

Cost and Benefits Analysis of Research and Community Services Information System Development

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Abstract: In this technological age, the availability of information systems that meet an organization's demands is critical. Manado State Polytechnic is a community-based educational institution that continues to encourage its members to develop in order to meet the demand for software infrastructure that can support each work unit's performance. Polytechnics must identify and quantify linked costs and benefits in software development in order to maximize the use of current financing resources. The expenses of research and service are compared to the costs of system development in this study using the Cost and Benefit Analysis approach. The results of the calculations show that the ratio is greater than 1, at 1.18, indicating that the value of the benefit is greater than the resulting cost, indicating that the alternative is more profitable, accounting for approximately 10% of the total investment if the information system is developed. We can get tangible benefits from reducing operational costs and intangible benefits, namely increasing satisfaction and decision making.

1 INTRODUCTION

In today's competitive climate, data digitization has become one of the segments that determines an institution's operational performance. Data is essential for administrative management as well as the development of existing and future institutional policies.

Manado State Polytechnic, being a vocational higher education institution, does not yet have fully functional software to manage institutional data in an integrated manner. Data digitization is still in its infancy and has yet to be fully integrated into a single client-server software system. Data synchronization is challenging to establish since most existing data is still a single entity that has not been coupled to other data entities

This research was carried out with the aim of optimizing in the form of a redesign of the proposal submission system to the announcement stage of the results of research selection and service to support the services and main tasks of the Center for Research and Community Service to the Manado State Polytechnic. The long-term goal of this research is the creation of an integrated research and service system that can provide services for lecturers, students and

other stakeholders. This certainly affects the productivity and competence of lecturers in realizing aspects of the tridharma, especially for the dharma of research and service

Because it can give the most up-to-date facts, the information system is an excellent tool for assisting the organization's aims. As a result, analysis is required for the creation of information systems to ensure that no losses occur. Using the Cost-Benefit Analysis Manado State Polytechnic can figure out how much profit or loss there is and whether establishing research and community service information systems is feasible.

2 RESEARCH METHODOLOGY

This research employs a mixed method approach, which combines qualitative and quantitative methodologies. Researchers collected data and conducted interviews with lecturers, as well as conducting innovative investigations to produce information system design

3 COST ANALYSIS

The information system design, as shown in fig 1, is used as a guide when conducting a cost-benefit analysis. The system design that will be used to calculate costs and benefits in fig 1 is a system redesign that was created to meet the needs of the relevant unit. The system design is depicted in fig 1 after conducting interviews with 50 researchers and collecting data. System design is one of the tools used in software development. System design can be classified as problem-solving cognitive tools.

The system is separated into three steps based on the developed system design: proposal, review, and determination. Table 1 shows the costs incurred by each proposer at each stage.

Table 1: Cost for system development.

Activity	Cost
App development	30.000.000
Operator training	240.000
Documentation	300.000
Data collecting	250.000
Socialisation	1.500.000
System maintenance	1.800.000
Total	34.090.000

The value of the rupiah in table 1 is used as the basis for calculating costs for the following year, with special emphasis paid to applying the amount of the inflation index acquired from the link <https://www.bi.go.id/id/statistik/indikator/data-inflasi.aspx> in the calculations.

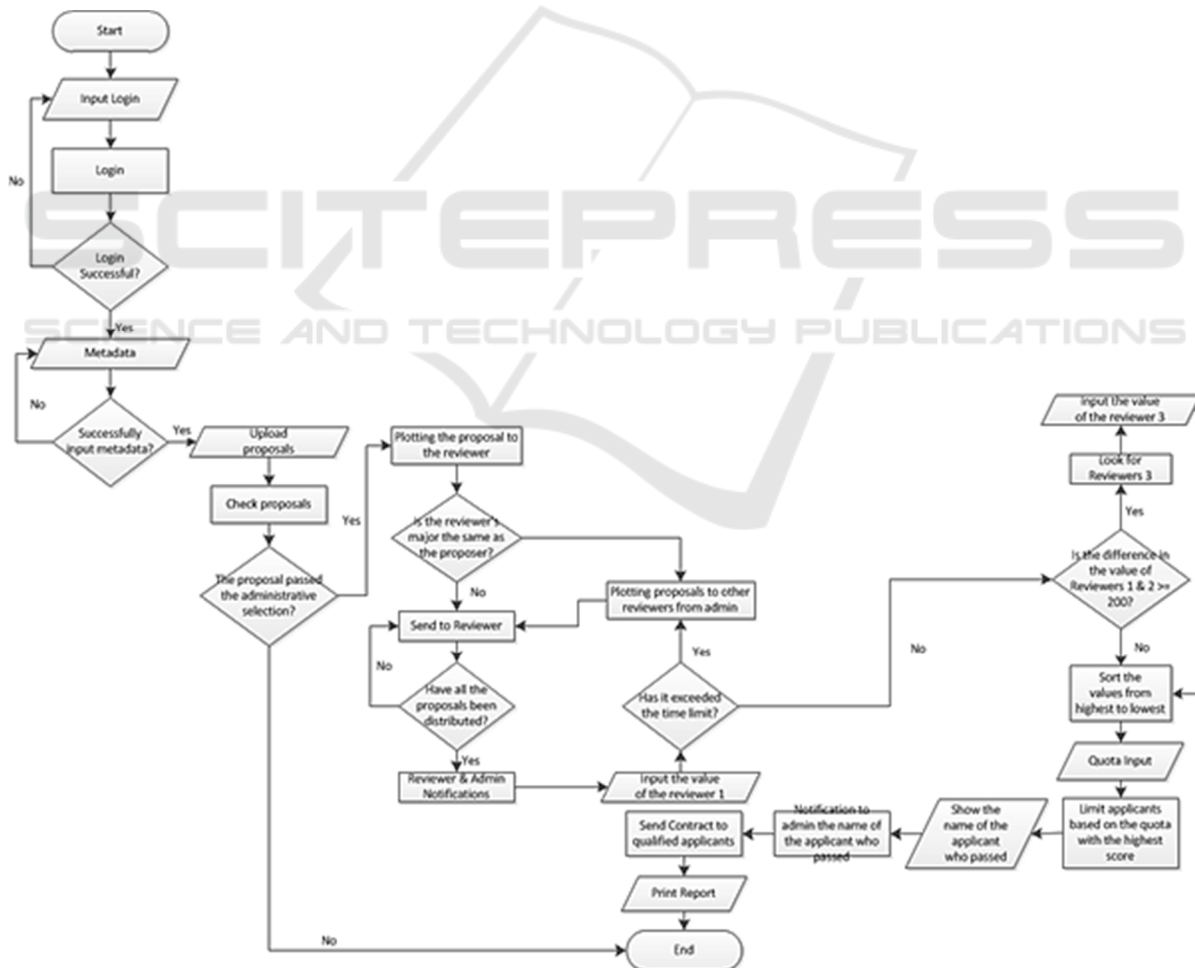


Figure 1: System design.

Tanggal	Data Inflasi
Juli 2021	1.52 %
Juni 2021	1.33 %
Mei 2021	1.68 %
April 2021	1.42 %
Maret 2021	1.37 %
Februari 2021	1.38 %
Januari 2021	1.55 %

Figure 2: Data inflation.

From February to July 2021, the inflation rate was 1.38 percent, 1.37 percent, 1.42 percent, 1.68 percent, 1.33 percent, 1.52 percent, resulting in a number of 2 percent when rounding off the highest inflation rate. Because of the The cost component is computed as follows dependent on the year of use:

1. The year the system was first designed, or year0, will be used to compute operational preparation expenses.
2. Because there are various phases to a project, such as analysis, data collecting, and technical meetings before the establishment of information systems, project expenses are determined from year 0 or before year 0.
3. Because operational and maintenance costs are used after the system is completed, they are computed after year 0

A cost analysis of the investment can be done using the cost and benefit analysis method. If the profit value is less than the investment, the investment is not profitable; if the profit value is greater than or equal to the investment, the investment is profitable. The benefit cost ratio approach can be used to obtain these conclusions.

Item	Year 0	Year 1	Year 2	Year 3
Tangible profit				
Operational cost deduction	0	240.000	244.800	249.696
Real benefit	0	240.000	244.800	249.696
Intangible profit				
User satisfaction has improved.	0	12.000.000	13.200.000	14.400.000
Improved decision making	0	150.000	160.000	170.000
Total intangible profit	0	12.150.000	13.360.000	14.570.000

Figure 3: Calculation of cost benefits.

The rule Benefit Cost Ratio (BCR) = (PW B)/(PW C)

Details:

BCR = Comparison benefits toward cost

PW B = Present Worth of Benefit

PW C = Present Worth of Cost

If the costs are calculated and described above for three years, the year 0 is Rp. 12,290,000, the year 1 is Rp. 11,800,000, the year 2 is Rp. 11,800,000, and the year 3 is Rp. 1,800,000. The effective cost for the first year, Rp. 12,150,000, Rp. 13,360,000 for the second year, and Rp. 14,570,000 for the third year was Rp. 12,150,000, Rp. 13,360,000 for the second year, and Rp. 14,570,000 for the third year.

In the first year, operational cost savings are considered to have no training costs, and so on.

The rise in customer satisfaction is expected to be 100 satisfied people at a cost of Rp. 120,000 per year, with 10 persons becoming increasingly satisfied each year.

So :

$$BCR = (PW B)/(PW C)$$

$$BCR = 40.080.000/34.090.000 = 1.18$$

$$BCR \text{ Value} = \text{Total of Benefits} / \text{Total of cost} = \text{Rp } 40.080.000/34.090.000 = 1.18$$

According to the findings of these calculations, the ratio is greater than 1, or 1.18, indicating that the value of the benefits is greater than the resultant costs, implying that developing the information system is more profitable by around 10% of the overall expenditure.

Conducting a cost-benefit analysis or determining the benefits achieved if the system is adopted is a tough task, because there are intangible costs that are difficult to quantify in addition to real costs. Then, as shown in figure 3 (look at above), the strategy is to develop an estimate of the increase in user activity.

In figure 3, the calculation of the cost-benefit explains that system users feel intangible benefits. Increasing satisfaction and decision-making has strategic value in improving The performance of the related units. In this research, the cost of servers and internet access is no longer a problem, because they are already available. It is undeniable that the calculation of profits at the time of implementation is quite complicated because there are intangible benefits that are difficult to measure therefore, we use a method to formulate the value of the benefits obtained by the users.

4 CONCLUSIONS

The development of research and service information systems is highly recommended based on the results of cost and benefit analysis, which show that the value of benefits is more dominant than the costs incurred, and that it is more profitable about 10% of the total investment if the information system is developed and implemented.

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