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The Effect of Modern Strategy Implementation on Smart Infrastructure on Increasing Employee Performance at University in Indonesia

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Abstract

The design of strategies to increase the potential benefits of an organization is very important for renewal by implementing modern strategies. Smart infrastructure is a digital system that functions to improve performance, welfare, and increase cost efficiency and resource consumption. Previous research shows a significant increase in smart infrastructure which is influenced by the ability of the community. This study aims to analyze the success of implementing a renewal strategy for Smart Infrastructure for employees at university which we can assess from the performance of the university employees. Primary data was collected through questionnaires with a sample of 40 respondents which was then processed quantitatively by ANOVA test and LSD test using the Statistical Package for the Social Sciences (SPSS). The results showed that the percentage rate accepted was 78%, so that the implementation of a smart infrastructure system could increase employee productivity in university.

1. Introduction

Currently, the use of smart infrastructure is being intensively applied in various fields, one of which is in the scope of university. Infrastructure can mean several things and has been defined in several ways. It could refer to the fundamental systems and facilities that an organization, city, or country needs to function [1]. Smart infrastructure is a system that uses digital technology [2]−[9], where this system functions to improve performance and welfare, reduce costs and resource consumption [10]−[12]. A smart infrastructure is a lens through which the future is seen [13]. Smart infrastructure connects buildings and environments in an intelligent manner [14]−[16]. Besides, smart grid technology is focused on enabling efficient grid integration and comprehensive analysis to support advances in renewable energy sources, power systems management, minimization of inefficiencies in usage, and

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maximization of user savings [17]. Smart infrastructure has the potential to revolutionize infrastructure work delivery, control and management, automatically [18]–[20]. Smart infrastructure is not just about using data to make civilized life more efficient–and given that the majority of people now live in urban areas, the term 'cities' is used in this paper as shorthand for where infrastructure systems focus their impacts, whether within or connecting cities and other communities [21]. Digitizing this system is certainly the right choice for university, where with the digitization of this system it will facilitate the performance of both employees and students [22]. Smart Infrastructure in university usually includes several things such as lecture attendance, preparation of student schedules, managing several registrations of student activity documents, and much more [23]. Each university has a different smart infrastructure, according to the needs of the university. Meanwhile, development of smart city has been increasingly accepted as a new technology-based solution to mitigate urban diseases [24]–[33]. Smart city paradigm is associated with the Internet of Things [34][35], sensors, and big data, leading to informed and data-led governance [36]–[38]. Besides, the implementation of artificial intelligence (AI) in a smart society, in which the analysis of human habits is mandatory, requires automated data scheduling and analysis using smart applications, a smart infrastructure, smart systems, and a smart network [39].

The success of implementing smart infrastructure itself is influenced by smart people who are the foundation of a smart infrastructure, sociotechnical complexities [40][41]. This is in accordance with previous research which says that the potential benefits of smart infrastructure are very significant, but in reality it returns to the ability of the community [42][13]. The behavior of internet network users, for example, public hotspots that are used continuously during working hours can lead to a distribution of workload intensity [43]. It can be said that there is a variation over time between the power source and the payload. One of the smart people is an employee at a university. We can measure this success based on the performance of the employees of the university.

Performance is a work result achieved by a person in carrying out his assigned tasks based on experience skills, and immediately time skills [44]. A new comfortable strategy can increase the availability of building facilities as well as increase productivity for all parties. Smart infrastructure will directly require competent human resources so that it will increase user knowledge [45][46]. Related to improving employee performance with the existence of modern strategies from previous research by [47] from the results of research that the implementation of modern infrastructure strategic planning at university has a high percentage of satisfaction, which is 70.48%.

It is necessary to identify the successful implementation of the renewal strategy for Smart Infrastructure for employees at university which we can judge from the performance of the university employees. This identification of success is needed to find out how effective the implementation of the renewal strategy for smart infrastructure for employees in university is so that developers and system owners can evaluate existing systems and, in the future, will produce even better systems. In addition to identifying the success of implementing a renewal strategy for smart infrastructure, this research also aims to identify the reality of modern strategic implementation for existing infrastructure in university.

2. Methods

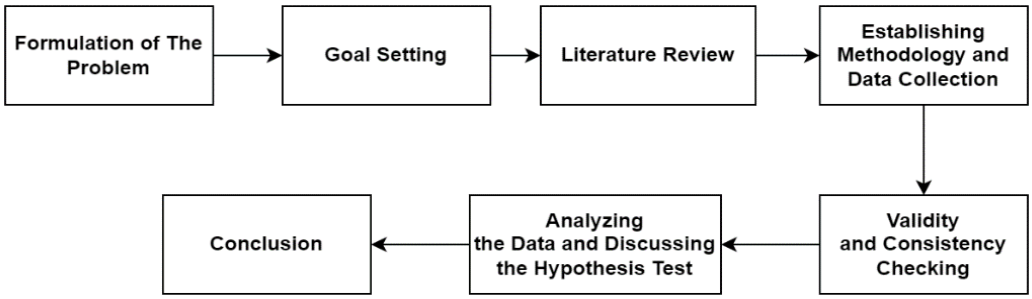

Figure 1. Research method flow

2.1.1. Literature Review

Researchers studied several journals, lecture materials, the internet, and other sources to collect data so that it became a reference in writing this research. The references used by researchers are in the form of related papers

2.1.2. Establishing Methodology and Data Collection

This research is quantitative research using descriptive analysis methods and making comparisons with the aim of explaining the object and explaining the problem in detail, as well as collecting all information that can increase its validity.

This study uses two sources of information, namely:

1. Main source: data collection through questionnaires prepared by researchers and to be filled out and disseminated.
2. The second source: using theoretical studies such as study and research subjects obtained through websites on the internet.

The research population was taken from employees of university institutions in Indonesia totaling 40 employees. The research sample was carried out using random sampling method by distributing questionnaires to university employees and a total of 40 employees answered.

The questionnaire was made with the title: "The Influence of Implementing Modern Strategies on Smart Infrastructure on Increasing Employee Performance at University in Indonesia". In the first part, respondents are required to fill in personal data such as: gender, age group, educational qualifications, years of service, position, and employment status. In the second part several statements with four constructs were presented, namely: integration, service orientation, user friendliness, usability. Each construct has three statements. If you add up, there are 12 statements. Then the respondents were given 5 choices, namely: very good, good, not good, enough, bad. With a value scale (5,4,3,2,1). For positive statements, a score of 5 is given for a very good answer, a score of 4 for a good answer, a score of 3 for a poor answer, a score of 2 for an adequate answer, a score of 1 for a bad answer. The opposite is true for statements. The research variable: (1) Independent Variable: implementation of modern strategy on smart infrastructure to improve the performance of university employees. (2) Demographic variables: gender, age group, educational qualifications, years of service, position, and employment status.

2.1.3. Validity and Consistency Checking

A validity test is a test used to show the extent to which the measuring instrument used in a measure is what is being measured. The validity test itself is used to measure the validity or validity of a questionnaire [48]. A questionnaire can be said to be valid if the statement on the questionnaire is able to reveal something that will be measured by the questionnaire.

There are two types of validity stage, namely:

1. Referees Validity: the scale is presented in a form that shows the current situation to a few specific referees.
2. Construct validation using the internal consistency method with a sample of 40 people.

The scale is calculated using two methods, namely half segmentation and Cronbach's Alpha. The correlation coefficient was calculated between the total paired expressions and the total respondents' statements for the range test using the Spearman Brown equation. This study used the One-Way Analysis of Variance (ANOVA) test method and the LSD test. The ANOVA (Analysis of variance) test is a form of statistical hypothesis testing, where researchers draw conclusions based on inferential statistical data or groups. The ANOVA test was developed to allow researchers to test the comparison hypothesis of more than two groups [49]. The LSD (Least Significant Difference) test is an advanced procedure to find out which treatment is significantly different if the null hypothesis is rejected [50].

2.1.4. Analyzing the Data and Discussing the Hypothesis Test

At this stage the researchers explained the results of the research with the fact that universities collect and analyze information about the effects of smart infrastructure on improving employee performance today and in the future. Calculate the data that has been collected before and analyze each hypothesis. In retrospect, there are significant differences or no significant differences in the average response of respondents regarding the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to the measurement variable.

2.1.5. Conclusion

Generate a proportion taken from several premises in the study. Then, with the research results, it will be used as evaluation material to further develop the smart infrastructure that has been used so that it is in line with the university's vision and mission.

3. Results and Discussion

3.1. Establishing Methodology and Data Collection

Following are the results of collecting personal data of respondents:

Table 1. Personal data of respondents

Gender	Woman		Man		Total
	17		23		40
Age Group	Less than equal to 30 years	31 years- 40 years	41-years - 50 years	51 years - 60 years	40
	25	10	5	0	
Educational Qualification	Diploma or below	Bachelor	Masters	Doctor	40
	3	5	20	12	
Years of service	Less than equal to 5 years	6 years - 10 years	11 years - 15 years	More than 15 years	40
	33	7	0	0	
Position	Teacher		Administrative		40
	19		21		
Employment status	civil servant	CPNS	BLU	Contract	40
	19	8	2	2	

3.2. Validity and Consistency Checking

Internal consistency scale results:

Table 2. Coefficient correlation results between statements

Statement	R	Significant	Statement	R	Significant
1	0.763	0.00	7	0.783	0.00
2	0.830	0.00	8	0.824	0.00
3	0.872	0.00	9	0.884	0.00
4	0.799	0.00	10	0.847	0.00
5	0.793	0.00	11	0.753	0.00
6	0.756	0.00	12	0.684	0.00

Table 3. Scale stability coefficient with cronbach alpha method

Dimensions	Total statement	Overall Coefficient Correlation	Cronbach's Alpha	Significance Level
Implementation of Modern Strategies on Smart Infrastructure for Improving Employee Performance at University	12	1	0.947	0.00

The scale is calculated using two methods, namely half segmentation and Cronbach's Alpha. The correlation coefficient was calculated between the total paired expressions and the total respondents' statements for the range test using the Spearman Brown equation. The total reliability coefficient is 1 and it can be seen that the reliability coefficient is very high, so the level of stability is high. Cronbach's Alpha reliability coefficient with a total of 0.947 which is a high reliability coefficient so that the level of stability is high

With this the researcher has confirmed the validity and reliability which then makes full confidence in the questionnaire that has been presented to answer the researcher's statements and analyze the results.

3.3. Analyzing the Data and Discussing the Hypothesis Test

Table of personal data of respondents:

Table 4. Distribution of respondents according to personal data

Personal data		**Amount**	**Percentage (%)**
Gender	Woman	17	42.5
	Man	23	57.5
Age Group	Less than equal to 30 years	25	62.5
	31 years - 40 years	10	25
	41 years - 50 years	5	12.5
	51 years - 60 years	0	0
Educational Qualification	Diploma or below	3	7,5
	Bachelor	5	12.5
	Personal data	Amount	Percentage (%)
	Masters	4	10
	Doctor	28	70

Years of service	Less than equal to 5 years	33	82.5
	6 years - 10 years	7	17.5
	11 years - 15 years	0	0
	More than 15 years	0	0
Position	Teacher	19	47.5
	Administrative	21	52.5
Employment status	civil servant	19	47.5
	CPNS	8	20
	BLU	2	5
	Contract	11	27.5

Table 5. Criteria adopted in the study (Ozen, *et.al*., 2012)

Senior High School	**Relative Weight**	**Approval Level**
From 1.79 – 1	From 35.9% - 20%	Bad
From 2.59 - 1.80	From 51.99% - 36%	Enough
From 3.39 - 2.60	From 67.99% - 52%	Not good
From 4.19 - 3.40	From 83.99% - 68%	Well
From 5 - 4.20	From 100% - 84%	Very good

Answers to research statements:
Q1: How is the availability of implementing modern strategies for smart infrastructure to improve employee performance?

Table 6. Arithmetic average, standard deviation, relative weight, ranking and agreement level for each statement

No.	Statement	Senior High School	Standard Deviation	Relative Weight	Rank	Approval Level
1	The university system is well integrated	3,200	1.223	64%	10	Not good
2	The system can store information electronically	3,525	0.933	70.5%	6	Well
3	The data in the system is consistent across the different modules	3,575	1.059	71.5%	5	Well
4	University provide an introduction or training if there are new features to the employee concerned	3,675	0.997	73.5 %	3	Well
5	The response speed of the system in completing work is good enough	3,525	0.933	70.5 %	6	Well
6	The system provides features that support work	3,700	0.822	74 %	2	Well
7	The display is easy to understand	3,525	1.109	70.5 %	6	Well
8	The system is very flexible to use	3,600	1,081	72 %	4	Well
9	The system is easy to operate by employees	3,475	1.176	69.5 %	7	Well
10	The system makes the work of employees easier	3,450	0.959	69 %	8	Well
11	The existence of a system to increase the productivity of university employees	3,900	0.944	78 %	1	Well
12	The system accelerates the work of employees	3,400	0.955	68 %	9	Well
	Total	3,545	1.016	70.9 %		Well

From the previous table, it can be drawn:
In the eleventh statement "The existence of a system increases the productivity of university employees" the arithmetic average is 3.9 (total score 5), which means that the relative weight of 78%

means that there is high agreement by respondents to this statement. In the first statement "The university system is well integrated" the arithmetic average is 3.2 out of a full total score of 5, which means that the relative weight of 64% means that there is an average agreement by respondents to this statement.

Overall, the arithmetic average of the effect of implementing smart infrastructure on improving employee performance in tertiary institutions is 3.545, meaning that the relative weight is 70.9%, this means high and good suitability for respondents. This statement scales the implementation of modern strategies on smart infrastructure to improve employee performance in university.

Researchers explain this result by the fact that university collect and analyze information on current and future employee performance, as well as strategies developed to improve employee performance by utilizing smart infrastructure [47].

3.4. Research Hypothesis

This study seeks to test the validity of the following hypotheses:

H0 1: There is a statistically significant difference at a significant level (alpha less than equal to 0.05) between the average respondent's responses about the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to personal and organizational variables: (for gender, age group, academic qualifications, years of service, position, employment status).

There are sub-hypotheses:

H0 1-1: There is a statistically significant difference at the level (alpha less than equal to 0.05) between the average respondent's responses regarding the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to gender.

Table 7: Gender, Total, Mean, Standard Deviation, T Value, Significance Level and Indication Due to Gender Variable

Domain	Gender	amount	Average	Standard Deviation	T grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Man	23	3.4094	0.82569	0.963	0.342	Not significant
	Woman	17	3.71	0.720			

From the results of the calculation above, gender does not find a significant difference in the average increase in employee performance on the use of smart infrastructure, where the average male employee is 3.4 and the average female employee is 3.71. From the results of the calculation, a significant value of 0.342 is obtained, which is above the alpha value which should be less than 0.05. From this it can be concluded that gender does not affect the increase in employee performance.

H0 1-2: There is a statistically significant difference in the level (alpha less than equal to 0.05) between the average respondent's responses regarding the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to age group.

Table 8. Domain, source, sum of squares, degrees of freedom, average of squares, f value, significance level, Indication with age group variables

Domain	Source	Sum of squares	Degrees of freedom	Average of squares	F grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Between Groups	0.253	12	0.021	0.788	0.658	Not significant
	In Groups	0.722	27	0.027			
	Total	0.975	39				

From the results of the calculations above, there is no significant difference to differences in age groups in improving staffing performance in implementing smart infrastructure in tertiary institutions. The age grouping in the data is grouped into several groups. From the results of the calculation, a significant value of 0.658 is obtained, which is above the alpha value which should be less than 0.05.

H0 1-3: There is a statistically significant difference in the level (alpha less than equal to 0.05) between the average respondent's responses regarding the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to educational qualifications.

Table 9. Domain, source, sum of squares, degrees of freedom, average of squares, f value, significance level, indication with educational qualification variables

Domain	Source	Sum of squares	Degrees of freedom	Average of squares	F grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Between Groups	18,773	12	1,564	2,223	0.041	Significant
	In Groups	19,002	27	0.704			
	Total	37,775	39				

From the calculation results above, there are significant differences in differences in educational qualifications in improving staffing performance in implementing smart infrastructure in tertiary institutions. The higher the level of educational qualifications, the easier it is to improve performance.

The grouping of educational qualifications in the data is grouped into several groups. From the results of the calculation, a significant value of 0.041 is obtained, which is above the alpha value which should be less than 0.05. This is in line with previous research which states that education has an influence on the abilities possessed by employees.

H0 1-4: There is a statistically significant difference in the level (alpha less than equal to 0.05) between the average respondent's responses about the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to years of service.

Table 10. Domain, source, sum of squares, degrees of freedom, average of squares, f value, significance level, indication with tenure variables

Domain	Source	Sum of squares	Degrees of freedom	Average of squares	F grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Between Groups	0.937	12	0.078	0.436	0.934	Not significant
	In Groups	4,838	27	0.179			
	Total	5,775	39				

From the results of the calculations above, there is no significant difference to the differences in work period groups in improving staffing performance in implementing smart infrastructure in tertiary institutions. Even for short or long working periods, both have opportunities to improve performance. The grouping of years of service in the data is grouped into several groups. From the results of the calculation, a significant value of 0.934 is obtained, which is above the alpha value which should be less than 0.05.

H0 1-5: There is a statistically significant difference in the level (alpha less than equal to 0.05) between the average respondent's responses about the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to their position.

Table 11. Domain, position, total, average, standard deviation, t value, significance level and indication due to position variables

Domain	Position	amount	Average	Standard Deviation	T grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Academic	19	3.8324	0.74174	-1.295	0.203	Not significant
	Administration	21	3.3452	0.82474			

From the calculation results above, there is no significant difference in the differences in job position groups in improving staffing performance in implementing smart infrastructure in tertiary institutions. The grouping of job positions in the data is grouped into several groups. From the results of the calculation, a significant value of 0.203 is obtained, which is above the alpha value which should be less than 0.05.

H0 1-6: There is a statistically significant difference in the level (alpha less than equal to 0.05) between the average respondent's responses about the effect of implementing smart infrastructure on improving employee performance in tertiary institutions according to employment status

Table 12. Domain, source, sum of squares, degrees of freedom, average of squares, f value, significance level, indication with employment status variables

Domain	Source	Sum of squares	Degrees of freedom	Average of squares	F grade	Significance Level	Indication
Total approval of the implementation of modern strategies on smart infrastructure to improve the performance of university employees	Between Groups	0.006	1	0.006	0.09	0.923	Not significant
	In Groups	25,786	38	0.679			
	Total	25,793	39				

From the calculation results above, there is no significant difference to differences in employment status in improving staffing performance in implementing smart infrastructure in tertiary institutions. The grouping of employment status in the data is grouped into several groups. From the results of the calculation, a significant value of 0.923 is obtained, which is above the alpha value which should be less than 0.05.

4. Conclusion

Through quantitative analysis of research statements and hypotheses, it shows that a high level of influence on the implementation of smart infrastructure on improving employee performance in university is with a percentage of 70.9%. The gender variable did not find a significant difference in the average increase in employee performance on the use of smart infrastructure. There is no significant difference with respect to age group differences in improving staffing performance in implementing smart infrastructure in university. There is a significant difference in the difference in educational qualifications in improving staffing performance in the application of smart infrastructure in university. There is no significant difference to the difference in working period groups in improving staffing performance in the application of smart infrastructure in university. There is no significant difference to differences in job position groups in improving staffing performance in the application of smart infrastructure in university. There is no significant difference to differences in employment status in improving staffing performance in implementing smart infrastructure in university.

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