

# ANALYSIS MODEL AND FINANCIAL DYNAMICS IN CASH MANAGEMENT IN ASRO INDONESIA NAVAL TECHNOLOGY COLLEGE POSTGRADUATE STUDENTS

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## ABSTRACT

*Financial management is an activity to organize, planning, directing, and supervising financial activities. Financial management is crucial in maintaining the sustainability of an institution or company to achieve its goals. Financial policies are taken to achieve effective and efficient use of the budget in planning, implementing and managing an activity that aims to achieve optimal profit. Likewise, with ASRO STTAL postgraduate students facing the dynamics of education courses require proper financial management so that budgetary support during the education process can be managed and utilized appropriately. By using a dynamic system, this study investigates the impact of scenarios on the internal financial policy of ASRO IX students on the financial dynamics of the cash flows of ASRO IX STTAL students. The scenarios were developed into optimistic, moderate and pessimistic scenarios. The Pessimistic Scenario shows results with stable financial dynamics which results in an increase in the amount of cash at the best of 71.3%. Simulation The policy scenario generates total cash at the end of the education period of Rp. 23,616.117. The model building can be used as a financial policy analysis tool for STTAL students.*

**Keywords:** Financial Management, Policy, System Dynamic

## 1. INTRODUCTION

Financial management is an activity to organize, plan, direct, and supervise financial activities. Financial management is one of the important factors in determining the success of a business or activity. There are various benefits in financial management, including (1) knowing capital; (2) cash management; (3) lower costs; (4) tax planning; (5) financial decision-making; (6) investment decisions, and various other benefits. Given that finance is a vital issue in every line of operation. The policy on the use of the budget and journal details of the outflow and inflow of funds must be clear, which can then be evaluated to achieve the expected profit.

The objective aspect is the main aspect of the organization. The common goal for every company is to get a profit (Hau, 2022), while in non-profit organizations, the purpose is to achieve the vision and mission of the organization. If financial factors cannot be regulated carefully, expenses and income will not be controlled, it can lead to waste, and ineffective financial management and can lead to bankruptcy or failure to achieve goals which can lead to system failure (Donpaala, 2022).

Postgraduate Indonesian Naval Technology College students are students whose education funding is fully supported by the department. Financial support is used to support lectures, research, and other student activities. Student financial support consists of several types of financial

support, including pocket money, food allowance, education allowance, cooperative money, and research fee allowance. There is the support that is periodic in the period of months or quarters as well as support that is incidental.

Existing financial resources are fully allocated for various types of student needs during the educational process at STTAL. Types of expenditure can be in the form of routine expenses, unexpected expenses, personal needs, research needs, and the needs of the final stage of education. Financial support is channeled by the STTAL finance department which is received by the treasurer of the force and is managed in the form of Force cash. The class cash management policy is based on a mutual agreement with students. Cash management is structured in an accountable, open, and accountable financial system policy.

The preparation of the Financial System Model is intended to be able to analyze the financial policy plan so that the financial system can be implemented properly, effectively, efficiently, and on target and can produce optimal benefits. The method that is often used in financial analysis is to use the cash flow model. There are various types of financial analysis, including net present value (NPV) to measure the current currency value based on the currency value in the coming year or vice versa, which is measured based on the effect of interest rates and the length of time of analysis. Internal Rate of Return (IRR) analysis is a method used to analyze investment policies and predict the level of profit that can be

obtained. In this study, the dynamic system model is used to model a dynamic and complex financial system. System dynamics models can provide more reliable estimates than statistical models, systems dynamic models provide a way to understand the causes of industrial behavior, detect early changes and determine the factors that predict behavior significantly and sensitively (Lyneis, 2000).

This research is structured to answer the problems formulated into several research questions as follows, (1) what factors affect the financial system of ASRO IX Students, (2) how to arrange the related factors into the financial system model, (3) What are the financial policy scenarios for ASRO IX Students, and (4) how is the dynamic impact of ASRO IX Student's financial policy scenario on the number of rights of each student at the end of education?

## **2. MATERIALS AND METHODS**

### **2.1 Literature Review**

Financial performance is one indicator to predict the company's future value (Data, 2017). Improved financial performance can support the achievement of sustainable future growth by making important decisions about the choice of capital structure (Shehla Akhtar, 2012). One of the biggest challenges in compiling and making decisions is the ability to analyze and choose the best combination for future predictions (Mona Ebrahimi, 2022). Strategic financial analysis is an innovative and quite effective instrument for examining the strategic aspects of an organization's financial activities and for establishing analytical support for its strategic financial management (Krylov, 2015). The subject of financial performance is studied in various economic sectors, such as industry, services, commercial, banking, and tourism from developed and developing countries.

Financial analysis is developed in various analytical models. (Khalifa, 2013) using financial ratio analysis to measure the level of liquidity, operational efficiency, and profitability, while statistical methods are used to identify variables that affect financial performance. (Agrawal, 2022) Researching things that contribute to increasing profitability and creating financial value for the company. Furthermore, (Md. Safiuddin, 2015) used descriptive statistics through SPSS as a technique to analyze the effect of financial structure on company performance. In the balanced scorecard theory model, the financial aspect is also used as a measurement of a company's performance, placing the factor of the size of the budget affecting the implementation of the strategy (Eric Kimathi Kithure, 2022).

System dynamics studies the changes that occur in a system or conditions that meet certain conditions over time, whether the system is stable or unstable (Resmawan, 2018). System dynamics is used to analyze phenomena that have interrelationships between elements that have certain behaviors in the form of changes in magnitude that

occur over a certain period of time (Tasrif, 2015). The System Dynamic Model allows simulating an intervention whose effects can differ dramatically: (1) in a time context (short-term vs. long-term effects, trade-offs in time), and (2) in a sectoral context (the effect of improving the performance of a sector which results in worsening performance of other sectors, trade-offs between sectors); which is known as dynamic complexity (Juniarti, 2019).

### **2.2 Research Methods**

The research begins with a literature study related to the variables used in the study. The observation phase of the research object was carried out to identify, collect and process data. The modeling stage begins with making *causal loop diagrams*, making mathematical and computational models, and model validation. The last stage is the simulation of policy scenarios on dynamic models and the interpretation of research results.

Data collection and processing related to the research include data on the amount and type of income, data, and number of types of expenditure, development of cash balances, financial planning, and management. After the variables have been identified, the concept of a causal relationship between the main variables and related sub-variables is compiled in the form of a Causal Loop Diagram (CLD). Mathematical causal relationships between variables are identified and inputted into the Stock and Flow Diagram (SFD) dynamic model. Model validation is done by doing external and internal validation. External validation uses expert judgment on the model structure and the adequacy of model constraints. While the internal validation of the model is carried out by testing the validation of the simulation data and testing the behavior of the model.

The policy scenarios that will be used are financial budgeting policies to be allocated as operational funds for closing education activities at the end of the simulation period and the amount of money received to all students as operational support in the form of cash each month. The analysis and interpretation of the simulation results is in the form of the amount of money that will be the right of each student which will be distributed at the end of education.

## **3. RESULTS AND DISCUSSION**

### **3.1 Identification of Research Objects**

The financial management of ASRO IX cash is carried out by the class treasurer. All receipts are deposited in a class account at a regional bank in East Java. The simulation of deposit interest per month is 3%-3.5 %. The cost of the deposit consists of an administrative fee of Rp. 12,000/month and an ATM fee of Rp. 5,000/month. Based on the class agreement, 2.5% is deducted every month from the total existing balance. The deduction is then donated

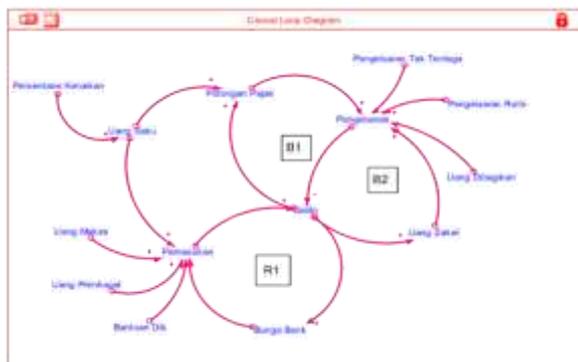
to an orphanage or an official zakat institution. This is done as a tangible form of the contribution of ASRO IX students to the social life of the community.

At the final stage of the lecture, it is planned to carry out a farewell event and give mementos to STTAL lecturers and institutions. There are 3 alternative activities to be carried out, each of which requires a different cost. Alternative 1 is estimated to cost Rp. 59,000,000, Alternative 2 is estimated to cost Rp. 67,000,000 and Alternative 3 is estimated to cost Rp. 76,000,000. The problem in this modeling is to analyze financial policy based on the amount of budget allocation for closing activities at the end of the second year and the amount of money distributed to each student each month. The purpose of the financial policy analysis is to find out how much money is the right of each student to be distributed after graduation.

### 3.2 Research Results

#### 3.2.1 Causal Loop Diagram (CLD)

The conceptualization of the ASRO IX Student Financial System model was carried out at the stage of preparing the *Causal Loop Diagram* (CLD). Causal Loop Diagram (CLD) is used to describe the causal relationship between the main variables, sub-variables, and sub-variables of the model. The main variables used in the modeling are Receipts, Expenditures, and Stock Levels on the Remaining Balance. The relationship between variables can be seen in **Figure.1** as follows :



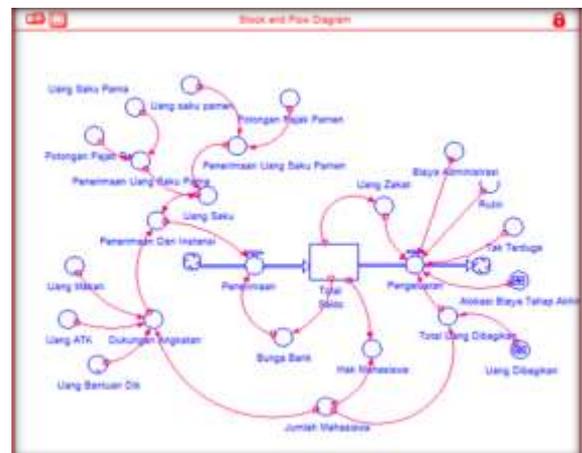
**Figure 1. Causal Loop Diagram (CLD)**

Positive Loop occurs in a cause-and-effect relationship between income/receipts increasing balance, balance increasing receipts from bank interest, and bank interest increasing balance. While the negative loop occurs in a cause-and-effect relationship between an increase in the remaining balance, an increase in zakat money, an increase in spending, and an increase in spending, a decreased balance.

#### 3.2.2 Stock and Flow Diagrams (SFD)

The preparation of *Stock and Flow Diagrams* is done by formulating mathematical relationships

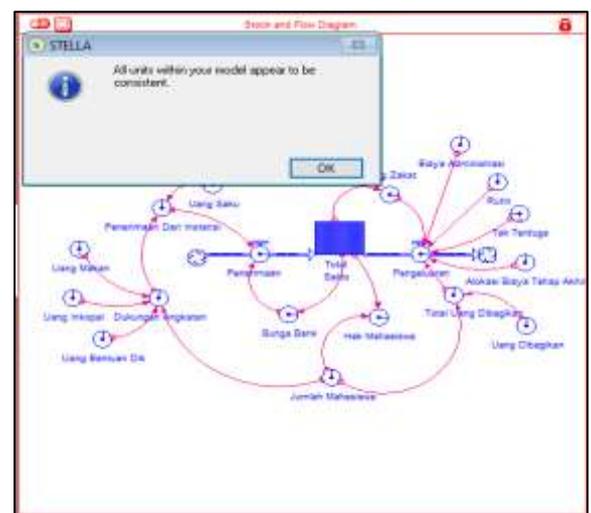
between variables and sub-variables as described in the *Causal Loop Diagram*. This stage uses the *STELLA* Dynamic System application. The result of this stage is a dynamic simulation tool that will later be used to analyze the impact of policy scenarios. Stock and Flow Diagrams on the ASRO IX cash financial system modeling are shown in **Figure 2.** as follows :



**Figure 2. Stock and Flow Diagram of ASRO IX Financial model**

#### 3.2.3 Variable Verification and Validation of Model

a. **Model Verification** This is done by verifying the model unit on all model variables and sub-variables. Verification of the ASRO IX financial system model shows *consistent results*. The results of the model verification are shown in **Figure 3.** as follows :

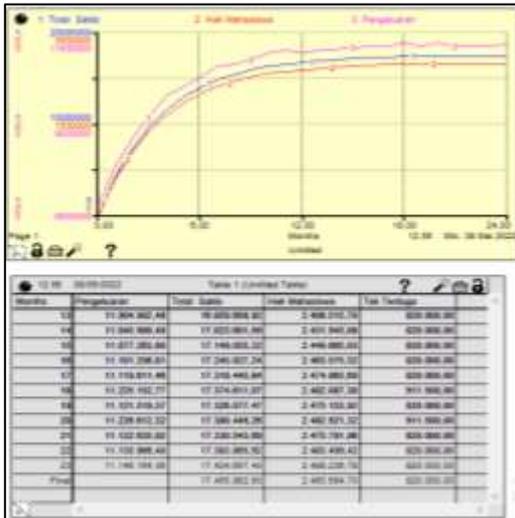


**Figure 3. Model Verification**

b. **Model Validation.** Model validation is carried out to ensure that the model made as a whole has met the objectives of modeling. The validation of the ASRO IX Financial system model was carried out by Testing the Structure and Sufficiency of Model Boundaries, Testing Model Parameters and Testing

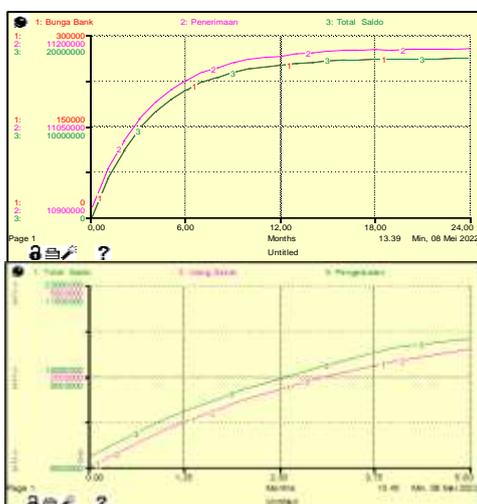
Model Behavior. The results of the model test are as follows:

(1) Test the Structure and Adequacy of Model Limits. The test is carried out by brainstorming the relevant stakeholders as experts. The test results are declared valid. The results of the model validation are shown in **Table 4.** below:



**Figure 4.** Structural Validation and Adequacy of Model Limits

(2) The Model Parameter Test is carried out on the Positive Loop and Negative Loop Model. Parameter Test on the Positive Loop shows receipts from bank interest have a positive effect on the Force's cash balance, the higher the balance will increase receipts from bank interest so that the total balance also increases as shown in **Figure 5 (a)**. The parameter Test in the Negative Loop shown in Increase in Balance will increase the number of deductions allocated for zakat money. This can increase the number of expenses that will reduce the total balance. Because the zakat deduction is only **2.5 %**, it is not very significant, it can be seen its effect on the remaining balance as shown in **Figure 5 (b)**.



**Figure 5.** Positive and Negative Loop Parameter Test (a,b)

(3) Test the Behavior Model ( *Behaviour Model Test* ). A model Behavior Test is conducted to test whether the developed model has the same behavior as the actual condition so that the model can be declared valid and can represent the real system. The test is done by comparing the actual condition data with the data from the simulation model. The test is carried out with the equation:

$$E = |(SA)/A$$

|.....

Information:

A : Actual Data

S : Simulation Data

E : Error value variance

If  $E < 0.1$  then the model is declared valid.

Behavioral tests are carried out on the Cash Balance Remaining Variable with the test results shown in **Table 1** below.

**Table 1.** Behavioral Test Model

No	Month	current	Simulation	E
1	July	4,008,800	4,126,000.00	0.02924
2	August	7,385,500	7,282,390.000	0.01396
3	September	9,588,200	9,697,028.35	0.01135
4	October	11,507,000	11,544,226.69	0.00324
5	November	12,789,000	12,865,833.42	0.00601
6	December	13,784,500	13,968,362.56	0.01334

Based on the results of the Model Behavioral Test, the error value  $E = 0.01285$  is smaller than the required 0.1. Thus, the ASRO IX financial system model is declared valid.

### 1.2.1 Scenario Simulation on the Model.

Preparation of financial policy scenarios based on alternative planned activities and the amount of money received to each student each month. The policy is based on a mutual agreement with ASRO IX STTAL Students. ASRO IX's financial policy scenario is structured into four scenarios as follows:

a. Existing Scenario. The current scenario is that the allocation for the final educational activity is Rp. 59,000,000.00 with the allocation of discounts per person per month is Rp. 350,000.00 . The amount of money received by each student per month is Rp. 600,000.00.

b. Optimistic Scenario. The allocation for the final educational activity is Rp. 59,000,000.00 with the allocation of discounts per person per month is Rp.

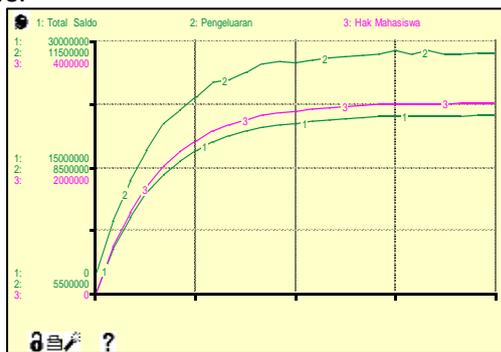
350,000.00 . The amount of money received by each student per month is Rp. 800.000,00.

c. *Moderate Scenario*. The allocation for the final educational activity is Rp. 67,000,000,00 with the allocation of discounts per person per month is Rp.400,000.00. The amount of money received by each student per month is Rp. 650,000.00.

d. *Pessimistic Scenario* . The allocation for the final educational activity is Rp. 76,000,000.00 with a discount allocation per person per month is Rp.450.000,00. The amount of money received by each student per month is Rp. 500,000.00.

### 1.2.2 Interpretation of Simulation Results.

a. *Existing Scenario*. The simulation results show that at the end of education each student has the right of **Rp. 3,009,578.00** . Financial fluctuations indicate an increase in the total cash balance with a total balance of Rp. 21,067,046,73. Comparison of the amount of cash at the end of the first semester with the end of the fourth semester grew by 52.8 % . The cash development graph is shown in **Figure 5** as follows:



**Figure 5.** Existing Scenario Graph.

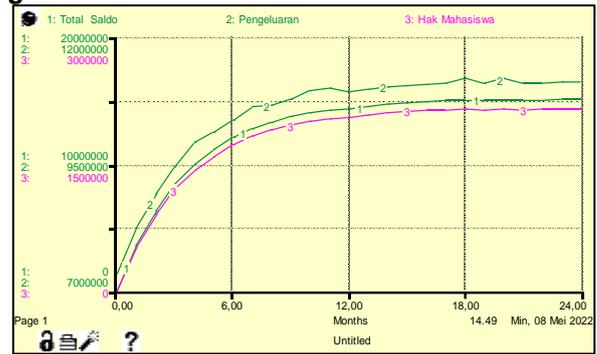
The development of student balances and entitlements in the final semester of education is shown in the simulation results table in the following table:

**Table 2.** Value of Student's Balance and Rights.

No	Months	Total Cash (Rp)	Student Rights (Rp)
1	19th	20,920,818.56	2,988,688.37
2	20th	20,980,426.21	2,997,203.74
3	21th	20,934,526.05	2,990,646.58
4	22th	20,990,912.43	2,998,701.78
5	23th	21,034,048.01	3,004,864,00
6	24th	21,067,046.73	3,009,578.10

b. *Optimistic Scenario*. The results of the scenario simulation show that at the end of the education period each student gets the right of **Rp. 2,159,887.80**. Financial fluctuations indicate an increase in the total cash balance with a total balance of Rp. 15,119,214,59 . Comparison of the amount of cash at the end of the first semester with the end of the fourth semester grew by 9.7%. Financial

fluctuations in the *Optimistic scenario* are shown in **Figure 6** as follows:



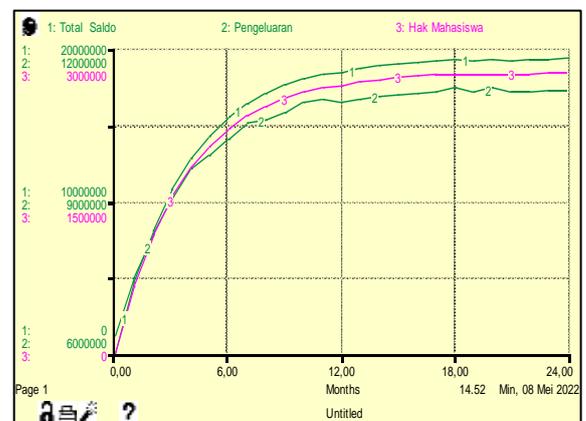
**Figure 6.** Optimistic Scenario financial graph.

The development of the cash balance value and the rights of each student in each month until the end of education is shown in **Table 3** below.

**Table 3.** Value of Student's Balance and Rights in Optimistic Scenario.

No	Months	Total Cash (Rp)	Student Rights (Rp)
1	19th	15,000,068.51	2,142,866.93
2	20th	15,051,052.41	2,150,150,34
3	21th	14,998,555.09	2,142,650.73
4	22th	15,049,894.65	2,149,984.95
5	23th	15,089,169.40	2,155,595.63
6	24th	15,119,214.59	1,159,887,80

c. *Moderate Scenario*. The simulation results show that the amount of money received by each student at the end of education is **Rp. 2,766,809.45** . Financial fluctuations indicate an increase in the total cash balance with a total balance of Rp. 15,119,214.59. Comparison of the amount of cash at the end of the first semester with the end of the fourth semester grew by 40.5%. The financial simulation in the moderate scenario is shown in the graph in **Figure 7** as follows.



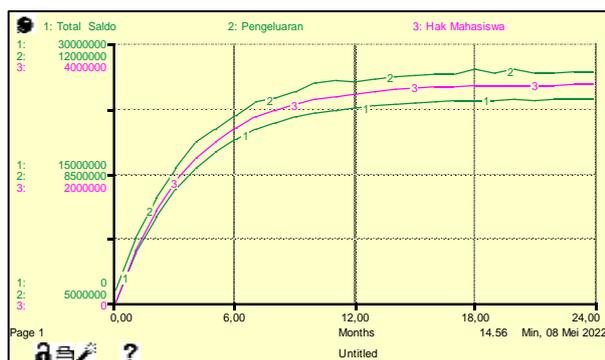
**Figure 7.** Financial Graph in Moderate Scenario.

The growth of the total cash balance and student entitlements at the end of the education period is shown in **Table 4.** below.

**Table 4.** Total Balance and Student Rights in Moderate Scenario.

No	Months	Total Cash (Rp)	Student Rights (Rp)
1	19th	19,229,175.70	2,747,025.10
2	20th	19,286,319.41	2,755,188.49
3	21th	19,238,534.35	2,748,362.05
4	22th	19,293,478.78	2,756,211.25
5	23th	19,335,511.27	2,762,215.90
6	24th	19,367,666.12	2,766,809.45

d. Pessimistic Scenario. The results of the pessimistic scenario simulation show that at the end of education each student gets financial rights in the amount of **Rp. 3,373,313.09**. Financial fluctuations indicate an increase in the total cash balance with a total balance of Rp. 23,616,117,64 . Comparison of the amount of cash at the end of the first semester with the end of the fourth semester grew by 71.3%. The financial simulation in the pessimistic scenario is shown in **Figure 8.** as follows.



**Figure 8.** Pessimistic Scenario Simulation Graph.

The growth in the number of balances and student entitlements at the end of education is shown in Table 5 below.

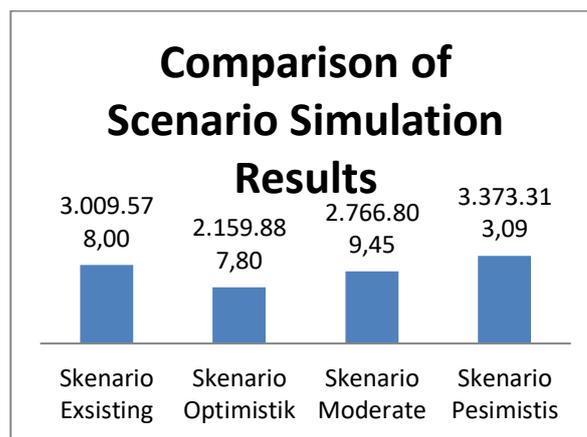
**Table 5.** Total Balance and Student Rights in the Pessimistic Scenario.

No	Months	Total Cash (Rp)	Student Rights (Rp)
1	19th	23,458,282.90	3,351,183.27
2	20th	23,521,586.42	3,360,226.63
3	21th	23,478,513.61	3,354,073.37
4	22th	23,537,062.91	3,362,437.56
5	23th	23,581,853.13	3,368,836.16
6	24th	23,616,117,64	3,373,731.09

### 3.3 Research Implications.

The simulation results in each scenario produce varied financial productivity. The Pessimistic scenario produces the best financial products with asset growth in cash balances during the end of the first

semester to the end of the fourth semester of 71.3%. At the end of the simulation period, each student gets the right to the money in the amount of Rp. 3,373,313,09 . \_ The comparison of the remaining balance that will be received by each student at the end of the education period in each scenario is shown in Figure 3.9. Based on the modeling results, it can be recommended to student officials to make changes to financial policies with a scenario of the cost of activities at the end of education is Rp. 76,000,000.00, the allocation of the discount per person per month is Rp.450.000,00. The amount of money received by each student per month is Rp. 500,000.00.



**Figure 9.** Comparison of Scenario Simulation Results

## 4. CONCLUSIONS

The dynamic system simulation can comprehensively model the financial management system of ASRO IX STTAL S2 students. The structure of the relationship between variables can show the relationship between the influence of policies on the condition of the Force's cash and the remaining amount distributed to each student at the end of education. The model can simulate the actual behavior of the system so that the model can be used as a policy scenario analysis tool to predict the impacts that arise within a certain period.

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