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Digital Transformation Readiness In Indonesian Institutions Of Higher Education With Digital Enabler

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Abstract

Introduction

Research has produced models and instruments for measuring Industry 4.0 readiness. This model was [1]developed using several approaches including systematic literature studies, conceptual models and qualitative and quantitative methods for empirical model validation. The developed industrial readiness measurement model consists of 2 aspects, namely knowledge and resource capabilities, 5 dimensions, namely understanding, leadership and strategy, workers and culture, technology and operational dimensions with 20 variables that are spread unevenly in each dimension. From the results of this readiness measurement, the readiness level of companies related to Industry 4.0 is obtained in 4 levels, namely "Not Ready", "Conditionally Ready", "Basic Readiness" and "Fully Ready". The target of the Industry 4.0 readiness measurement model is aimed at manufacturing companies in Indonesia that produce finished goods with their own production facilities for certain customers, both B2B and end customers. One of the important feedbacks obtained from interviews with practitioners during model testing is that each dimension measured has a different importance or weight to one another. For example, the understanding dimension and the technology dimension have different contributions to Industry 4.0 readiness. The Industry 4.0 readiness measurement model assigns weight to each dimension according to its contribution to Industry 4.0 readiness. Future studies will identify the weights for each dimension and also for each variable in each dimension to obtain more accurate measurement results. As a final note, this Industry 4.0 readiness measurement model is not intended to make the Industry 4.0 transformation process easy and automatic. However, this Industry 4.0 readiness measurement model serves as a tool to assess company readiness that reflects the knowledge and capabilities possessed regarding Industry 4.0 and as a decision-making tool in strategies, work plans and targets in the 4.0 transformation process.

Digital Transformation

A research study conducted in Kosovo investigated the current readiness of Higher Education Institutions (HEI) for digital transformation (Limani 2019). This study aims to understand the readiness level of HEI in Kosovo to adopt digital processes. Another study focuses on digital

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transformation readiness in universities in the context of the COVID-19 pandemic in Vietnam (Cai, Liu, and Huang 2017). The research examines the factors influencing the readiness of Vietnamese students for digital transformation. A systematic literature review analyzes the readiness of higher education institutions in Indonesia to face digital transformation (Latifah, C. Budiyanto, and Saputro 2022). The study aims to assess the level of readiness of Indonesian tertiary institutions in adopting digital technology.

A review paper discusses digital transformation readiness in education in general, with a focus on higher education (Latifah, C. W. Budiyanto, and Saputro 2022). This research aims to answer questions about the popularity and implementation of digital transformation in higher education.

A case study from Norway explores the implementation of digital transformation in higher education after the COVID-19 pandemic (Latifah, C. W. Budiyanto, and Saputro 2022). The study highlights the importance of organizational readiness for change in achieving successful digitalization outcomes.

A study conducted in a Swiss vocational school examines digital transformation from the perspective of school management and teachers (Tømte, Degn, and Geschwind 2023). Research is focused on the teacher's role in building digital literacy among students and the responsibility of school management in facilitating digital transformation.

Overall, this study highlights the importance of assessing digital transformation readiness in vocational higher education institutions. Understanding the factors that influence readiness can help institutions apply digital technologies effectively and adapt to a changing educational landscape.

Digital Enabler

This digital enabler focuses on improving the quality of vocational education, increasing digital literacy, and preparing students to face the demands of the digital era. They provide resources, support, and guidance to institutions and students in integrating technology and digital skills into their education and future careers. The importance of work skills in the industrial era 4.0, coupled with the presence of talent in prospective students (Yang et al. 2020). Kominfo is expected to become an enabler in the digital field in the field of vocational tertiary institutions to create a digital economy after the digital skills possessed by graduates of vocational tertiary institutions (Nyoman 2022). Digital enabler programs at vocational tertiary institutions in the form of preparing students with digital skills, curriculum development and career preparation in accordance with the industrial world, funding grant programs to improve the quality and integration of digital technology in vocational tertiary institutions (ILO and UNESCO 2020) Digital enablers can help students understand the importance of digital innovation and its contribution to industry 4.0 (Pujianto 2022).

Inovation Management

Innovation management at vocational tertiary institutions includes developing innovative behavior among lecturers and students, studying the role of innovative work behavior and work engagement on performance, and conducting applied research to meet the needs of industry and society. Collaboration between ASEAN countries and the integration of digital tools and platforms are seen as ongoing efforts to accelerate the transformation of vocational education (Fiernaningsih, Herijanto, Kristianingsih, et al. 2022; Fiernaningsih, Herijanto, and Widayani 2022. Several important factors for increasing innovation in management include support from transformational leadership, support from internal organizations, the existence of applied research, entrepreneurial programs and innovative learning activities.

Organizational Agility

Organizational agility in vocational tertiary institutions refers to the institution's ability to adapt quickly and efficiently to changes that occur both internally and externally. In the VUCA era (Volatility, Uncertainly, Complexity, and Ambiguity), vocational colleges are faced with changes that are fast and difficult to predict and control. To achieve an agile organization, vocational tertiary institutions need to be able to adapt quickly and continue to innovate. By having organizational agility, vocational tertiary institutions can be more prepared and responsive in facing the challenges and opportunities that arise, and can improve the quality and relevance of the education they provide. Agility is the ability of an organization to be able to adapt quickly and efficiently to changes, both internally and externally, indicators of agility, namely acting according to information, making decisions quickly and implementing them in daily life.

Organizational agility in vocational tertiary institutions can be achieved through several stages including, building adaptive capabilities that are fast and flexible in dealing with changes in a competitive environment, applying lean and agile thinking in business processes and organizational strategy, optimizing business processes and making clear and firm new commitments. in developing organizational strategy, adopting an organizational culture that supports change and innovation, building an organizational structure that facilitates the core elements of agility. Having organizational agility at vocational tertiary institutions can be more prepared and responsive in facing the challenges and opportunities that arise, and can improve the quality and relevance of education.

Research Methodology

1. Research Mehodology
   This study uses quantitative research at vocational higher education institutions in Indonesia with the aim of seeing the influence of Industry 4.0 Implementation, organizational agility and digital transformation readiness. Using random sampling type. The data is distributed using a questionnaire to vocational higher education institutions in Indonesia. With a total of 104 respondents who filled out valid questionnaires for statistical analysis.

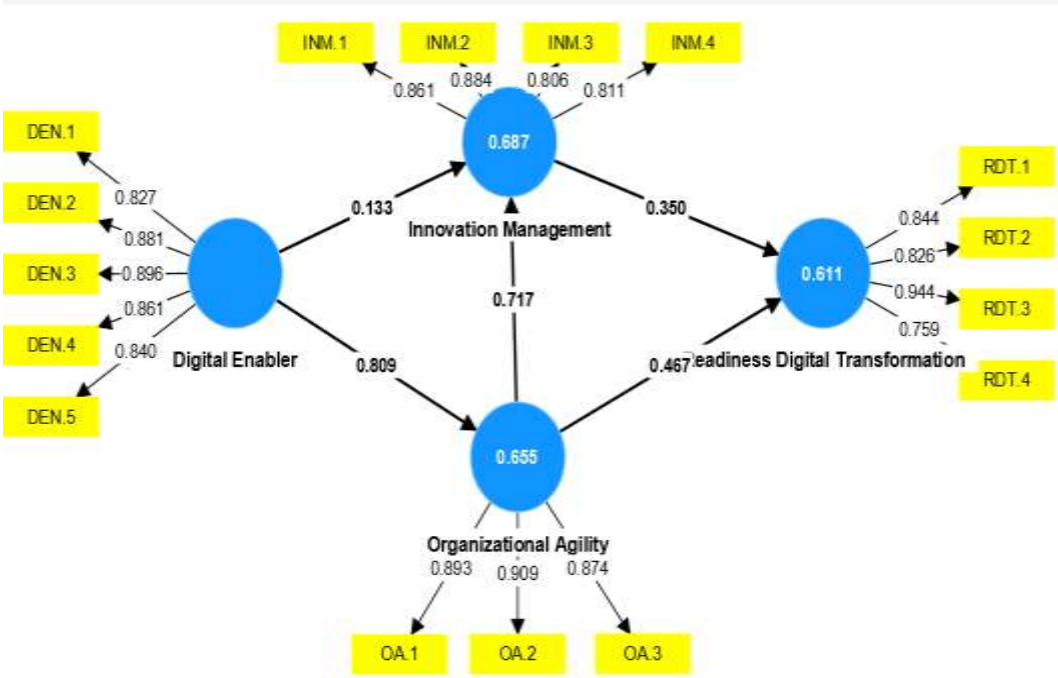
No	Profile	Characteristic	N	%
1	Position Structural	Supervisory Board	1	0,96%
		Director	34	32,69%
		Deputy Direktur	6	5,77%
		Lecturer	48	46,15%
		other structural officials	15	14,42%
2.	Institution Area	LLDIKTI I	5	4,81%
		LLDIKTI II	9	8,65%
		LLDIKTI III	6	5,77%
		LLDIKTI IV	8	7,69%
		LLDIKTI V	4	3,85%
		LLDIKTI VI	6	5,77%

		LLDIKTI VII	21	20,19%
		LLDIKTI VIII	11	10,58%
		LLDIKTI IX	6	5,77%
		LLDIKTI X	4	3,85%
		LLDIKTI XI	6	5,77%
		LLDIKTI XII	2	1,92%
		LLDIKTI XIII	7	6,73%
		LLDIKTI XIV	3	2,88%
		LLDIKTI XV	5	4,81%
		LLDIKTI XVI	1	0,96%
3	Accreditation	Superior	2	1,92%
		Very Good	17	16,35%
		Good	45	43,27%
		A	6	5,77%
		B	34	32,69%
4	Has a Doctoral NIDN Academic Position	0-10%	54	51,92%
		11-20%	6	5,77%
		21-30%	6	5,77%
		31-40%	10	9,62%
		More 40 %	28	26,92%
5	Utilization of Lecturers with industry	0-20%	35	33,65%
		21-40%	20	19,23%
		41-60%	25	24,04%
		61-80%	18	17,31%
		More 81%	6	5,77%

This survey was taken in the first half of 2022. This questionnaire uses a Likert scale of 7. The range of the questionnaire is from (1) Strongly Disagree to (7) Strongly agree. The target respondents are leaders of vocational tertiary institutions in Indonesia. Retrieval of this questionnaire data as primary data collection.

Result and Discusion

To provide consistency for each item, factor loading is calculated for each variable. All items use a factor loading of more than 0.7.



From the results of the validity test, it shows that the variables used in this study already have a loading factor according above 0.7. Meanwhile, the average variance extracted (AVE) value shows results above 0.5 which means the model is considered valid.

Table 2 : AVE

Variabel	Average variance extracted (AVE)
Digital Enabler	0,742
Inovation Mangement	0,707
Organizational Agility	0,796
Readiness Digital Transformation	0,716

Meanwhile for discrimant validity, two approaches were utilized. First, the Hetero-monotrait method (HTMT) was used, that HTMT values are only one above than the value of 0.90 (Henseler, Ringle, and Sarstedt 2014) . The second methode was the Fornell and Larcker technique by estimating the square root of the AVE and comparing it with the correlations between latent variables (Fornell and Larcker 2012)

Table 3 : HTMT Matriks

Variabel	Digital Enabler	Inovation Mangement	Organizational Agility	Readiness Digital Transformation
Digital Enabler				
Inovation Mangement	0,803			
Organizational Agility	0,898	0,952		

Readiness Digital Transformation	0,732	0,832	0,849	

Table 4 : Fornell & Larcker Criteration

	Digital Enabler	Inovation Mangement	Organizational Agility	Readiness Digital Transformation
Digital Enabler	0,862			
Inovation Mangement	0,716	0,841		
Organizational Agility	0,812	0,823	0,892	
Readiness Digital Transformation	0,663	0,735	0,757	0,846

While for the reliability test using two methods, namely Composite Reliability and Cronbach's Alpha. The table below shows that the test results of the two methods show results above 0.7 so it can be concluded that the questionnaire used has met the reliability test

Table 5: CR and Cronbach's Alpha

Variabel	Cronbach's alpha	Composite reliability
Digital Enabler	0,913	0,935
Inovation Mangement	0,862	0,906
Organizational Agility	0,872	0,921
Readiness Digital Transformation	0,866	0,909

The R square value for organizational agility and readiness digital transformation as shown in thetable below is included in the accepted (Chin and Marcoulides 1998). The R square value for organizational agility is 0.349 and for readiness digital transformation is 0,621.

Table 6 : R Square

Variabel	R-square	R-square adjusted
Inovation Mangement	0,687	0,672
Organizational Agility	0,655	0,647
Readiness Digital Transformation	0,611	0,593

Table 7 : Goodness of Fit

GOFI	Calculated Value	Standard Value	Conclusion
SRMR	0,081	<0.100	Good Fit

NFI	0,741	Closser to 1 the better	Good Fit

Table 8 : Hypothesis Results

	T statistics (|O/STDEV|)	P values
Digital Enabler -> Inovation Mangement	0,782	0,434
Digital Enabler -> Organizational Agility	18,727	0,000
Inovation Management -> Readiness Digital Transformation	1,422	0,155
Organizational Agility -> Inovation Management	4,531	0,000
Organizational Agility -> Readiness Digital Transformation	2,072	0,038

This study aims to determine the readiness of digital transformation in vocational tertiary institutions with several important factors, namely e-leadership, digital enabler and industry 4.0 implementation with mediating variables namely innovation management and organizational agility. The results of this study are only digital enablers that have a positive and significant impact on the readiness of digital transformation in vocational tertiary institutions.
Theoretical implications of digital transformation readiness in vocational tertiary institutions in the Industry 4.0 era with a focus on e-leadership, digital enabler, industry 4.0 implementation, innovation management, organizational agility, and readiness digital transformation.
Digital Enabler: In the context of digital transformation readiness, digital enablers play an important role in empowering vocational tertiary institutions to adopt and utilize digital technology effectively. The theoretical implication is the importance of identifying and using appropriate digital enablers to support digital transformation initiatives.
Innovation Management: The theoretical implication of innovation management is the importance of encouraging innovation in vocational tertiary institutions to deal with technological changes and industry demands. The use of innovation theory will help vocational tertiary institutions to create an environment that supports creativity and collaboration.
Organizational Agility: In the dynamic Industry 4.0 era, the speed of adaptation and response to change is very important. The theoretical implication of organizational agility is the need to use theories and practices that support flexibility, openness to change, and adaptation in dealing with complex environments.
Digital Transformation Readiness: Digital transformation readiness is a critical element in the entire transformation process. The theoretical implication is the need to measure and analyze the readiness of vocational tertiary institutions in dealing with digital change by using theories related to digital readiness.
Through the application of the theories above, vocational tertiary institutions can better prepare themselves to face the Industry 4.0 era with a focus on digital transformation readiness. By integrating digital enablers, innovation management, organizational agility, and digital transformation readiness, vocational tertiary institutions can become more adaptive, innovative, and relevant to the needs of industry and society.

Managerial implications of digital transformation readiness in vocational tertiary institutions in the Industry 4.0 era with a focus on e-leadership, digital enabler, industry 4.0

implementation, innovation management, organizational agility, and readiness digital transformation.

Digital Enabler, the managerial implication is the importance of identifying and adopting digital enablers that are relevant and in accordance with the needs of vocational tertiary institutions. Management must ensure that the required technological resources are available and accessible to the entire academic community.

Innovation Management, vocational higher education management needs to create an environment that supports innovation and experimentation. They should encourage cross-unit collaboration and knowledge sharing to encourage creativity and the development of innovative solutions.

Organizational Agility, in the face of rapid changes in the Industry 4.0 era, management must ensure that vocational tertiary institutions have high flexibility and adaptability. This involves developing responsive organizational structures, quick decision-making processes, and the ability to learn from failures.

Readiness Digital Transformation Vocational tertiary education management must regularly evaluate digital readiness to identify weaknesses and opportunities for improvement. They should use data and analytics to understand readiness levels and develop strategies to increase digital transformation readiness.

By applying the managerial implications above, vocational tertiary institutions can be more prepared and adaptive to face digital transformation in the Industry 4.0 era. In an effort to achieve competitive advantage and relevance in an increasingly connected and technological world, management must focus on the integration of e-leadership, digital enabler, industry 4.0 implementation, innovation management, organizational agility, and readiness digital transformation.

Regenerate response

This study aims to examine the role of organizational agility on the relationship between Industry 4.0 implementation and readiness digital transformation in the vocational higher education in Indonesia. The results of this study support hypothesis that industry 4.0 implementation has a positive and significant influence on organizational agility. These results are in line with previous research which showed a positive relationship between industry 4.0 implementation and organizational agility (Raygan and Henry 2019; Shashi et al. 2020). The results of this study have the implication that technology industry 4.0 in vocational higher education have a positive contribution to increasing organizational using digital technology.

While related, the results of this study indicate that organizational agility is a positive and significant influence on readiness digital transformation. The results of this study are in line with previous research (Boyer and Bucklew 2019).

Conclusion

The test of this study is the impact of e-leadership, digital enabler and industry 4.0 implementation on digital transformation readiness, with organizational agility and innovation management as a mediating variable between Industry 4.0 implementation and digital transformation readiness. Industry 4.0 Implementation has a significant influence on organizational agility. Industry 4.0 Implementation has a positive and not significant effect on digital transformation readiness. Organizational agility has a positive and significant effect on digital transformation readiness.

Meanwhile, practical advantages, this research is very useful for higher education managers, especially in the current digital era with a very dynamic external environment. The direct implementation of industry 4.0 for digital transformation readiness has an effect but not significant, there must be organizational intervention in shaping digital transformation preparations.

The implementation of industry 4.0 in organizations shows positive and useful things for organizational development to become digital transformation readiness. By forming an ordinary organization into an agile organization, it will be able to go through a dynamic external environment and to build an organization moving forward, to become digital transformation ready.

As research has several limitations. First, the data taken is from polytechnics in Indonesia, it cannot be generalized to all universities. Furthermore, for further research it can be used with the same research for outside Indonesia with similar conditions. Second, there is the opportunity to use different types of implementations from Industry 4.0 for organizational agility and digital transformation readiness. Third, this research uses quantitative methods, there is an opportunity to use qualitative for further research.

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