PROFILE MATCHING PERFORMANCE FOR ADVISOR RECOMMENDATION BASED ON GOOGLE SCHOLAR INDEX

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ABSTRACT

Determination of thesis advisor and examiner is the authority of the Head of Department in which the process involves a conventional way following the personal experience of an advisor in his\her corresponding field that is relevant to a research. In Dipanegara school of informatics management and computer (STMIK), Makassar, it is often resulted in non-optimal decisions that students did not get thesis advisors that match their field of expertise. This study applied the Profile Matching method, a decision-making method with an ideal variable level that must be met by the subject under study. The matching was based on the history of lecturers' publication obtained from Google Scholar Index by searching through the scholar ID of advisors. The stages were the formulation of Gap score, Core Factor, Secondary Factor, and total aspect value. The role of Profile Matching supports the thesis advisor recommendation system operated by the Head of Department to the thesis advisor, examiner, and students based on the resulted research topic. The decision support system had been evaluated with questionnaires distributed to 30 lecturer and staff departement as the respondents. The evaluation process used the Technology Acceptance Model and Likert scale. It was found that CronBach scores for Perceived Usefulness was 0.71 and Perceived Ease of Use was 0.60 and then they were considered as reliable.

Keywords: Profile Matching, Technology Acceptance Model, Decision Support

INTRODUCTION

STMIK Dipanegara is one of Information Technology universities that can be the main choice for South Sulawesi people to continue their studies at higher educational level in the field of informatics. It has curriculum requiring its students to build a system/application as their final project to complete the study. There are more than 200 students performing research for their final project in each semester. With no less than 100 research title each semester, so that it certainly becomes a challenge for the Head of study program in determining the right advisors in accordance with the expertise of each lecturer (90 lecturers) that can be seen based on the research track record indexed on Google scholar.

Determining advisors and examiners for the final project is usually taken by the Head of Department or the administration division in the department, in which the process of the determination still employs conventional method by counting on the personal knowledge on the specification of lecture's expertise according to the topic of the final project. This also happens in all study programs in STMIK Dipanegara Makassar, so that the results show non-optimal decision, meaning that the appointed lecture does not have enough specification in the topic. In fact, if we refer to the research result indexed in Google scholar, field of science, academic rank,

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and education level, we can reduce the inaccuracy in determining advisors. Direct appointment of lecturers also rules out the amount of guidance which results in an imbalance of the supervisory lecturers and the mismatch of research themes (Purba, 2019). To solve the problem, it requires a solution that is able to take into account the specification of expertise of the lecture, academic rank and education level that is according to the needs for determining advisors and examiners.

Profile matching method in general is a process for comparing individual competence to expertise or job competence in order to find the difference in their competence (also known as gap), according to Kusrini that the process of profile matching in making decision has variable level, that is in this case is ideal predictor owned by each candidate (Kusrini, 2007). To identify user who profiles match the profile specified by the querying user(Yi et al., 2019). By the existence of support system using the profile matching method, the Head of Department is facilitated and provided additional assessment to make decision.

Building an application with additional method is not enough to make sure whether or not the system created has the score of technology use and acceptance, the Technology Acceptance Model method has calculation of the score of Perceived Usefulness and Ease of Use (Granić & Marangunić, 2019) in which each system or technology user is measured to find score benefit and so that it can be applied.

LITERATURE REVIEW

The role of advisor in general is as an organizer, facilitator, innovator, inventor, role model, evaluator, guide, encourager, counselor, and motivator. The role of the thesis advisor must be manifested by students in their thesis writing, starting from the preparation of thesis proposal, field research, presentation and discussion, to reporting the result of thesis research. The advisor also has important role during thesis examination and the final revision after the examination. The advisor monitors student activities while performing research in the field, and finally helping or defending their students during the thesis examination examined by the examining team (Amsyah, 2003).

Profile Matching Method

Profile Matching Method in general is a process for comparing individual competence to objective competence in order to find the difference in their competence (gap), the smaller the resulting gap, the higher the score is, which means that it has greater chance (Nofriansyah et al., 2015). The stages of Profile Matching method are Gap mapping, core and secondary factor calculation and grouping, total score calculation of each aspect (Oktaviani et al., 2020).

Gap Mapping

Gap mapping is a process carried out to determine the difference score of each aspect criterion by using the ideal score that has been determined for each criterion. In this case, in order to be able to determine the criterion gap score, the criterion score and the ideal criterion score must first be converted into a fuzzy score, so that the based on the fuzzy criteria score and the ideal fuzzy criteria score, the difference in fuzzy scores can be determined or what is called as the gap (Tanti et al., 2018; Utama, 2017).

After determining the gap score, which is the difference between the fuzzy score of the applicant's criteria and the ideal fuzzy score of the criteria, it is then weighted based on the score of the gap obtained. As for the weighting of the gap itself, according to several journals referring to the standard gap weight table, the largest score weighting is carried out by sorting from the score of the gap or the smallest difference. The smaller the difference, the higher the weight score and vice versa (Dhammayanti et al., 2019).

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Core and Secondary Factor Calculation and Grouping

After determining the weight of the gap score for the three required aspects, then each aspect is grouped again into 2 groups, which are the core factor and secondary factor, Core factor is the aspect (competence) that is most prominent/most needed. To calculate the core factor, the following formula is used:

$$NFC = \frac{\sum NC}{\sum IC}$$

Description:
NCF = Average score of the core factor aspects
NC = Total score of the core factor aspects
IC = Number of core factor items
Secondary factor is item other than aspects in the core factor. To calculate the secondary factor, the following formula is used:

$$NFC = \frac{\sum NS}{\sum IS}$$

Description:
NSF = Average score of the secondary factor aspects
NS = Total score of the secondary factor aspects
IS = Number of secondary factor items
Those formulas are used to calculate core factor and secondary factor of each aspect.

Calculation of Total Score of Each Aspect

Based on the calculation of the core factor and secondary factor of each aspect, then the total score of each aspect is calculated which is expected to have an effect on each profile. To calculate the total score for each aspect, the following formula is used:

$$Ni = 60\,\%\,NCF + 40\%\,NSF$$

Description:
Ni = Total Score of Each Aspect
NCF = *Core Factor Score*
NSF = *Secondary Factor Score*

System Testing

To support the decision of the Head of the Department in determining the student thesis advisor with the use of the system, reactions and understanding can be measured through a prediction method of Perceived Usefulness and Ease Of Use found in the Technology Acceptance Model (Masrom, 2007), TAM can be used to review some external aspects and test the acceptance of the system (Salloum et al., 2019) . In testing this system, the author chose TAM by using a questionnaire as a medium for retrieving related information during system use.

RESEARCH METHOD

Procedure for Determining Advisor and Examiner

Procedure for determining advisor and examiner employed in the scope of STMIK Dipanegara were as follows:

1. The administration division of the department compiled a list of students who have programmed their thesis on their study plan card (KRS).
2. Students registered sent their draft of research proposals to the department.

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3. The head of the department chose and selected lecturers who met the requirements and suitability of the lecturer's research topic on the student's thesis proposal. After determining the advisor, then the list of advisors' names were handed over to the department administration to make a Supervisory Assignment Letter and then it was submitted to the students.

Students met the Advisor to Start Mentoring

Application design using the Unified Modeling Language

Unified Modeling Language included symbols, and a grammar describing how these symbols can be used. By studying symbols and grammar, it is easy for people to understand the system being designed. In Figure 1, diagram uses case for systems built using the UML method.

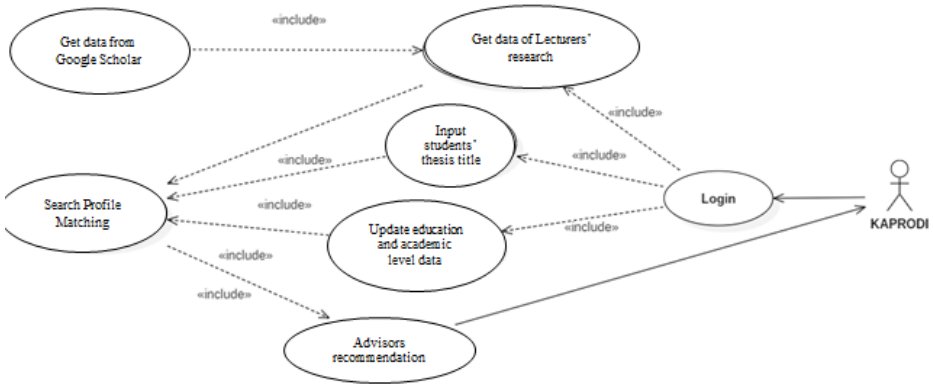

FIGURE 1
USE CASE DIAGRAM PROPOSED

The system created was a web-based application integrated with Google Scholar as a source of research data for lecturers. The head of the study program had the authority to synchronize lecturer research data with data indexed on Google Scholar and input lecturer data submitted by students. The research title of the students was then analyzed using profile matching method to find titles that have a level of conformity with the research of lecturers that have been indexed by Google Scholar.

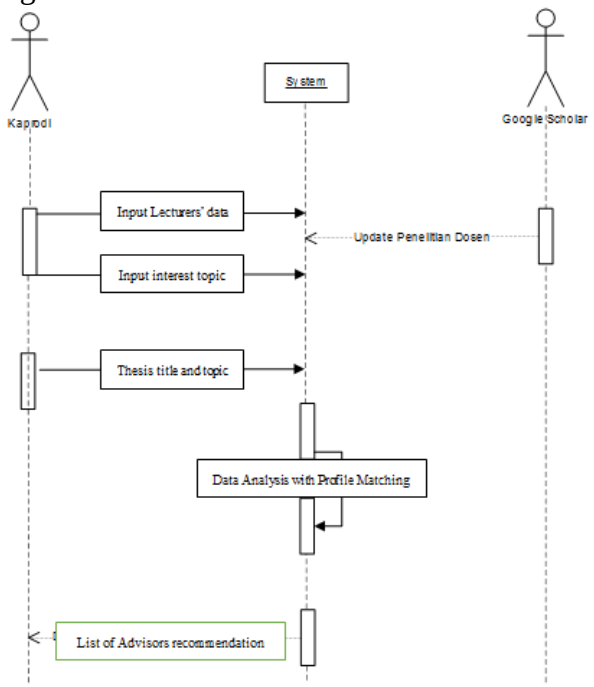

FIGURE 2

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SEQUENCE DIAGRAM PROPOSED
FINDING AND DISCUSSION

Implementation of the Profile Matching Method

The assessment criteria used by the department in determining the thesis advisor were the Core Factor, consisted of education and academic rank and secondary factor, consisted of the lecturer research area and the similarity of research titles between students and lecturers. In table 1, there are 3 lecturer data that will be taken into consideration by the department and N. Target as the determination basis that will be searched by data.

1. Assessment standards for departments, scores of Core Factor and Secondary Factor Aspects

Table 1
ASSESSMENT WEIGHTS FOR CORE FACTOR AND SECONDARY FACTOR

Candidate	The number of words that are same with the Lecturer Research (A1)	Title Category with Lecturer Topic Interest (A2)	Academic Rank (A3)	Education (A4)
Lecturer A	80%	Same	Lecturer	S3
Lecturer B	60%	Not the same	Head of Lecturer	S2
Lecturer C	40%	Same	Expert assistant	S2
N.Target	100%	Same	Head of Lecturer	S3
Type	Secondary Factor	Secondary Factor	Core Factor	Core Factor
Weight	40%		60%	

2. Normalization of Aspect Assessment Data

To ensure the independence of the data in table 1, normalization is carried out on the weight of department assessment standard as in table 2

Table 2
NORMALIZATION OF SCORE TABLE FROM THE TABLE OF DEPARTMENT ASSESSMENT STANDARD

Candidate	(A1)	(A2)	(A3)	(A4)
Lecturer A	8	1	2	3
Lecturer B	6	0	3	2
Lecturer C	4	1	1	2
N. Target	10	1	3	3

3. Calculation of Gap Mapping

Gap score given for each criterion of the department assessment standard on each lecturer can be seen in table 3.

Table 3
THE SCORE OF GAP MAPPING

Candidate	(A1)	(A2)	(A3)	A4
Lecturer A	(8-10) =-2	1-1 = 0	2-3=-1	3-3=0
Lecturer B	(6-10) =-4	0-1 = -1	3-3=0	2-3=-1
Lecturer C	(4-10) =-6	1-1 = 0	1-3=-2	3-3=0

4. Weight of Gap Score

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The results of the factorization of the Gap score used in the assessment standard can be seen in table 4.

Table 4
DIFFERENCE WEIGHT (GAP) SCORES

Difference	Score Weight	Description
0	5	No difference found
1	4,5	Individual competence is 1 level higher
-1	4	Individual competence is 1 level lower
2	3,5	Individual competence is 2 level higher
-2	3	Individual competence is 2 level lower
3	2.5	Individual competence is 3 level higher
-3	2	Individual competence is 3 level lower
4	1,5	Individual competence is 4 level higher
-4	1	Individual competence is 4 level lower
>5	0	Individual competence is 5 level higher
<-5	0	Individual competence is 5 level lower

5. Calculation and Grouping of Core and Secondary Factors

The core factor is the most prominent competency score or the most needed score and is considered to be the most determining factor in making decision, while the secondary factor is an additional assessment of the core factor which can be seen in the table.

Table 5
NCF AND NSF SCORES

Candidate	A1	A2	A3	A4	NSF	NCF
Lecturer A	3	5	4	5	(3+5)/2=4	(4+5)/2=4.5
Lecturer B	1	4	5	4	(1+4)/2=2.5	(5+4)/2=4.5
Lecturer C	0	5	3	5	(0+5)/2=2.5	(3+5)/2=4

6. Calculation of Total Score of NSF and NCF

The calculation of the total score of all prospective advisors to find the ranking score of each recommended lecturer data affecting the eligibility of the criteria for the lecturer can be seen in table 6.

Table 6
TOTAL SCORE OF NSF AND NCF CALCULATION

Candidate	NSF	NCF	Calculation	Score
Lecturer A	4	4.5	0.4*4 + 0.6*4.5	4.3
Lecturer B	2.5	4.5	0.4*2.5 + 0.6*4.5	3.7
Lecturer C	2.5	4	0.4*2.5 + 0.6*4	3,4

7. Ranking based on the Highest Score

Based on the total score in table 6, each lecturer obtains a final score which will then be ranked to determine the advisor meeting the assessment standards, in table 7 it can be seen that the higher the final score, the higher the recommended score proposed.

Table 7
RANKING OF NSF AND NCF TOTAL SCORE

Candidate	Calculation	Score	Recommendation
Lecturer B	0.6*4.5 + 0.4*4	4.3	1
Lecturer A	0.6*4.5 + 0.4*2.5	3.7	2
Lecturer C	0.6*4 + 0.4*2.5	3,4	3

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Based on table 7 above, it can be concluded that by using the Profile Matching method, the title of the thesis "Application for Determination of Thesis Advisory Lecturers using Google Scholar Index-Based Profile Matching Method" was recommended to Lecturer B with a final score of 4.3 as the main advisor.

User Interface

The results of this study produced a web-based application. The following is the user interface of the application that has been made where there are several pages such as data storage for lecturers, supervisor recommendations, research topic input, data processing from Google Scholar. Figure 3 shows that the lecturer data in accordance with the criteria as thesis advisor can be filled in according to the assessment standards in evaluating the potential of the lecturer.

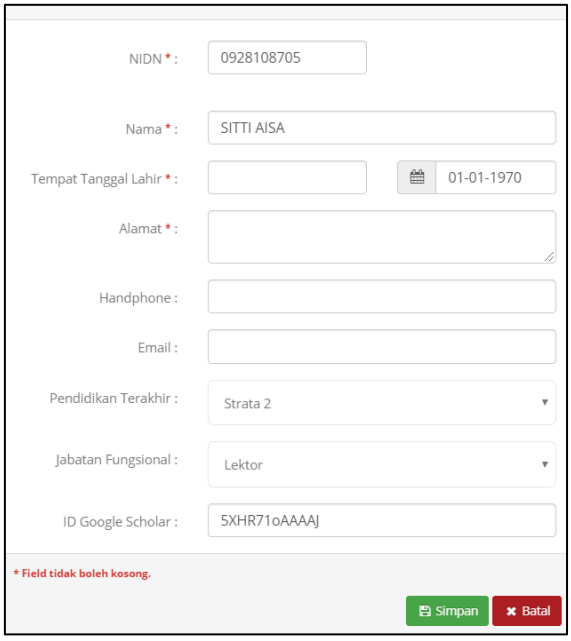
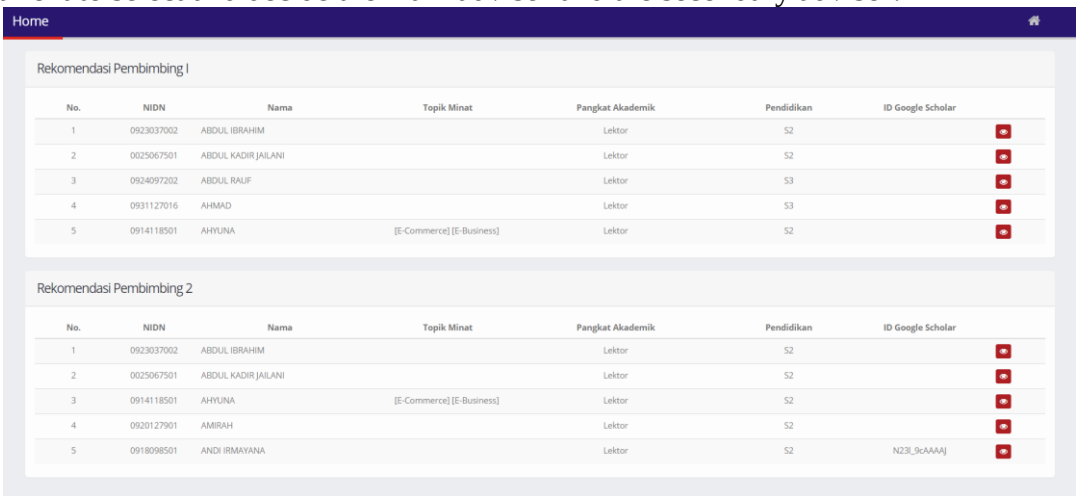


FIGURE 3
DATA FORM OF LECTURER CANDIDATE

Figure 4 shows the process of Profile Matching by first inputting the score of Gap difference and then the system will show recommendation of 2 advisors based on ranking score or the highest final score from calculation. The result of this process was used by the Head of Department to select and decide the main advisor and the secondary advisor.



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THE PROCESS OF DATA PROCESSING FROM PROFILE MATCHING

Testing using method of Technology Acceptance Model

Questionnaires were used to collect data and they were distributed to 30 respondents, who were the Head of Department, lecturers, and administration staff of the Department. Questionnaire distributed consisted of 2 TAM variables, Perceived Usefulness and Perceived Ease of Use containing 10 questions as listed in table 8.

Table 8
TAM VARIABLE ON THE PERCEIVED USEFULNESS AND PERCEIVED EASE OF USE

Q1(Perceived Usefulness)	
Q1	Seeking information
Q2	Performance improvement
Q3	Effectiveness
Q4	Ease of finding information
Q5	Increase in production
Q6	Compatibility of system results
Y1(Perceived Ease Of Use)	
Y1	Easy to understand
Y2	Explicit
Y3	Flexible
Y4	All parts of the system are easy to use

After obtaining data from questionnaires, then the data were processed and analyzed using R Language. However, before they were precede further, validity and reliability of the instrument must be tested to make sure that the instrument can be used as definite reference. The statement in the questionnaire was considered as valid if the validity score index, which was r-count (correlation), was more than 0.5. Figure 5 shows that all question items in the questionnaire of Perceived Usefulness has correlation score of more than 0.5 and then it is considered as valid.

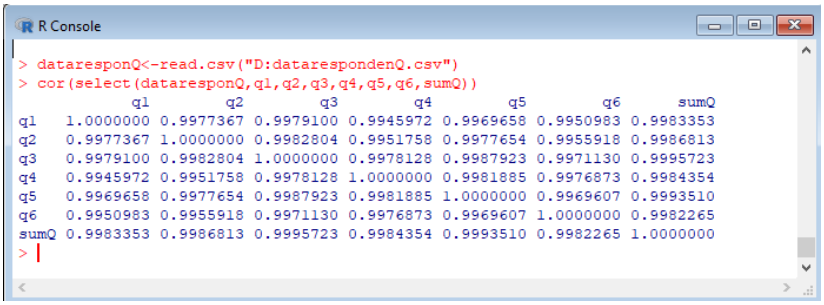

FIGURE 5
VALIDITY TEST ON PERCEIVED USEFULNESS ITEM USING R APPLICATION

Validity of each item contained in the questionnaire of Ease of Use was also tested. Figure 6 shows that each item contained in the questionnaire of Ease of Use has correlation score of more than 0.5 and then it is considered as valid.

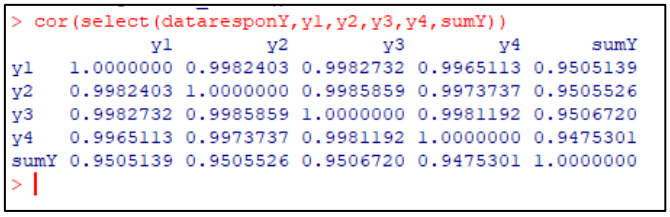

FIGURE 6
VALIDITY TEST ON EASE OF USE ITEM USING R APPLICATION

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Reliability test on the questionnaire used CronBarch Alpha calculation, in which this technique was able to show accurate internal consistency index. Questionnaire was considered as reliable if the CronBarch sore was higher than 0.60. Figure 7 shows that questionnaire was considered as reliable if the scores were 0.71 and 0.60.

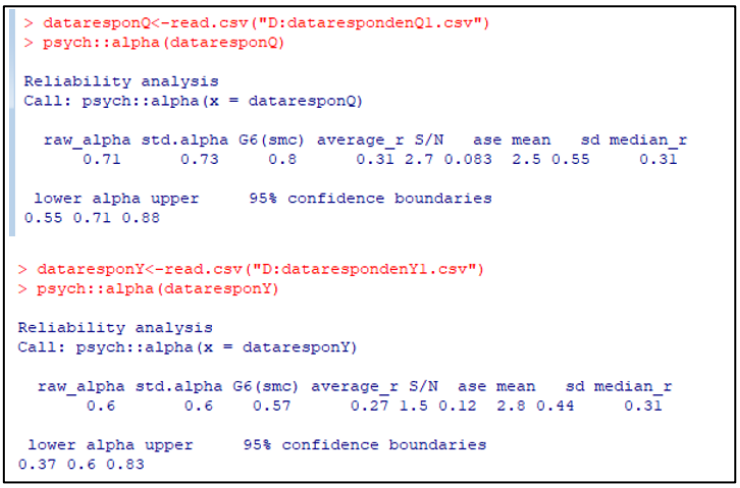

FIGURE 7
RELIABILITY TEST ON THE QUESTIONNAIRE USING R APPLICATION

CONCLUSION

The used of web-based Profile Matching method was implemented by determining standard aspect of the advisor's assessment by categorizing it into criteria of Core Factor and Secondary factor, then it followed by Gap mapping score determination. Scores that had been determined in each criterion resulted in average score for NCF and NFC. The scores were used as reference and the scores were ranked to find the highest score so that a list of advisor recommendation can be produced. The result of the 1st and 2nd recommendation issued by the system was used as material for determining the main and secondary advisors.

The result of system testing using TAM method with questionnaire media in collecting data found that CronBach Alpha score for Perceived Usefulness was 0.71 and for Perceived Ease of Use was 0.60, so that it was considered as reliable or factual and the system created was also considered as good to be used and developed.

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