LMS. Second, it aims to evaluate how the quality of LMS content affects user satisfaction and, consequently, the enhancement of employee

competencies. Third, the study intends to provide actionable recommendations to optimize LMS implementation, grounded in an evaluation of the Technology Acceptance Model (TAM) theory. These objectives collectively aim to enhance the effectiveness of the LMS as a tool for human resource development in the digital era.

Despite these limitations, this research provides valuable insights that can benefit both academic and practical applications. By identifying the key factors that influence learning outcomes and competency development through the LMS, the study contributes to the broader understanding of technology-driven human resource development. The findings also offer organizations actionable strategies to enhance LMS content quality, improve user satisfaction, and ultimately boost employee competencies. Furthermore, the recommendations derived from the evaluation of the Technology Acceptance Model (TAM) theory can help companies optimize their LMS implementation, ensuring it aligns with organizational goals and maximizes its potential as a tool for continuous learning and professional growth. These outcomes not only advance academic discourse on e-learning systems but also provide practical guidance for businesses navigating digital transformation in workforce development.

METHOD

Research Flowchart

This study aims to analyze the relationship between the use of *Learning Management Systems* (LMS) and the improvement of human resource (*HR*) competencies using the *Technology Acceptance Model 2* (*TAM2*), while incorporating variables from the *Unified Theory of Acceptance and Use of Technology* (*UTAUT*) model. By applying the Partial Least Squares (*PLS*) and *Structural Equation Modeling* (*SEM*) methods, this study explores the relationship between the main variables, such as the effectiveness of LMS usage and ease of access, as well as their impact on improving HR competencies. This approach aims to delve deeper into how the LMS can facilitate employee skill development and support organizational success. It is hoped that the results of this study can provide practical guidelines for companies to optimally utilize LMS in enhancing their human resource competencies, and enrich the understanding of the role of technology in HR competency development in the digital era.

Research Design Stage

1. **Reasons for using PLS-SEM**

The Partial Least Squares Structural Equation Modeling (*PLS-SEM*) method was chosen in this study because of its flexibility and advantages in dealing with various methodological challenges. This method is highly useful for analyzing data with small sample sizes, non-normally distributed data, and complex models. Additionally, *PLS-SEM* enables the measurement of formative constructs and supports exploratory research to identify new relationships among latent variables. In operations management research, *PLS-SEM* is frequently used for theory validation, new theory development, and an emphasis on prediction (Bayonne et al., 2020). Meanwhile, Zeng et al. (2021) emphasize that *PLS-SEM* is an ideal method for research focused on prediction and complex data analysis, making it a relevant and effective tool in research contexts involving complex structural models.

Table 1. Reasons for using PLS-SEM

Specific Reasons	Number of articles	Percentage (of 139)
Small sample size	8	5

Specific Reasons	Number of articles	Percentage (of 139)
Data is not normal	5	40.29
Exploratory research	44	31.65
Formative steps	23	16.55
Focus on prediction	20	14.39
Model complexity	20	14.39
Theory development	10	7.19
Theory validation	9	6.47
Categorical variables	7	5.04
Mediation effect	6	4.32
Not determined	11	7.91

Source: (Zeng et al., 2021)

2. Determining the Type of Quantitative and Qualitative Research

This study uses a *mixed methods* approach, which combines quantitative and qualitative methods to obtain a more comprehensive understanding of the phenomenon being studied—namely, the effect of the use of a *Learning Management System* (*LMS*) on the improvement of human resource (*HR*) competencies. Quantitative methods are used to test causal relationships between constructs in a conceptual model developed based on the *Technology Acceptance Model 2* (*TAM2*) and the *Unified Theory of Acceptance and Use of Technology* (*UTAUT*). Quantitative data collection was conducted through the distribution of questionnaires, which were then analyzed using *Partial Least Squares Structural Equation Modeling* (*PLS-SEM*) to measure the strength and direction of relationships between variables in the model. Meanwhile, a qualitative approach was used as a complement to explore in greater depth the perspectives, experiences, and perceptions of users toward the LMS—perspectives that cannot be fully captured through numbers or statistics. Qualitative data collection techniques were conducted through in-depth interviews with a selected number of respondents. Thus, this qualitative approach plays a role in confirming, enriching, or even explaining quantitative findings that may be ambiguous. The combination of these two approaches is expected to provide a more comprehensive picture, both in terms of statistical measurement and contextual depth, of the factors influencing LMS usage and its impact on HR competency improvement.

3. Determining the Variables to be Measured

After determining the type of research, the next step is to determine the variables to be measured in this study. The variables selected must be relevant to the research objectives, which is to measure the influence of LMS usage on HR competency improvement. These variables may include aspects such as the level of LMS usage, user satisfaction with the LMS, and indicators of HR competency improvement. Each variable will be measured using a *Likert* scale that allows respondents to express their agreement or disagreement with the statements provided in the questionnaire.

4. Designing a Model Based on TAM2 or UTAUT Theory

At this stage, a literature review is conducted to explore the *Technology Acceptance Model 2* (*TAM2*) and *Unified Theory of Acceptance and Use of Technology* (*UTAUT*), which serve as the main foundation for formulating the conceptual model. The conceptual model proposed in this study integrates external variables from TAM and relevant constructs from UTAUT. Although the UTAUT model includes four moderating variables,

namely *Gender*, *Age*, *Experience*, and *Voluntariness of Use*, these four variables were omitted in this study for the following reasons:

1. **Focus on organizational context:** The LMS used in IT consulting companies is mandatory for all employees, so the construct of Voluntariness of Use is irrelevant because there is no freedom to choose whether or not to use the LMS.
2. **Homogeneity of respondent characteristics:** The majority of LMS users in this company are young professionals with relatively similar age and work experience, so the variables *Age* and *Experience* do not show significant variation and are unlikely to contribute meaningful moderation in the model.
3. **Minimal gender differences in system usage:** The LMS is used for role-based training that does not significantly differentiate between male and female users. Therefore, the influence *of Gender* as a moderating variable is considered insignificant.

Considering this context, the model was simplified by removing moderator variables to maintain the focus of the analysis on the relationships between the main constructs that are empirically and practically relevant in the organizational context.

The variables in this study include:

a. Exogenous/Independent Variables
   - *Job Relevance* (JR), which refers to the perception of how relevant the content in the LMS is to the user's job tasks. (Alharbi & Drew, 2014) indicate that JR significantly influences *Perceived Usefulness* (PU), as users are more likely to use technology if the content supports their work.
   - *Result Demonstrability* (RD), which refers to the extent to which the benefits of using the LMS can be demonstrated concretely, such as improved understanding or skills (Venkatesh & Davis, 2000).
   - *Computer Self-Efficacy* (CSE), which is the user's belief in their ability to operate the LMS effectively. A study by (Fathema & Shannon, 2015) demonstrated that CSE influences PU and *Perceived Ease of Use* (PEOU).
   - *Perceived Enjoyment* (PE), which reflects positive experiences and feelings of enjoyment when using an LMS (Liaw et al., 2007). From the UTAUT perspective, *Performance Expectancy* (PEX) and *Effort Expectancy* (EEX) are added as exogenous variables, representing users' expectations that the LMS will improve performance and their perception that the LMS is easy to use (Venkatesh et al., 2003b). *Social Influence* (SI) is also used as an exogenous variable, describing pressure or encouragement from the work environment, such as supervisors or colleagues, to use the LMS (El-Masri & Tarhini, 2017).

b. Endogenous/dependent variables
   - *Actual Usage* (AU), how often and to what extent the LMS is used in work and training activities. Although Actual Usage is used as a dependent variable in the conceptual model (Figure 3.2), this variable more accurately represents LMS usage behavior rather than a direct indicator of HR competency improvement. In the context of learning systems like LMS, usage frequency indicates user engagement but does not necessarily reflect comprehensive competency transformation.

Therefore, in this study, Actual Usage is positioned as an indirect indicator that needs to be combined with other evaluation approaches. A qualitative approach through interviews is used to capture more comprehensive dimensions of competency, such as changes in work behavior, soft skills, and managerial perceptions of employee capability improvement.

c. Mediation Variable
   - *Perceived Usefulness* (PU), the perception that using the LMS is beneficial in supporting work and competency development.
   - *Perceived Ease of Use* (PEOU), the perception that the LMS is easy to use. These two variables form *Attitude Toward Using* (ATU), which is the user's attitude toward the system, which then influences behavioral intention and actual usage.

Actual Usage is a dependent variable that describes how often and to what extent employees use the LMS in learning activities. In the context of digital learning systems, active and continuous use of the LMS reflects engagement in the learning process but does not necessarily indicate that employee competencies have improved. Therefore, *Actual Usage* in this model is positioned as a process indicator, not a direct indicator of HR competency improvement. To gain a more complete and valid understanding of competency improvement, LMS usage needs to be combined with other evaluation methods, such as pre- and post-tests, skill tests, and work behavior observations. In this study, a qualitative approach through interviews was used as a complement to capture changes in competency more deeply. This additional evaluation is important to explain the impact of LMS on aspects such as changes in work behavior, skill mastery, and managerial perceptions of employee performance improvement. Thus, *Actual Usage* serves as a proxy indicator of involvement in learning that can lead to indirect improvements in HR competency.

The following Table 2 also provides explanations and references for the definitions of each research variable.

Table 2. Definition of Research Variables

Variable	Definition	Source
***Technology Acceptance Model* (TAM)**		
Perceived Usefulness (PU)	Users' perception of the benefits of technology.	(Davis, 1989a)
Perceived Ease of Use (PEOU)	Users' views on the extent to which technology is easy to use.	(Davis, 1989a)
Attitude Toward Using (ATU)	Positive or negative attitude toward the use of technology.	(Shroff et al., 2011)
Actual Use (AU)	The actual use of technology that can be measured through frequency and duration of use.	(Asiimwe & Grönlund, 2015)
Usage Behavior (UB)	Actual and sustained behavior in using technology, including frequency, intensity, and consistency of use after initial adoption.	(Venkatesh et al., 2012)
External Factor TAM		
Job Relevance (JR)	Perception of the extent to which the material in the LMS is relevant to the user's job tasks	(Alharbi & Drew, 2014)

Variable	Definition	Source
Result Demonstrability (RD)	The extent to which the benefits of using the LMS can be demonstrated in tangible terms, such as improved understanding or skills.	(Fathema & Shannon, 2015)
Computer Self-Efficacy (CSE)	Users' belief in their ability to effectively operate an LMS.	(Fathema & Shannon, 2015)
Perceived Enjoyment (PE)	The level of enjoyment or pleasure users experience when using an LMS.	(Liaw et al., 2007)
Unified Theory of Acceptance and Use of Technology (UTAUT)		
Performance Expectancy (PEX)	The extent to which users believe that using the LMS will improve their work performance or productivity.	(Venkatesh et al., 2003a)
Effort Expectancy (EEX)	The perceived ease of understanding and using the LMS	(Venkatesh et al., 2003a)
Social Influence (SI)	Pressure from the work environment, such as supervisors or colleagues, to use the LMS	(El-Masri & Tarhini, 2017b)

Source: Developed based on the synthesis of TAM2 (Davis, 1989) and UTAUT (Venkatesh et al., 2003) theories

a. Data Collection Stage

i. Determining the Population and Sample

The population of this study consists of IT consulting company employees who actively use *a Learning Management System* (LMS) for competency development. The sample was determined using *purposive sampling* with criteria for respondents who have active experience using LMS within a certain period, making them relevant to the research objectives. Based on the designed structural model, the minimum sample size was calculated using the *Rule of Thumb 10-Times* approach, which is 10 × the largest number of indicators in the latent construct with the most indicators or the largest number of entry paths into the latent construct in the structural model.

ii. Preparing the Questionnaire on LMS Usage

After determining the sample, the next step is to distribute the questionnaire to the respondents. The questionnaire is based on the *Technology Acceptance Model* 2 (TAM2) or *Unified Theory of Acceptance and Use of Technology* (UTAUT) and refers to Table 3.3 to collect data on the acceptance and use of the Learning Management System (LMS). The questionnaire is designed in an easy-to-understand format using a Likert scale, allowing respondents to rate their level of agreement or disagreement with the statements provided. Before being distributed to the selected sample, the questionnaire instrument was tested for validity and reliability to ensure that the data obtained is accurate and reliable for research analysis.

Table 3. Likert Scale

Description	Strongly Disagree (SD)	Disagree (DS)	Neutral (N)	Agree (A)	Strongly Agree (SS)
Score	1	2	3	4	5

Source: Adaptation of psychometric measurement standards (Likert 1932)

RESULTS AND DISCUSSION

Characteristics of Informants and Respondents

a) Respondent Description

Researchers distributed questionnaires to employees of PT IDStar Cipta Teknologi who use *a Learning Management System* in their competency development activities. The questionnaires were distributed in digital format using *Google Forms*, and 120 respondents completed and submitted valid questionnaires. Based on the questionnaire results, a descriptive analysis was conducted to describe the characteristics of the respondents. This technique was used to examine the distribution of data based on gender, age, highest level of education, job position, and frequency of LMS use by each respondent. This information is presented in detail in the following table.

Table 4. Respondent Characteristics

	Characteristics	Total	Percentage
Gender	Male	90	75
	Female	30	25
	Total	**120**	**100**
Age	20 - 25 years	41	34.2
	26 - 30 years	42	35
	31 - 35 years	26	21.7
	36 - 40 years	10	8.3
	Total	**120**	**100**
Level of Education	High School/Vocational School	30	25
	D1/D3	19	15.8
	Bachelor	58	48.3
	Master	13	10.8
	Total	**120**	**100**
Years of Service	Less than 2 years	29	24.2
	2–5 years	52	43
	More than 5 years	39	32.5
	Total	**120**	**100**
Position/Job Title	*Business Analyst*	28	23.3
	Developer	37	30
	DevOps/IT Infrastructure	8	6.7
	Quality Assurance	19	15
	Robotic Process Automation / Business Intelligence	6	5
	Scrum Master / Project Management	2	18.3
	Total	**12**	**100**

Source: Primary data of the research questionnaire (2023)

From Table 4 above, it can be seen that the characteristics of the respondents in this study consisted of 120 people, with the majority being male (90 people, 75.0%) and female (30 people, 25.0%). Based on age, the 26–30 age group dominates with 42 people (35.0%), followed by the 20–25 age group with 41 people (34.2%), the 31–35 age group with 26 people (21.7%), and the 36–40 age group with 10 people (8.3%). In terms of education, the majority of respondents were university graduates (58 people, 48.3%), followed by high school/vocational school graduates (30 people, 25.0%), diploma holders (19 people, 15.8%),

and master's degree holders (13 people, 10.8%). Based on work experience, 52 respondents (43.3%) have 2–5 years of work experience, 39 respondents (32.5%) have more than 5 years of work experience, and 29 respondents (24.2%) have less than 2 years of work experience. In terms of position or job title, the majority of respondents are *Developers* (37 respondents, 30.8%), followed by *Business Analyst with* 28 people (23.3%), *Scrum Master/Project Management* with 22 people (18.3%), *Quality Assurance with* 19 people (15.8%), *DevOps/IT Infrastructure* with 8 people (6.7%), and *Robotic Process Automation/Business Intelligence* with 6 people (5.0%).

b) Variable Description

Based on the data collected from each variable through the questionnaire distributed to 120 respondents, the description of each indicator can be determined. Table 5 shows the frequency distribution of the variables.

Table 5. Frequency Distribution of Variables

Factor	Indicator	Question	Mean	SD
Perceived Usefulness	**PU1**	LMS is very helpful in improving my technical and non-technical skills	4.43	0.718
	PU2	LMS has improved my ability to perform my daily work tasks.	4.446	0.695
Perceived Ease of Use	**PEOU1**	LMS is easy to use for competency improvement training	4.496	0.709
	PEOU2	I feel comfortable using the LMS to learn new things in my job	4.430	0.773
	PEOU3	The ease of the LMS makes me more interested in continuing to develop my competencies.	4.388	0.840
	PEOU4	The LMS encourages me to learn independently without relying on face-to-face training.	4.38	0.757
Attitude Toward Using	**ATU1**	I feel it is important to continue using LMS to improve my competencies.	4.273	0.92
	ATU2	I support the use of LMS as part of human resource development.	4.471	0.72
Actual Use	**AU1**	I regularly participate in training or competency modules through the LMS	4	1
	AU2	I have developed new competencies thanks to the use of the LMS	4,397	0.769
Usage Behavior	**UB1**	I tend to use the LMS even when not required by my supervisor	4.264	0
	UB2	I explore the features in the LMS on my own initiative.	4.405	0.962
Job Relevance	**JR1**	The material in the LMS is relevant to my job and helps improve my competencies	4.488	0.697
	JR2	The use of the LMS has helped me better understand the tasks in my job	4.438	0.752
Demonstrable Results	**RD1**	I can apply what I have learned from the LMS directly in my work.	4.36	0.742
	RD2	The benefits of LMS on improving my competencies are clearly visible in my performance	4.438	0.752
Computer Self-Efficacy	**CSE1**	I am confident in learning new competencies through LMS without the help of others	4.314	0.827
	CSE2	I feel capable of completing tasks through the LMS well	4.438	0.718

Factor	Indicator	Question	Mean	SD
Perceived Enjoyment	**PE1**	I enjoy the learning process in the LMS because it helps me develop professionally.	4.521	0.731
	PE2	The use of LMS makes me more motivated to improve my competencies.	4.488	0.787
Performance Expectancy	**PEX1**	LMS supports the achievement of my work competency targets	4.446	0.730
	PEX2	Training through LMS helps me be better prepared to face work challenges	4.438	0.805
Effort Expectancy	**EEX1**	I did not experience any significant difficulties in accessing training for competency improvement through the LMS.	4.347	0.854
	EEX2	The LMS presents the material in an easy-to-understand manner	4.496	0.697
Social Influence	**SI1**	My coworkers encourage me to improve my skills through LMS	4.149	0.937
	SI2	My supervisor supports the use of LMS as a means of improving competencies.	4.355	0.84

Source: Statistical analysis of questionnaire data using PLS-SEM

Based on Table 5, it can be seen that all indicators have a mean value above 4 with relatively low standard deviations, indicating a tendency for respondents to consistently answer "agree." In the *Perceived Usefulness* and *Perceived Ease of Use* factors, respondents assessed that LMS helps in task implementation and is easy to use. Attitudes toward using LMS (*Attitude Toward Using)* are also positive, as reflected in the high level of respondent support for the continued use of LMS. Although the AU1 indicator in the Actual Use factor has the lowest mean value (3.973), respondents generally still feel that LMS is beneficial for competency development. Other factors such as *Job Relevance, Result Demonstrability, Computer Self-Efficacy, Perceived Enjoyment, Performance Expectancy,* and *Effort Expectancy* also showed positive ratings. Meanwhile, *social* influence was slightly lower than other factors but still fell into the "agree" category. Overall, these findings indicate that acceptance of the LMS is high and supports its implementation in the training and human resource development process.

Table 6. Profile of Key Informants (INF-MGM)

Informant	Name	Age	Gender	Position	Years of Experience
INF-MGM1	Nilla	33	Female	*Head of Professional Service Acquisition*	7
	INF1 is *the Head of Professional Service Acquisition* at PT IDStar and has been working there for 7 years. She also has 5 years of experience as *a Talent Management Specialist*.				
INF-MGM2	Ananti	4	Female	*General Manager*	3
	INF2 is *the General Manager* at PT IDStar and has been working there for 3 years. She also has over 20 years of experience as *a Talent Business Manager and Learning and Development Manager*.				
INF-MGM3	Erwin	4	Male	*Chief Strategy and Growth Officer*	4
	INF3 is *the Chief Strategy and Growth Officer* at PT IDStar and has been working there for 4 years. He also has over 26 years of experience as *a Business Director and Learning and Development Manager*.				
INF-MGM4	Alvin	5	Male	*Partnerships Manager*	4

Informant	Name	Age	Gender	Position	Years of Experience
	INF4 is *a Partnerships Manager* at PT IDStar and has been working there for 4 years. He also has over 7 years of experience as *a Project Manager*.				
INF-MGM5	Prasetyo Keifan	3	Male	*Human Capital Manager*	3
	INF5 is *a Human Capital Manager* at PT IDStar and has been working there for 3 years. He has over 7 years of experience in this field.				

Source: In-depth interviews with key informants

Table 7. *Supporting Informant Profile* (INF)

Informant	Name	Age	Gender	Position	Years of Experience
INF1	Fachrizal	30	Male	*Mobile Developer*	5
	INF1 is a *Mobile Developer* at PT IDStar and has been working there for 5 years. He holds a Bachelor's degree in Computer Science from the Institute of Technology Sepuluh Nopember, graduating in 2017.				
INF2	Satrio		Male	*Frontend Developer*	4
	INF2 is a *Frontend Engineer* at PT IDStar and has been working there for 4 years. He holds a Bachelor's degree in Computer Science from Gunadarma University, graduating in 2019.				
INF3	Amin	2	Male	*Frontend Developer*	3
	INF3 is a *Frontend Engineer* at PT IDStar and has been working there for 3 years. He holds a Bachelor's degree in Information Systems from the Institute of Technology Tangerang Selatan.				
INF4	Yusuf		Male	*Frontend Developer*	2
	INF4 is a *Frontend Engineer* at PT IDStar and has been working there for 2 years. He holds a Bachelor's degree in Computer Science from Bina Sarana Informatika.				
INF5	Rohmat	3	Male	*Backend Engineer*	7
	INF5 is a *Backend Engineer* at PT IDStar and has been working there for 7 years. He holds a Bachelor's degree in Computer Science from Pamulang University.				
INF6	Haykal	3	Male	*DevOps*	3
	INF6 is a *DevOps* at PT IDStar and has been working there for 3 years. He holds a Bachelor's degree in Computer Science from Budi Luhur University.				
INF7	Nindia	3	Female	*Quality Assurance*	3
	INF7 is a *Quality Assurance* at PT IDStar and has been working there for 3 years. She holds a Bachelor's degree in Information Management from Bogor Agricultural University				
INF8	Fia		Female	*Quality Assurance*	2
	INF8 is a *Quality Assurance* at PT IDStar and has been working there for 2 years. She holds a Bachelor's degree in Computer Engineering from Bogor Agricultural University				
INF9	Adi		Male	*Frontend Developer*	5
	INF9 is a *Frontend Developer* at PT IDStar and has been working there for 5 years. He holds a Bachelor's degree in Computer Science from Pamulang University				
INF10	Gusti		Male	*Business Intelligence*	3
	INF10 is a *Frontend Developer* at PT IDStar and has been working for 5 years. He holds a Bachelor's degree in Computer Science from the National Veterans University of Jakarta				

Source: In-depth interviews with key informants

1) Observation Results

In this process, the researcher, who also serves as a talent at an IT consulting company, utilized an LMS as part of competency development activities. Through this direct experience, the researcher observed that some features within the system did not fully support the learning process optimally. Some of the challenges identified include an unintuitive user interface, inconsistent menu structure, and unclear system feedback after completing materials or quizzes. These obstacles indicate that perceptions of the ease and benefits of using the system have not yet been fully formed positively, which could ultimately affect attitudes and the intensity of LMS use in supporting competency improvement.

Data Analysis

a. Thematic Analysis

In this thematic analysis process, the researcher identifies and categorizes patterns of meaning from qualitative data to gain an in-depth understanding of the phenomenon being studied. This method allows researchers to systematically organize main themes based on the stages proposed by (Braun & Clarke, 2006), such as data coding, theme search, and report writing.

Table 8. Quotes, and Codes

INF	Quotation	Initial Coding
INF	"The use of LMS is very helpful in improving competence through more systematic and structured independent learning."	Benefits of LMS (competency improvement, self-directed learning, systematic)
INF1	"The training materials are generally appropriate for the needs, but some content feels too basic, so I need to seek additional references."	Training material relevance, Content limitations, Self-directed learning initiative
INF1	"The LMS fosters independence, discipline, and helps me understand new technologies to apply in my work."	Independence, Discipline, Understanding, Application
INF1	"Since the LMS doesn't always provide real-world case studies, I supplement it with external sources or other online courses."	Limited content, self-paced learning.
INF1	"LMS serves as the foundation for long-term learning and a culture of continuous learning, aligning human resource competencies with strategy."	Learning foundation, Learning culture
INF1	"Content should be personalized, supported by collaborative features and gamification to make learning more engaging and relevant."	Personalized content, Collaborative features, Learning communities, Gamification
INF2	"The LMS helps me learn new things outside of projects and develop my skills."	New learning, skill development
INF2	"Courses are selected by the team leader to align with members' needs and competencies."	Relevance of materials, role of supervisors
INF2	"So there are many options for solving problems."	Alternative solutions, problem solving
INF2	"The LMS is used on weekends or after work hours to avoid interfering with work."	Time management, learning flexibility
INF2	"Employees have equivalent competencies so that work is easier to do."	Competency equality, ease of work

INF	Quotation	Initial Coding
INF2	"The point system can be used as a reference for level advancement or level claims within the company."	Point system, career progression
INF3	"LMS supports skill development and knowledge enhancement that align with job responsibilities."	Skill development, knowledge, work support
INF3	"The material has been filtered according to role, making it more targeted and relevant to learn."	Content filtering, relevance, and accuracy
INF3	"I gained more knowledge, insights, and quickly identified biases from the training I attended."	Knowledge, insights, awareness of biases
INF3	"Sometimes confused about which materials to choose."	Confusion in selecting materials
INF3	"LMS is important in the digital age because it provides extensive and effective training."	The role of LMS, training effectiveness, digitalization
INF3	"There is a need to develop the sources and quality of materials to ensure that the knowledge gained is of high quality and up to date."	Development of materials, quality, and relevance
INF4	"LMS enhances knowledge, new skills, and can be applied in the workplace."	Knowledge, new skills, application
INF4	"Some LMS materials are relevant to my expertise, while others are not, but they are still useful for expanding my knowledge and learning new things."	Content relevance, knowledge, exploration
INF4	"I feel more confident in tackling work challenges."	Increased self-confidence
INF4	"If there is material that I don't understand, I look it up on Google or ask my seniors."	Understanding difficulties, learning initiative
INF4	"LMS is important as part of the organization's efforts to support employee well-being and development."	Role of LMS, organizational support, self-development
INF4	"It is hoped that certificates and rewards will be provided to encourage users to use the LMS more enthusiastically."	Certification, recognition, motivation
INF5	"The LMS enhances knowledge and skills that can be directly applied."	Competency improvement, direct application
INF5	"Most of the material is role-relevant, though some is not contextually appropriate."	Content relevance, contextual relevance
INF5	"I feel more confident, independent, and disciplined after using the LMS."	Self-confidence, independence, discipline
INF5	"Sometimes I'm confused about choosing materials, but I overcome this by using external references or asking seniors."	Confusion about materials, self-directed learning, collaboration
INF5	"LMS serves as the foundation for sustainable human resource development aligned with the company's strategy."	Human resource foundation, sustainability, strategy alignment
INF5	"Content needs to be improved, with additional collaborative features and rewards such as certificates or points."	Content improvement, collaborative features, recognition

Source: Encoded interview transcript

Table 8 Quotes and Codes shows the results of data processing from interviews containing direct quotes from informants regarding their experiences in using LMS. Each quote is given initial coding to capture the core meaning of the statement. After that, codes with similarities or interrelationships are grouped into main themes that are in line with the research objectives. This process is carried out systematically by identifying meaningful patterns in the

data. This stage is not only descriptive but also interpretive, so that researchers consider the context of the data and refer to relevant literature to ensure that the themes that emerge truly reflect the experiences and views of the informants.

Table 9. Thematic synthesis

Code	Theme	Literature
Enhancement of competencies, skills, knowledge, self-directed learning, application in work	Competency Development & *Self-directed Learning*	(Braun & Clarke, 2006; Y.-M. Cheng, 2011; Knowles, 1977)
Material relevance, role appropriateness, content relevance	Content and Contextual Relevance	(Alraimi et al., 2015)
Independence, discipline, learning initiative, self-confidence	Behavioral and Work Attitude Changes	(Braun & Clarke, 2006; Davis, 1989a; Knowles, 1977)
Learning foundations, human resource development, corporate strategy, material confusion, competency equality	The Role of LMS in Sustainable Human Resource Development	(Koole, 2009)
Personalized content, collaborative features, gamification, learning communities	Learning innovation in LMS	(Alraimi et al., 2015; Hamari et al., 2014; Koivisto & Hamari, 2019)
Certification, rewards, point systems, learning motivation	User Appreciation & Motivation in LMS	(Deci & Ryan, 2000)

Source: Thematic synthesis based on Braun & Clarke's theory (2006)

Table 6 illustrates the grouping of thematic analysis codes regarding the use of LMS in human resource competency development. Codes such as skill enhancement, material relevance, behavioral change, development strategies, feature innovation, and learning motivation are grouped into six main themes: *Competency Development, Material Relevance, Work Behavior Change, Role of LMS in Sustainable HR Development, Learning Innovation, and Appreciation & Motivation.* Each theme is supported by relevant literature, indicating that LMS plays a crucial role not only as a learning tool but also as an organizational strategy in promoting self-directed learning, work relevance, and enhanced employee motivation.

CONCLUSION

Based on the results of quantitative analysis, it was found that *Perceived Ease of Use* has a significant effect on *Perceived Usefulness* and *Attitude Toward Using*, which ultimately impacts *Actual Usage* of the *LMS*. In addition, *Attitude Toward Using* was also found to significantly influence actual usage, which is key to improving *HR* competencies. Qualitative findings reinforce this by showing that consistent use of the LMS has encouraged improvements in digital and soft skills, especially for motivated employees who receive support from their work environment. Quantitative results indicate that the *Job Relevance* variable does not significantly influence *Perceived Usefulness*, suggesting that LMS content that is not fully aligned with job requirements reduces the perceived benefits of the system. Meanwhile, qualitative interviews revealed that some users felt the learning content was less relevant and required regular evaluation to remain contextual with the challenges faced at work. This impacts user satisfaction and the effectiveness of the LMS in developing

functional competencies. The *TAM2* model remains relevant in describing technology acceptance, but the synthesis results suggest the need to refine the model by adding contextual elements. Informants suggested adding factors such as management support (including evaluation and monitoring of usage), reward systems (such as certificates or badges), and aligning content with organizational needs. By expanding the *TAM2* model contextually, organizations can more effectively implement LMS as a strategic tool in human resource development in the era of digital transformation.

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