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The Impact of Training 4.0 in Improving the Quality of Human Resource Management in the Digital Era with Work Readiness as an Intervening Variable

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Abstract

In the digital era, technological developments require the workforce to have relevant skills to increase efficiency and productivity in organizations. The purpose of this study was to examine the effect of Training 4.0 on the quality of human resources on the staff of the North Sumatra Education Quality Assurance Center (BPMP) with job readiness as an intervening variable. A total of 30 respondents who have worked at BPMP North Sumatra for at least 2 years were included in this quantitative research using the Partial Least Square (PLS) based Structural Equation Model (SEM) technique. The results showed that Training 4.0 has a direct and significant effect on the quality of human resources, work readiness has a positive effect on the quality of human resources, and Training 4.0 has a positive and significant effect on work readiness. In addition, work readiness is proven as a mediating variable in the relationship between Training 4.0 and HRM quality. This research underscores the importance of technology-based skills development in improving work readiness and human resource management effectiveness in the digital era.

Keywords : Training 4.0, work readiness, human resource management, digital era.

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INTRODUCTION

Humans must follow the latest technological developments in the modern world that continues to develop rapidly. The demands of the modern world cause changes in employment laws, which can result in situations where workers experience stress. Employees will quickly assume that there is pressure or demands that scare them and will cause conflict if they are unable to keep up with technological developments (Fath & Adji, 2021)

Given the current conditions, Indonesian workers and entrepreneurs must realize that we are living in the era of the fourth industrial revolution, which is characterized by advanced technology that makes everyone's life easier, including in the workplace. Therefore, it is only natural for them to acquire skills related to contemporary work systems. Likewise, because many workers and businesses, especially in Indonesia, still lack the skills needed to succeed in the contemporary workplace in the era of the industrial revolution 4.0. Workers and entrepreneurs who

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are unable to adapt to the industrial revolution 4.0 work system can be eliminated from the world of work and business (Setiaji et al, 2020).

Based on data from Garuda Kemendikbud, PT. Indoraya Sekaye, a manufacturing company founded in 1990, went bankrupt in 2020 after facing various challenges in adapting to changing times. The company's leadership is dominated by the Baby Boomer generation, with 60% of leaders over the age of 55, who tend to maintain conservative leadership patterns and are reluctant to take risks.

Table 1 Generation

Year Birth	**Generation Name**
1946 - 1964	Baby Boomers
1965 - 1980	Generation X
1981 - 1996	Generation Y (Millennials)
1997 - 2012	Generation Z
2013 to on	Generation Alpha

As a result, the company experienced a decline in performance due to its inability to adapt to new technologies. Lack of investment in innovation and failure to adopt increasingly rapid technological developments further worsened the company's condition. With leadership that still relied on old methods and avoided change, PT. Indoraya Sekaye was ultimately unable to compete in the increasingly competitive manufacturing industry, leading to its bankruptcy.

As a catalyst for business operations, human resources are an important component of every organization (Jun et al., 2021). This means that if an organization lacks quality human resources, the organization will not be able to function effectively. This shows that workers, as part of a company's human resources, have a significant impact on the success or failure of the company (Adair et al., 2018).

Strategic management of an organization's staff so that they can work effectively and efficiently in achieving organizational goals is known as human resource management. HR includes the functions of planning, recruitment, training, development, and performance evaluation. In the digital era, HR focuses on technology adaptation, competency enhancement, and work flexibility management (Dessler, G. 2020). There is also a gap in HR research in the digital era, namely that most Training 4.0 designs are designed without considering the specific needs of senior employees, who may have limitations in technological literacy. According to Kyndt et al. (2013), senior employees often feel less confident with new technologies, so a more inclusive training approach is needed, such as experiential learning methods or mentoring.

According to Robinson et al. (2007), work readiness is the ability of individuals to demonstrate skills that are in accordance with the needs of the organization or company, including technical competencies such as the ability to use Microsoft Office,

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SPSS, accounting software. And non-technical such as communication skills, teamwork, time management needed to succeed in the work environment. Based on the phenomena that occur, the perception of the older generation regarding work readiness is also different from the younger generation. The older generation may have more experience, but they also often face psychological and social challenges that affect their work motivation (Brown & Taylor, 2018).

Observations made on employees of the North Sumatra Education Quality Assurance Center (BPMP) show that they are dominated by the older generation. In this work environment, it has the potential to be a major challenge in facing industry 4.0. Because the older generation often has difficulty adapting to new technologies. This is due to their lack of understanding in using digital devices and sophisticated technology-based tools. They are more accustomed to traditional or manual systems that they have mastered for years. The impact is that delays in adopting technology can slow down work efficiency and organizations or companies can lose opportunities to increase productivity and service quality that can be achieved with the latest technology.

Therefore, the purpose of this study is to determine and evaluate the effect of 4.0 training on the quality of human resources and the readiness of workers at the North Sumatra Education Quality Assurance Center (BPMP) for the digital era. The quality of human resource management is the dependent variable, work readiness is the intervening variable, and 4.0 training is the independent variable in this study.

BPMP (Education Quality Assurance Center) of North Sumatra is an institution under the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia which is tasked with improving the quality of education at the provincial and district/city levels. BPMP is responsible for ensuring the quality of education through curriculum development, training of educators, as well as evaluation and monitoring of education quality standards (Ministry of Education, Culture, Research and Technology, 2022).

Digital skills theory by Martin and Grudziecki (2020) defines digital skills as basic competencies in understanding technology, practical use for daily tasks, and digital transformation in work. In training 4.0, this theory supports improving the quality of human resources by combining basic skills with practical applications to achieve digital transformation in the work environment. Human resource management, according to Hall T. Douglas and Goodale G. James (1986: 6), is the process of achieving the best fit between workers, jobs, organizations, and the environment so that workers perform and feel satisfied at the desired level and the organization achieves its goals. HR is the process of finding, selecting, training, retaining, and using human resources to achieve personal and organizational goals, according to Handoko (2001). Increasing productivity and effectiveness through performance-based and organized workforce management solutions is one of the main metrics of human resource management (HRM) (Armstrong & Taylor, 2020). In addition, another important indicator is increasing employee motivation and job satisfaction through reward systems, career development, and a supportive work environment (Robbins & Judge, 2019). In the digital era, technology-based performance indicators are also very

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important, where the use of big data and artificial intelligence in decision making can increase the efficiency and competitiveness of organizations (Stone et al., 2015).

According to adaptation theory, the process of adjustment or adaptation of individuals determines their capacity to interact with new cultural norms and values. To take advantage of the new environment, each person must overcome difficulties in adjustment. According to Susilo Toto Roharjo (2014) "Adaptation ability shows readiness and "the ability of individuals, groups of individuals or organizations to follow the changes that occur". Job Readiness is the ability of individuals to enter the workforce with skills, competencies, and attitudes that are in accordance with industry needs. Includes mastery of hard skills, soft skills, and adaptability to changes in the work environment. Job readiness is a key element in increasing the competitiveness of the workforce, especially in the digital era (Yorke, M. 2006). According to Brady (2010: 4) job readiness focuses on individual personal characteristics, such as work attitudes and body defense mechanisms needed when obtaining and maintaining jobs that have been obtained. Job readiness in the digital era has several main indicators, including mastery of digital technology that allows individuals to adapt to an increasingly digitalized work environment (Prensky, 2012). In addition, indicators of readiness to face change are also important factors, where the workforce must be flexible and able to adapt to the dynamics of the ever-evolving industry (Bridgstock, 2009). Increased self-confidence in facing professional challenges is also a crucial indicator of work readiness, as self-confident individuals are better able to take initiative and contribute maximally in the workplace (Bandura, 1997)

Human Capital Theory (Becker, 1964) Training is considered as an investment in human resources. Technology-based Training 4.0 (e.g. e-learning, VR, AI) improves employee knowledge and skills, which ultimately increases productivity and loyalty. Herman (2018) stated that training 4.0 is a process of improving skills that integrates digital technology and automation to prepare the workforce to face challenges in an increasingly complex work environment. The main indicators of training 4.0 are the relevance of training materials to modern technology (Schwab, 2017), improving digital skills such as data literacy and digital analysis (Brynjolfsson & McAfee, 2014), and understanding digitalization trends to adapt to technological changes (Wagner, Herrmann, & Thiede, 2021). Training 4.0 is a technology-based training approach that utilizes digital technologies such as big data, artificial intelligence, virtual reality, and other elements of the industrial revolution 4.0. The goal is to improve workforce competency according to the needs of today's dynamic industry. Training 4.0 also emphasizes independent and collaborative learning (Schwab, K. 2017).

The goal of training 4.0, a digital technology-based training strategy, is to improve employee skills in dealing with industry 4.0 issues such as automation and digitalization of work processes. This training is based on Adult Learning Theory (Knowles, 1980), which highlights the value of experience and independence in adult learning processes, and Human Capital Theory (Becker, 1964), which asserts that training expenditures can increase employee productivity. According to Training Transfer Theory, the application of skills that participants have learned in the workplace is also a major factor in the success of training (Baldwin & Ford, 1988).

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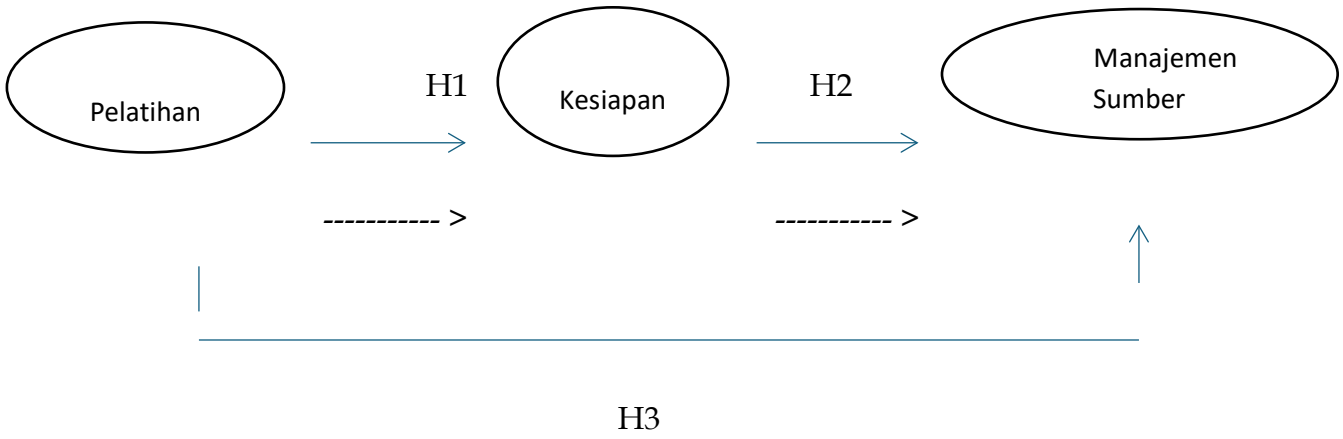
The intermediary variable that links 4.0 training with improved HR management standards is job readiness. Technical skills, professional attitudes, and personal psychological readiness to work are components of job readiness, according to the Job Readiness Theory (Caballero et al., 2011). Good job readiness increases the effectiveness of HR management because it allows employees to apply the skills they have learned in training more effectively. Superior human resources are an organization's competitive advantage, according to the Resource-Based View (Barney, 1991). Therefore, the quality of HR management in the digital era is positively influenced by 4.0 training, which helps improve employee job readiness.

Figure 1
Research methods



Note : _____ Direct Effect

---------- Indirect Effect

Based on the theoretical framework above, the following hypothesis is formulated:

H1: Training 4.0 has a positive and significant effect on work readiness.

H2: Work readiness has a positive and significant effect on HR quality.

H3: Training 4.0 has a positive and significant effect on HR quality.

H4: Training 4.0 has a positive and significant effect on HR quality through work readiness as an intervening variable.

RESEARCH METHODS

This study uses a quantitative approach, processing data with statistical techniques and presenting it in the form of numerical data with the Structural Equation Model (SEM) methodology based on Partial Least Square (PLS). The population of this study was six PPNPN and seventy-two PNS of the North Sumatra Education Quality Assurance Center. Based on the methodology used by the researcher, the items in this study are expected to provide the information needed about the 4.0 training program in improving the quality of human resource management with work readiness in the digital era. In the Survey Research Method book, Singarimbun and Effendi state that

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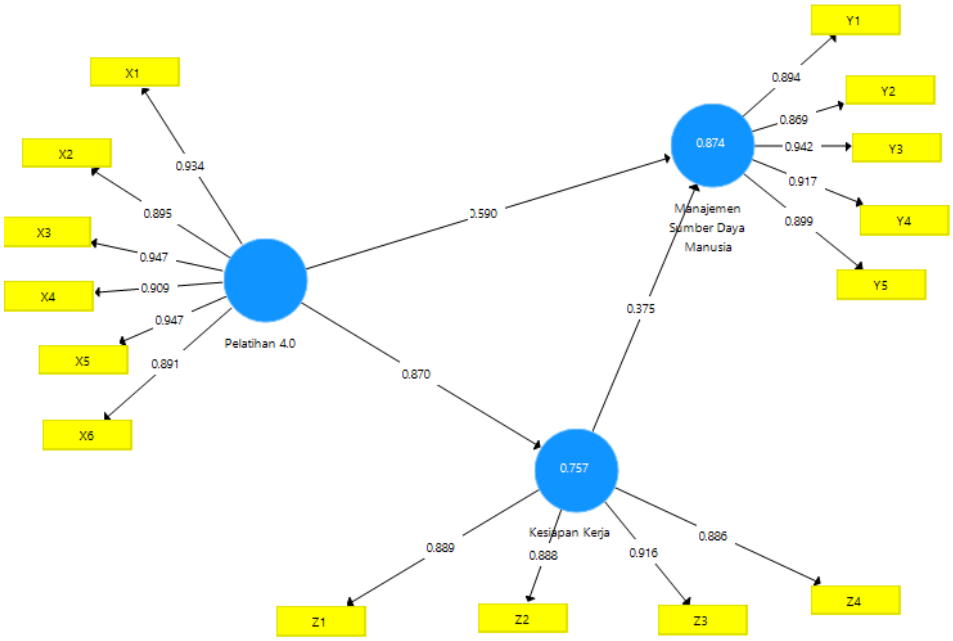
a minimum of 30 respondents must fill out the questionnaire. Thus, the sample of this study was personnel who had worked at the North Sumatra BPMP for at least two years, totaling thirty respondents.

This study uses primary data and secondary data. The primary data of the study were obtained by distributing questionnaires to predetermined groups. For this study, secondary data came from public sources such as training programs, company biographies, and strategic plans.

RESULTS AND DISCUSSION

Outer Model Analysis

Figure 1. ***Outer Model***



Convergent Validity Test

The correlation between item scores calculated using PLS software is used to evaluate convergent validity in the measurement model by reflecting indicators. Reflective indicators are considered to have a high level of reliability if their correlation exceeds 0.70. Based on the data below, it is known that all indicators have values above 0.70 so that it can be concluded that convergent validity has been met .

DOI: 10.37531/amar.v5i1.2714

Table 1. ***Outer Loading***

	Outer Loading	**Information**
X1	0.934	VALID
X2	0.895	VALID
X3	0.947	VALID
X4	0.909	VALID
X5	0.947	VALID
X6	0.891	VALID
Y1	0.894	VALID
Y2	0.869	VALID
Y3	0.942	VALID
Y4	0.917	VALID
Y5	0.899	VALID
Z1	0.889	VALID
Z2	0.888	VALID
Z3	0.916	VALID
Z4	0.886	VALID

Reliability and Validity Test

The accuracy, consistency, and precision of the instrument in measuring a construct are tested through reliability assessment. If the average variance extracted (AVE) is more than 0.50, the composite reliability is better than 0.70, and the Cronbach's alpha value is at least 0.60, the construct is considered very reliable. According to Table 1 *Outer Loading* , all indicators get *outer loading* values above 0.869. This value shows that each indicator makes a strong contribution related to its respective construct. In general, the *outer loading value* is considered valid if it exceeds 0.7, so all indicators in this table meet the requirements for convergent validity. Therefore , it can be concluded that the measurement model used in this study can be concluded that the reliability of the instrument has been met.

Table 2. ***Reliability and Validity***

Variables	*Cronbach's Alpha*	*rho_A*	*Composite Reliability*	*Average Variance Extracted (AVE)*
Work Readiness	0.917	0.918	0.941	0.800
Human Resource Management	0.944	0.944	0.957	0.818
Training 4.0	0.964	0.965	0.971	0.848

Discriminant Validity

Discriminant validity is one of the important indicators in assessing the quality of measurement with reflective indicators that can be evaluated through the *cross loading value* between each indicator and the construct it measures. The results of discriminant validity testing can be analyzed using the *cross loading table* . In addition, *cross loading*

DOI: 10.37531/amar.v5i1.2714

correlation also functions as an alternative in testing discriminant validity, in addition to the Heterotrait-Monotrait Ratio (HTMT) and *Fornell-Larcker Criterion* methods . Based on the data below, the *cross loading value* has met the required criteria so that it can be concluded that discriminant validity has been met.

Table 3. ***Cross Loading***

	Work Readiness	Human Resource Management	Training 4.0
X1	0.787	0.862	0.934
X2	0.806	0.771	0.895
X3	0.812	0.843	0.947
X4	0.761	0.833	0.909
X5	0.802	0.900	0.947
X6	0.836	0.847	0.891
Y1	0.778	0.894	0.866
Y2	0.786	0.869	0.836
Y3	0.747	0.942	0.871
Y4	0.809	0.917	0.802
Y5	0.897	0.899	0.766
Z1	0.889	0.793	0.754
Z2	0.888	0.725	0.754
Z3	0.916	0.810	0.786
Z4	0.886	0.844	0.815

The next validity test is *the Fornell-Larcker Criterion* which is used to assess the discriminant validity of a variable. Validity is considered fulfilled if the square root of *the Average Variance Extracted* (AVE) of a variable is greater than the correlation between the variables and other variables in the model. According to Validity test results discriminant using the Fornell-Larcker Criterion, it is seen that root AVE squared for each construct (Readiness Work = 0.895, Management Human Resources = 0.910, and Training 4.0 = 0.926) more big than correlation between construct other in the model. This is show that every latent variable gets validity good discriminant , so that capable measure different concept with good and bad happen problem multicollinearity between construct in research This . So, the research model This be fulfilled condition validity discriminant and can used For analysis furthermore .

Table 4. ***Fornell-Larcker Criterion***

	Work Readiness	Human Resource Management	Training 4.0
Work Readiness	0.895		
Human Resource Management	0.888	0.9 10	
Training 4.0	0.870	0.916	0.92 6

DOI: 10.37531/amar.v5i1.2714

The final validity test was conducted using *the Heterotrait-Monotrait Ratio* (HTMT) method. HTMT is a technique used to assess discriminant validity by comparing the average correlation between indicators from different constructs (*heterotrait*) with the average correlation of indicators in the same construct (*monotrait*). Discriminant validity is considered fulfilled if the HTMT value is below the threshold of 0.90. If the HTMT value exceeds this limit, then there is an indication that the constructs have too high similarities, so that discriminant validity is not fulfilled.

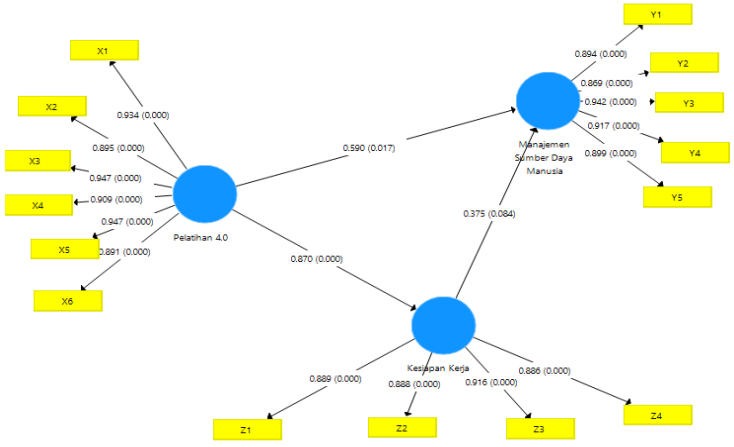
Table 5. *Heterotrait-Monotrait Ratio* (HTMT)

	Work Readiness	Human Resource Management	Training 4.0
Work Readiness			
Human Resource Management	0. 850		
Training 4.0	0. 820	0. 880	

Based on Validity test results discriminant use Heterotrait-Monotrait Ratio (HTMT), all HTMT value is below the maximum limit of 0.90 (Readiness Work – Human Resource Management = 0.850, Readiness Work – Training 4.0 = 0.820, and Human Resource Management – Training 4.0 = 0.880). This is show that each construct get validity good discriminant , so that in conclusion variables in research This each other different as well as No experience problem redundancy concept . With Thus , the research model This fulfil criteria validity discriminant based on HTML and can used For analysis more carry on .

***Inner Model* Analysis**

Figure 2. *Inner Model*



***R-Square* Test**

Table 5. *R-Square*

	R Square	R Square Adjusted
Work Readiness	0.757	0.749

DOI: 10.37531/amar.v5i1.2714

Human Resource Management	0.874	0.865

Based on the data above, the R-Square value for the work readiness variable is 0.757. This shows that 75.7% of the variation in work readiness can be explained by the training variable 4.0, while the rest is influenced by other factors outside the model. Meanwhile, the human resource management variable has an R-Square value of 0.847. This shows that the work readiness and training variables 4.0 cover 84.7% of the variance in human resource management, while additional factors not included in this research model affect the remaining 15.3%.

***F-Square* Test**

Table 5. *F-Square*

	Work Readiness	**Human Resource Management**	**Training 4.0**
Work Readiness		0.271	
Human Resource Management			
Training 4.0	3,108	0.671	

F-Square test is used For measure effect effect size of a variable independent related variable dependent on the structural model . The F-Square value is interpreted namely :

0.02 = Effect small

0.15 = Effect currently

0.35 = Effect big

Readiness Work to Management Human Resources own value 0.271, which indicates effect medium . That is , Readiness Work own influence moderate to Human Resource Management .

Training 4.0 on Readiness Work own value of 3.108, which is very high . This value exceeds the general limit , so need checked repeat whether There is error in calculation or the scale used . If correct , this show that Training 4.0 has very big effect to Readiness Work .

Training 4.0 on Human Resource Management has value 0.671, which means the effect big . This is show that Training 4.0 has influence strong to Human Resource Management .

Overall, the results of the F-Square test show that Training 4.0 has a significant impact on Work Readiness and HR Management, while Work Readiness has a moderate influence on HR Management.

***Q-Square* Test**

Table 6. *Q-Square*

DOI: 10.37531/amar.v5i1.2714

	SSO	SSE	Q^2 (=1-SSE/SSO)
Work Readiness	132,000	65,766	0.502
Human Resource Management	165,000	65,534	0.603
Training 4.0	198,000	198,000	

The Q^2 test is used to assess the extent to which the model has predictive relevance to endogenous variables. The Q^2 value is obtained from the calculation of Q^2 = 1 - (SSE/SSO), where SSO (Sum of Squares of Observations) is the total observed variance, while SSE (Sum of Squares of Errors) indicates the variance that cannot be explained by the model.

In assessing the results of the Q^2 test, there are the following interpretation categories:

- **$Q^2 > 0$** shows that the model has predictive relevance.
- **$Q^2 \geq 0.02$** indicates little predictive relevance.
- **$Q^2 \geq 0.15$** indicates moderate predictive relevance.
- **$Q^2 \geq 0.35$** indicates strong predictive relevance.

Based on the results of the blindfolding analysis in the table above, the following interpretations were obtained:

- **Job Readiness** has a Q^2 value of **0.502** , which is above **0.35,** thus showing that the model has **strong predictive relevance** in explaining the Job Readiness variable. Thus, the variables in the model are able to predict Job Readiness well.
- **Human Resource Management (HRM)** has a Q^2 value of **0.603** , which is also greater than **0.35** , thus showing that the model has **very strong predictive relevance** to this variable. This indicates that the independent variables in the model can explain Human Resource Management very well.

Hypothesis Testing

In hypothesis testing, especially in direct and indirect relationships, evaluation is based on the suitability between *the path coefficient values* (*original sample*), *t-statistics* , and *p-value* . A hypothesis is accepted if the *t-statistic* value exceeds the threshold of 1.96 and *the p-value* is less than 0.05, which indicates a statistically significant relationship. In addition, the direction of the relationship formulated in the hypothesis must be in line with the coefficient obtained from the analysis results, thus further strengthening the validity of the research findings.

Direct Effect

Table 7. ***Direct Effect***

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values	Information

DOI: 10.37531/amar.v5i1.2714

Work Readiness -> Human Resource Management	0, 4 75	0, 4 9 0	0, 180	2,639	0.0 08	Proven
Training 4.0 -> Job Readiness	0.870	0.849	0.098	8,854	0,000	Proven
Training 4.0 -> Human Resource Management	0.590	0.551	0, 180	3,278	0.0 01	Proven

Based on the data above, it can be concluded:

1. Influence Management Human Resources to Readiness Work
   Based on results analysis , T-Statistic value = 2.639 (more of 1.96) and P-Value = 0.008 (less of 0.05), which shows that connection This significant . That is , Readiness Work influential positive and significant to Management Human Resources . In other words, the more tall readiness Work employees , increasingly good management too source Power man in organization . This is can happen Because more employees Ready Work tend more easy adapt with HR policies and demonstrate more optimal performance .

2. Influence Training 4.0 on Readiness Work
   Test results show that the T-Statistic = 8.854 (more of 1.96) and P-Value = 0.000 (less from 0.05), so that connection this is very significant . This is indicates that Training 4.0 has very strong impact to improvement Readiness Work . With implementation training based on technology and digitalization in the industrial era 4.0, employees more Ready in face challenge modern jobs . Effective training help increase skills and competencies power work , which in the end increase readiness they in Work .

3. Influence Training 4.0 on Management Human Resources
   With T-Statistic value = 3.278 (more of 1.96) and P-Value = 0.001 (less from 0.05), the relationship This is also significant . This means that Training 4.0 plays a role important in increase effectiveness Management Human Resources . Implementation training based on technology No only increase skills individual , but also supports human resource management more efficient , such as in planning power work , development career , and advancement productivity employees . With Thus , organizations that implement modern training can more easy manage human resources strategic .

Overall, the results of the hypothesis testing show that Training 4.0 has a significant impact on Work Readiness and Human Resource Management, and Work Readiness also has an effect on HR Management . This confirm that development skills through modern training is factor important in increase readiness Work employee as well as effectiveness human resource management in a organization .

Indirect Effect

Table 8. ***Indirect Effect***

Variables	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Information

DOI: 10.37531/amar.v5i1.2714

	(O)	(M)	(STDEV)			
Training 4.0 -> Work Readiness -> Human Resource Management	0.785	0.732	0.161	4,884	0,000	Proven

Based on the data above, it can be concluded:

1. The Training 4.0 Hypothesis has a positive and significant influence on HR quality. through work readiness as an intervening variable is accepted . The *path coefficient value* is 0.785 which indicates consistency with the positive direction proposed in the hypothesis with the *t-statistic value* meeting the significance criteria, namely 4.884> 1.96, the *p-value* meets the criteria, namely 0.000 < 0.05, which indicates that the relationship is statistically significant.

Table 9. Results of Mediating Variables

Hypothesis		Results	Conclusion	Information
Direct	Training 4.0 -> Human Resource Management	*Significant*	*Mediation*	*Proven*
Indirect	Training 4.0 -> Work Readiness -> Human Resource Management	*significant*		*Proven*

Based on the data above , it can be concluded that Training 4.0 has influence significant to Management Human Resources (HR) . However , when Readiness Work used as variable mediation , its influence significant . This is show that Readiness Work play a role as a mediator in connection between Training 4.0 and HR, so that can concluded that happen effect mediation .

CONCLUSION

Based on results research , can concluded that Training 4.0 got influence significant to readiness work and quality management source Power human resources (HR) at the North Sumatra Education Quality Assurance Center (BPMP). Readiness work also plays a role as variable mediation in relationships between Training 4.0 and quality of HR. This is show that the more effective training based on the technology provided , the more tall readiness Work employee in face challenges in the digital era, which ultimately increase quality of human resources.

Findings This confirm that implementation Training 4.0 is not only just improvement skills technical , but also contribute to mental readiness and professionalism power Work in adopt change technology . Therefore that ,

DOI: 10.37531/amar.v5i1.2714

organization need Keep going develop method appropriate training with modern industry needs for increase Power competition power work and effectiveness as well as quality human resource management.

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