

The Relationship between Human Capital Readiness in Digital Transformation Era 4.0 and Individual Performance Perception (The Case of Smart Campus in Indonesia Defense University)

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ABSTRACT : Digital transformation in the 4.0 era brings changes to human activities along with changes in technology where each individual needs to improve skills and knowledge according to industry 4.0. Digital change 4.0 also has an impact on higher education institutions. Currently, Defense University is in the process of digital transformation and is becoming a world-class university. The program now being run is the Smart Campus, one of the programs for a world-class university. The performance of the Smart Campus program is also supported by the readiness of human resources to achieve optimal targets. This research uses quantitative methods, and data processing is done using SPSS. The results show that the willingness of human resources has positive and significant effects on the performance of the smart campus.

Keywords - Human Capital Readiness, Digital Transformation, Smart Campus, Higher Education

I. INTRODUCTION

Technological developments in Industry 4.0 have changed the paradigm of human civilization, especially in economic, business, and social life. Many things that were never planned before became an activity greatly facilitated by this technological change (Team, 2021) [1]. Changes in mindset, culture, and policies must be adapted to changes in renewable technology so that all tertiary institutions can adapt as producers of the next generation with superior quality and competence, such as critical thinking, adaptability, creativity, and a high degree of competitiveness. In addition, redesigning complete business models along the whole value chain is a challenging task for the Higher Education sector, which must capitalize on all the opportunities and possibilities afforded by the abundance of digital technology (Benavides, et.al, 2020) [2]

To get this strategy, the researchers directed it to one of the tertiary institutions, including Defense University. The Defense University is one of the tertiary institutions in Indonesia which is implementing a digital transformation program in the campus environment to support the development of the 4.0 transformation work program in the field of Defense based on national values and defending the country. The work program implemented in transformation 4.0 in Defense includes digital change and human resource transformation. Apart from that, Defense University has a strategic goal in building its educational process to become a World Class University in 2024 by implementing the Smart Campus.

Organizing education by universities so that they become Smart Campus is no longer an option but has become a necessity for universities to be able and able to compete in the era of the industrial revolution 4.0, producing alums who are competitive and innovative and renewable to support national development directions and policies. Supporting the implementation of Smart Campus requires commitment and major changes starting from resources, infrastructure, procedures, and information technology, including those held by the Defense University. Changes to work programs related to digital transformation 4.0 and the implementation of Smart Campus on-campus impact academic and non-teaching staff to describe and realize the Smart Campus. Of course, Defense University has prepared qualified human resources that understand information technology for implementing Smart Campus. As a researcher, author must pay close attention to the fulfilment of the systems and infrastructure implemented.

The application of Smart Campus explains that implementation can be realized and successful if educational staff and education staff are the keys to success in building the Defense University into a Smart Campus to support the digital transformation 4.0 program. To produce objective and measurable research, the purpose of this research is to examine the readiness of human resources at the Defense University about the realization and implementation of the industry 4.0 development direction in the application of Smart Campus as a measuring tool to find out these two aspects supports the Defense University towards readiness the quality of the results of educators and education personnel.

II. LITERATURE REVIEW

II.1 Digital Transformation 4.0 in Higher Education

Digital transformation is the intentional and prioritized transformation of company activities and organizations, processes, competences, and models to maximize the transformation of the changes and possibilities of a technological mix and its rapid influence on society (Gobble, 2018) [3]. Digital transformation in higher education is a disruptive, competitive, and innovative change innovation to engage learners, lecturers, staff, industry, parents, and the community (Kodri, 2022) [4]. The pandemic has proven higher education institutions' capacity to provide continuity in teaching and learning. Still, it has also indicated that more work must be done to maintain digital technologies are successfully leveraged to improve quality, efficiency, and fairness in higher education (OECD, 2021) [5].

II.2 Human Capital Readiness in 4.0

Human capital plays an important role in a company's organization because it shows how a company's strategy is. The capabilities that exist in each employee make a great potential for the company. The readiness of human capital as an intangible asset is assessed by determining whether employees have the skills, talent, and expertise to implement the new concept and influence the organizational learning experience (Hendarman, et al., 2020) [6]. Human capital readiness is the readiness of human capital to support the implementation of corporate strategy. Digital changes in industry 4.0 require a company to be ready to carry out transformations, especially human resources, to support the transformation process by following the strategies and targets to be achieved. In developing human capital readiness measurements in companies or organizations, this, of course, signifies the allocation of employee skills, talent, and know-how to carry out the internal processes essential to the success of the strategy (Kaplan & Norton, 2003) [7].

II.3 Dimensions of Human Capital Readiness

This study measures the readiness of human capital by using dimensions or indicators that refer to the questionnaire developed by Hendarman et.al.(2020) [8].

1. Knowledge, the statements about what we know or believe we know. We don't know how much we know because knowledge includes both explicit and implicit knowledge, which refers to an experience in our unconscious zone and manifests particularly as intuition (Bolisani & Bratianu, 2018) [9].
2. Soft skills, refers to personal characteristics, habits, attitudes, and social graces that make someone a good employee and compatible with work (Vasanthakumari, 2019) [10]. According to (Hendarman & Cantner, 2017) [11] Soft skills are mostly subjective, are not linked to a deliverable or a concrete outcome and are used without the use of tools or templates.
3. Hard skill, the aspects of hard skills may be seen from the intelligence quotient thinking that contains indications such as counting, analysing, designing, comprehensive knowledge, modelling, and critical thinking (Sopa, et al., 2020) [12].
4. Attitude may be described as a person's perspective and evaluation of something or someone, a propensity or inclination to react favourably or adversely to a certain concept, item, person, or circumstance (Vargas-Sánchez, et.al., 2016) [13].

II.4 Smart Campus Performance

The smart campus is a concept that uses technologies within the campus environment that consist of the interaction of many complex systems that support its users' primary requirements, enhance learning skills, and inspire them to deal with problems that arise (Hidayat, et.al., 2021) [14]. Smart campus became a reality as the high-end type of a smart education system and has gained increasing global interest and smart campuses provide people with a smart learning environment to develop them into smart workforce members (Dong et.al 2020) [15]. The framework used in Smart Campus is an adaptation of Smart City, which is then combined and adapted to the instrument model that Smart Campus will use. The campus is a small independent city in many ways, such as the many functions, users, activities, and connections; additionally, the campus and the city have issues and challenges that can be compared, such as environmental effects, management and organizational problems, infrastructure and internal and external mobility, efficiency low and fundamental lack of services and features with unsatisfactory user response (Pagliaro, et.al., 2016) [16]. The measurement of Smart City performance is to determine the level of progress that has been set in achieving a smart campus based on the components that have been set.

II.5 Dimensions of Smart Campus Performance

In this study, the dimensions or indicators used to measure smart campus performance were adapted from research conducted by Bhukya (2022), which were then adjusted according to the research to be carried out. The dimensions or indicators used are as follows:

1. Smart Governance, this approach encourages university personnel and students to participate. Smart governance, defined as the intelligent use of information and communication technology (ICT) to enhance decision-making via greater cooperation among many stakeholders, including government and public, is directly tied to government methods (Pereira, et.al., 2018) [17].
2. Smart Courses, make use of digital technologies to improve the learning experience. A smart course allows course designers and instructors to update their design in response to student input or data obtained throughout the course's usage.
3. Smart Classroom, a digitally equipped classroom with a wide range of teaching and learning techniques based on technology. Smart classrooms are designed to bridge the gap between students and teachers, support instructors in teaching more efficiently, and improve the teaching and learning environment (Kaur & Stea, 2022) [18].
4. Smart Mobility, As the scope of a smart campus expands, so does the need for environmentally friendly transportation solutions that can also provide intelligent services.

II.6 Conceptual Framework

A conceptual framework is a central idea and concept of theory and research that guides the research project process. The conceptual framework organizes the important ideas in the research to establish the investigation's emphasis and direction (Shikalepo, 2020) [19]. In this study, the authors developed this conceptual framework to examine the relationship between Human Capital Readiness 4.0, proposed by Hendarman et al. (2020), and Smart Campus Performance, the indicator was proposed by Bhukya (2022).



Figure II.1 Conceptual Framework

Based on the conceptual framework, Human Capital Readiness 4.0 is an independent variable consisting of 4 (four) dimensions, namely knowledge, soft skills, hard skills, and attitude, to examine how the readiness of human resources at the Defense University in facing changes in digital transformation 4.0. Smart Campus Performance is a dependent variable consisting of 4 (four) dimensions or indicators, namely Smart Governance, Smart Courses, Smart Classroom, and Smart Mobility, to study the concept of Smart Campus, which has been implemented at the Defense University. In this research, the relationship between human capital readiness and smart campus performance is very important because it will show how human capital plays a role in ensuring the sustainability of the smart campus in achieving goals and objectives. The following is the hypothesis of this study:

H0: There is no significant relationship between human capital readiness and smart campus performance.

H1: There is a significant relationship between human capital readiness and smart campus performance.

III. RESEARCH METHODOLOGY

III.1 Quantitative Research

In this research, data collection was carried out using a sampling method based on a survey that had been distributed. This method is used to collect samples from individuals or participants who will be used as research. Random sampling does not mean that each sample is representative of the population. It suggests that most random samples will be close to the people most of the time and that it is easy to compute the probability that an example is accurate.

The survey questionnaire in this study will be filled in by lecturers and education staff at Defense University. The total population of lecturers and education staff is 738 people. The author uses the Slovin Formula to take a population sample with an accuracy level of 10%. Thus the following is a calculation from the Slovin Formulas:

The margin of error used in this study is 10%, so the minimum number of respondents is as follows:

$$n = \frac{738}{1 + 738 (0.1)^2}$$

n = 88.06 ~ 88 respondents.

III.2 Data Analysis Method

The data analysis method uses quantitative data, namely collecting data systematically and numerically from the questionnaire results, and then will be evaluated measurably. Analysis of quantitative data contains statistical mechanisms such as classical assumption testing (normality test) and linear regression.

III.2.1 Human Development Index (HDI)

Human development index (HDI) data is based on a formula developed by Hendarman et al. (2020) by performing gap-based calculations to show the relativity of preparedness between factors. The data is processed based on the results of the reliability and validity tests. The following is the formula for the Human Development Index:

$$\frac{X - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}}$$

Where,

X = GAP, the expected state value minus the current state value

Minimum Value = Smallest GAP Value

Maximum Value = Highest GAP Value

IV. RESULTS AND DISCUSSION

IV.1 GAP and Human Development Index Score

The author uses the HDI (Human Development Index) computation to determine how prepared the lecturers and education personnel at Defense University are for each element. Because the present study's topic is lecturers and education staff, the author splits digital transformation industry 4.0 preparation into two segments: lecturer and education staff readiness. The table below displays each GAP and HDI value:

Table IV.1 GAP and HDI Score (Lecturer)

GAP and HDI Score (Lecturer)					
Factors	Current Condition Value	Expected Condition Value	GAP	HDI	Conclusion
Knowledge	3.35	4.13	0.77	0.42	Ready
Hard Skills	3.98	4.29	0.31	0.52	Ready
Soft Skills	3.48	4.29	0.81	1.00	Not Ready
Attitude	3.73	4.23	0.50	0.33	Receptive

Table IV.2 GAP and HDI Score (Educational Staff)

GAP and HDI Score (Educational Staff)					
Factors	Current Condition Value	Expected Condition Value	GAP	HDI	Conclusion
Knowledge	2.92	3.94	1.02	0.36	Receptive
Hard Skills	3.62	4.10	0.48	0.73	Early Stage Ready
Soft Skills	3.40	4.35	0.94	1.00	Not Ready
Attitude	3.56	4.17	0.62	0.35	Receptive

The table above displays the GAP and HDI scores for lecturers and education staff when dealing with digital transformation 4.0 and how prepared they are. The Knowledge and Hard Skills dimensions have reached the ready stage for lecturers, indicating better conditions for the industrial era 4.0. The Attitude readiness index displays receptive outcomes. It demonstrates that Defense University has included an attitude component in Industry 4.0. However, the Soft Skills dimension still needs to be prepared, indicating that more than just the soft skill component is required to apply to Industry 4.0. The section on education staff displays a receptive index for the Knowledge and Attitude dimensions. Meanwhile, hard skills are found in the early-stage ready index, indicating that the organization's resources have begun implementing industry 4.0 changes. The same can be said for the lecturer category. It provides an unfinished index for educational staff that will serve as an organizational input assessment.

IV.2 Smart Campus Performance Analysis

The following is a table of calculation results showing 4 dimensional aspects of smart campus performance based on individual assessments:

Table IV.3 Smart Campus Performance Score

Dimensions	Average Score	Score (%)
Smart Governance	4.51	90.2
Smart Courses	4.40	88.08
Smart Classroom	4.28	85.52
Smart Mobility	4.47	89.45
Total Score of Smart Campus Performance	4.42	88.31

According to the preceding computation, the category score on the smart campus performance scale is relatively high. Each dimension has a score greater than 85%. The average percentage ranges from 85.52 to 90.2. With a score of 85.52%, the smart classroom gets the lowest rating score in smart campus performance. Smart Courses and Smart Mobility get the highest marks on the Smart Governance aspects. Smart Governance receives the maximum score of 90.2%. According to data analysis, the smart campus implementation was going exceptionally well at Defense University, based on the findings of a survey.

IV.3. Regression Model

This study uses Simple Regression to determine the relationship between two variables: Human Capital Readiness as the independent variable and Smart Campus Performance based on Individual Perception as the dependent variable. The following is the regression model used in this study which can be seen in the following table:

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	55.128	5.852		9.420	.000
	HC Readiness	.235	.047	.448	4.961	.000

a. Dependent Variable: Smart Campus

Figure IV.1 Regression Model

Based on the table, conclusions can be drawn related to the research hypothesis, which shows that the independent variable Human Capital Readiness and the dependent variable smart campus performance, have a positive and significant relationship. H1 (H1: There is a significant relationship between human capital readiness and smart campus performance) is accepted, where the significant value on the human capital readiness variable has a value of 0.000 which is less than 0.05, and the t-count value (4.961) > t- table (1.985). The regression results show that the variable is accepted and has a positive significance to the dependent variable.

V. CONCLUSION

Defense University plans to become a world-class university and operates a smart campus initiative. It must be supported by the availability of human capital for Defense University to achieve its most significant potential. The poll assessed the readiness of human resources to attain a world-class university in the 4.0 industrial age. According to the poll data, the HDI score of 1.00 indicated that lecturers and education professionals were unprepared. The study's findings also suggest that the capacity-based readiness of workers (lecturers and education staff) is significant since it relates to university environment adaption. The low dimension of soft skills serves as an assessment tool for Defense University to effectively implement assistance initiatives for world-class institutions.

Current survey findings indicate that the smart campus operated by Defense University is doing very well. It is just necessary to increase the size of the smart classroom. The smart campus must also be supported by human resource preparedness because, with this assessment, it can maximize advantages, minimize risks, and sustain the current level of performance. Based on the judgments of each person, the calculation findings indicate a substantial association between human capital preparation and smart campus performance. It has the most positive and significant relationship to smart campus performance. The readiness of human resources will have a favorable effect on the smart campus production of firms in the present day.

Due to the lack of lectures and academic personnel at Defense University, the university may improvise by supporting hard and soft skills, notably in the soft skills department. The Defense Institution may progress towards becoming a world-class university in the industrial age 4.0 by offering training or workshops for assessment and capacity development.

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