23. Modelling effectivenes of IS learning methodology with AHP method

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Research paper

Modelling effectivenes of IS learning methodology with AHP method

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Abstract

Information system research methodology, Bahasa: Metodologi Penelitian Sistem Informasi (MPSI), is a mandatory course that must be attended by information system and management student at STMIK Pringsewu. MPSI learning must be conducted effectively to achieve the expected goal. The problem is how to determine MPSI learning effectiveness at STMIK Pringsewu. This problem must be done by Analytical Hierarchy Process method. AHP method can help solving complex problem by structuring a hierarchy criteria, party who has interest, result and by attract some consideration to develop weight and priority. The results of this research was a decision support system which adapts related party in determining learning effectiveness of MPSI at STMIK Pringewu. From this research result obtained a conclusion that is MPSI learning at STMIK Pringsewu is very effective with score of 2.138.

Keywords: *Decision Support System; MPSI; Analytic Hierarchy Process (AHP).*

1. Introduction

1.1. Background

Research methodology in information system is not different with other fields in general. The difference of it is research tradition done [1 - 4]. In scientific research there are some rules and clear procedures where a research is based on field fact happened [5 - 9]. The effective learning is expected learning by every lecturer because with this condition students is expected can attend the course with full of knowledge and meaningful skill. With effective learning achievement expected can improve student learning achievement [10 - 14]. Learning process that exists now tends to curriculum goal achievement and more accentuate concept memorizing not understanding of condition, it can be seen from activities done in class discussion where material achievement uses lecture method, student only watches the slide, notes and listens [15 - 20]. Thus the learning atmosphere becomes not effective so student cannot be active [21 - 26].
Law number 14 year 2005 states lecturer is professional teacher and scientist with the main duty is to transform, to develop and to share knowledge, technology, and art through education, research and community service [27 - 30]. Considering the importance of lecturer role so the establishment of education institution must be able to motivate itself and develop itself to improve the performance maximally [31 - 34].
In general, an effective learning system requires an interesting delivered learning method and according to student expectation and liked by students the learning atmosphere needs to use the right learning model or method in accordance with the delivered material, so that learning effectiveness can be expected to be more interesting and students can become active [35 - 40].
Before researcher did the research about Information System Research Methodology that is less attractive to less active student, temporary suspicion of Learning Information Systems Research Methodology is less easily understood by student and can be used as the biggest obstacle in a study, if only using traditional learning methods in the lectures where the lecturer is only a learning center [41 - 44].

After researcher conducted observation about effective learning of Information System Research Methodology at STIMK Pringsewu, researcher hoped learning of Information System Research Methodology can be demanded by students and can make students become more active.

1.2. Problem formulation

According to the above background, the formulation of this research is how to determine the effectiveness of the Information

System Research Methodology learning at STMIK Pringsewu with the AHP (Analytic Hierarchy Process) method?

1.3. Problem limitation

In an observation done the problem limitation is how to determine learning effectiveness of Information System Research Methodology at STMIK Pringsewu using Analytic Hierarchy Proses method.

1.4. Research purpose

The purpose was this research can be the illustration for lecturer to create effective learning space and can create more active and more effective learning space.

2. Literature review

2.1. Decision support system definition

Decision Support System (DSS) is interactive information that provides information, modeling and manipulation of data that is used to help decision making in structured and unstructured situations. Where nobody knows how decisions should be made in the 2007 decision support system concept book [45 - 48].
This system is used to assist decision making in semi-structured and unstructured situation, where no one knows surely how a decision should be made [49 -52]. Decision support system as a system used to support and help management make decisions in semi-structured and unstructured conditions [53 - 55]. Basically the concept of DSS is only limited to activities to help managers make an assessment and replace the position and role of managers [56 - 58].

2.2. FMADM

Fuzzy Multi attribute decision making (FMADM) is a method used to search optimal alternative to a number of alternatives with some criteria [59 - 62]. The core of FMADM is determining the weight score for each attribute, then proceed with the ranking process that will select alternatives that have been given [63 - 65]. Basically, there are 3 approaches to find weight score attribute, namely subjective approaches, objective approaches and integration approaches between subjective and objective. Each approach has advantages and disadvantages [60 - 62]. On subjective approach, the weighting score is determined based on the subjectivity of the decision makers, so that several factors in the alternative ranking process can be determined freely. Whereas in the objective approach, the weight value is calculated mathematically so that ignore subjectivity from takers decision.

2.3. Analytic hierarchy process

AHP method was developed by Thomas L. Saaty, a mathematician. This method is a framework for making decisions effectively for the complex issue by simplifying and speeding up the decision-making process by solving the problem into its parts, arranging these parts or variables in a hierarchical arrangement, giving numerical scores to subjective judgments about the importance of each variable and synthesizing these considerations to determine which variable has the highest priority and act to influence the outcome of the situation [60 - 62]. This AHP method helps solve complex problems by structuring a hierarchy of criteria, interested parties, results and by drawing various considerations to develop weight or priority. This method also combines the strengths of the feelings and logic involved in various problems, then synthesizes various considerations into results that match our estimation intuitively as presented at the consideration that has been made [37 - 40]. The core point of view about the Analytic Hierarchy Process is one method to help formulate a priority from various choices using various criteria [42 - 44]. Because of its multi-criteria, Analytic Hiearchy Process is quite widely used in prioritizing. As an example to formulate research priorities, the management of research institutions often uses several criteria such as the impact of research, costs, human resource capabilities, and implementation time.

2.3.1. Advantage of AHP method

The advantage of AHP model compared to other decision-making models lies in its ability to solve multi-objectivity problems with multi-criteria. Most existing models use single objectives with multi-criteria. Linear Programming models, for example, use a goal with many constraints (criteria). The advantages of the AHP model is more due to its high flexibility, especially in the creation of hierarchies. This flexible characteristic of AHP makes AHP model can capture several objectives and several criteria at once in a model or a hierarchy.

2.3.2. Disadvantage of AHP method

Beside its advantages, the AHP model also has several disadvantages. This model's dependence on input in the form of an expert's perception will make the end result of this model meaningless if the expert gives a wrong assessment. Most people ask whether the perception of an expert can represent the interest of many people or not. This Doubt is because of the fact that everyone has a different perception from others. Therefore, for the AHP model to be accepted by the community, it needs to be given strict criteria and limitations from an expert and to convince the public to assume that the expert's perception can represent the opinion of the community or at least part of the community.

2.4 Steps of using AHP method

There are several steps in using AHP method. :
1) Define problem and determine desired solution
2) Determine element priority
3) Synthesis
4) Divide some score column with total column to obtain matrix normalization
5) Sum some scores in every row and divide them with the number of elements to obtain average score.

3. Research method

3.1. Data collection method

1) Observation Method. Observation method is data collection method by direct observation to the observed object by analyzing running system and give argumentation or useful solution.
2) Literature Research Method [66-86]. Data collection technique by references collection those are documents either from Internet or scientific journal.

3.2. Design method

3.2.1. Analytic hierarchy process

Steps to do AHP are as follows:
1) Hierarchy arrangement
Hierarchy arrangement is determining the destination which is overall system target at top level. The next level consists of criteria for assessing or considering existing alternatives and decisive the alternative. Every criterion can have sub-criteria below it and each criterion can have score each intensity.
2) Define problem and goal determinant.
If AHP is used to choose alternative or compiling alternative priority, in this step it was done alternative development. Scale 1-9 is best scale to express argumentation as shown in table 1.

Table 1: Importance Level

Importance Level	Definition	Description
1	As same as important	Both element have influence
3	More important one and another	Experience and scoring is very impartial to an element that its partner
5	Fairly important	Experience and decision show strong preference to an element than others
7	Very important	Experience and decision shows strong preference to an element than others
9	Absolutely important	One absolute element is more preferred than its partner at high confidence level
2,4,6,8	Middle value between two close score	If the component is needed

3.2.2. Criteria

In this research there are weight and criteria in determining learning effectiveness of Information System Research Methodology at STMIK Pringsewu.
C1: Learning purpose oriented
C2: Choose technique or learning method
C3: Use learning media as much as we can
C4: Give motivation to lecture and student in class

3.2.3. Weighting

According to weighting of weighting table as shown in table 2.

Table 2: Weighting

No	GAP	Weight Score	Description
1	2	8	According to competence and learning effectiveness
2	1	7	Individual competence from student activity
3	0.5	6	According to applied lecturer regulation
4	0	5	Indiscipline in college contract leadership

3.2.4. Data analysis

In making decision support system to determine MPSI learning effectiveness at STMIK Pringsewu, it is needed internal and private data
1) Internal data
Internal data are data that have been exist in learning data at STMIK Pringsewu
2) Private data
Private data are argumentation data from user. In this research the private data were set criteria data that will be used to solve problem

4. System analysis and implementation

4.1. System analysis

This application using the top down approach which is a characteristic of the design of the structure. This application involves the ability to view internal data and external data in the form of assessment criteria so that decision can discuss various criteria and alternatives of AHP complex problem that can be grouped, then arranged into a hierarchy , the work system only arranges input to complete to be worked but does not make the choice. This application has control over all so that it makes a decision by overriding the computer recommendation during the direct process

4.2. Decomposition

In this research there are weight and criteria in determining MPSI learning effectiveness at STMIK Pringsewu as shown in table 3.

Table 3: Pair Matrix

Criteria	C1	C2	C3	C4
C1	1	3	3	3
C2	0.33	1	3	3
C3	0.33	0.33	1	2
C4	0.33	0.33	0.5	1
∑	1.99	4.66	7.5	9

Score for each alternative at every attribute has been converted based on weight criteria description.

4.3. System implementation

4.3.1. Calculating priority criteria matrix

In this step, it is looked for the score, is the score entered to matrix compatible as shown in table 4.

Table 4: Pair priority matrix

Criteria	C1	C2	C3	C4	Eigen Vector
C1	0.502	0.644	0.4	0.33	0.469
C2	0.166	0.214	0.4	0.33	0.277
C3	0.166	0.071	0.133	0.222	0.148
C4	0.166	0.071	0.66	0.111	0.252

The number above obtained from dividing the number at row column with the number of columns. Priority is obtained through dividing the number of rows with the number of matrix

λ mask	= (1.99 X 0.469) + (4.66 X 0.277)
	+ (7.5 X 0.148) + (9 X 0.252)
	= 0.933 + 1.291 + 1.11 + 2.268
	= 5.60
C1	= (λ mask - n) / (n-1)
	= (5.60 – 4) / (4 – 1)
	= 0.53
CR	= C1/CR
	= 0.53 / 0.9
	= 0.58

Therefore C1 (consistency) from criteria <0.1, so that consistency from this calculation can be said very effective

4.3.2. Calculation of C1 pair matrix (orientation)

Table 5 shows calculation of C1 pair matrix.

Table 5: Calculation of C1 Pair Matrix (Orientation)

Criteria	Orientation	Method	Media	Motivation
Orientation	0.502	0.644	0.4	0.33
Method	0.166	0.214	0.4	0.33
Media	0.166	0.071	0.133	0.222
Motivation	0.166	0.071	0.66	0.111

4.3.3. Calculation of C2 pair matrix (method)

Table 6 shows calculation of C2 pair matrix.

Table 6: Calculation of C2 Pair Matrix (Method)

Criteria	Orientation	Method	Media	Motivation
Orientation	0.502	0.644	0.4	0.33
Method	0.166	0.214	0.4	0.33
Media	0.166	0.071	0.133	0.222
Motivation	0.166	0.071	0.66	0.111

4.3.4. Calculation of C3 pair matrix (media)

Table 7 shows calculation of C3 pair matrix.

Table 7: Calculation of C3 Pair Matrix (Media)

Criteria	Orientation	Method	Media	Motivation
Orientation	0.502	0.644	0.4	0.33
Method	0.166	0.214	0.4	0.33
Media	0.166	0.071	0.133	0.222

Motivation	0.166	0.071	0.66	0.111

4.3.5. Calculation of C4 pair matrix (motivation)

Table 8 shows calculation of C4 pair matrix.

Table 8: Calculation of C4 Pair Matrix (Motivation)

Criteria	Orientation	Method	Media	Motivation
Orientation	0.502	0.644	0.4	0.33
Method	0.166	0.214	0.4	0.33
Media	0.166	0.071	0.133	0.222
Motivation	0.166	0.071	0.66	0.111

C1
1) ≥40% from weight value orientation 3
2) ≥30% from weight value orientation 2
3) ≥20% from weight value orientation 1

C2
1) ≥ 40% from weight value method 3
2) ≥30% from weight value method 2
3) ≥20% from weight value method 1

C3
1) ≥ 40% from weight value media 3
2) ≥ 30% from weight value media 2
3) ≥ 20% from weight value media 1

C4
1) ≥ 40% from weight value motivation 3
2) ≥ 30% from weight value motivation 2
3) ≥ 20% from weight value motivation 1

Weight criteria:
- 3 (high)
- 2 (medium)
- 1 (low)

Table 9: Weight Ranking

	C1	C2	C3	C4	Total
Very effective	0.502	0.644	0.660	0.330	2.136
Effective	0.166	0.214	0.400	0.330	1.110
Less effective	0.166	0.071	0.400	0.222	0.859
Not effective	0.166	0.071	0.660	0.111	1.008

From the results of weight criteria ranking as shown in table 9, the "Very Effective" criteria weight got the highest score, so it is concluded that the Information System Research Methodology learning in the STMIK Pringsewu was Very Effective.

5. Conclusion

There are several conclusions from Decision Support System to determine MPSI learning effectiveness at STMIK Pringsewu namely: 1) Decision Support System used Analytic Hierarchy Process method in finishing problem. 2) In determining MPSI learning effectiveness at STMIK Pringsewu used some criteria among others: orientation, method, media and motivation. 3) Decision support system with Analytic Hierarchy Process can help related party in determining MPSI learning effectiveness at STMIK Pringsewu.
Suggestions from author for next research, namely : 1) To conduct research using other methods like FMADM, Fuzzy Logic, TOPSIS and etc. 2) To add data criteria in determining MPSI learning effectiveness at STMIK Pringsewu.

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