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Effect of Information Technology Capital: Technology Infrastructure, Database, Software, and Brainware Toward Optimize the Use of Information Technology (Case Study : UIN Sunan Ampel Of Surabaya)

Rismawati Br Sitepu
Airlangga University of Surabaya, East Java East Java, Indonesia, rismasitepu07@gmail.com

Ilham m.said
UIN Sunan Ampel Of Surabaya, East Java, Indonesia, ilham-2019@feb.unair.ac.id

Tanti Handriana
Airlangga University of Surabaya, East Java East Java, Indonesia

Praptini Yulianti
Airlangga University of Surabaya, East Java East Java, Indonesia

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Ilham[1], Tanti Handriana[2], Praptini Yulianti[3], Rina Dewi[4], Rismawati Br Sitepu[5]
[1]Information Systems Study Program, Department of Technology, Faculty of Science and Technology, Sunan Ampel Islamic University Of Surabaya, East Java, Indonesia
Ahmad Yani Number 117 Street, Surabaya, East Java, Indonesia
[1]ilham-2019@feb.unair.ac.id
[1,2,3,4,5]Department of Management, Faculty of Economics and Business, Airlangga University
Airlangga Number 4-6 Street, Surabaya, East Java East Java, Indonesia

ABSTRACT

This research was conducted to determine the extent of the influence of technology infrastructure costs, software costs, database costs and brainware costs to increase the information technology budget of the Sunan Ampel State Islamic University in Surabaya and efficient use of the budget. The purpose of this study is to prove that there is a positive and significant influence of technology infrastructure costs, software costs, database costs and brainware costs to increase information technology budgets by using validity and reliability tests and classic tests such as the Normality test, Multicollinearity test, autocorrelation test, Heteroskedasticity test , and Linearity test. This study will provide the results of the analysis of each test using Skewness and Kurtosis, Multicollinearity test with variance inflation factor (VIF), autocorrelation test with Durbin-Watson test, Heteroskedasticity test with the Glejser test, Linearity test with Durbin-Watson, The conclusion of the study is that the cost of technology infrastructure has a significant effect, the cost of software has a significant effect on increasing the information technology budget, database costs have a significant effect on increasing the information technology budget and the cost of brainware has a significant effect on increasing the information technology budget.

Keyword : Information Tehnology, Infrastructure, Software, Database, Brainware, Capital, Optimize, and University

INTRODUCTION

Information technology has changed the map of world power which covers the fields of geography, economy, politics, social, culture, to the level of defense and security. Along with the demands of rapid technological development, the government of the Republic of Indonesia has responded by issuing Presidential Instruction No. 3 of 2003 concerning National Policies and Strategies for E-Government Development. On the other hand there are strong community demands for efforts to improve public services and good governance so that the term good governance appears. Good governance is an aggregate of individual behavior that obeys and complies with the provisions (regulatory) that have been set, so that good governance is a reflection of government actors in accordance with predetermined rules [4]. Higher Education has allocated large amounts of funds for investment in information technology. To support the accountability of tertiary institutions in the implementation of information technology, a model in the form of guidelines for monitoring the implementation of information technology is needed. The development of technology is very fast, especially in developing countries along with the development of information technology and technology (Khadaroo, 2005).

The first choice for users to use the internet to obtain information is time and makes it easy to get the desired documents. The main media used by investors and financial analysts is the internet to obtain financial and non-financial information. This study discusses the classic problems in managing the budget, which occur in various fields one of them in the world of education. Although the government has provided various systems for budget management, internal budget management is still needed. Starting from the submission of the budget plan of each unit, then merging the data in one satker, submitting revisions and submitting the realization and reporting as well as statistical monitoring by the leaders of the Higher Education. So in this study created a system for managing internal budgets for information technology procurement. The results of this study create an evaluation and recommendation results that can help budget management of information technology procurement at the Sunan Ampel State Islamic University in Surabaya, this will be very helpful especially for state universities.

METHOD

The research model in this study is as follows. Increased Technology Budget = $\alpha 0$ + $\alpha 1$ Infrastructure + $\alpha 2$ Software + $\alpha 3$ Databases + $\alpha 4$Brainware + ε. The population in this study was the Sunan Ampel State Islamic University of Surabaya in 1980-2019. The sample selection method uses random sampling with the following criteria. a. University Units, Faculties, Departments and Study Programs that have used information technology and had technological infrastructure in 1980 such as computers. This is because this research began in June 1980. b. Supporting units of Education activities such as libraries, business units, LPPM, LPM and others who have used information technology. The completeness of the data is needed so that the results of the study can represent the condition of the UIN Sunan Ampel Surabaya university.

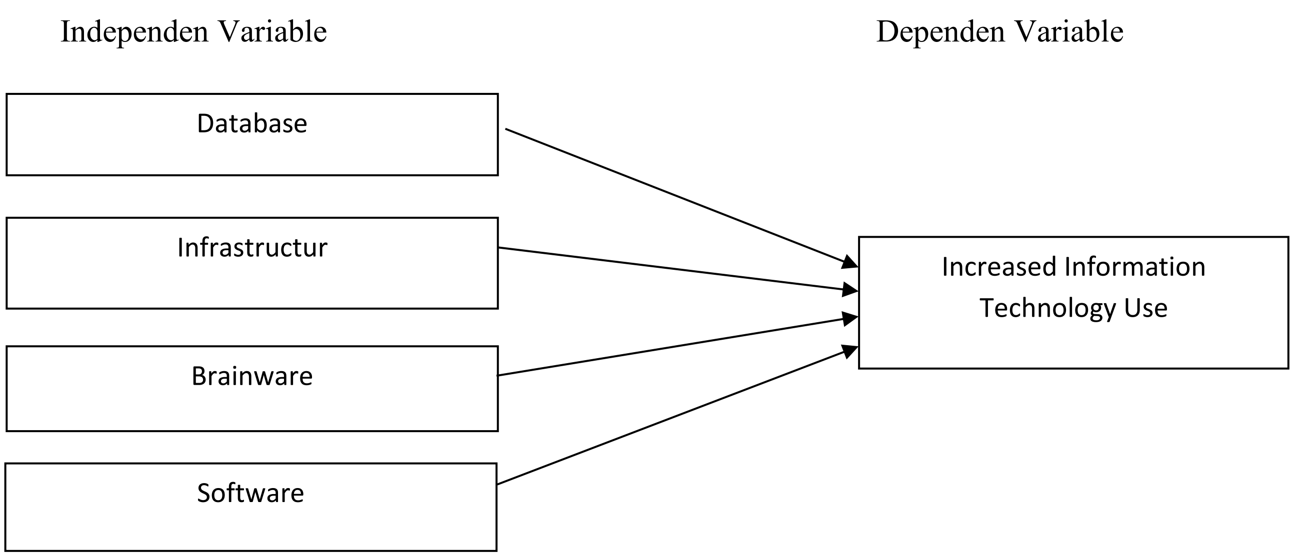

Figure 1. Construction Of Research Model

Classic assumption test

The first time, the data was processed and analyzed through the classic assumption test including normality test, multicollerierity test, autocorrelation test, heteroscedasticity test and linearity test. Autocorrelation test is performed considering the data used there are time series data in an annual period. Testing classic assumptions must be done to test the assumptions that exist in modeling multiple linear regression. The purpose of testing this classic assumption is to provide certainty that the regression equations obtained have accuracy in estimation, are unbiased and consistent. (Ghozali, 2013).

Assumption of Normality

The normality test aims to test whether the regression model, confounding or residual variables have a normal distribution. The t test and F test assume that the residual value follows the normal distribution. If this assumption is violated, then the statistical test becomes invalid for a small sample size. A good regression model is to have residual values that are normally distributed. To detect whether residuals are normally distributed or not in SPSS can use the P Plot normal test facility, histogram test, Chi Square test, Skewness and Kurtosis test or Kolmogorov Smirnov test. The basis of the analysis is as follows.

Assumption of Multicollinearity

Multicollinearity test aims to test whether the regression model found a correlation between independent variables. A good regression model should not occur correlation between independent variables. If the independent variables are correlated with each other, then these variables are not orthogonal. Orthogonal variable is an independent variable whose correlation value between fellow independent variables is equal to zero. To detect the presence or absence of multicollinearity in the regression model in the SPSS program can be seen from the variance inflation factor (VIF) in the coefficients table with a tolerance limit of no more than or equal to 10. So the assessment criteria can be arranged as follows. IF VIF value ≤ 10, then the independent variables do not have multicollinearity. IF VIF value ≥ 10, then the independent variables are multicollinearity.

Autocorrelation Test

Autocorrelation is one of the classic assumptions tests in multiple linear regression analysis. Autocorrelation test is to see whether there is a correlation between a period t with the previous period (t -1). Regression analysis aims to see the effect of the independent variables on the dependent variable, so there should not be a correlation between observations and previous observational data. Criteria for whether or not autocorrelation can use the Durbin Watson number (d) and the Durbin Watson table. If (4-dL) <d <dL, then Ho is rejected, which means there is autocorrelation. If dU <d <(4-dU), then Ho is accepted, which means there is no autocorrelation.However, if dL <d <dU or (4-dU) <d <(4-dL), then it does not produce definitive conclusions.

Assumption of Heteroscedasticity

Heteroscedasticity test aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another. If the variance from one observation residual to another observation is fixed, then it is called homoscedasticity and if different is called heteroscedasticity. A good regression model is homoscedasticity or heteroscedasticity does not occur. To determine the presence or absence of heteroscedasticity, it can be detected by looking at the presence or absence of certain patterns on a scatterplot chart, the Glejser test, the Park test or the White test. The basis of the analysis is as follows. If there are certain patterns, such as the dots that form a regular pattern (wavy, widened and then narrowed), then it indicates that heteroscedasticity has occurred. If there is no clear pattern, and the points spread above and below the number 0 on the Y axis, then there is no heteroscedasticity.

Assumption Of Linearity

Linearity test is used to see whether the model built has a linear relationship or not. This test is rarely used in various studies, because usually the model is formed based on a theoretical study that the relationship between the independent variable and the dependent variable is linear. Relationships between variables which in theory are not linear relationships actually can not be analyzed by linear regression, for example the problem of elasticity. If there is a relationship between two variables that are not yet known whether linear or not, the linearity test cannot be used to provide an adjustment that the relationship is linear or not. The linearity test is used to confirm whether the linear nature between the two variables identified in theory is compatible with the results of existing observations. The linearity test can use the Means test, the Durbin-Watson test, the Ramsey Test or the Lagrange Multiplier test.

Statistical Test F

Statistical tests to determine whether all the independent variables entered into the model have a joint relationship with the dependent variable. The null hypothesis (Ho) that requests evaluation is that all parameters in the model are zero, or: Ho: b1 = b2 = ... = bk = 0, That is, all independent variables are not a significant explanation of the dependent variable. The alternative hypothesis (Ha) is fully approved, not all simultaneous parameters are zero, or: Ha: b1 ≠ b2 ≠ .... ≠ bk ≠ 0, Which means, all the independent variables which are significant explanations of the dependent variable. In SPSS, the F test can be seen in the ANOVA table (Analysis of Variance) and is taken based on the probability value (significant) compared to alpha (α) 5%. The following are the agreed criteria. Probability If the probability (sig.)> A (5%), then there is no significant difference simultaneously variables X1, X2, X3, X4 and so on the variable Y, with a 95% confidence level. If the probability (sig.) <A (5%), then there is at least 1 variable X that is significantly significant to the variable Y, with a confidence level of 95%.

Statistical Test t

T test shows how far the influence of one independent variable individually in explaining the variation of the dependent variable. The null hypothesis (Ho) to be tested is whether a parameter (bi) is equal to zero, or: Ho = bi = 0, That is, whether an independent variable is not a significant explanation of the dependent variable. The alternative hypothesis (Ha) to be tested is that the parameters of a variable are not equal to zero, or: Ha: bi ≠ 0, That is, the variable is a significant explanation of the dependent variable. In SPSS, the t test can be seen in the coefficients table and the assessment is taken based on the probability value (significance) compared to alpha (α) 5%. The following evaluation criteria: If the probability (sig.)> A (5%), then there is no significant effect between the variables on the Y variable, with a confidence level of 95%. If the probability (sig.) <A (5%), then there is a significant influence between the variable X on the Y variable, with a confidence level of 95%.

Determination Coefficient Test (r^2)

Next, to test the suitability of a model, the coefficient of determination (r2) is used. The coefficient of determination is the proportion of variability in a data that is calculated based on a statistical model. The coefficient of determination is the ratio of the variability of values created by the model with the variability of the original data values. In regression, r2 is used as a measurement of how well the regression line approaches the original data value made by the model. R2 can be interpreted as the proportion of variation of responses explained by the regressor (independent variable) in the model. If r2 = 1, then the number shows the regression line matches the data perfectly. The model fits in explaining all the variability in the Y variable. If r2 = 0, it means that there is no relationship between the X variable and the Y variable. If 0 <r2 <1, it means that the percent variation of the variable Y (the dependent / response variable) is explained by the variable X (the independent / explanatory variable), while the rest is influenced by unknown variables. Augustine and Kristaung (2013).

RESULT AND DISCUSSION

The data used in this study are companies that are included in the pure financing category that were recorded in the annual period 1980 to 2019. All data is available to be the research sample.

Assumption of Normality

Based on the Descriptive Statistics table, the skewness ratio = -0.58 / 0.374 = -1.55 can be calculated; while the ratio of kurtosis = 0.754 / 0.733 = 1.02. Because the skewness ratio and kurtosis ratio are between –2 to +2, it can be concluded that the data distribution is normal. Following Table 1. Skewness dan Kurtosis.

Table 1. Skewness and Kurtosis Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Unstandardized Residual	40	-1.19809E8	9.55949E7	.0000000	4.29773928E7	-.058	.374	.754	.733
Valid N (listwise)	40								

Assumptions Of Autocorrelation

The Durbin-Watson value is 2,040 and this value will be compared with the DW table value. The next step is to set the dl and du values, by using α = 5%, the sample (n) we have as many as 40 observations, and the independent variables as much as 4, we get the value of dl = 1.2848 and du = 1.7209. So the DW value is smaller than the dl value (2.040> 1.2848) so it can be concluded that this model has no positive autocorrelation symptoms. Following Table 2. Durbin-Watson Test Results.

Table 2. Durbin-Watson Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.882[a]	.779	.753	4.537E7	2.040

a. Predictors: (Constant), Software_Costs, Infrastructure_CostsTechnoInfo, Database_Brainware, Database_Costs, b. Dependent Variable: Budget Level of Information Technology

Assumptions of Multicollinearity

Based on the results of the SPSS output shows that there is no independent variable that has a Tolerance value of less than 0.10 which means there is no correlation between the independent variables whose value is more than 95%. The results of the calculation of the value of Variance Inflation Factor (VIF) also showed the same thing that there was no one independent variable that had a VIF value greater than 10. So it can be concluded that there were no symptoms of multicollinearity between the independent variables in the regression model. Looking at the results of the magnitude of correlation between the independent variables it appears that the database cost variable has a low correlation with the software cost variable of -0,321, as well as the infrastructure cost variable with Brainware costs with a correlation of -0.071 where both of these correlation values are less than 0.70. So it can be concluded that there are no symptoms of multicollinearity between independent variables in the regression model. Following Table 3. Tolerance and VIF Test Results

Table 3. Tolerance and VIF Test Results

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	T	Sig.	Tolerance	VIF
1	(Constant)	9.264E7	1.758E7		5.270	.000		
	Database_Cost	-1.009	1.001	-.092	-1.009	.320	.768	1.302
	InfrastrukturTeknoInfo_Cost	3.278	.820	.346	3.997	.000	.845	1.184
	Brainware_Cost	-.852	1.032	-.070	-.825	.415	.886	1.129
	Software_Cost	8.216	.928	.802	8.854	.000	.771	1.297

a. Dependent Variable: Budget Level of Information Technology

Assumption of Heteroscedasticity

The results of the SPSS output display clearly show that there are no independent variables that are statistically significant influence the dependent variable residual absolute value (Abresid). This can be seen from the significant probability of each independent variable, namely 0.437, 0.450, 0.491, and 0.530, all of which are greater than α = 0.05; so it can be concluded that this regression model does not contain heteroscedasticity or homoscedasticity problems.Following Table 4 Heteroscedasticity Abresid Test Results.

Table 4. Heteroscedasticity Abresid Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.215E7	1.116E7		2.880	.007
	Database	.500	.635	.149	.786	.437
	InfrastrukturTeknoInfo	-.398	.521	-.138	-.764	.450
	Brainware	.456	.655	.122	.695	.491
	Software	-.374	.589	-.120	-.634	.530

a. Dependent Variable: Abresid

Assumptions Of Linearity

Linearity test is used to see whether the model built has a linear relationship or not. If there is a relationship between two variables that are not yet known whether linear or not, the linearity test cannot be used to provide an adjustment that the relationship is linear or not. The linearity test is used to confirm whether the linear nature between the two variables identified in theory is compatible with the results of existing observations. The linearity test can use the Means test, ANOVA, Durbin-Watson Test, Ramsey Test or Lagrange Multiplier test. Look at Table 5. Linearity Test Results on ANOVA.

Table 5. Linearity Test Results on ANOVA

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Tingkat_Anggaran_TeknologiInformasi * Biaya_Software	Between Groups	(Combined)	2.718E17	19	1.430E16	5.331	.000
		Linearity	2.197E17	1	2.197E17	81.860	.000
		Deviation from Linearity	5.212E16	18	2.896E15	1.079	.432
	Within Groups		5.367E16	20	2.683E15		
	Total		3.254E17	39			

Statistical Test F (Simultaneous)

The results of Anova with probability (sig.) = 0.000 or <α (5%), then there is at least 1 variable X which significantly influences the variable Y, with a confidence level of 95%. Following Table 6 F (Simultaneous) Statistical Test Results.

Table 6. F (Simultaneous) Statistical Test Results

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.534E17	4	6.335E16	30.782	.000[a]
	Residual	7.204E16	35	2.058E15		
	Total	3.254E17	39			

Statistical Test t (Partial)

The probability result (sig.)> A (5%), then there is no significant effect between the variables on the Y variable, with a confidence level of 95%. Namely variable Database costs are 0.320 and brainware costs are 0.415. This value indicates that the two variables are not significant or more than 0.05. If the probability (sig.) <A (5%), then there is a significant influence between the variable X on the Y variable, with a confidence level of 95%. Namely Infrastructure costs of 0,000 and Software costs of 0,000 this value shows that the two variables are significant or less than 0.05. Following Table 7 Statistical Test Results t (Partial).

Table 7. Statistical Test Results t (Partial)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.264E7	1.758E7		5.270	.000
	Biaya_Database	-1.009	1.001	-.092	-1.009	.320
	Biaya_InfrastrukturTeknoInfo	3.278	.820	.346	3.997	.000
	Biaya_Brainware	-.852	1.032	-.070	-.825	.415
	Biaya_Software	8.216	.928	.802	8.854	.000

a. Dependent Variable: Tingkat_Anggaran_TeknologiInformasi

Determination Coefficient Test (r^2)

The coefficient of determination test results indicate that r2 is equal to 0.779. This figure shows that 77.9% of the variation in the Information Technology Budget Level (TATI) (dependent / response variable) can be explained by software cost variables, and infrastructure costs (independent / explanatory variables), while the remaining 22.1% is influenced by variables not known. Look this Table 8 Determination Coefficient Test Results

Table 8. Determination Coefficient Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.882[a]	.779	.753	4.537E7	2.040

For each hypothesis the following results can be arranged with table 10.

Table 10. Resume of Hypothesis Test Results

Hypothesis	Sig Value	Supported / Not Supported
H1: Database Cost (BD) has a negative effect on increasing the Information technology budget (PATI)	0.320	Unsupported
H2: IT Infrastructure Costs (BITI) have a positive effect on increasing the information technology budget	0.00	Supported
H3: The cost of Brainware (BB) has a negative effect on increasing the information technology budget	0.415	Unsupported
H4: Software costs (BS) have a positive effect on increasing the information technology budget	0.000	Supported

Source: researchers processed products

The regression equation is as follows:

PATI = 9,264 - 1,009BD + 3,278BITI - 0.852BB + 8.216BS + e

From the above hypothesis test it can be seen that the Cost of Database (BD) and Cost of Brainware (BB) have a negative effect on increasing the information technology budget (PATI). While IT Infrastructure Costs (BITI), and Software Costs (BS) simultaneously influence the increase in the information technology budget. However, a partial test for infrastructure costs and software costs turned out to provide significant results. That is, infrastructure costs and software costs affect the increase in the information technology budget. This proves that the cost of infrastructure and software costs will absorb more budget than other costs. In this research, it can be seen that the infrastructure and software that spend the most budget increases the information technology budget.

CONCLUSION

This study aims to examine the effect of database costs, infrastructure costs, brainware costs and software costs on the Increased Information Technology Budget. From the test results obtained that only infrastructure and software costs have a significant effect on increasing the Information Technology Budget. While database costs and brainware costs do not significantly influence the Information Technology Budget Increase.

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