

# OPTIMIZATION OF ONLINE EXAMINATION DEVELOPMENT ON NEW STUDENTS ADMISSION OF POLYTECHNIC FURNITURE AND WOOD PROCESSING INDUSTRY WITH ECONOMIC AND TECHNOLOGICAL FEASIBILITY ANALYSIS

Yessi Nasia Ulfia<sup>1</sup>, Fesa Putra Kristianto<sup>2\*</sup>, Peni Shoffiyati<sup>3</sup>, Magfur Rosada<sup>4</sup>  
Furniture Industry Business Management Program Study, Polytechnic of Furniture Industry and  
Wood Processing.  
E-mail : [fesa.putra@poltek-furnitur.ac.id](mailto:fesa.putra@poltek-furnitur.ac.id)

**Abstract:** The admission of new students at the Polytechnic of Furniture and Wood Processing Industry (Polifurneka) has a significant impact on the quality of education, One of which is the level of competence of the new students who are accepted. Therefore, it is necessary to optimize the development of a new student admission selection system using the CAT (Computer Assisted Test) online examination system to produce competent students. There are three online exam system options that can be implemented at the Furniture and Wood Processing Industry Polytechnic, namely the online exam system by making your own, an online exam system provided by PT. X and online exam system of premium upgrade google form. Therefore these three options must be analyzed economically and technologically. Based on the economic and technological feasibility analysis, an online exam is chosen that is self-exam. In the economic feasibility of the online exam made by itself, it provides a Payback Ratio (PP) value of 0.12 years, Net Present Value (NPV) of Rp. 446.088.408,-, Return On Investment (ROI) of 13,229%, and from the results of technology analysis, the online exam made by yourself is considered feasible because there is an additional listening question feature and storage capacity of up to 900,000 register per month.

**Keyword:** Computer Assisted Test, Economic and Technology Feasibility Analysis, Vendors and Premium Upgrades.

## INTRODUCTION

Admission of new students Polytechnic of Furniture and Wood Processing Industry has completed five admissions starting from 2018 to 2022 in the first five years since the establishment of the campus, students are awarded full scholarships starting from the exemption of registration fees to tuition fees. In the 6th year Politeknik has independently not provided full scholarships for students so that financing will be charged to students.

The 2023 academic year will officially provide fees for all registrants and students who have been accepted at the Polytechnic of Furniture and Wood Processing Industry with a registration fee of Rp. 100.000 and a UKT Education fee of Rp. 2.200.000,- which is paid every semester.

Dismissing the scholarship will certainly affect the interest of applicants at the Polytechnic

of Furniture and Wood Processing Industry because scholarships are one of the effective ways to attract many applicants [1] because it needs to be balanced with effective promotions to maintain or increase the interest of registrants.

In the previous year, the data of participants who passed the administrative selection was 240 people with the need for a selection fee of Rp. 100.000,- per person. The psychotest selection process uses a third party so that the campus must pay a fee of Rp. 24.000.000,-. Therefore, there is a need for efficiency so that the new student admission budget (PMB) is not used in full for test fees but can be allocated for other costs such as promotional costs to increase the number of registrants [2].

Cost efficiency efforts so that the funds managed can be used optimally can be done by

comparing three online exam system options that can be implemented at the Furniture and Wood Processing Industry Polytechnic, namely the online examination system provided by PT. X (option A), online exam system by creating your own (option B), and online exam system from premium upgrade google form (option C) [3].

Therefore these three options must be analyzed economically and technologically.

The campus must calculate the values that will be obtained from the online exam technology investment in the current year, therefore a technology investment needs to be further studied whether a system is feasible or not to be developed or implemented [4].

## RESEARCH METHODOLOGY

This study uses an analysis or evaluation method in the form of advanced analysis obtained by comparing three online examination system options and evaluated based on:

### 1. Economic Feasibility Analysis :

#### a. Net Present Value (NPV)

NPV is the net profit of a project is gross revenue minus the amount of costs. Therefore, the NPV of a project is the difference between the present value (PV) of the benefit flow and the present value of the cost flow [5]. The NPV value can be calculated by using the formula:

$$NPV = \sum_{t=0}^n \frac{(Bt - Ct)}{(1 + i)^t}$$

#### b. Return On Investment (ROI)

ROI is the ratio of net profit to cost [6] with formula:

$$ROI = \frac{(Total\ Sales - Investment)}{Investment} \times 100\%$$

#### c. Payback Period (PP)

PP is used to determine the duration of investment capital turnover used in doing business [7]. The payback period formula is as follows:

$$PP = \frac{Initial\ Investment}{Advantage} \times 100\%$$

### 2. Technology feasibility analysis is used to

compare the existing features of various online exam system options. [8].

## RESULT AND DISCUSSION

### New Student Admissions Unit (PMB)

The Polytechnic of Furniture and Wood Processing Industry (Polifurneka) has established a PMB Unit in 2021. The purpose of establishing the PMB Unit is to introduce more broadly and intensively the existence of Polifurneka to the community, provide educational services to prospective new students, and formulate marketing strategies and a sustainable annual PMB process [9]. The PMB unit at Polifurneka is led by the unit head and unit secretary. In the implementation of the PMB process, the PMB unit is assisted by a committee formed from lecturers and PPNPN. The committee is divided into seven divisions, namely promotion, question making, facilities relations, and administration and secretariat [10]. Figure 1 describes the PMB organizational structure

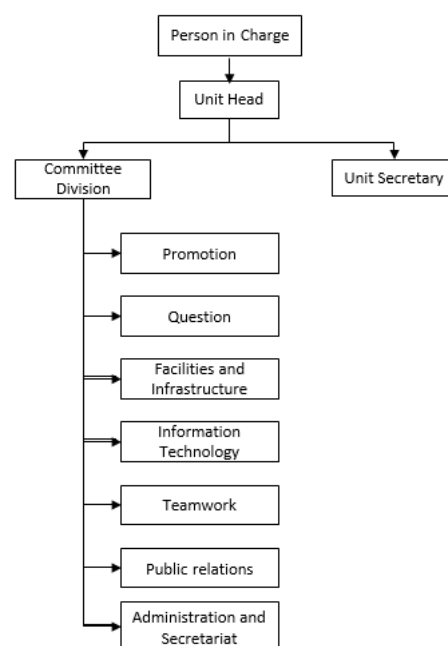


Figure 1. PMB Organizational Structure

quota was called to conduct a series of test selections. Test selection includes Academic Potential Test, English Test, Psychotest Test, Field Ability Test and Industry Interview. All tests are carried out online by hiring the services of a third party to conduct an online test. The

following is the number of participants who take the PMB staged online test:

Table 1. Number of Quotas and Number of Test Participants per PMB Stage

PMB Stages	Admission Quota	Number of Test Participants
Jarvis Achievements	20	40
Jarvis Industries	46	92
Jarvis Together	42	84
Jarvis Independent	12	24
<b>Total</b>	<b>120</b>	<b>240</b>

In the PMB process, there are costs incurred by Polifurneka. These costs are used for the operation of the PMB process. The cost component of the PMB process is contained in the promotion, implementation of tests, committee honors and completeness of facilities and infrastructure [12]. Table 2 is a breakdown of PMB process costs.

Table 2. PMB Process Details

Cost Details	IDR.
<b>Offline Promotion</b>	
- Banners and Installation	10.000.000
- High School/Vocational High School Visit	2.000.000
- Brochure	5.000.000
<b>Online Promotion</b>	
- Paid Promo	1.000.000
- Social Media Subscription Ads	1.000.000
<b>Media Advertising</b>	
- Radio	3.000.000
- Mass Media	5.000.000
<b>Test Implementation</b>	
- Online Test + 3rd Party Psychotest	24.000.000
<b>Facilities and Infrastructure</b>	
- Storage Box	500.000
- Starter Pack	20.000
<b>Honor Committee</b>	

- Design Committee	500.000
- Video Committee	700.000
- Public Relations Committee	3.000.000
- Offline Promotion Committee	2.000.000
<b>Total</b>	<b>57.720.000</b>

In the sixth year, the PMB process at Polifurneka has been paid with a registration payment of Rp. 100.000,- and UKT of Rp. 2.200.000,-. Then there needs to be more effort in promoting to attract registrants [13]. So there is a need to change the cost structure from the cost of conducting the test to the cost of promotion. The result was that Polifurneka had to create its own online exam system.

### PMB Unit Online Exam System

There are three options for creating an online exam system. The option is to use the online exam system provided by PT. X, create a self-developed online exam system, or upgrade the google form so that it can be used for CAT tests. Here is a detailed explanation of each option and its cost:

#### Online Exam System Provided by PT. X

PT. X is a company that develops academic systems for lectures. From siakad cloud, campus administration, new student admission system, finance, judiciary or graduation, tracer study, e-learning, student affairs and reporting to the Higher Education. For online exam facilities, it is provided by charging a rental fee of Rp. 10.000.000 per month. Currently, Polifurneka still subscribes to the basic package of Rp. 7.000.000,- per month. The features provided for the online exam are question types that can be used such as single choice, multiple choice, causation, right and wrong and essay systems, supervision and assessment systems [14].

#### 3.2.2. Self-developed online exam system

For self-development of online exams can be designed as needed from scratch, design

from scratch this starts from FGD for needs determination. The next step is to create an online exam system, after which it conducts a test trial and gives an assessment of the system created. The cost is much cheaper than the first option because the maintenance of data and data systems is handled by yourself, so the costs that arise are cloud storage and domain costs. The features are almost the same as those provided by PT. X, however, there is an additional question type, namely listening that can be used for Toefl or English exams [15].

### Upgrade Google Form Premium

The online exam system can also be created from google form. Google has provided free or paid cloud storage services for its online exams. However, if it is free, many features are omitted such as a timer, a form-like appearance, and links that cannot be customized. Hence the need to use paid ones for Polifurneka online exams. The fee to be paid for upgrading the google form is Rp. 1.400,000.-. For the features are the same as provided by PT. X[16]. Table 3. Describes the fees and features for online exam system options.

Table 3. Online Exam Options that Polifurneka will develop

Review	Online Exam System Options		
	Provided by PT. X	Developing Your Own	Upgrade Google Form
Question Type	Single Choice	Single Choice	Single Choice
	Multiple Choice	Multiple Choice	Multiple Choice

Review	Online Exam System Options		
	Provided by PT. X	Developing Your Own	Upgrade Google Form
	Cause and Effect	Cause and Effect	Cause and Effect
	True and False	True and False	True and False
	Essay	Essay Listening	Essay
Surveillance System	Exist	Exist	Exist
Grading System	Exist	Exist	Exist
Storage	Cloud Storage PT. X	Own Cloud Storage	Cloud Storage Google
Storage Capacity	Big	Moderate	Small
Maintenance	PT. X	Own	Google
<b>Cost</b>			
- Rent (month)	3.000.000		1.400.000
<b>Investment</b>			
- Buy Cloud Storage		3.328.705	
- Buy Domain		137.389	
<b>Maintenance</b>			
- Cloud Storage (Month)		120.000	
- Domain (Month)		12.500	

### Economic Feasibility Analysis

Based on the target of paid new student admissions in 2023, it is estimated that the number of applicants for all study programs (there are 3 study programs) in one year is 700 registrants and those who make UKT payments are 210 new student, For registration fee of Rp. 100.000,- and UKT Rp. 2.200.000,- per participant. Based on the calculation of existing data, then in 1 year period (12 months) registration will be obtained income described in Tables 4 and 5.

Table 4. Target Registrants and PMB Re-register in 2023

		UKT	Fee	
Achievement	160	50		
Industry	160	50	100	2.200.000
Together	230	70		
Independent	150	40		
<b>Total</b>	<b>700</b>	<b>210</b>		

Table 5. Total PMB Income in 2023

Jarvis	Registration Income	Income UKT	Total Income
Achievement	16.000.000	110.000.000	126.000.000
Industry	16.000.000	110.000.000	126.000.000
Together	23.000.000	154.000.000	177.000.000
Independent	15.000.000	88.000.000	103.000.000
<b>Total</b>	<b>70.000.000</b>	<b>462.000.000</b>	<b>532.000.000</b>

For expenses during the PMB process of Rp. 57.720.000,-. So that the average monthly income, average monthly expenses and income from the PMB process are obtained in Table 6.

Table 6. PMB Financial Summary

Summary	IDR
Average Income/Month	44.333.333
Average Expenses/Month	4.810.000
Data collection	474.280.000

From the PMB data, an economic feasibility analysis can be carried out for the option of creating a PMB online examination system. So that from the three options it will be possible to determine which one is more feasible in calculating economic feasibility [17]. For its calculation can be done in Tables 7, 8 and 9.

Table 7. Payback Period Calculation

Description	Option A	Option B	Option C
	Provided PT. X	Self-Made	Upgrade G-Form
Income	532.000.000	532.000.000	532.000.000
<b>PMB Fees</b>			
Expense	57.720.000	57.720.000	57.720.000
Online Exam System Fees	36.000.000	3.466.094	16.800.000
<b>Pay Back Period (Year)</b>	<b>0.18</b>	<b>0.12</b>	<b>0.14</b>

From the calculation of Payback Period, Option B is faster because the investment cost is cheaper than other options [18]. Option B's investment costs are only used to purchase cloud

storage and domains. For the manufacture option B is handled by itself so that it is cheaper than other options which tend to cost per month and the system is rented.

Table 8. Calculation of Return On Investment (ROI)

Description	Option A	Option B	Option C
	Provided PT. X	Self-Made	Upgrade G-Form
Income UKT	462.000.000	462.000.000	462.000.000
Online Exam System Fees	36.000.000	3.466.094	16.800.000
<b>ROI (%)</b>	<b>1,18%</b>	<b>13,23%</b>	<b>2,65%</b>

From the calculation, the ROI of option B is higher, which is 13,299% than the ROI value of other options [19]. This is because the investment cost is cheaper because it is done by yourself.

Table 9. Net Present Value (NPV) calculation

Description	Option A	Option B	Option C
	Provided PT. X	Self-Made	Upgrade G-Form
<b>Investmen</b>			
Online Exam System Fees	36.000.000	3.466.094	16.800.000
<b>Income</b>			
Income PMB	532.000.000	532.000.000	532.000.000
PMB Expenditure	57.720.000	57.720.000	57.720.000
<b>NPV (i = 5,5%)</b>	<b>413.554.502</b>	<b>446.088.408</b>	<b>432.754.502</b>

NPV for determining the feasibility of building a PMB online examination system, an approach rate is used with a current deposit (  $1(1+r)^1$ ) interest of 5.5% per year. Then a discount value of 0.947 was obtained and the present value (PV) in one year was Rp. 449.554.502,-. So the NPV obtained is as in Table 9. In the calculation of NPV Option B is better, this is because the investment cost is lower than other options [20].

Of the three economic feasibility analyses, option B is always superior to other options because the investment cost is cheaper because it is done by building its own system and

in accordance with the needs of the Polifurneka PMB unit.

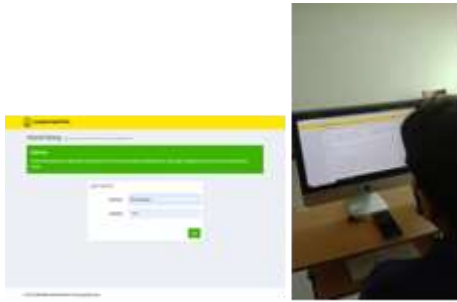


Figure 2. Implementation Opsi B

### Technology Feasibility Analysis

Based on Table 3, we can see a comparison of the existing features of the various online exam system options. For option A, the advantage of Option B is that it has a listening feature, but for cloud storage to buy from web hosting there is a limit on use for the test, which is 900.000 users per month. The highest registrants from Polifurneka only reached 4.239 registrants. Therefore, the capacity of 900.000 is considered sufficient for the online test system to use. For Option C, the features are almost the same as option A, but the storage is very small, only providing tests for 20.000 registrants per month. Therefore, the selection of Option B is the most optimal because there are advantages in terms of features, namely providing a listening exam question feature and storage capacity that is still sufficiently used for the test [17].

### Online Exam System Option Selection Decision

From the economic and technological feasibility analysis, the most optimal Option B results are obtained with advantages in economic feasibility, namely a faster payback period, high ROI and NPV. In the feasibility of Option B technology, the most features are being able to perform test listening and storage capacity that can still limit the number of registrants. Therefore, option B was chosen to be implemented in the Polifurneka PMB unit. Figure 2 shows the implementation activity of option B

### CONCLUSION

Based on the results of research and calculations that have been carried out on the

creation of the Polifurneka online examination system. Then conclusions can be drawn from the economic feasibility analysis chosen option B to be implemented in the Polifurneka PMB process. To implement Option B, funds of Rp. 3.466.094 are needed, - based on the system specifications set out in the Focus Group Discussion (FGD). Looking at the calculation of option B's payback period of 0.12 years (about 1 month), ROI of 13,229% and NPV of Rp. 446.088.408,-, then option B is declared feasible. From the results of the technology analysis, option B is considered feasible because there are additional listening features and storage capacity of up to 900.000 registrants per month.

Suggestions that need to be considered in building a PMB online examination system are to provide training or training to the pmb question committee and socialization of test work to registrants, and PMB units carry out regular maintenance from extending the mass of cloud storage and domains as well as system development in exam supervision.

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