Influence of College Accreditation Rank, Cumulative Achievement Index, and Field Interest on Training Result in the Training Credit System

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ABSTRACT

This paper aims to examine the factors that influence training outcomes in the training credit system with independent/predictors variables are the accreditation of the prior college, cumulative achievement index of prior learning and field interests. The population and sample came from Basic Aircraft Mechanic students who used the training credit system with data sourced from academic transcript and questionnaires. This study uses multiple linear regression methods and hypothesis testing uses t-statistics to test the partial regression coefficient and F-statistical to find out the simultaneous effect of the independent variable (X) on the dependent variable (Y) with a level of significance of 5%.The results showed that only the cumulative achievement index had a positive effect on the training outcomes of 2.149, greater than the t table 2.064

Keywords: training credit system, cumulative achievement index, prior laerning, field interest

1. INTRODUCTION

An aircraft maintenance technician must submit to basic aircraft mechanic training in an institution that is approved by the directorate of airworthiness and aircraft operations, the ministry of transportation to obtain an aircraft maintenance license[2]. Institutions that obtain permission to administer aircraft maintenance training will obtain an Approved Aircraft Maintenance Training Organization (AMTO) 147 identity. The training system at AMTO 147 provides a minimum limit of training hours of 3000 hours to get the right to take the Basic Aircraft Mechanic test with a load of material according to the curriculum and syllabus stated on the technical training procedure manual[1]. The training credit system is a training system that provides recognition of prior learning experiences, both learning experiences taken through AMTO training or learning experiences taken through college in not AMTO organizations. The training credit system provides a reduction in the number of training hours from the recognition of prior learning experiences. The amount of reduction in training hours depends on the compatibility of prior learning experiences with the Basic Aircraft Mechanic syllabus as seen in the academic transcript. The Civil Aviation Safety Regulation 147 revision 1 amendment 0 subpart c number 147.37 only mentions the terms of training credit is an accredited academy/college graduate.

College accreditation rank is the accreditation ranking of basic college from students in the training credit system. Following the regulations of the Higher Education National Accreditation Agency, there are 3 statuses of colleges in Indonesia, namely accredited A with Superior status, accredited B with Very Good status, and accredited C with Good status. Higher education accreditation is a guarantee of the quality of education management[3] as well as external parties' recognition of the quality and proof of the commitment of institutional leaders to quality commitments[4]. There is a tough relationship between the quality of graduates and college[5][6], but in his research, Al Kautsar found no relationship between accreditation of basic schools with medical student learning outcomes[7].

The cumulative achievement index (CAI) is the cumulative average learning outcomes of all courses in the entire burden of the College. In this study, the CAI of prospective students is the score of learning outcomes at the diploma or undergraduate level listed in the academic transcript which is a requirement to attend a training credit system program. Smart students who have high intellectual intelligence tend to have higher CAI scores[8]. But this is different from Sunandar research, that intellectual intelligence does not affect the cumulative achievement index (CAI)[9]. Sunandar's research is in line with Madhuri's research that the cumulative achievement index (CAI) is influenced by emotional intelligence and spiritual

intelligence[10]. But they agreed that the CAI was proof of learning achievement at the diploma and undergraduate level. This value is considered as the initial ability before undergoing further training in the training credit system. Besides being determined by the accreditation status of the college before, learning outcomes are also determined by initial ability[11]. There is a significant influence between the initial ability of mathematics learning outcomes[12], and the results of learning Biology[13]. But different in spatial abilities, students with low spatial abilities gain more after using computer games than those with better initial skills. Training sessions through simple computer games have proved to be useful in participants with reduced spatial skills, the lower the initial level, the higher is the improvement[14][15].

In addition to the initial ability and status of the college before, there is one more factor that is thought to influence learning outcomes in the training credit system, namely fied interest[16][17][18][31][32]. Field interest is student interest in aircraft maintenance. The high interest of someone in a field of work is thought to influence the interest in learning in that field[24][25][26]. There is a significant relationship between learning interest and mathematics learning achievement[19][20][21][22]. Likewise, there is a positive interaction between interest and initial ability towards learning outcomes in physics[23]. Likewise, Ariyanti got the conclusion that there was an influence of interest in accounting learning and learning motivation on student achievement in Accounting Education Study Program in Semarang State University partially or simultaneously[27][2][29][30].

This paper will examine the effect of college accreditation rank, cumulative achievement index, and field interest on training result in the training credit system.

2. METHOD

The method used is observational analytic with multiple linear regression analysis with 3 predictors/independent variables. The study was conducted in Surabaya Aviation Polytechnic on Non-Diploma Basic Aircraft Mechanic students, which uses the training credit system with a population of 30 students. The population is small because this system was only implemented in 2016 with a limited scale of permission from the Directorate of Airworthiness and the Aircraft Operation (one time approval). According to Isaac and Michael for a population of 30 students with an error rate of 5%, the ideal sample for research is 28 students[16]. The data is interval or ratio data obtained through questionnaires distributed through online questionnaires and secondary data from training achievement achieved through educational administration documents in aircraft engineering study programs. The data that has been collected is processed statistically using multiple linear regression tests with the classic assumption test of heteroskedasticity test, multicollinearity test, and normality test.

3. RESULTS AND DISCUSSION

Research has been conducted at Surabaya Aviation Polytechnics at Non-Diploma Basic Aircraft Mechanic (ND BAM) in 2016 with a limited scale of permission (one-time

approval) from the Directorate of Airworthiness and the Aircraft Operation before CASR 147 rev 01 regulations were established. This research aims to determine the influence of college accreditation rank, CAI score, and field interest on the results of the 2016 ND BAM training. Respondents in this research were all ND BAM 2016 students, a total of 30 students. Out of 30 students, there were 2 students whose data were incomplete, so in this research, those who met the regression data criteria totaled 28 students. Because of the limited population of research objects, the determination of samples using the Isaac and Michael approach, wherewith a 95% confidence level, the samples needed were 28 people[42].

This research aims to examine the effect of the accreditation status of the basic college, CAI of prospective students, and interest in the field to training results. It's used multiple linear regression because in this case there are dependent variables or criterium namely training results and independent variables or predictor namely the accreditation status of the basic college, the CAI of prospective, and interest in the field. Multiple linear regression is a regression analysis that is used to predict the state of the dependent variable (criterion) if two or more independent variables as a predictor are manipulated (increased in value)[42] with the equation:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \qquad (1)$$

Information:
Y = Dependent Variable or criterion.
X = Independent variable or predictor.
α = Constant.
β = Slope or Estimate coefficient

3.1 *Classical Assumption Test*

1) Data

One of the requirements for multiple linear regression is data must be interval or ratio data. Accreditation rank of basic college is interval data that has a range of values/ intervals between levels[43] meaning that as well as the letters C, B or A, the accreditation rank has a value of the scale of numbers in the range <200 to> 361[44]. But because the questionnaire data that can be collected is data in the form of letters, so weighting is done with the following table

Table 1.

College Accreditation	Score	Value
A	>361	4
B	301-361	3
C	200-300	2
N/A	<200	1

So in the calculation of multiple linear regression used the value according to the weighting above.

Field interest data is a prospective student questionnaire data on their interest in aircraft maintenance. Data was taken

using a Linkert scale with a scale of 1-5, ranging from very disinterested, not interested, less interested, interested, and very interested. This data, besides having a name (attribute), also has a ranking or sequence. The number given contains levels. This measure does not give an absolute value to the object, but only gives rank so that the field of interest questionnaire data is only ordinal data[45]. According to Al-Rasyid[46], converting the data from an ordinal scale to an interval scale is called transformation using the Successive Interval method. The use of interval scale for parametric statistical purposes, besides being a norm, is also for changing data to have a normal distribution. Transforming using this model means there is no need to test normality. Because one of the conditions for using parametric statistics, in addition to the data must have an interval scale (or ratio), the data must have a normal distribution. Unlike nonparametric statistics, it is only used to measure distribution[21].

The resulting training and cumulative achievement index are ratio data so they can be used directly in multiple linear regression analysis. Characteristics of ratio data besides having intervals also have absolute zero[16]. Data on the results of ND BAM students' training is the result of the final training exam at intervals of 0-100. These data are obtained from the academic archives in aircraft engineering study programs. While cumulative achievement index data is data obtained from prospective student biodata which is data on academic achievement of prospective students in basic college and the form of ratio data at intervals of 0-4.

Table 2.

No	Training Result	Basic College Accreditation		CAI	Field Interest	
					Linkert	MSI
		State	interval		ordinal	Interval
1	78.70	B	3	2.7	3	1.85
2	77.40	A	4	3.0	5	3.73
3	80.00	B	3	3.0	3	1.58
4	81.70	B	3	3.25	3	1.00
5	79.77	B	3	2.96	5	3.73
6	80.10	B	3	3.51	4	2.39
7	78.00	B	3	3.0	4	2.39
8	77.43	A	4	2.46	4	2.39
9	80.27	A	4	2.81	5	3.73
10	78.17	A	4	2.90	5	3.73
11	81.35	A	4	3.02	5	3.73
12	82.57	B	3	3.32	4	2.39
13	80.22	B	3	3.18	5	3.73
14	79.87	B	3	3.30	5	3.73
15	84.12	A	4	2.91	5	3.73
16	84.57	B	3	3.16	5	3.73
17	82.19	B	3	3.11	4	2.39
18	83.57	C	2	3.32	5	3.73
19	83.59	A	4	3.75	5	3.73
20	81.85	B	3	3.21	5	3.73
21	85.09	A	4	3.20	5	3.73
22	83.78	A	4	3.00	4	2.39
23	82.19	B	3	3.40	5	3.73
24	83.52	A	4	2.99	5	3.73
25	84.25	A	4	3.03	5	3.73
26	79.70	B	3	3.48	5	3.73
27	81.65	B	3	3.04	5	3.73

2) Normality Test

Multiple linear regression with no-time series data types requires a prerequisite test in the form of normality test, multicollinearity test, and heteroscedasticity test, without an autocorrelation test[22].

Normality test is a test conducted to assess the distribution of data in a group of data or variables, whether the data distribution is normally distributed or not. For multiple linear regression, the assumption of normality is not per variable, but rather the residual. Residual normality test is a normality test that aims to test whether in the regression model, confounding or residual variables have a normal distribution[23]. The data is normally distributed if the data distribution on the P-P Plot of Regression Standarized Residual follows a diagonal line[22]. As shown in the fig.1 the distribution of plotting data on the P-P Plot of Regression Standarized Residual follows the diagonal line. This means that residual data is normally distributed.
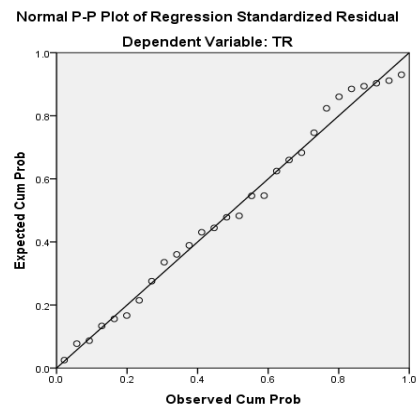

Figure 1.

3) Multicollinearity test

Multicollinearity test is a test conducted to ascertain whether in a regression model there is intercorrelation or colinearity between independent variables. Intercorrelation is a linear relationship or a strong relationship between one independent variable or predictor variable with other predictor variables in a regression model. The intercorrelation can be seen by the value of the correlation coefficient between the independent variables, the VIF and Tolerance values, the Eigenvalue and Condition Index values, and the standard error value of the beta coefficient or partial regression coefficient

Table 3.

Correlations

		TR	CA	IS	FI
Pearson Correlation	TR	1.000	.049	.395	.249
	CA	.049	1.000	-.368	.208
	CAI	.395	-.368	1.000	.196
	FI	.249	.208	.196	1.000

The correlation table shows the results of the intercorrelation analysis between independent variables that are marked by Pearson correlation coefficient values. In this case, it can be seen in the intersection between independent

variables. The results of the correlation between the independent variables CA and CAI are r = - 0.368, CA with FI is r = 0.208, and FI with CAI for r = 0.196. Because the value is less than 0.8, multicollinearity symptoms are not detected. The symptom of multicollinearity can also be observed by looking at the colinearity statistics table where if the tolerance value> 0.010 and the VIF value <10.00 then no multicollinearity symptoms occur[22].

Table 4.

| Model | Collinearity Statistics | |
	Tolerance	VIF
1 (Constant)		
College Accreditation (CA)	.783	1.277
cumulative achievement index (CAI)	.787	1.271
Field Interest (FI)	.871	1.149

From the table can be seen the tolerance value on the variable CA = 0.783, CAI = 0.787 and FI = 0.871. this value is greater than 0.010, while the VIF value of CA = 1.277, CAI = 1.271 and FI = 1.149. This VIF value is less than 10.00. From the provisions and the table, it can be concluded that there is no symptom of multicollinearity in the independent variables.

4) Heteroscedasticity Test

The Heteroscedasticity test is a test that assesses whether there is a variance in residual variance for all observations in a linear regression model. If the heteroscedasticity assumption is not met, then the regression model is declared invalid as a forecasting tool. Heteroscedasticity is the opposite of homoscedasticity, which is a condition in which the variance in error occurs for all observations of each independent variable in the regression model. Conversely, the notion of homoscedasticity is a state in which there is a common variant of error for all observations of each independent variable in the regression model. Heterokedastitas can be known from the distribution of points on scatterplots. If the point distribution does not form a pattern and is above and below the zero points on the scatterplot graph, heteroskedasticity will not occur[22].
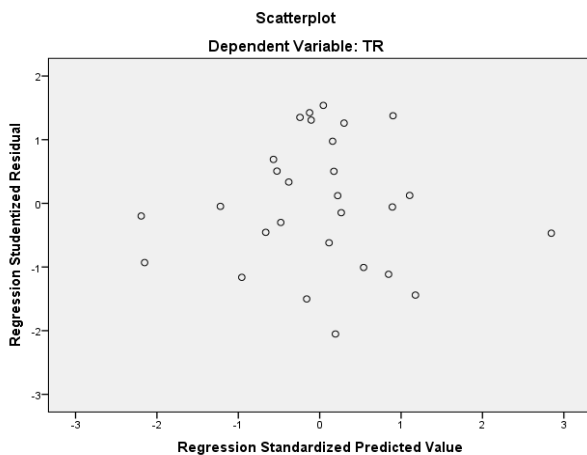

Figure 2

From the distribution of points on the scatterplot graph, it can be concluded that there is no heteroskedasticity because the points on the scatterplot do not form patterns and are above and below the zero points[22].

3.2 Multiple Linear Regression

Multiple linear regression analysis aims to determine whether there is the influence of two or more independent variables (X) with dependent variables (Y). The t-test aims to determine the presence of partial influence of the independent variable (X) with the dependent variable (Y). The f-test aims to find out the simultaneous effect of the independent variable (X) on the dependent variable (Y). The coefficient of determination serves to find out what percentage of the effect of variable X simultaneously on the variable Y. In this research, there are 4 hypotheses proposed

[1] H1 there is the influence of college accreditation (CA) on the training result on the training credit system,

[2] H2 there is the influence of the cumulative achievement index (CAI) on the training result on the training credit system,

[3] H3 there is an influence of field interest (FI) on the training result on the training credit system,

[4] H4 there is an influence of CA, CIA and FI simultaneously on the training result on the training credit system, at the 95% confidence level or 5% error rate.

1) t-Test

The t-test aims to determine the presence of partial influence of the independent variable (X) with the dependent variable (Y). The provisions are if in the coefficient table the value of sig <0.05 means that the variable X partially influences the variable Y[22]. If the sig value> 0.05 means that the variable X partially does not affect the variable Y. From the table, the sig value of CA = 0.376, CAI = 0.042 and FI = 0.527. Based on the above provisions and the sig value in the table, only CAI variables affect the training result

The presence of partial influence of the independent variable (X) with the dependent variable (Y) also can be observed by looking at the value of t-count in the coefficient table. If the value of the t-count > t-table then it means that the independent variable (X) partially influences the dependent variable (Y)[4]. The formula for t-table = (α / 2; n-k-1), because the number of samples is 28 and there are 3 independent variables/predictors, then t table = (0.05 / 2; 28-3-1), = 0.025; 24, = 2.064.

Table 5.

Coefficients^a

| Model | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics |
	B	Std. Error	Beta	t	Sig.	Tolerance
1 (Constant)	66.191	6.651		9.952	.000	
CA	.749	.831	.185	.902	.376	.783
CAI	3.705	1.724	.439	2.149	.042	.787
FI	.341	.531	.125	.642	.527	.871

From the coefficient table it can be seen that the value of the t-table on the independent variable CA = 0.902, CAI = 2.149 and FI = 0.642. Because the value of t-table < t-count, CA and FI independent variables do not affect the dependent training result variable, but on the independent variable CAI t-count> t-table so that CAI affects the outcome of the training result.

5) F-test

The F-test is used to determine the effect of the independent variables simultaneously on the dependent variable. There are two ways to use the F-test, by looking at the significant value in the Anova table or seeing the calculated F count. For F-test by looking at the sig value, the provisions are if the sig value <0.05 means that the variable x simultaneously influences the Y variable. If the sig value> 0.05 means that the variable x simultaneously does not affect the Y variable.

Table 6.

ANOVA^a

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.646	3	9.882	2.170	.118^b
	Residual	109.311	24	4.555		
	Total	138.957	27			

From the table known as the sig value = 0.118, this value> of 0.05 means that independent variables CA, CAI and FI simultaneously do not affect the training results on the training credit system. For F-test by looking at the F-count, the provisions are if the calculated F-count> F-table then it means that the independent variable (X) simultaneously influences the dependent variable (Y). But if F-count <F-table then there is no simultaneous influence of variable X on variable Y. From the Fisher table obtained F-table = F (k; n-k) = F (3; 25) = 2,990, F-count = 2,170. So that the F-count <F-table, then there is no simultaneous effect of the CA, CIA and FI variables on the results of the training on the Training Credit System (TCS). From the Summary Model table, it is known that the R square value of 0.213 means that simultaneously the variables of CA, CAI, and FI affect the training result (Y) of 21%.

Table 7.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.462^a	.213	.115	2.13416	1.464

The training credit system that provides recognition for prior learning has been implemented in the formal education environment of the Ministry of Education and Culture known as Recognition Prior Learning. As part of the learning process, of course, prior learning plays a role in influencing further learning outcomes because in substance it is expected that the material which becomes a burden of compulsory training has been partially completed in the past even though the courses are not the same. This is evidenced by the results of the multiple linear regression test which states there is a positive influence on the value of the CAI in the prior learning period towards the achievement of training results[33][34][35]. Although the CAI is a cumulative score of all subjects which are not all in line with matriculation in the field of aircraft maintenance, because the entry requirements for this program are from the diploma/bachelor of mechanical engineering programs, it is generally expected that there will be common knowledge[36][37]. The results of this study reinforce the implementation of the CASR 147 rev 01 that has been carried out so far, but it requires confirmation in regulations related to the field of science that can be accepted to implement this program[1].

In the CASR 147 rev 01 regulation, it is stated that one of the requirements for joining this program is an accredited university graduate. The regression test results mentioned that basic college accreditation (BCA) did not significantly influence the results of the training. This is acceptable given the data obtained stating that all students come from accredited college even with different accreditation ranks[38][39]. At least BCA does not have a negative influence on training outcomes, so this policy can continue to be applied.

FI gives the smallest influence even though it is still in the area of no significant effect. The research sample is employees and practitioners in the field of aircraft maintenance who have carried out aircraft maintenance techniques[40][41]. In general, although the level of specialization is different, the initial ability which is seen from the achievement index score is more dominant in influencing the results of the training.
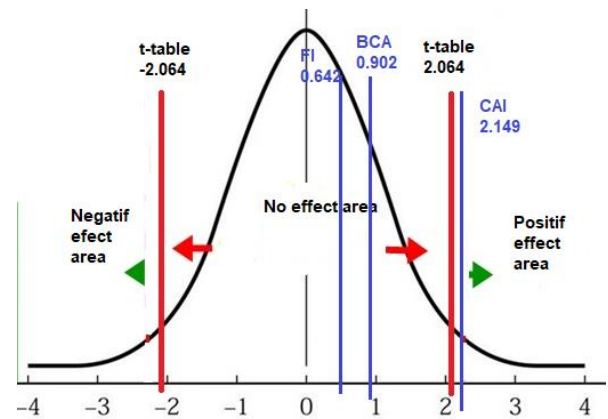

Figure 3.

4. CONCLUSION

The Field Interest does not have a significant influence on the training result, nor does the basic college accreditation, even though the basic college accreditation value is greater than the field interest to influence the training results. The cumulative achievement index has a significant effect on the training result with at value of 2.149. The predictor variable comprehensively influences the training results of 21%. These

findings reinforce the application of CASR 147 rev 01, by adding attention to the appropriateness of previous fields of education and limiting the value of cumulative achievement index (CAI).

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