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Analysis of the Relationship Between University Entrance and Student Graduation Predicate

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Abstract: *There are different characteristics of each entry route, so there will be the potential to achieve a different GPA. There are 3 types of entrance routes for public universities held by LTMPT, namely SNMPTN, SBMPTN, and SMMPTM. The achievement of student learning outcomes in tertiary institutions can be seen through the final results indicated by the GPA. Diploma and undergraduate program students have four graduation predicates, three of which are satisfactory (GPA 2.76-3.00), very satisfactory (GPA 3.01-3.50), and with honors (GPA more than 3.50). The population in this study were all PTN graduates from 2018 to 2022. The sample used in this study was at least 50 PTN graduates from 2018 to 2022 and 150 samples. This research will be tested using the Chi-Square test method. Based on the Chi-Square test on the contingency table related to the relationship between college admissions and student graduation predicates, it can be concluded that there is no relationship between college admissions and student graduation predicates. In addition, the relationship between university admissions and student graduation predicates is related to majors and campus clustering in 2020. Meanwhile, the relationship between university admissions and student graduation predicates has no relationship with gender and domicile.*

Keywords— Chi-square test; 2020 campus clustering; grade point average; state university; university entrance pathway

1. INTRODUCTION

Education is the most important element in human life because through education humans can achieve a good future (Pratami, 2015). By pursuing education, humans can shape and develop their own qualities. One of the forums for the process of forming quality Human Resources (HR) is a college or university.

There are 3 types of state university entrance selections organized by LTMPT, including 'Seleksi Nasional Masuk Perguruan Tinggi Negeri' (SNMPTN), 'Seleksi Bersama Masuk Perguruan Tinggi Negeri' (SBMPTN) and 'Seleksi Mandiri Masuk Perguruan Tinggi Negeri' (SMMPTN).

The achievement of student learning outcomes in higher education can be seen through the final results indicated by the grade-point average (GPA) score. For diploma and undergraduate students, they have three graduation predicates, namely sufficient (2.00-2.75), satisfactory (GPA 2.76-3.00), very satisfactory (GPA 3.01-3.50), and with honors (GPA of more than 3.50). The student's GPA certainly has expectations for every university because through the GPA can reflect the quality of the university, the more students who have good GPA, the better the quality of the university.

Because there are different characteristics of each entry pathway, it will have the potential to achieve different GPA, so this study aims to see whether there is a relationship between the selection of new student admission entrance pathways and the Grade Point Average (GPA) in the last year or more precisely in the Graduation Predicate from alumni using categorical data analysis methods.

According to Negara and Prabowo (2018) categorical data analysis is a statistical method that aims to test the relationship between categorical variables. Some categorical data analysis methods include the Chi-Square test, the Exact Fisher Test, and so on.

Research related to university entrance pathways to graduation predicate is research conducted by Aderini Y. Lubalu, Christine K. Ekowati and Patrisius Afrisno Udil (2022), Nusa Cendana University, with the title " Pengaruh Jalur Seleksi Masuk Universitas Terhadap IPK Tahun Pertama Mahasiswa Angkatan Tahun 2020 Program Studi Pendidikan Matematika FKIP Universitas Nusa Cendana". The purpose of the study was to analyze the significant influence of the university entrance selection path on the first-year GPA of Undana Mathematics Education class of 2020 students. The results of the study stated that the university entrance path had a significant effect on the first-year GPA of Undana Mathematics Education class of 2020 students. In addition, this study also shows that SBMPTN entrance students have higher GPA, followed by SNMPTN entrance students, and finally SMMPTN pathway students.

Another related research is research by Muhammad Anzar (2019), regarding the influence of the PTN entrance pathway system on the GPA of students of the Sendratasik Study Program for the 2014 academic year, Faculty of Art and Design, Makassar State University (UNM). The results of this

study showed that the university entrance pathways affects the GPA of UNM Sendratasik Study Program students.

Based on the research that has been carried out, it can be seen that there is an influence of university entrance pathways on students' GPA. This research will develop an existing analysis by applying the Chi-Square test to analyze whether there is a relationship between the university entrance path and the student's graduation predicate which can be seen from the GPA in the last year.

2. BIBLIOGRAPHY REVIEW

2.1 Categorical Data Analysis

Categorical data is data that can be grouped based on the characteristics of certain traits (Nugraha, 2002). Generally, categorical data has nominal and ordinal scales. Categorical data can come from qualitative observations summarized as calculations, or from observations of quantitative data grouped in specific groups. This categorical data is usually summarized in the form of contingency tables (Astuti et. al, 2020). Negara and Prabowo (2018) stated that categorical data can be analyzed using categorical data analysis, which is a statistical method that aims to test the relationship between categorical variables. Some categorical data analysis methods include the Chi-Square test, the Exact Fisher Test, and so on.

2.2 Chi-Square Test

The chi square test is a statistical test tool used to find out whether two variables are significantly related. The two variables tested are categorical variables and are arranged in the form of a contingency table. The value of Chi-square can be calculated using the following equation :

$$X^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(o_{ij} - e_{ij})}{e_{ij}} \quad (1)$$

In the equation above, o_{ij} is the frequency of observation in the i-th row and the j and e_{ij} columns is the expectation frequency in the i-th row and the j-th column. Here are the steps for testing chi-square :

1. Determining the hypothesis

   H_0: No relationship between variables

   H_1: There are relationships between variables

2. Define a chi-square table

   $$X^2_{\alpha;(b-1)(k-1)}$$

3. Define a chi-square count
4. Take the decision

   If the table is calculated then reject $X^2 < X^2 H_0$

5. Conclusion

3. RESEARCH METHODS

3.1 Place and Time of Research

Sampling of this research was carried out online by compiling and distributing questionnaires through Google Forms to various social media. In addition, literature studies, discussions, data processing and analysis, and paper writing were carried out both online and offline in Surabaya. This study took place from the third week of October to the first week of December 2022.

3.2 Data Sources

The data source of this study is primary data source. Data was obtained directly from respondents through an online questionnaire. In this study, the answers to primary data were obtained from alumni of undergraduate students of state universities who graduated in 2018-2022. Primary data collection activities are intended to obtain accurate information regarding the relationship between university entrance pathways and graduation predicates.

3.3 Research Population and Sample

The population in this study is all graduates of state universities from 2018 to 2022. The sample used in this study was at least 50 graduates of state universities from 2018 to 2022. Researchers will use a sample of 150 samples.

3.4 Data Retrieval Methods

In data collection, researchers will use purposive sampling approach. Data collection using this method is through sample selection which is carried out intentionally with the characteristics of respondents in accordance with what has been determined by the researcher. In this study, the characteristics of the sample determined were alumni of State Universities from 2018 to 2022.

3.5 Data Analysis Techniques

The analysis technique used in this study is the Chi-Square test. The Chi-Square test is used to analyze the relationship between two variables in the form of categories (ordinals). These variables are university pathways and graduation predicates. Meanwhile, to analyze the measure of the density between the two variables, the Contingency Coefficient of Cramer's V is used.

3.6 Contingency Table

A contingency table is a table that shows the level of each categorical variable based on the frequency of observations. Every frequency observed in a contingency table $r \times c$, there is an expectation frequency or theoretical frequency calculated with constraints to a hypothesis according to the probability rule (Susila et al., 1988).

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4. RESEARCH RESULT

The predicate used at the beginning of this study was 4 predicates. However, after collecting the predicate data used in this study, there were 3 predicates, namely 'satisfactory', 'very satisfactory', and 'with praise'. This is because there are no respondents who meet the predicate 'enough'.

4.1 Description Statistics

Based on the data obtained, the profile can be described as follows :

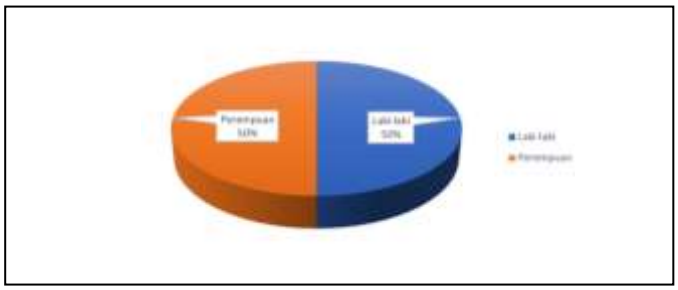

Fig. 1. Percentage of Respondents By Gender

Based on Figure 1, the percentage of female respondents in this study was 50% or as many as 75 respondents. Meanwhile, there were 75 male respondents.

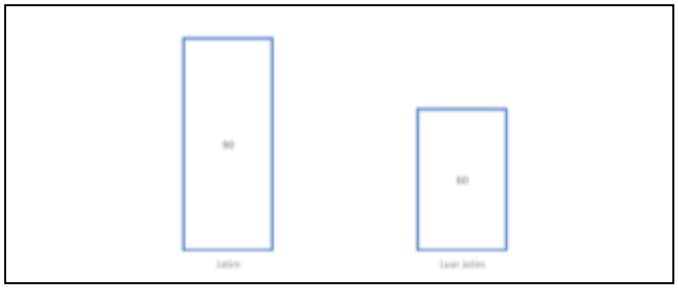

Fig. 2. Number of Respondents Based on High School Domicile

Based on Figure 2, the number of respondents with a high school domicile in East Java was 90 respondents and outside East Java as many as 60 respondents.

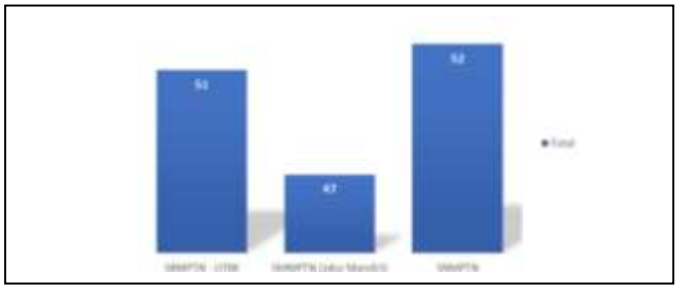

Fig. 3. Number of Respondents By University Entrance

Based on Figure 3, the number of respondents who entered the university through the SNMPTN pathway was 52 respondents. Meanwhile, with the SBMPTN pathway was 51 respondents and the SMMPTN pathway as many as 47 respondents.

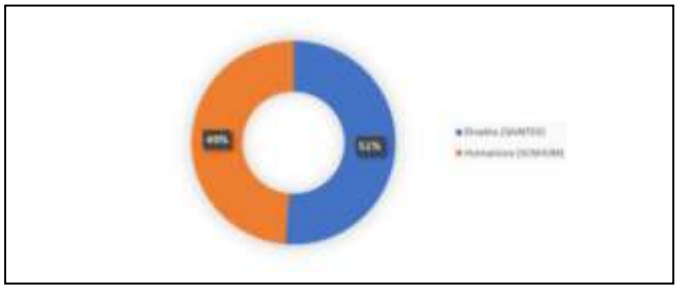

Fig. 4. Percentage of Respondents by Major

Based on Figure 4, the percentage of respondents came from exact or scientific majors in this study was 51% or as many as 77 respondents. Meanwhile, 73 respondents came from the humanities or social department.

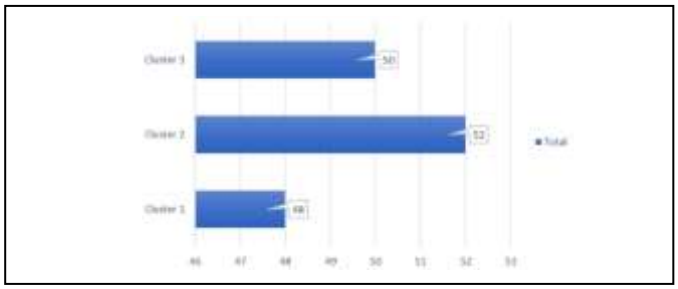

Fig. 5. Number of Respondents Based on University Clustering

Based on Figure 5, the number of respondents who carry out education at cluster 1 universities is 48 respondents, cluster 2 is 52 respondents and cluster 3 is 50 respondents.

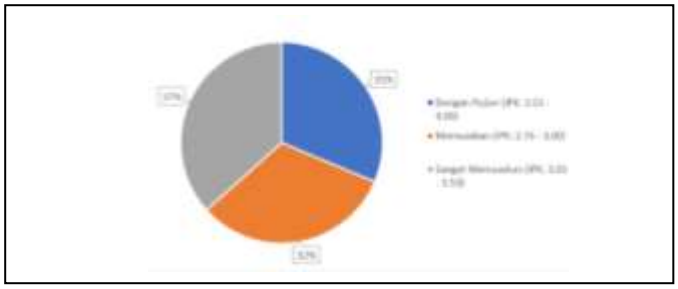

Fig. 6. Number of Respondents Based on Graduation Predicate

Based on Figure 6, the percentage of respondents with graduation predicates with honors was 31% or as many as 47 respondents. Meanwhile, with a satisfactory predicate of 55 respondents and very satisfying 48 respondents.

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4.2 The Relationship between University Pathways and Student Graduation Predicates

The Chi-Square test is carried out to analyze the relationship between the variables of university entrance pathways and student graduation predicates can be done by conducting the Chi-Square Test. Furthermore, to analyze the magnitude of the association of the two variables can be done through the calculation of the Goodman Kruskal Coefficient or the Gamma Coefficient.

4.2.1 Uji Chi-Square

The contingency tables analyzed in this study are presented in Table 6 is :

Table 1: Tabel Contingency of University Entrance Pathways with Graduation Predicate (3x3)

University Entrance Pathway	Graduation Predicate		
	Satisfactory	***Very Satisfactory***	***With Praise***
SNMPTN	15	20	17
SBMPTN	18	18	15
SMMPTN	15	17	15

This testing hypothesis can be formulated as follows:

H_0 : There is no relation between the university entrance pathway and the student's graduation predicate.

H_1 : There is a relation between the university entrance pathway and the student's graduation predicate.

At the level of significance $\alpha = 5\%$, then the critical area was reject H_0 if the *p-value* $< \alpha$ or $\chi^2 > \chi^2_{(\alpha;4)}$ with $\chi^2_{(\alpha;4)} = 9{,}488$

The statistical calculation of the test χ^2 is as follows :

$$\chi^2 = \frac{(15-16{,}64)^2}{16{,}64} + \frac{(20-19{,}067)^2}{19{,}067} + \cdots + \frac{(15-14{,}7267)^2}{14{,}7267} = 0{,}5056$$

The *p-value* of the *Chi-Square* test results shown in table 2 is:

Table 2: Chi-Square Test Results

Pearson Chi-Square	***Value***	***Df***	***Asymptotic Significance (2-Sided)***
	0,5056	4	0,973

Based on the test results, a decision can be made to reject the H_0 because the value (0.5056) does not meet the critical area, that is, it is worth less than . In addition, the p-value of the test result (0.973) is also worth more than α. Therefore, it can be concluded that there is no relation between the university entrance path and the student's graduation predicate. Since there is no relation between the entrance path and the student's graduation predicate, further testing to calculate the association size of the two variables is not necessary.

4.3 Relationship between University Pathways and Student Graduation Predicates by Gender

Chi-Square was conducted to analyze the relationship between university entrance variables and student graduation predicates based on student gender. The contingency table analyzed in this study is presented in Table 3 as follows :

Table 3: University Entrance Pathway Contingency Table with Graduation Predicate by Gender (3x3x2)

University Entrance Pathway	Men			Woman		
	1	***2***	***3***	***1***	***2***	***3***
SNMPTN	7	9	8	8	11	9
SBMPTN	9	11	8	9	7	7
SMMPTN	7	9	8	8	8	8

Information:
1 : Satisfactory
2 : Very Satisfactory
3 : With praise

This testing hypothesis can be formulated as follows:

H_0 : There is no relation between the university entrance pathway and the student's graduation predicate based on gender.

H_1 : There is relation between the university entrance pathway and the student's graduation predicate based on gender.

At the level of significance $\alpha = 5\%$, then the critical area is reject H_0 if the *p-value value* is $< \alpha$ or $\chi^2 > \chi^2_{(\alpha;12)}$ with $\chi^2_{(\alpha;12)} = 21{,}02606982.$

The statistical calculation of the test χ^2 is as follows:

$$\chi^2 = \frac{(7-8{,}32)^2}{8{,}32} + \frac{(9-9{,}53)^2}{9{,}53} + \cdots + \frac{(8-7{,}3633)^2}{7{,}3633} = 1{,}9474301$$

Based on the test results, a decision can be made to fail to refuse H_0 because the value $\chi^2(1{,}9474301)$ does not meet the critical area, that is less than. $\chi^2_{(\alpha;12)} = 21{,}026069$ Therefore, it can be concluded that there is no relationship between the university entrance path and the student's graduation predicate based on the gender of the graduate.

4.4 Relationship between University Pathways and Student Graduation Predicates based on Major

The Chi-Square test was conducted to analyze the relationship between university entrance variables and student graduation predicates based on student major. The contingency table analyzed in this study is presented in Table 4 as follows :

Table 4: University Entrance Pathway Contingency Table with Graduation Predicate by Major (3x3x2)

University Entrance Pathway	Exacta			Non-Exact		
	1	***2***	***3***	***1***	***2***	***3***
SNMPTN	6	9	10	9	11	7
SBMPTN	8	9	9	10	9	6
SMMPTN	10	9	7	5	8	8

Information:
1 : Satisfactory
2 : Very Satisfying
3 : With praise

This testing hypothesis can be formulated as follows:
H_0 : There is no relation between the university entrance path and the student's graduation predicate based on the major.
H_1 : There is relation between the university entrance path and the student's graduation predicate based on the major.

At the level of significance $= 5\%$, then the critical area is reject H_0 if the *p-value* < α or $\chi^2 > \chi^2_{(\alpha;12)}$ with $\chi^2_{(\alpha;12)} = 21{,}02607$.
The statistical calculation of the χ^2 test is as follows:

$$\chi^2 = \frac{(6-8{,}541867)^2}{8{,}541867} + \frac{(9-8{,}09813)^2}{8{,}09813} + \cdots + \frac{(8-7{,}1669)^2}{7{,}1669} = 30{,}76868697$$

Based on the test results, a decision can be made to fail to refuse H_0 because the value $\chi^2(30{,}76868697)$ meets the critical area, which is worth more than $\chi^2_{(\alpha;12)} = 21{,}026$. Therefore, it can be concluded that there is a relation between the university entrance path and the student's graduation predicate based on the major.

4.5 Relationship between University Pathways and Student Graduation Predicates based on Domicile

The Chi-Square test was conducted to analyze the relationship between university entrance variables and student graduation predicates based on student gender. The contingency table analyzed in this study is presented in Table 5 as follows :

Table 5 : University Entrance Pathway Contingency Table with Graduation Predicate by Major (3x3x2)

University Entrance Pathway	East Java			Outside East Java		
	1	***2***	***3***	***1***	***2***	***3***
SNMPTN	10	13	10	5	7	7
SBMPTN	11	10	9	7	8	6
SMMPTN	8	11	8	7	6	7

Information:
1 : Satisfactory
2 : Very Satisfying
3 : With praise

This testing hypothesis can be formulated as follows:
H_0: There is no relation between the university entrance route and the student's graduation predicate based on domicile.
H_1: There is relation between the university entrance path and the student's graduation predicate based on domicile.

At the level of significance $\alpha = 5\%$, then the critical area is reject H_0 if the *p-value* < α or $\chi^2 > \chi^2_{(\alpha;12)}$ with $\chi^2_{(\alpha;12)} = 21{,}026$.
The statistical calculation of the χ^2 test is as follows:

$$\chi^2 = \frac{(10-9{,}9840)^2}{9{,}9840} + \frac{(13-11{,}44)^2}{11{,}44} + \cdots + \frac{(7-5{,}8907)^2}{5{,}8907} = 1{,}8522$$

Based on the test results, a decision can be made to fail to refuse H_0 because the score $\chi^2(1{,}8522)$ does not meet the critical area, that is, it is worth less than $\chi^2_{(\alpha;12)} = 21{,}026$. Therefore, it can be concluded that there is relation between the university entrance path and the student's graduation predicate based on domicile.

4.6 Relationship between University Pathways and Student Graduation Predicates based on *Clustering* 2020

The Chi-Square test was conducted to analyze the relationship between university entrance variables and student graduation predicates based on campus clustering in 2020. The contingency table analyzed in this study is presented in Table 6 as follows :

Table 6 : University Entrance Pathway Contingency Table with Graduation Predicate based on Campus Clustering 2020 (3x3x3)

University Entrance Pathway	Cluster 1			Cluster 2			Cluster 3		
	1	***2***	***3***	***1***	***2***	***3***	***1***	***2***	***3***
SNMPTN	6	9	10	9	11	7	5	6	6
SBMPTN	8	9	9	10	9	6	7	6	5
SMMPTN	10	9	7	5	8	8	5	6	5

Information:
1 : Satisfactory
2 : Very Satisfying
3 : With praise

This testing hypothesis can be formulated as follows:
H_0: There is no relation between the university entrance path and the student graduation predicate based on campus *clustering* in 2020.
H_1: There is relation between the university entrance path and the student's graduation predicate based on campus *clustering* in 2020.

At the level of significance $= 5\%$, then the critical area is reject H_0 if the *p-value* < α or $\chi^2 > \chi^2_{(\alpha;20)}$ with $\chi^2_{(\alpha;20)} = 31{,}41$.
The statistical calculation of the test χ^2 is as follows:

$$\chi^2 = \frac{(5-5{,}3248)^2}{5{,}3248} + \frac{(6-6{,}1013)^2}{6{,}1013} + \cdots + \frac{(5-5{,}00767)^2}{5{,}00767} = 1{,}358352506$$

Based on the test results, a decision can be made to refuse H_0 because the value $\chi^2(1{,}358352506)$ does not meet the critical area, that is, it is worth less than $\chi^2_{(\alpha;20)} = 31{,}41$. Therefore, it can be concluded that there is no link between the university entrance path and student graduation predicates based on the 2020 campus clustering.

5. CONCLUSION

Based on the results of the analysis that has been carried out, some of the conclusions obtained are as follows.

a. Based on the Chi-Square test on the contingency table The relationship between the University Entrance Path and the Student Graduation Predicate, it can be concluded that there is no relationship between the university entrance path and the student's graduation predicate.
b. Based on the Chi-Square test on the contingency table The relationship between the University Entrance Pathway and the Student Graduation Predicate by Gender, it can be concluded that there is no relationship between the university entrance path and the student's graduation predicate based on gender.
c. Based on the Chi-Square test on the contingency table The relationship between the University Entrance Path to the Student Graduation Predicate by Major, it can be concluded that there is a relationship between the university entrance path and the student's graduation predicate based on the major.
d. Based on the Chi-Square test on the contingency table The relationship between the University Entrance Path to the Student Graduation Predicate based on the Student's High School Domicile, it can be concluded that there is no relationship between the university entrance path and the student's graduation predicate based on domicile.
e. Based on the Chi-Square test on the contingency table The relationship between the University Entrance Pathway to the Student Graduation Predicate based on the 2020 Campus Clustering, it can be concluded that there is no relationship between the university entrance path and the student graduation predicate based on the 2020 campus clustering.

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