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Investment Feasibility Analysis of Outpatient Electronic Medical Records in RSUP Surakarta Hospital

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Abstract

Advances in technology have an effect on the health sector, the use of information system technology in hospitals is a necessity in health services. One application of the use of information systems in services is the Electronic Medical Record (RME). This study aims to determine the feasibility study of the RME investment that has been carried out at Surakarta Hospital. This type of research is a quantitative descriptive study with a sample of RME on outpatient care. The method used to analyze the feasibility of outpatient RME investment is Cost Benefit Analysis (CBA). The results of the Net Benefit Cost Ratio (BCR) study were 1,010, where Net BCR > 1 and it was concluded that outpatient RME investment was feasible. The feasibility of this investment is supported by the results of other economic analyzes such as the IRR values indicating that they are feasible. Based on the evaluation of the feasibility of the project, only the NPV is not feasible with an NPV < 1.

Key words: *Cost Benefit Analysis, Information System Investment, Electronic Medical Record Development.*

1. Introduction

Advances in information technology affect various areas of human life, including the health sector. Information technology has an important role in today's health services, where the quality of information processing is an important factor for the success of health service institutions. Various information system applications have been created and developed to support health data management activities in health care facilities, one of which is in a hospital. Information systems in hospitals have an important role in increasing the sharing of health information. In addition, the information system will also increase hospital profits, improve service quality, and save hospital costs [1].

The development of technology and information systems is very beneficial for hospitals. One of the uses of information system technology in hospitals which is becoming a trend in global health services is the use of electronic medical records. The use of information technology in hospitals to manage medical records is known as Electronic Medical Records (EMR). EMR is very important for management to manage health problems because it provides integrity and accuracy, it can also be a solution to increase cost efficiency, increase access and quality of services in health care facilities [2].

Barriers to health services in the form of uncertainty in the process of patient care related to the complexity of the hospital itself, especially the linkage of services with hospital capacity that is not able to process information properly related to the patient's condition with all services in the hospital because the system is not integrated [3]. The Indonesian Ministry of Health has established an action strategy map for the Hospital Management Information System with policy regulations as the EMR development standard by the end of 2023 to integrate all service flows in the Hospital, thereby facilitating decision making and achieving efficiency in the Hospital. However, these policy regulations have not been realized optimally [4].

Challenges and implementation EMR face issues such as the high cost of first-time implementation, new technical and technological conditions, the readiness of human resources in computer use, and the development of security, privacy and confidentiality of the system itself. EMR development is currently being carried out partially considering the process also requires high costs and the availability of program developers in hospitals [3]. Therefore, the stages of system development starting from planning, analysis, design and implementation cannot be avoided. Planning is the first stage in designing this system, namely observing the company's business processes, then conducting interviews to identify the required system and continuing with the feasibility analysis of the system to be developed. System feasibility analysis includes technical, economic and operational aspects [5].

The slow development of EMR in health service facilities in Indonesia is shown by the government requiring fayankes to organize EMR according to PMK of the Republic of Indonesia number 24 of 2022 concerning medical records [6]. This shows that fayankes are still reluctant to invest in RME given the high costs. An investment feasibility analysis is needed to identify the RME development planning stage through a financial approach. Investment feasibility analysis

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using the cost benefit analysis (CBA) method is used as an organizational benchmark to determine project viability and the purpose of this study is to analyze the feasibility of outpatient RME investment in RSUP Surakarta Hospital.

2. Method

This study uses quantitative research by describing the feasibility of outpatient RME investment in RSUP Surakarta Hospital. This study used descriptive research methods and statistics. Primary data source is Head of Medical Records and IT department, while the secondary data source is Electronic Medical Record investment development report. Primary data collection techniques are carried out by interviews and observation. Secondary data collection techniques are carried out by means of documentation studies on financial reports and other documents.

Calculation of the feasibility of EMR investment using the Cost Benefit Analysis (CBA) method which has elements of NPV, IRR, BCR [7]. We used the cost-benefit method to analyze the feasibility of investing in Outpatient RME at Surakarta Hospital. Cost analysis is obtained by estimating the RME development costs including development costs, operating costs and maintenance costs. Benefit analysis includes tangible benefits and intangible benefits. The main outcome measure is the net financial profit or cost of the Outpatient RME investment at RSUP Surakarta for a 4 year period. Cost-Benefit Analysis method used, among others:

2.1. Net Present Value (NPV)

NPV is the net benefit that has been discounted using the Social Opportunity Cost of Capital (SOCC) as the discount factor.

$$NPV = \sum_{i=1}^{n} NB_i\,(1+i)^{-n}$$

$$Or$$

$$NPV = \sum_{i=1}^{n} \frac{NB_i}{(1+i)^n}$$

$$Or$$

$$NPV = \sum_{i=1}^{n} \overline{B_i} - \overline{C_i} = \sum_{i=1}^{n} N\overline{B_i}$$

Where:

NB = Net benefit = Benefit – Cost

C = Investment Cost + Operating Cost = Benefit that has been discounted = Cost that has been discounted

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i = Discount Factor

n = year (time)

Criteria:

NPV > 0 (zero) → bussines/project is feasible

NPV < 0 (zero) → bussines/project is not feasible

NPV = 0 (zero) → business/project in a state where the BEP TR = TC in the form of present value

To calculate the required data on the estimated NPV of investment costs, operating costs, and maintenance as well as the estimated benefits of the planned project.

2.2. Internal Rate of Return (IRR)

IRR is a discount rate that results in NPV = 0

IF: IRR > SOCC so the project is feasible

IRR = SOCC means the project on BEP

IRR < SOCC said that the project is not feasible.

To determine the value of IRR should be calculated first NPV1 and NPV2 by trial and error. If discount factor of NPV1is positive so the second must be greater than SOCC, and otherwise.

From this experiment, it is, explained the IRR value is between positive NPVand negative NPV, so there is the NPV = 0.

$$IRR = i_1 + \frac{NPV_1}{(NPV_1 - NPV_2)}(i_2 - i_1)$$

Where:

i_1 = discount rate that produces NPV1

i_2 = discount rate that produces NPV2

2.3. Net Benefit Cost Ratio (BCR)

Net B / C is the ratio between the discounted net benefit is positive (+) with a net negative benefit, which has been discounted.

IF: Net B/C > 1 (one) means the bussines/project is feasible

Net B/C < 1 (one) means bussines/project is not feasible

Net B/C = 1 (one) means cash in flows = cash oput flows (BEP)

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$$NetB/C = \frac{\sum_{i=1}^{n} N\overline{B_i}(+)}{\sum_{i=1}^{n} N\overline{B_i}(-)}$$

3. Result and Discussion

Results and discussion can be made as a whole that contains research findings and explanations.

3.1. Economic/Financial Approach

The economic feasibility of EMR development is used to analyze costs and benefits, providing an illustration of whether EMR has greater benefits than the costs incurred by RSUP Surakarta. This analysis only includes cost and benefit factors that can be expressed in terms of money. The following are the results of an analysis of the costs and benefits of developing an outpatient EMR at RSUP Surakarta:

Table 1. Cost of Development Electronic Medical Record (EMR)

COST	
Year 0	
Develop Outpatient EMR	IDR 230.400.000
Hardware additions	IDR 227.625.000
EMR Usage Workshop	IDR 36.000.000
EMR Installation Hardware and Software, Evaluation, Repair	IDR 150.000.000
Year 1	
Maintenance system	IDR 6.840.000
Year 2	
Maintenance system	IDR 6.840.000
Year 3	
Maintenance system	IDR 6.840.000

The total investment cost for the development of electronic medical records for 3 years is IDR 664,545,000, while year 0 shows an investment amount of IDR 494,025,000. The high investment value is because Surakarta Hospital is an investment that must be issued for the first time by providing hardware consisting of computers and equipment, communication networks such as routers, lan cables, and others [2].

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Table 2. Benefit of Development Electronic Medical Record (EMR)

BENEFIT	
Year 1	
Outpatient Form Efficiency	IDR 24.300.000
Office Stationery Efficiency	IDR 5.255.000
Time and Labor Efficiency	IDR 52.228.704
Year 2	
Outpatient Form Efficiency	IDR 24.300.000
Office Stationery Efficiency	IDR 5.255.000
Time and Labor Efficiency	IDR 52.228.704
Year 3	
Outpatient Form Efficiency	IDR 24.300.000
Office Stationery Efficiency	IDR 5.255.000
Time and Labor Efficiency	IDR 52.228.704

The estimated benefit expressed in money is IDR 245,351,112 for 3 years. The benefit components included in this study have not been explored to the fullest because development at Surakarta Hospital is still at the outpatient stage, so the benefits of task efficiency from medical recorders cannot be felt to the fullest.

3.2. Evaluation Project

3.2.1. Net Present Value (NPV)

Table 3. Net Present Value Calculation of Development Electronic Medical Record (EMR)

	BENEFIT	COST	B/C	NB	DF (11%)	NPV (11%)	DF (15%)	NPV (15%)
Year 0	-	644.025.000	0	-644025000	1	-644025000	1	-644025000
Year 1	76.533.959	6.840.000	11,18917529	69693959	0,9009	62787287,66	0,8696	60605866,75
Year 2	76.533.959	6.840.000	11,18917529	69693959	0,8116	56563617,12	0,7561	52695602,4
Year 3	76.533.959	6.840.000	11,18917529	69693959	0,7312	50960222,82	0,6675	46520717,63
	229.601.877	**664.545.000**	**8,391881469**	**-434943123**		**-473713872,4**		**-484202813,2**

The result of NPV < 1, so investment in Electronic Medical Record is not feasible.

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3.2.2. Internal Rate Return (IRR)

Table 4. Internal Rate Return of Development Electronic Medical Record

	NPV (11%)	NPV (15%)	IRR
Year 0	-644025000	-644025000	13
Year 1	62787287,66	60605866,75	13,04
Year 2	56563617,12	52695602,4	13,07
Year 3	50960222,82	46520717,63	13,09
	-473713872,4	**-484202813,2**	**13,05**

This analysis uses a discount factor level of 11% and 15%, so it can be seen that the IRR = 13.05 which explains that the IRR is greater than the social discount rate (11%). That is, the development of outpatient electronic medical records is feasible.

3.2.3. Net Benefit Cost Ratio (BCR)

Table 5. Net Benefit Cost Ratio of Development Electronic Medical Record

	NPV (11%)	NPV (15%)	BCR
Year 0	-644025000	-644025000	1
Year 1	62787287,66	60605866,75	1,04
Year 2	56563617,12	52695602,4	1,07
Year 3	50960222,82	46520717,63	1,10
	-473713872,4	**-484202813,2**	**4,20**

The result of the Net Benefit Cost Ratio (Net B/C) is 4.20, so the Net B/C is more than 1, thus explaining the development of electronic outpatient medical records is feasible.

4. Conclusion

4.1. Net Present Value (NPV) = -484.202 million It shows NPV < 1, so investment in Electronic Medical Record is not feasible

4.2. Internal Rate of Return (IRR = 13.05 explained IRR is bigger than sosial discount rate (11%), so investment in Electronic Medical Record is feasible

4.3. Net Benefit Cost Ratio (Net B/C) = 4,20 indicate that the BCR more than 1, so investment in Electronic Medical Record is feasible

Based on the results of the economic feasibility analysis above, the development of Electronic Medical Records is feasible by considering the FEASIBLE of IRR and BCR.

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