



Effect of Social Media Function on Student Graduation Rate

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ARTICLE INFO	ABSTRACT
ISSN: 2798-2688	<i>This observation aimed to determine the significant effect of social media facilities on improving the quality of scholars. The research stages began with some interviews with scholars. This observation utilizes the Manova method through the statistic software program. The period to graduate from college and the period of not working is eminently affected by the sort of social media function that student often searches for. This investigation was only conducted on students in Indonesia. This investigation is useful in Indonesia and useful in the fields of social science and industrial engineering.</i>
Keywords: <i>Manova; media; social.</i>	

Introduction

Humanities is the study of how to make or elevate humans to be more humane and cultured (López-Cantos 2022). Social humanity is a field that studies the values of humanism but is related to social science (Wesarat et al. 2022). LIPI believes that a social science approach is needed to solve state problems, including formulating solutions and programs to overcome poverty. Every year the number of undergraduate graduates in Indonesia is increasing and increasing rapidly, but the number of people who do not work in Indonesia is also quite large. Undergraduate graduates must improve their quality to obtain a job to reduce the number of unemployed (Ransom 2022). To improve quality, undergraduate graduates can take advantage of existing social media facilities (Noori et al. 2022). Human thinking and behavior change in this technological era. In social humanities research, the phenomenon of social media on human behavior can be studied. Based on the outcome of the Indonesian Polling study in collaboration with the Indonesian Internet Service Providers Association (APJII), in 2018 the number of internet users in Indonesia had reached 171.17 million. This number is equivalent to 64.8% of Indonesia's total population of 264.16 million people (Franedya 2019). Most Indonesians have cell phones connected to the internet, and Indonesians are very

active in using social media services on the international scene. Mobile phones or laptops connected to the internet and social media can be social capital for undergraduate graduates in particular and Indonesian citizens in general. In this investigation, the social sciences and humanities are combined with industrial engineering. Humanities social sciences to study the leverage of social media on undergraduate behavior. The positive influence of social media is utilized to increase the knowledge and insights of scholars to make them more qualified. For example, mechanical engineering graduates who often watch youtube with the theme of mechanical engineering practicum as preparation for practice in the real world will have different results from mechanical engineering graduates who rarely watch practicum on youtube. In this investigation, industrial engineering was used to analyze the outcome of the leverage of social media on the quality of scholars utilizing the Manova method. Manova is a statistical test used to measure the effect of independent variables on a categorical scale on several dependent variables at the same time on a quantitative data scale. This analysis is also known as multivariate ANOVA. Multivariate ANOVA stands for multivariate analysis of variance, meaning it is a multivariate form of analysis of variance (ANOVA). The multivariate form means that there is more than one dependent variable. So that the manova test is used to measure the effect of the independent variable on several dependent variables simultaneously or at once. This test is very similar to Hotelling's T^2 test. The location of the difference is if the hotelling's T^2 test is used if there is only 1 independent variable with 2 categories. Meanwhile, multivariate ANOVA can be used on more than 1 independent variable and/or two or more categories. The advantage is that it can be used to analyze the effect of each independent variable on a categorical scale on each dependent variable separately, where the dependent variable has a quantitative scale. The Manova method in this investigation was operated through SPSS software.

A few researchers focused on social media. There have been limited studies concerned with scholars. Therefore, this research intends to investigate the importance to do to improving the quality of scholars. The objectives of this research are to analyze the significant influence of social media on improving the quality of graduates. The yields of this investigation are expected to utilize social media as a means to develop undergraduate skills so that they can immediately work in their scientific fields.

Literature Review

MANOVA is a multivariate analysis technique using the dependency method (Hair et al. 2014). MANOVA is an extension of the ANOVA which has long been used in various fields of science (Stockemer 2019). Technically, MANOVA can be defined as a statistical method to explore the relationship between several independent variables that are categorical in nominal or ordinal scales with several dependent variables that are numerical at the interval or ratio scale (Santoso 2002). The purpose of using MANOVA is to find groups of respondents who show differences in a set of dependent variables (Nurhayati 2021). In general, MANOVA is utilized to notice the leverage of a set of independent variables (X_1, X_2, \dots, X_n) on a set of dependent variables (Y_1, Y_2, \dots, Y_n) (Mutiarany, Arma, and Fitria 2015). MANOVA analysis requires data normality requirements and homogeneity of covariance variance (Dean, Voss, and Draguljic 2017). Therefore these requirements are tested first before hypothesis testing is implemented (Mardelina and Muhson 2017).

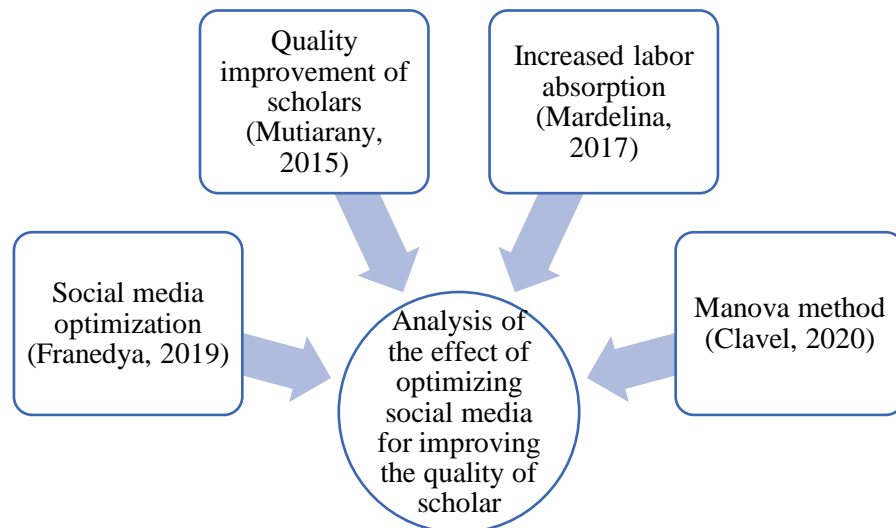


figure 1. contribution diagrams from several papers

Method

The method of analysis utilized in this investigation is the Manova method. Manova criteria may be viewed as extensions of univariate criteria (Huberty and Olejnik 2006). In the Manova method, it is composed of two varieties of variables, namely:

1. Dependent Variable (Nurhayati 2020b). Dependent variables in this investigation are the improvement of the quality of graduates (Nurhayati 2020a).
2. Independent Variable (Nurhayati 2019a). In this watchfulness, the independent variables are the sorts of social media (Nurhayati and Sugiatna 2021). The Manova method is utilized to investigate the leverage of the independent variable on the dependent variable (Nurhayati 2019b). In this investigation, an analysis of the leverage of types of social media was implemented on improving the quality of graduates. The Manova model for comparing the mean vector of g is as follows (Clavel and Morlon 2020):

$$X_{ij} = \mu + \tau_i + e_{ij}, \quad (1)$$

Information:

$j = 1, 2, 3, \dots, n_i$

$i = 1, 2, 3, \dots, g$

X_{ij} = observation vector

μ = sample mean

τ_i = treatment effect

e_{ij} = residue

This investigation was conducted utilizing the Manova technique through the SPSS version 25 software program. The stages of the watchfulness implementation process are as follows:

1. Collect data (Heumann and Schomaker Shalabh 2016).
The research stage began with a survey of scholars.
2. Pre-processing data (Choi and Kang 2013).
3. Carry out a multivariate normality test (Schumacker and Tomek 2013).
4. Carry out a multicollinearity test (Harrell 2015).
5. Perform the homogeneity test
6. Conducting Manova test on research data (each independent variable).
7. Provide conclusions and suggestions.

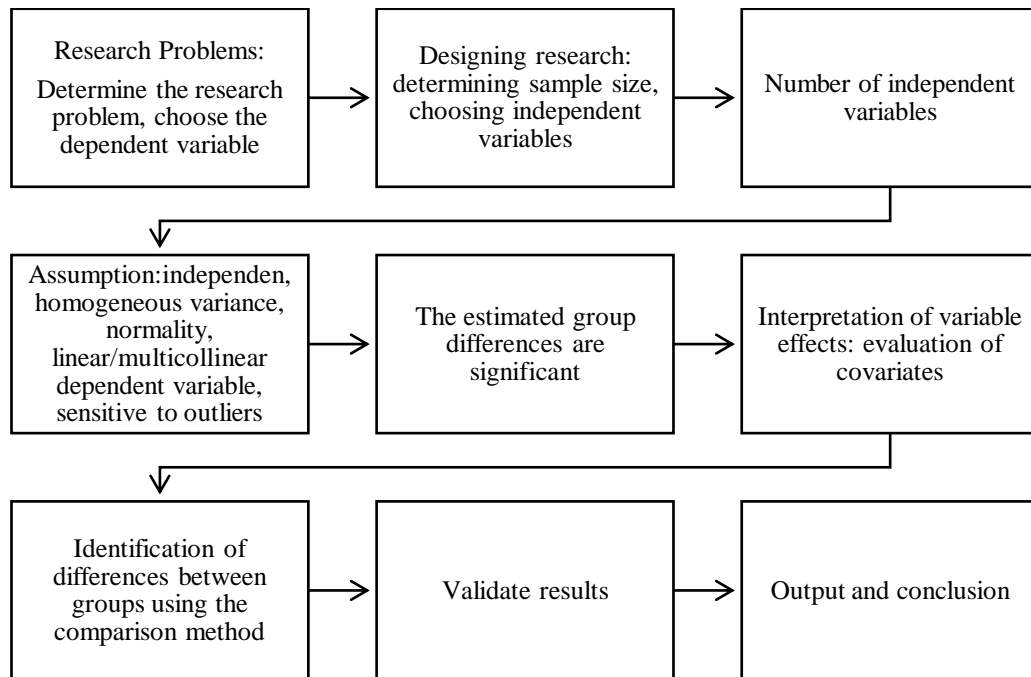


figure 2. flowchart of research utilizing the Manova method

Figure 2 above is the research flow chart with the multivariate analysis method utilizing the Manova method.

Result and Discussion

To get out a person's behavior using social media facilities, a sample of 30 people were taken, with information as follows: the identity number of the respondent, the social media facility, the period he graduated from college (in years), the period of unemployment (in months), the sorts of social media functions that are often visited for profession, knowledge, entertainment, and business. In this investigation, was there any influence on the sort of social media function that was frequently visited with long graduation? One of the assumptions in the Manova process is whether the variance-covariance matrix of the dependent variable, namely the length of time graduated from college is similar for the existing groups (independent variable) (Cowpewartait and Metcalfe 2009). In this sense, the group is the sort of social media function that is often searched. Manova output can be interpreted properly if the variance-covariance matrix of the dependent variable is similar in each independent group. Testing of variance-covariance can be viewed from two sides, specifically tested together and testing per dependent variable (Dattalo 2013). Collaborative testing was implemented utilizing Box's M.

Table 1. General Linear Model

Between-Subjects Factors		
	Value Label	N
Sorts of social media functions	1 Profession	15
	2 Knowledge	3
	3 Entertainment	10
	4 Business	2

Table 2. Box's Test of Similarity of Covariance Matrices

Box's M	2.994
F	0.897
df1	3
df2	17560.109
Sig.	0.442

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

Hypothesis: H_0 : The dependent variables (length of study) have a similar variance-covariance matrix in the existing groups (sorts of social media functions of profession, knowledge, entertainment, and business). H_1 : The dependent variables (length of study) have dissimilar variance-covariance matrices in the existing groups (sorts of social media functions, profession, knowledge, entertainment, and business). Decision criteria: In case the significance value is more than 0.05, accordingly H_0 is passed. If the significance value is less than 0.05, accordingly H_0 is not passed. From table 2, it can be viewed that the Box's M number is 2.994 with the Sig. 0.442. Because the value exceeds 0.05, H_0 is passed. This means that the variance-covariance matrix on the variables of the length of graduation from college is similar for each cluster of the student's social media function sorts. Individual testing has been implemented using the Levene Test:

Table 3. Levene's Test of Similarity of Error Variances

		Levene Statistic	df ₁	df ₂	Sig.
length of study (year)	Mean	8.219	3	26	0.001
	Median	1.160	3	26	0.344
	Median and with adjusted df	1.160	3	20.281	0.349
	trimmed mean	7.022	3	26	0.001

Hypothesis: H_0 : certain dependent variable (length of graduation) has a similar variance-covariance matrix in existing groups (sorts of social media functions of profession, knowledge, entertainment, and business). H_1 : certain dependent variable (length of graduation) has dissimilar variance-covariance matrices in existing groups (sorts of social media functions of profession, knowledge, entertainment, and business). The dissimilarity with the previous hypothesis is only in the use of one dependent variable. Decision criteria: In case the significance value is more than 0.05, accordingly H_0 is passed. In case the significance value is less than 0.05, accordingly, H_0 is not passed. The table indicates the significance of the Levene test for the dependent variable, specifically the variable length of graduation. Because the values exceed 0.05, H_0 is passed. This means that the variance-covariance matrices on the variable length of graduation are similar for per cluster of the student's social media function sorts. Since the requirements of variance-covariance similarity are reached, the Manova analysis can be processed to the next stage. There are two components to the manova output, specifically the output which vouches whether there is a significant dissimilar between clusters and the output which tests per variable individually. The two varieties of output will be checked one by one. Multivariate significance test output:

Table 4. Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	0.997	4787.571	2	25	0
	Wilks' Lambda	0.003	4787.571	2	25	0
	Hotelling's Trace	383.006	4787.571	2	25	0
	Roy's Largest Root	383.006	4787.571	2	25	0
Social Media	Pillai's Trace	0.791	5.671	6	52	0
	Wilks' Lambda	0.211	9.806	6	50	0
	Hotelling's Trace	3.728	14.912	6	48	0
	Roy's Largest Root	3.725	32.287	3	26	0

Hypothesis: H_0 : the variable length of graduation did not indicate a dissimilar in the assorted sorts of social media functions of the students. H_1 : the variable length of graduation indicates a significant dissimilar in the assorted sorts of social media functions of the students. Decision criteria: In case the significance value is more than 0.05, accordingly H_0 is passed. If the significance value is less than 0.05, accordingly H_0 is not passed. On the line of social media function sorts at significance levels tested by Pillai, Wilk's lambda, Hotteling, and Roy's procedures. All four procedures indicate numbers under 0.05. Thus H_0 is not passed. Because H_0 is not passed, then,

the length of college graduation is indeed leveraged by the sort of social media function that is often searched by a student. Maybe student often searches for the sort of social media function, profession, and knowledge that will make student quickly graduate from college. Output between the subject:

Table 5. Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	length of study (year)	3.683	3	1.228	30.163	0
Intercept	length of study (year)	328.214	1	328.2	8063.2	0
Social Media	length of study (year)	3.683	3	1.228	30.163	0
Error	length of study (year)	1.058	26	0.041		
Total	length of study (year)	607.750	30			
Corrected Total	length of study (year)	4.742	29			

Hypothesis: H_0 : the length of graduation from college does not indicate any dissimilar in the assorted sorts of social media functions often searched by students. H_1 : length of graduation from college indicates a significant dissimilar in various sorts of social media functions often searched by students. Decision criteria: If the significance value is more than 0.05, accordingly H_0 is passed. In case the significance value is less than 0.05, accordingly, H_0 is not passed. Observations on the sort of social media function line, mainly the significance value. It can be viewed that for the dependent variable length of graduation from college, the significance value is under 0.05 (ie 0). Thus, for the test of the old variable passing college, it was resolved to reject H_0 . So the length of graduation from college is indeed leveraged by the sort of social media function that a student often searches for. So, if the multivariate test is implemented together, the variables of the length of graduation are dissimilar in the four clusters of social media function sorts often searched by students.

Conclusion

From the results of observations, it can be concluded that the length of learning time is strongly influenced by the various functions of social media that are often sought after by students. This can be implied for students who want to finish college immediately by choosing the type of social media function that will be used to support the speed process in understanding the lesson. The contribution of this research is to provide understanding to students so that they are right in choosing

the type of social media function that can support learning in order to quickly graduate from college. The limitation of this study is that the number of samples used is still not large. So there are opportunities for further research, namely by taking more samples on a national scale.

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References

- Choi, Byoung Kyu, and Donghun Kang. 2013. *Modelling and Simulation of Discrete-Event Systems*. New Jersey: John Wiley & Sons, Inc.
- Clavel, Julien, and Helene Morlon. 2020. "Reliable Phylogenetic Regressions for Multivariate Comparative Data: Illustration with the MANOVA and Application to the Effect of Diet on Mandible Morphology in Phyllostomid Bats." *Systematic Biology* 69(5):927–43.
- Cowpertwait, Paul S. P., and Andrew V. Metcalfe. 2009. *Introductory Time Series with R*. edited by R. Gentleman, K. Hornik, and G. Parmigiani. New York: Springer.
- Dattalo, Patrick. 2013. *Analysis of Multiple Dependent Variables*. New York: Oxford University Press.
- Dean, Angela, Daniel Voss, and Danel Draguljic. 2017. *Design and Analysis of Experiments*. 2nd ed. edited by R. DeVeaux, S. E. Fienberg, and I. Olkin. New York: Springer.
- Franedy, Roy. 2019. "Survei: Pengguna Internet Di RI Tembus 171,17 Juta Jiwa." <https://www.cnbcindonesia.com/tech/20190516191935-73041/survei-pengguna-internet-di-ri-tembus-17117-juta-jiwa>. Retrieved September 17, 2020 (<https://www.cnbcindonesia.com/tech/20190516191935-73041/survei-pengguna-internet-di-ri-tembus-17117-juta-jiwa>).
- Hair, Joseph F., William C. Black, Barry J. Babin, and Rolph E. Anderson. 2014. *Multivariate Data Analysis (MVDA)*. 7th ed. London: Pearson.
- Harrell, Frank E. 2015. *Regression Modeling Strategies*. Nashville: Springer.
- Heumann, Christian, and Michael Schomaker Shalabh. 2016. *Introduction to Statistics and Data Analysis*. Cham: Springer.
- Huberty, Carl J., and Stephen Olejnik. 2006. *Applied MANOVA and Discriminant*

Analysis. Vol. 102. 2nd ed. edited by D. J. Balding, N. A. C. Cressie, N. I. Fisher, I. M. Johnstone, J. B. Kadane, G. Molenberghs, L. M. Ryan, D. W. Scott, A. F. M. Smith, and J. L. Teugels. Athens: Wiley.

- López-Cantos, Francisco. 2022. "Institutional Promotion of Research in Humanities and Social Sciences in Spain: SINC News Agency of the Spanish Science and Technology Foundation-FECYT." *Estudios Sobre El Mensaje Periodístico* 28(1):103–15. doi: 10.5209/esmp.77145.
- Mardelina, Elma, and Ali Muhson. 2017. "Mahasiswa Bekerja Dan Dampaknya Pada Aktivitas Belajar Dan Prestasi Akademik." *Jurnal Economia* 13(2):201. doi: 10.21831/economia.v13i2.13239.
- Mutiarany, Jehan, Abdul Jalil Amri Arma, and Maya Fitria. 2015. "Penerapan Two Way Manova Dalam Melihat Perbedaan Lama Studi Dan Indeks Prestasi Mahasiswa Reguler 2009 Berdasarkan Jalur Masuk Dan Aktivitas Mahasiswa FKM USU Tahun 2013." *Jurnal Kebijakan, Promosi Kesehatan Dan Biostatistik* 1(2):1–10.
- Noori, Abdul Qawi, Sayeed Naqibullah Orfan, Sayeed Asif Akramy, and Aminuddin Hashemi. 2022. "The Use of Social Media in EFL Learning and Teaching in Higher Education of Afghanistan." *Cogent Social Sciences* 8(1). doi: 10.1080/23311886.2022.2027613.
- Nurhayati, Ai. 2019a. *Dasar-Dasar Analisis Multivariat*. Bandung: CV. Future Business Machine Solusindo.
- Nurhayati, Ai. 2019b. "Mapping Perception of Consumer Antivirus Software with Multidimensional Scaling Method." *APTİKOM Journal on Computer Science and Information Technologies* 4(3):91–95. doi: 10.11591/APTIKOM.J.CSIT.13.
- Nurhayati, Ai. 2020a. *Analisis Data Statistik*. Bandung: CV. Future Business Machine Solusindo.
- Nurhayati, Ai. 2020b. *Kamus Teknik Industri*. edited by K. Susilowati. Bandung: CV. Future Business Machine Solusindo.
- Nurhayati, Ai. 2021. "The Effect of the Internet during COVID-19 on Work Using the Manova Algorithm The Effect of the Internet during COVID-19 on Work Using the Manova Algorithm." *Journal of Physics: Conference Series* 1844:12030. doi: 10.1088/1742-6596/1844/1/012030.
- Nurhayati, Ai, and Angling Sugiartna. 2021. "Uji Korelasi Dengan Metode Analisis Korelasi Kanonik." *Sistemik : Jurnal Ilmiah Nasional Bidang Ilmu Teknik* 9(02):18–21. doi: 10.53580/sistemik.v9i02.59.

- Ransom, Tyler. 2022. "Labor Market Frictions and Moving Costs of the Employed and Unemployed." *Journal of Human Resources* 57(S):S137–66. doi: 10.3368/jhr.monopsony.0219-10013r2.
- Santoso, Singgih. 2002. *Buku Latihan SPSS - Statistik Multivariat.Pdf*. Jakarta: PT. Elex Media Komputindo.
- Schumacker, Randall, and Sara Tomek. 2013. *Understanding Statistics Using R*. New York: Springer.
- Stockemer, Daniel. 2019. *Quantitative Methods for the Social Sciences*. Cham: Springer.
- Wesarat, Phathara-on, Rudsada Kaewsaeng-on, Daranat Tansui, Kanyaprin Tongsamsi, Parichard Benrit, Warrapojn Panrod, and Nursahida Useng. 2022. "Developing Expected Learning Outomes for the Bachelor of Business Administration Program, Faculty of Humanities and Social Sciences, Prince of Songkla University." *Proceedings of the Annual Civic Education Conference (ACEC 2021)* 636(Acec 2021):289–95. doi: 10.2991/assehr.k.220108.053.