The effectiveness of evaluation application implementation based on Alkin(CSE-UCLA)-Weighted Product model to evaluate the digital library services as education supporting facilities

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Abstract. Digital library can be said to be quality if it has been able to give services optimally to support the learning process. Efforts to get optimization of digital library service can be executed through the evaluation process. One application that can be used to evaluate the optimization level of the digital library is an evaluation application that combines the Alkin(CSE-UCLA) model with Weighted Product. Related to that statement, this study purpose was to obtain an overview of evaluation application effectiveness used to evaluate the digital library services optimization on computer colleges, especially in Bali. The method used in this study was R&D with Borg and Gall design, especially in the implementation stage. The subjects involved in the assessment of evaluation application implementation were 32 peoples, such as two education experts, 15 evaluators, and 15 users. This study location was carried out on six computer colleges in Bali. The data collection was conducted by distributing questionnaires that consist of 15 items to all research subjects. The analysis technique for data collection results uses quantitative descriptive based on effectiveness percentage level of digital library services. These study results indicate the effectiveness level of evaluation application based on Alkin(CSE-UCLA)-Weighted Product model was 86.38\% so that it includes the good category. The impact of the results of this study is the level of effectiveness of digital library services in several computer colleges in Bali increasing and has implications for the field of education in the presence of new evaluation models that can be used to determine the education support services effectiveness based on artificial intelligence.

1. Introduction

The universities that are quality, it can be seen based on their accreditation results. Components those can lead to the achievement of excellent accreditation in a university include the number and quality of human resources, management and governance, infrastructures and supporting facilities of the learning process. One of the learning process’ supporting facilities in universities that also play a role in determining the realization of excellence accreditation is the existence of a digital library. The role of digital libraries is vital in supporting the learning process at higher education as a receptacle to save and access various digital documents/collections that are needed by the academic community. The existence
of digital libraries is also increasingly important and needed very much since the emergence of 4.0 industrial revolution era which requires all educational facilities to use digital technology so that it is easily accessible to all circles in universities. The importance of the digital libraries function as facilities to support education at universities requires special attention from stakeholders in order their implementation is able to run optimally. The facts those occur in the field showed that there were still many stakeholders who had not been able to take appropriate policies were related to the management of digital libraries at universities so that digital library services cannot run effectively. Based on the obstacles/problems those were found in the field, the determination of digital library services’ effectiveness at college/university can be measured through an accurate evaluation process. One application finding that can be used to evaluate digital library services at universities accurately is the digital library evaluation application based on Alkin(CSE-UCLA)-Weighted Product. Based on the finding, the purpose of this research was to find out the implementation of evaluation application based on Alkin(CSE-UCLA)-Weighted Product that can be used to determine the effectiveness of digital library services at colleges, especially at computer colleges in Bali. From the research objectives, those have been described above, so the problem statement is how is the implement effectiveness of an evaluation application based on Alkin(CSE-UCLA)-Weighted Product in evaluating digital library services especially of computer college in Bali?

This study is based on the results of several studies those had been done previously by several researchers, including the research that was conducted in 2014 by Siguenza-Guzman, Saquicela, and Cattrysse [1] about “design of an integrated decision support system for library holistic evaluation” that showed the integrating existence of holistic matrix with a decision support system that can be used to evaluate the optimal use of digital library resources and services. The thing that had not been found in the Siguenza-Guzman, Saquicela, and Cattrysse’s research was no explanation about the aspects in the quadrant of a holistic matrix which is the priority determinants of digital library services’ effectiveness yet. The research that was conducted by Leibbrandt, et al. about “smart collections: can artificial intelligence tools and techniques assist with discovering, evaluating and tagging digital learning resources?” showed that artificial intelligence could be used as a tool to help to evaluate digital learning resources based on the rule and complex knowledge base [2]. The thing which had not been found in the research that was conducted by Leibbrandt, et al is that there is no detailed explanation about the standard evaluation of digital learning resources yet. A research that was conducted in 2015 by Cabrerozo, et al. about “a decision support system to develop a quality management in academic digital libraries” showed the existence of fuzzy linguistic approach which was used as a decision support system calculation technique in determining academic quality management at an academic library that refers to measurement criteria of digital library (inputs system, library processes, and outputs system) [3]. The things that had not been discussed in the Cabrerozo, et al.’s research are related to the priority improvements aspects ranging from the highest to the lowest priority in measurement criteria of quality management at the academic digital library.

The research that was conducted by Ciptayani and Dewi about “decision support system of e-book provider selection for library using Simple Additive Weighting” showed the utilization one of the decision support system methods that are called SAW (Simple Additive Weighting) to determine the best e-book provider based on nine predetermined criteria [4]. The thing that had not been found in the Ciptayani and Dewi’s research is the ability of several decision support system methods (one of them SAW) which can also be used to determine the ranking of evaluation aspects from the highest to the lowest to obtain improvements priority against digital library services that is still not optimal.

The research that was conducted by Tramullas, Sánchez-Casabón, and Garrido-Picazo, about “an evaluation based on the digital library user: an experience with Greenstone software” showed a tool that could be used to evaluate digital libraries with an evaluation focus to the process of making a digital collection and its configuration [5]. The obstacle that is still not found in the research of Tramullas, Sánchez-Casabón, and Garrido-Picazo is it hadn’t appeared the aspects of evaluation in detail at its components of context, input, process, and output. The research that was conducted in 2014 by Ahmad and Abawajy, about “digital library service quality assessment model” showed several components that
can be used to assess the quality of digital library services, including environmental quality, delivery quality, outcome quality, standard and procedure of digital libraries implementation [6]. The obstacle in Ahmad and Abawajy’s research is had not showing evidence of the quality level of digital library services quantitatively on each determining component of digital library services’ quality. The research that was conducted by Sun and Yuan about “development and characteristic of the digital library as a library branch” showed the definition of digital libraries, digital library characteristics, digital library law, digital library principles, digital library functions, advantages and disadvantages digital library [7]. The thing that had not been explained in the research that was conducted by Sun and Yuan is the evaluation models which are suitable in use for evaluating digital libraries.

The research that was conducted by Vullo about “A Global Approach to Digital Library Evaluation” showed that the models which can be used in evaluating digital libraries come from three research fields, including computer science, library science and information, and human-computer interaction [8]. The thing that had not been discussed in the Vullo research is the science of educational evaluation which can be used as a basic concept in evaluating digital libraries (where digital libraries are also one of the educational support facilities). The research that was conducted by Dorward, Reinke, and Recker about “an evaluation model for a digital library service tool” showed the existence of an evaluation model that involving process components and results to evaluate the learning architectures in digital libraries [9]. The obstacle that is still found in the Dorward, Reinke, and Recker’s research is it had not shown the involvement of the input component in conducting evaluations.

2. Method
This research was included development research that used the R & D method with design of the Borg and Gall model, which consists of 10 stages of development, including (a) research and information collecting stage, (b) planning stage, (c) develop preliminary form of product stage, (d) preliminary field test stage, (e) main product revision stage, (f) main field test stage, (g) operational product revision stage, (h) operational field testing stage, (i) final product revision stage, and (j) dissemination and implementation stage [10]. From the ten stages, the stages those were carried out in this study focused on the implementation stage. The subjects those were involved in this research were 32 peoples, including two education experts, 15 evaluators, and 15 users of digital library services. The location of this research was carried out on six computer colleges that are spread across several districts in Bali.

The data collected from all research subjects was conducted by distributing questionnaires. The questionnaire was consists of 15 questions, with each question having five answer choices. The data was collected then analyzed using quantitative descriptive analysis techniques by comparing the percentage of digital library services’ effectiveness with an eleven scale reference standard score. The formula that was used to obtain the percentage level of effectiveness can be shown in equation (1), while the reference standard score for the level of eleven scale effectiveness, can be shown in table 1 [11].

\[
\text{Effectiveness Percentage} = \frac{\sum (\text{Respondents Answer} \times \text{The Weight of Each Respondents Answer Choice})}{\text{n} \times \text{Highest Weight}} \times 100\% \quad (1)
\]

Where: \( \sum \) = Total  
  \( \text{n} \) = The total number of questionnaires item

| Category     | Excellent | Good | Advanced | Intermediate | Enough | Elementary | Less | Very | Less | Bad | Very | Bad | Poor |
|--------------|-----------|------|----------|--------------|--------|------------|------|------|------|-----|------|-----|------|
| Effectiveness Percentage | 95-100 | 85-94 | 75-84  | 65-74  | 55-64  | 45-54  | 35-44 | 25-34 | 15-24 | 5-14 | 0-4  |

3. Results and discussion
The implementation of this research had resulted in an overview of the implement effectiveness of the Alkin(CSE-UCLA)-Weighted Product-based evaluation application to digital library services at computer colleges which there are on Bali province in the form of effectiveness percentage. The
effectiveness percentage level of the evaluation application implement, it can be seen completely in table 2 below.

**Table 2.** The effectiveness level percentage of implementation of evaluation application based on Alkin(CSE-UCLA)-Weighted Product.

| Respondent       | Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | Σ   | Effectiveness Percentage (%) |
|------------------|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|---|-----|--------------------------------|
| Education Expert-1 | 5    | 4 | 5 | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 5  | 4  | 68  | 90.67                          |
| Education Expert-2 | 5    | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4  | 4  | 4  | 4  | 5  | 62  | 82.67                          |
| Evaluator-1       | 5    | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 5  | 4  | 67  | 89.33                          |
| Evaluator-2       | 5    | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 4  | 5  | 65  | 86.67                          |
| Evaluator-3       | 4    | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 4 | 5 | 4  | 5  | 4  | 4  | 5  | 4  | 64  | 85.33                          |
| Evaluator-4       | 5    | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 5  | 4  | 65  | 86.67                          |
| Evaluator-5       | 5    | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4  | 4  | 4  | 4  | 4  | 4  | 63  | 84.00                          |
| Evaluator-6       | 5    | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 5  | 4  | 4  | 5  | 4  | 5  | 64  | 85.33                          |
| Evaluator-7       | 4    | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5  | 4  | 4  | 5  | 4  | 4  | 64  | 85.33                          |
| Evaluator-8       | 5    | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5  | 4  | 5  | 5  | 4  | 5  | 64  | 85.33                          |
| Evaluator-9       | 4    | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4  | 5  | 4  | 5  | 4  | 5  | 65  | 86.67                          |
| Evaluator-10      | 5    | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 5  | 4  | 66  | 88.00                          |
| Evaluator-11      | 4    | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4  | 4  | 4  | 4  | 4  | 5  | 66  | 88.00                          |
| Evaluator-12      | 5    | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 5 | 5  | 4  | 5  | 4  | 5  | 4  | 66  | 88.00                          |
| Evaluator-13      | 4    | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4  | 5  | 4  | 5  | 4  | 5  | 64  | 85.33                          |
| Evaluator-14      | 5    | 5 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 5 | 5  | 4  | 4  | 5  | 5  | 5  | 66  | 88.00                          |
| Evaluator-15      | 5    | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 5 | 5  | 4  | 4  | 4  | 4  | 4  | 64  | 85.33                          |
| User-1            | 5    | 4 | 4 | 5 | 5 | 4 | 4 | 4 | 4 | 5 | 4  | 5  | 4  | 5  | 4  | 5  | 64  | 85.33                          |
| User-2            | 4    | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 5 | 5 | 4  | 5  | 4  | 4  | 4  | 5  | 65  | 86.67                          |
| User-3            | 5    | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 4  | 5  | 67  | 89.33                          |
| User-4            | 4    | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 5  | 4  | 4  | 4  | 4  | 5  | 63  | 84.00                          |
| User-5            | 4    | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 5 | 5 | 4  | 4  | 5  | 4  | 4  | 4  | 67  | 89.33                          |
| User-6            | 5    | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4  | 5  | 5  | 5  | 5  | 5  | 66  | 88.00                          |
| User-7            | 4    | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4  | 4  | 4  | 4  | 4  | 4  | 61  | 81.33                          |
| User-8            | 4    | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5  | 4  | 4  | 5  | 4  | 5  | 65  | 86.67                          |
| User-9            | 4    | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5  | 5  | 5  | 4  | 4  | 5  | 64  | 85.33                          |
| User-10           | 4    | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5  | 4  | 5  | 4  | 5  | 4  | 64  | 85.33                          |
| User-11           | 4    | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4  | 4  | 4  | 5  | 4  | 5  | 62  | 82.67                          |
| User-12           | 4    | 4 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 5 | 5  | 4  | 4  | 5  | 4  | 5  | 65  | 88.00                          |
| User-13           | 4    | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 5 | 4  | 5  | 4  | 5  | 4  | 5  | 65  | 86.67                          |
| User-14           | 4    | 5 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 5  | 4  | 5  | 4  | 5  | 4  | 66  | 88.00                          |
| User-15           | 5    | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4  | 5  | 4  | 5  | 4  | 4  | 65  | 86.67                          |

| Average           | 5    | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5  | 5  | 5  | 5  | 5  | 5  | 66  | 86.38                          |

Based on the results that showed in Table 2 above, it can be explained that the evaluation application based on Alkin(CSE-UCLA)-Weighted Product is categorized as good as evidenced by the average effectiveness percentage of 86.38% so that the evaluation application is ready to be applied on a bigger scale. From table 2 it also appears that the number of items which was used for the assessment was 15 items, with details as follows: (a) point-1 about the ease in the process of installing the application; (b) point-2 about the application appearance; (c) point-3 regarding the layout consistency of each form in the application; (d) point-4 concerning grammar that was used for indicators of each aspect from evaluation in the assessment system component; (e) point-5 concerning grammar that was used for indicators of each aspect from evaluation in the program planning component; (f) point-6 concerning grammar that was used for indicators of each aspect from evaluation in the program implementation component; (g) point-7 concerning grammar that was used for indicators of each aspect from evaluation in the program improvement component; (h) item 8 concerning grammar that was used for indicators of each aspect from evaluation in the program certification component; (i) point 9 concerning features that
make it easy for users to make an assessment (scoring) of the evaluation aspects to the assessment system component; (j) point 10 about features that make it easy for users to make an assessment (scoring) on the evaluation aspects of the program planning component; (k) point 11 concerning features that make it easy for users to make an assessment (scoring) to the evaluation aspects of the program implementation component; (l) point 12 concerning features that make it easy for users to make an assessment (scoring) to the evaluation aspects of the program improvement component; (m) point 13 concerning features that make it easy for users to make an assessment (scoring) to the evaluation aspects of the program certification component; (n) point 14 about features that make it easy to store data, edit, update, and delete; (o) point 15 about the accuracy of the application in carrying out the evaluation process and the accuracy in providing recommendations.

The results of this research have been able to answer the weaknesses of the Siguenza-Guzman, Saquicela, and Cattrysse research by showing the aspects that to be the determinant priority in the effectiveness level of digital library services from the highest to the lowest priority levels. The weakness of Leibbrandt et al.’s research, it can also be solved through this research by showing the existence of established evaluation standards in evaluating digital learning resources (in this case was digital libraries). Cabrerizo et al. research constraints had also been solved through this research by showing the existence of priority aspects in digital library service improvement through recommendations which were obtained from Alkin(CSE-UCLA)-Weighted Product-based evaluation application. The weakness of the research that was conducted by Ciptayani and Dewi had been answered through this research by showing the ability of the weighted product method in determining the effectiveness percentage of each evaluation aspect starting from the lowest to the highest score, so that quickly in obtaining the aspects that need to get repair priority. The research constraints of Tramullas, Sánchez-Casabón, and Garrido-Picazo had been answered through this research by eliciting in detail the evaluation aspects of the assessment system components, planning program, implementation program, improvement program, and certification program. Ahmad and Abawajy’s research constraints had been answered through this research by showing the percentage effectiveness of each determinant evaluation component the digital library services effectiveness. Sun and Yuan’s research constraints had been answered through the results of this research which showed one of evaluation model that can be used to evaluate digital library services, namely the Alkin model (or often called the CSE-UCLA model). Vullo’s research constraints were answered through this research by showing that the science of educational evaluation can be used to determine the appropriate evaluation model are used to evaluate digital library services as a facility supporting the learning process. Dorward, Reinke, and Recker’s research constraints had also been answered through this research by showing the existence of a program planning component from the Alkin model that functions as an input component in evaluation activities.

The weakness of this research was obtained when the Alkin(CSE-UCLA)-Weighted Product-based evaluation application implemented at one of the computer colleges in Buleleng Regency showed that the application’s inability to provide recommendations automatically. The other weakness is that this application is still desktop-based so that it can only be accessed in the library space, so it cannot be accessed outdoors.

The Alkin-Weighted Product-based evaluation application that has been implemented in several computer colleges in Bali can be an innovation to show an accurate evaluation process so that the aspects that have not been implemented optimally can be given the right recommendations to be improved so that later the effectiveness of library services digital can be measured properly. This statement is reinforced from the results of a study conducted by Roopa and Krishnamurthy, which revealed that an innovative evaluation process is needed to determine the level of success and effectiveness of the services of a digital library [12]. Also, the results of Samadi, Masrek, and Yatin’s research in 2014 also show that the effectiveness of digital library services can be measured properly through an evaluation process that is carried out optimally from the individual characteristics and digital library characteristics [13].
4. Conclusions
This research has been able to prove that in general, the evaluation application implementation based on *Alkin(CSE-UCLA)-Weighted Product* in computer colleges can well-categorized and effective is used to evaluate digital libraries as one of the facilities to support education in the college. The solution that can be offered to solve the constraints that were found in this research is adding features to the evaluation application so that the recommendation determination process can work automatically. The process of determining these recommendations can be sought by determining the evaluation aspects that are most dominant need to get improvement priority through traceability using the backward chaining method. The solution offered to solve the constraints associated with applications that just base desktop is by creating applications in the form of web so that they can be accessed anytime and anywhere both in the library and outside the library.

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