CONCEPTUAL AND PHYSICAL DESIGN OF EVALUATION PROGRAM FOR OPTIMIZING DIGITAL LIBRARY SERVICES AT COMPUTER COLLEGE IN BALI BASED ON CSE-UCLA MODEL MODIFICATION WITH WEIGHTED PRODUCT

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ABSTRACT

This study aimed to obtain information about the appropriate aspects used to evaluate digital library services in the terms of *System Assessment*, *Program Planning*, *Program Implementations*, *Program Improvements* and *Program Certifications* components, as well as to obtain the conceptual and physical application design for *CSE-UCLA* evaluation model that had been modified by *weighted product*. The method used in this research was development method with Borg and Gall development design model. The subjects involved in the preliminary trial of this study were educational experts and informatics experts. Data analysis technique used in this research was quantitative descriptive analysis technique. The results of this study indicated that there were 26 aspects used in evaluating digital library services reviewed by *CSE-UCLA* model components. It was profen by the assessment percentage average which reached 92.86% with very good category, the conceptual design in the form of database design was appropriate with the standard needs of a database was proven by assessment average percentage at 87.50% with good category, the physical design in the form of user interface design was suitable with the needs of application programming functionality. It was proven by the assessment average percentage. It was 88.75% with good category.

Keywords: *Evaluation, CSE-UCLA, Weighted Product, Digital Library*

1. INTRODUCTION

High quality education might be obtained through good quality and professional education. To be able implementing good education, it needs the support from all components both human resources and infrastructure. Human resources components, including: the number of lecturers and employees, meanwhile the infrastructure components, including: the number and condition of the classroom, the number and conditions of the laboratory, the condition of the library and the number of collections it possesses, the number and condition other supporting facilities. If it was specifically reviewed about infrastructure components, then the most important component and affected the education quality in college was the library condition. If the library services were

optimal in a college then the college would become a high quality college. Seeing the needs of information access that increase rapidly, it made the library services had been led to the use of information technology. Library service through the utilization of information technology is often called as digital library. Optimum digital library in a college becomes a necessity and an important thing for all academic community colleges, especially for students and lecturers. Through digital libraries, students and lecturers can access digital collections whenever and wherever they are.

Nowadays, the development of digital library utilization in several colleges in Bali as education services had started to increase, but the services were still not optimal. Almost all computer colleges in Bali organized digital libraries only for complementary components and requirements to

obtain good accreditation, regardless the importance of digital library services for the education quality.

According to these problems, it was necessary to evaluate the digital library services in several colleges in Bali. Evaluation was very important, because it would generate an idea about the optimization level of digital library services.

Basically, evaluation is an activity that consists of the process of gathering, describing, and explaining various pieces of information about the effectiveness of something that can be used later as the consideration for making a decision and a recommendation [1]. Evaluation is an activity for collecting, analyzing, and presenting, information about a particular object to be used for a consideration in making an appropriate and accurate decision [2]. The evaluation is an activity for data collecting, data analyzing and data presenting into information about a particular object under study so that the results can be used to take a decision [3]. Evaluation is an activity to collect, analyze, and present information about an object to be evaluated, where the results of these evaluations are used for consideration in making a decision that is precise, accurate, and reliable [4]. Evaluation is an activity for collecting, understanding, and reporting the result of analysis of a particular program/object in such a way that the result can be used as the consideration in making a decision as to whether the program will be continued or stopped [5]. Evaluation is an activity for collecting, analyzing, and explaining comprehensively information about a particular object/program/ policy being studied and the results of an evaluation can be used for the consideration in making a decision to continue or to stop the object/program/policy [6]. Evaluation is an activity conducted by the evaluator to collect, analyze, and present complete and accurate information about a particular object/program/service/policy being studied, thus the results could be used as a recommendation in making a decision [7]. Evaluation is an activity of data collection, data processing, data analysis, presentation of data into information that used as a recommendation in taking a right decision [8]. Evaluation is an activity undertaken by the evaluators to collect, analyze, and present the analyzed data into a useful information as the basis for taking a decision to continue or stop a program/object [9]. Evaluation is an activity that collects, analyzes, and presents data into useful information in making decisions based on recommendations obtained from these

activities[10]. The definition of evaluation is also similar to the opinion of Divayana in 2017 which focuses on the main purpose of evaluation is in order to obtain consideration to take a decision on the object being evaluated [11]. From some concepts that had been explained about the evaluation, it could be concluded that evaluation is an activity conducted by an evaluator in collecting, analyzing, and presenting information related to the program/object/policy that the results can be used to take a decision.

In the field of education, there were several evaluation models that were often used to evaluate educational planning, educational processes and educational services, including: *Goal Oriented Evaluation Model*, *Goal Free Evaluation Model*, *Formative Summative Evaluation Model*, *Countenance Evaluation Model*, *Responsive Evaluation Model*, *CSE-UCLA Evaluation Model*, *CIPP Evaluation Model*, dan *Discrepancy Evaluation Model*. From several modes mentioned above, one models used in evaluating digital library services in several computer colleges in Bali was the *CSE-UCLA* model. The reason was because *CSE-UCLA* model was very suitable and appropriate to be used in evaluating education service, such as digital library. This was in line with Divayana's opinion, which stated that the *CSE-UCLA* model is an evaluation model that has five dimensions of evaluation (*System Assessment*, *Program Planning*, *Program Implementation*, *Program Improvement*, and *Program Certification*) and is suitable to evaluate service programs that help human life, such as library programs, banks, cooperatives, e-government, e-learning and others [12].

Although the *CSE-UCLA* model is a very suitable and appropriate model used to evaluate digital library services at computer colleges in Bali, there were also obstacles/weaknesses found in this model. It had not been able to show the results of trace and accurate quantitative calculations, from highest to the lowest category of each evaluation component. This model was only able to provide a qualitative and quantitative general conception for each evaluation component.

To overcome the *CSE-UCLA* model weaknesses, it was necessary to have a new model idea that could overcome it. The evaluation model which was designed to overcome the weakness was the *CSE-UCLA* evaluation model modified with *weighted product*. This evaluation model was a combination of evaluation model in the education area with decision support system method in the

informatics area. The reason for using decision support system method was to modify the *CSE-UCLA* evaluation model because in principle decision support system method had the same main objective with education evaluation model. The main objective was generating recommendation to be used in consideration in taking a decision. In the *CSE-UCLA* evaluation model modified with *weighted product*, *CSE-UCLA* evaluation model was used to get the evaluation result in the form of qualitative and quantitative general view for every evaluation component to digital library service in terms of *System Assessment*, *Program Planning*, *Program Implementation*, *Program Improvement*, *Program Certification* components. Meanwhile, the *weighted product* method was one of the decision support system methods which was used to obtain accurate and detailed results in quantitative form showing the highest to lowest category of each *CSE-UCLA* evaluation component.

The development of information technology was getting beter. It caused all things could be completed automatically, quickly, and accurately. Therefore, the *CSE-UCLA* evaluation model modified with this *weighted product* also needed to be designed into a computerized application program, thus speeding up the calculation process and calculation results to be more accurate.

This research was developed based on the findings on some previous researches, such as: research about digital library based on expert system at Indonesia Technology University which was conducted in 2015 by Divayana, *et.al*[13]. It obtained the digital library application program formation that applied one concept of artificial intelligence. It was expert system that included basic knowledge and inference motor in providing online library searching services. The weakness found in the research was not able to show the conception about the level of digltal library services quality/effectiveness.

Then, a research was conducted in 2016 by Divayana [14] about the evaluation of digital library program based on expert system at Universitas Teknologi Indonesia to find out the service quality of digital library program based on expert system applied at Universitas Teknologi Indonesia by using *CSE- UCLA* evaluation model. The results showed that the quality of service program reviewed from the *system assessment* component was 79.80% with good category, *program planning* components was 69.69% with good category, *program implementation* components was 57.40% with adequate category, *program improvement*

components equal to 74,90% with good category, and *program certification* component equal to 66,80% with good category. The weakness found in this research was that the *CSE-UCLA* model used had not been able to show accurate results in sequence from the highest category to the lowest for each evaluation component.

Thus, the study which conducted in 2017 until 2019 (for 3 years) required a breakthrough new model that could overcome the research problems in the researches which had been conducted in 2015 and 2016. The evaluation model which was developed in 2017-2019 was *CSE-UCLA* evaluation model modified with *weighted product*.

Based on several problems that had been mentioned above, it could be stated these following problems: 1) What were the appropriate aspects used to evaluate digital library services in terms of *system assessment*, *program planning*, *program implementation*, *program improvement* and *program certification* components? 2) How was the conceptual and physical design of the *CSE-UCLA* evaluation model application program that had been modified with weighted product?

The purpose of this research were: 1) To know the evaluation aspects of digital library service viewed from the *system assessment*, *program planning*, *program implementation*, *program improvement* and *program certification* components; 2) To obtain the conceptual and physical design of the *CSE-UCLA* evaluation model application program that had been modified with *weighted product* so that it could show the accurate calculation results in sequence from the highest to the lowest category for each evaluation component.

Some research results were also related to this research, among others: A research was conducted by Fadli, Kusumandari, and Nurussaadah about the evaluation of online libraries at SMA Negeri 8 Semarang [15], had similarities to this research in the terms of research studies about digital library. While the difference was in research methods used, in which this research used Borg and Gall model development methods, while Fadli, Kusumandari, and Nurussaadah used evaluative methods with *CIPP* evaluation model.

Syamsudin's research was evaluating the effectiveness of information retrieval in the digital library system at library in UIN Sunan Kalijaga Yogyakarta [16], it had similarities with this research in the terms of research studies that discussed about digital library. However the difference was in the research method used, in

which this research used the development method with Borg and Gall model, and focused on developing *CSE-UCLA* evaluation model modified with *weighted product*, while Syamsudin used evaluative method with precision effectiveness formulation model and focus on evaluation digital library services. Srirahayu, Anna, and Irfana conducted a research on user evaluation at digital library in Airlangga University (UNAIR) [17]. It had similarities with this research in the case of research study that was about digital library. While the difference was in the research method used, this research used the development method with Borg and Gall model, and focused on determining accurate calculation in sequence from the highest to the lowest category for each evaluation component, while the research conducted by Srirahayu, Anna, and Irfana used quantitative methods and focus on determining the highest dimensions in digital library evaluation results.

Based on the problems and background of previous researches, the researchers was interested to design the evaluation program based on *CSE-UCLA* model modified by *weighted product*, so that the digital library service in the computer colleges in Bali could be optimized.

2. LITERATURE REVIEW

2.1 *CSE-UCLA* (*Center for the Study of Evaluation-University of California in Los Angeles*) Evaluation Model

Evaluation framework was developed by Alkin in (1969, 1991) at University of California-Los Angeles. This framework was called the *UCLA* Evaluation Model and was extensively used by the Center for the Study of Evaluation at *UCLA*. The Alkin framework has five types of evaluations within it (see Table 1) [18].

Table 1: Alkin's UCLA Evaluation Framework

Evaluation Type	Description
System Assessment	Provide information about the state of a system
Program Planning	Assist in the selection of particular programs likely to be effective in meeting specific educational needs
Program Implementation	Provide information about whether a program was introduced to an appropriate group in the manner intended
Program Improvement	Provide information about how a program is functioning, whether interim objectives are being achieved, and whether unanticipated outcomes are appearing

Evaluation Type	Description
Program Certification	Provide information about the value of the program and its potential for use elsewhere

CSE-UCLA evaluation model which was developed by Alkin have five kine of evaluation stages, such as: *system assesment*, *program planning*, *program implementation*, *program improvement*, dan *program certification* [19].

The evaluation *CSE-UCLA* model developed by Alkin evaluate program in five stages: *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification* [20]. *CSE-UCLA* model evaluation was accomplished in several phases, namely: *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification* [21]. *CSE-UCLA* model is an evaluation model that has five evaluation dimensions, which include *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification* that is suitable to be used to evaluate service programs that help human life [22]. *CSE-UCLA* model is a model evaluation has five dimensions of evaluation, among other *systems assessment* that provide information about the state of the system, the *program planning* which enables selection of the program particular to meet the needs of the program, program implementation that prepare information to introduce the program, *program improvement* that provides information of function/program performance, *program certification* which gives information about the benefit or usefulness of the program [23]. C*SE-UCLA* model is an evaluation model with five evaluation dimensions (*system assessment*, *program planning*, *program implementation*, *program improvement*, *program certification*) and are suitable to be used to evaluate service programs that help human life, such as: library program, bank, cooperative, e-government, e-learning, etc[24].

Based on several definitions of *CSE-UCLA* above, it could be generated a conclusion that the *CSE-UCLA* evaluation model is one evaluation model that has five evaluation components, namely *System Assessment*, *Program Planning*, *Program Implementation*, *Program Improvement*, and *Program Certification* that is suitable to evaluate the service programs both in general education area, or other areas particularly so that the quality/effectiveness of running program could be further optimized.

2.2 Weighted Product

Weighted Product is one method of the decision support system as the way to take decisions based on the highest value from the process of ranking some alternative values obtained by the multiplication of weighted attributes.

Weighted Product method uses multiplication to relate the attribute ratings, in which the rating of each attribute must be raised first with the attribute weight. This process is similar to the normalization process. Preferences for alternative Ai are given as follows [25,26]:

$$S_i = \prod_{j=1}^{n} x_{ij}^{w_j} \qquad (1)$$

with i=1,2,...,m; and $\sum w_j = 1$.
w_j is a positive-valued rank for the gain attribute, and is negative-valued for the cost attribute.

The example of *Weighted Product* method application, especially in the field of education could be illustrated as follows [26]: In a state university, Ganesha University of Education, an evaluation of digital library program was conducted. The evaluation model used was *CIPP* (*Context*, *Input*, *Process*, and *Product*). The aspects evaluated included the program condition, the digital documents integrity, the preparedness of officers, and the readiness of the user. Determine the order of priority aspects affecting the success of digital library programs implementation at Ganesha University of Education ranging from the most important or the most dominant. The decision maker gave the preference weight for each criterion that was as follows: [5 5 5 5]. If supposed that the data obtained as shown in table 2 below.

Table 2: Data of Evaluation Result on Digital Library Program at Universitas Pendidikan Ganesha Using Weighted Product Method

Evaluation Aspect	Evaluation Components			
	C	I	P	P
Program Condition	92	93	84	90
Digital Document integrity	90	90	85	86
Officer readiness	85	83	82	80
Users readiness	80	79	79	78

Answer:

Before, it was conducted a prior weighting, such that $\Sigma w = 1$. Therefore, it was obtained that $w_1 = 0.25$; $w_2 = 0.25$; $w_3 = 0.25$; and $w_4 = 0.25$.

Category of each evaluation component, as follows: 1) Context component is profit criteria, 2) Input component is profit criteria, 3) Process component is profit criteria, and 4) Product component is profit criteria.

Then, the normalization processes that generated the S vector could be calculated as follows:

$S_1 = (92^{0.25})(93^{0.25})(84^{0.25})(90^{0.25}) = 89.681$
$S_2 = (90^{0.25})(90^{0.25})(85^{0.25})(86^{0.25}) = 87.720$
$S_3 = (85^{0.25})(83^{0.25})(82^{0.25})(80^{0.25}) = 82.480$
$S_4 = (80^{0.25})(79^{0.25})(79^{0.25})(78^{0.25}) = 78.997$

The value of V vector that would be used for ranking could be calculated as follows:

$V_1 = \dfrac{89.681}{89.681+87.720+82.480+78.997} = \dfrac{89.681}{338.88} = 0.265$

$V_2 = \dfrac{87.720}{89.681+87.720+82.480+78.997} = \dfrac{87.720}{338.88} = 0.259$

$V_3 = \dfrac{82.480}{89.681+87.720+82.480+78.997} = \dfrac{82.480}{338.88} = 0.243$

$V_4 = \dfrac{78.997}{89.681+87.720+82.480+78.997} = \dfrac{78.997}{338.88} = 0.233$

The highest value was on V_1, then forwarded to V_2, V_3, and last V_4. This meant that the most dominant aspect which was affecting the success of digital library program implementation at Ganesha University of Education was the condition of the program. Then, it was followed by other aspects such as: the integrity of digital documents, then the officers' readiness, and the last was the the users' readiness.

3. RESEARCH METHODOLOGY

3.1 Research Approach

The approach used in this study was a qualitative approach. Research method used in this research was development method with *Borg and Gall* model development design. The *Borg and Gall* model has 10 stages, such as [27]: 1) research and collecting information/data. This stage could be regarded as the preliminary study stage. In this stage includes literature studies related to the issues studied, and preparation for formulating research frameworks; 2) Research planning. In this stage includes such activities as: a) formulating research objectives, b) allocating funds, personnel and time, c) formulating the researcher qualifications and the forms of participation in the research; 3) design development (develop preliminary form of product). In this stage the development of the preliminary form of the product is pattern determination in accordance to the topic of the subject matter; 4) preliminary field test. In this stage the product test is limited. The activities conducted in this stage are: (a) conducting preliminary tests on product design, b) limited, both design substance and the parties involved, c) Prelimnary field test conducted repeatedly to obtain feasible designs, both substance and methodology; 5) main product revision. This stage is an improvement of the model or design based on the

preliminary test; 6) field test (main field test). This stage can be called as a wider product test. The result of the field test is obtaining effective design, in the terms of substance and methodology; 7) Operational product revision. This stage is the second improvement after a wider field test than the preliminary test; 8) operational field testing. This stage will be better if it can be conducted on a large scale. This stage includes: a) testing the effectiveness and adaptability of product design, b) testing the effectiveness and adaptability of design involving prospective product users, c) field test result is obtaining the design model which is ready to be applied both in substance and methodology; 9) final product revision. This stage will be further improvement for the product being developed. The problems found in the preliminary, are fixed in this stage, so that the solutions will be found and the product is ready to be applied; 10) dissemination and implementation of the final product. This stage is carried out the dissemination of final product that is ready to be operated. The final product is expected to be spreaded up to the target user, such as the parties concerned on the product usage.

The phases of the Borg and Gall development model which was conducted in this research were limited to: research and data collection, planning, model design development, preliminary test, and main product revision. This was because the purpose of this study was limited to know the aspects used to evaluate digital library services in terms of evaluation component of *CSE-UCLA* model and to obtain conceptual and physical design of *CSE-UCLA* model application program modified with *weighted product*.

3.2 Research Object

The object of this research was the application program of *CSE-UCLA* evaluation model that had been modified with *weighted product*. The reason for doing research on this object, because this object was a new breakthrough that needed to be examined whether it was capable in determining accurate calculations in sequence from the highest category to the lowest for each evaluation component used to evaluate the digital libraries service of at computer college in Bali.

3.3 Research Subject

Research subject in this study was determined by using the Purposive Sampling technique, ie the parties associated with digital library services at computer colleges in Bali. The reason of using purposive sampling technique was this technique was very appropriate to be used in getting accurate information from parties who have

knowledge and experience about the program/ object being evaluated. The research subjects used in the preliminary trial (in 2017) were 2 experts of education, and 2 experts of informatics. The four experts examined the feasibility of the aspects used to evaluate digital library services in the terms of *CSE-UCLA* evaluation model components and also tested the feasibility of the conceptual and physical design of *CSE-UCLA* model application program modified with *weighted product*.

3.4 Research Location

This research was conducted at one of computer colleges in Bali. It was at STIKOM Bali. The reason of choosing this location was because STIKOM Bali as one of the computer colleges in Bali which had conducted digital library. Besides that, STIKOM Bali was also categorized as one of the best computer colleges in Bali and had complete facilities to conduct research on digital library, so that STIKOM Bali could be referred to be a college of digital library pilot for other universities in Bali, especially in digital library services.

3.5 Data Collecting Methods

In collecting the data, this research used the main instruments and complementary instruments.

The main instrument was questionnaires, while complementary instruments were interview guides and photographs/documentation pictures.

Questionnaires and interview guidelines were used by education experts in conducting feasibility testing of evaluation aspects. The questionnaires, interview guide and documentation were used by informatics experts in performing the feasibility testing of the conceptual and physical design of *CSE-UCLA* model application program modified with a *weighted product*.

3.6 Data Analysis Technique

Data analysis technique used in this research was quantitative descriptive analysis technique. Ranks determination in sequence from the highest to the lowest category for each evaluation component of *CSE-UCLA* model used *weighted product* calculation results.

From the ranking results, then viewed one by one which aspects got the lowest value, than the aspect would get improvement recomendation. Qualitative descriptive analysis technique was used to analyze the obstacles found in the design of *CSE-UCLA* evaluation model with *weighted product* modification.

4. RESULTS AND DISCUSSION

4.1 Results

According to the objectives to be achieved in this research which was limited to know the aspects used to evaluate digital library services in terms of *CSE-UCLA* model evaluation component and to obtain *CSE-UCLA* model design modified with *weighted product*, then there were several things that were generated in this study based on *Borg and Gall* model development stage, including research and field data collection, planning, model design development, preliminary test, and main product revision.

4.1.1 Research and Field Data Collection

In this stage, several aspects were used to evaluate digital library services at computer colleges in Bali in terms of *CSE-UCLA* model evaluation component. The aspect of the *System Assessment* component, included: legal foundation, vision, mission, objectives, and benefits of the digital libraries implementation, the needs of digital library management staff support, and support from the entire academic community colleges. Aspects of *Program Planning* components included: organization structure of digital library management, the readiness of lecturers' ability in using digital library service, the readiness of students' ability in using digital library service, the readiness of management personnels' ability to manage digital library service, the readiness of university's funding in organizing digital library, and the readiness of facilities and infrastructure that support digital library implementation. Aspects of the *Program Implementation* components included: the socialization of features that can be used in digital library for users, the socailization of the required hardware in the digital library for the management team, and the socailization of the required software in the digital library for the management team. Aspects of *Program Improvement* components included: digital library operation for users, installation process and hardware settings required for digital library, installation process and software settings required for digital library, management for ducument data and file collection by digital library personnels, budget management by digital library personnels. Aspects of the *Program Certification* components included: the quality of digital library service from tangibles dimension, the quality of digital library service from reliability dimension, the quality of digital library service from responsiveness dimension, the quality of digital library service from assurance dimension, and the quality of digital library service from empathy dimension.

4.1.2 Planning

In this stage, it was obtained the data related to planning about personnel requirements which was needed to create the conceptual and physical design of the *CSE-UCLA* model modified with *weighted product*. The number of personnel required in determining the evaluation aspects used in measuring the optimization of digital library services were 3 people, the weighting for each evaluation aspect needed to involve 3 people, designing the conceptual and physical design of *CSE-UCLA* evaluation model modified with the *weighted product* involved 3 people, for the preliminary test and main product revision to conceptual and physical design involved 4 experts.

In addition to the planning on personnel requirements, it was also conducted the planning on time requirements to complete this research. The required time in determining the evaluation aspects used in measuring the optimization of digital library services was 29 days. The required time in determining the weighting for each evaluation aspect was 2 days. The required time in designing the conceptual and physical design of *CSE-UCLA* evaluation model modified with *weighted product* was 31 days. The required time in condcuting the prelimnary trial of the conceptual and physical design of the *CSE-UCLA* evaluation model modified *weighted product* was 31 days, while for it revision was 7 days.

4.1.3 Designing *CSE-UCLA* Model Application Program Modified by *Weighted Product*

In this stage, it was described the results of the conceptual and physical design of *CSE-UCLA* model program application modified with *weighted product*. The conceptual design of this application program explained about the framework design of *CSE-UCLA* model modified with the concept of *weighted product* method and the database design of *CSE-UCLA* model application program modified with *weighted product* method. In the framework design, it was shown that the *CSE-UCLA* evaluation model consisted of 5 evaluation components, namely: *system assessment*, *program planning*, *program implementation*, *program improvement*, and *program certification*. Each of these evaluation components had evaluation aspects used to measure the optimum level of digital library services. Rank calculation of evaluation component in sequence from highest to lowest category used *weighted product* method. For more details about framework design of *CSE-UCLA* model modified with *weighted product* could be seen in Figure 1 below.
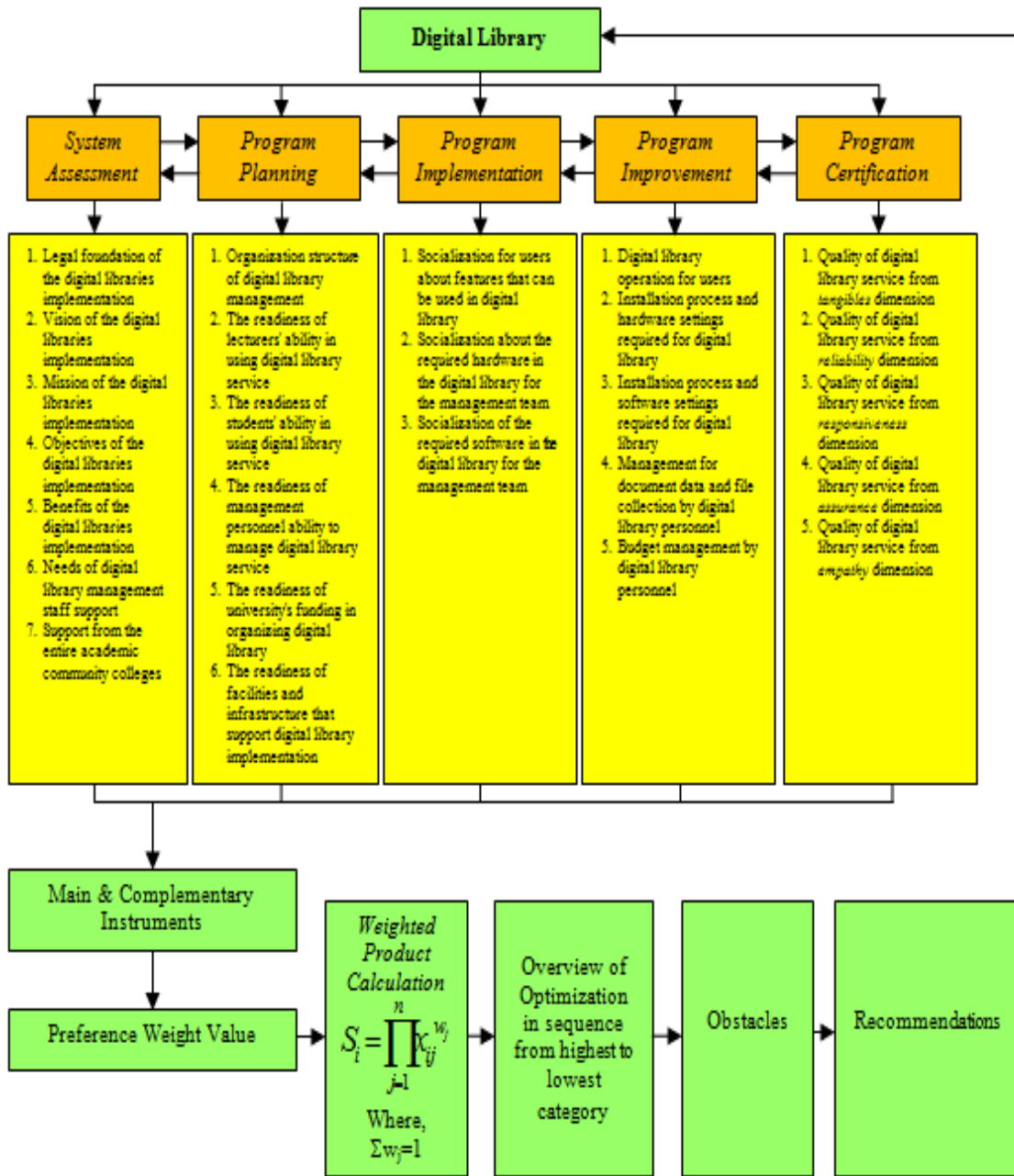
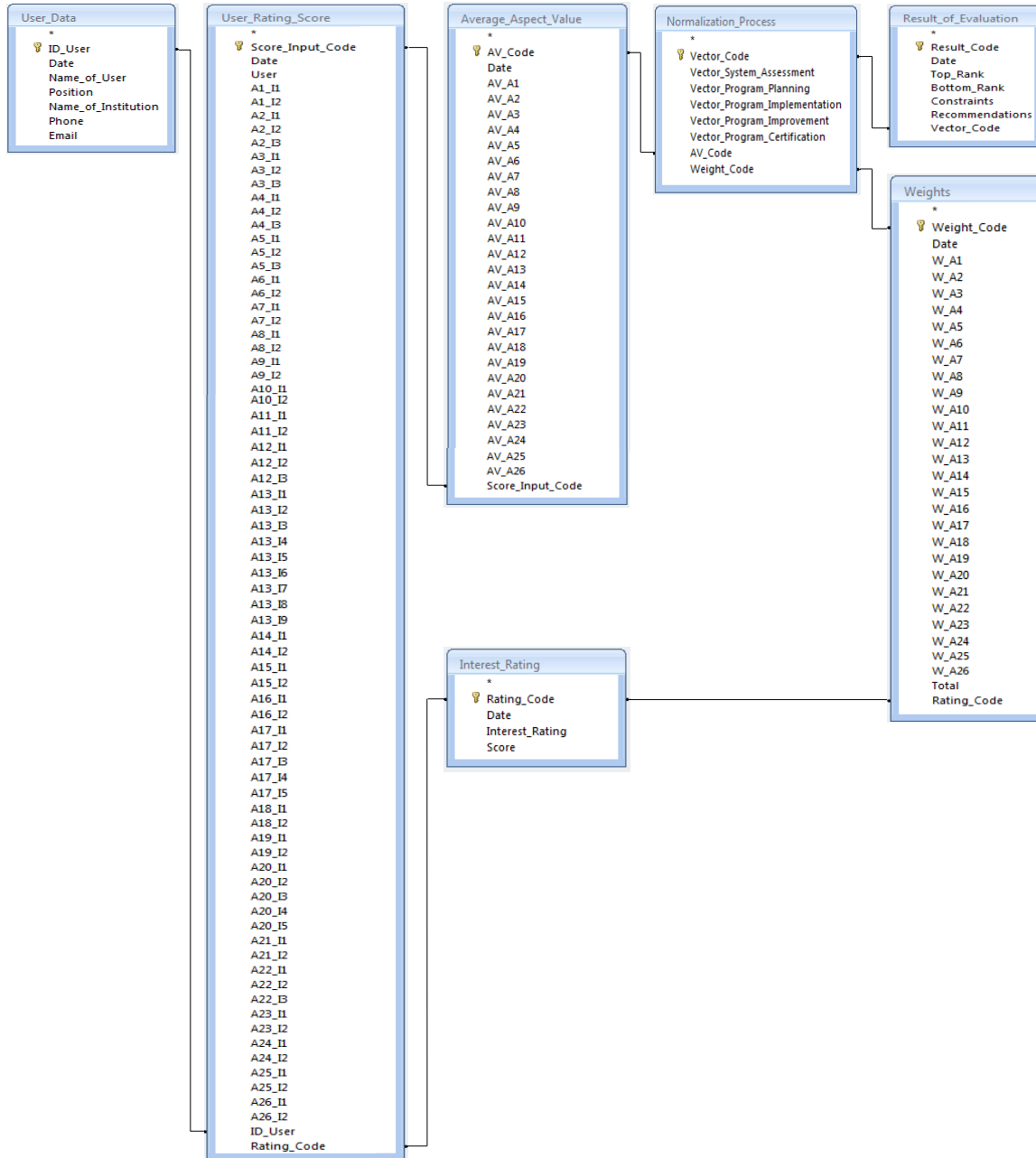*Figure 1: Design of CSE-UCLA Evaluation Models Modified by Weighted Product to Measure Optimization of Digital Library Service at Computer College in Bali*

The database design about *CSE-UCLA* model application program modified with *weighted product* consisted of 7 tables, among others: 1) user_data table, which was used to store user data; 2) interest_rating table, was used to store interest rating data and scores; 3) weights table, was used to store weighted data provided by the decision maker; 4) user_rating_score table, which was used to store the rating data of interest given by the user to the evaluation aspects; 5) average_aspect_value table, which was used to store the average data of each aspect based on the rating score of interest given by the user; 6) normalization_process table, which was used to store the normalized results data; 7) result_of_evaluation, which was used to store data evaluation results. The view of the database design from the application program of *CSE-UCLA* model modified with *weighted product* could be seen in Figure 2 below.

Figure 2: Database Design of Application Program of CSE-UCLA Evaluation Model Modified by Weighted Product to Measure the Optimization of Digital Library Service at Computer College in Bali

The physical design of this application program explained the user interface design of the *CSE-UCLA* model modified with *weighted product* method concept. This interface designed consisted of 8 design forms, among others: 1) main menu, which was used to navigate to other forms; 2) input of user data, used to input user identity data; 3) interest rating, which was used to input interest rate data and its score; 4) preference weights of decision makers, were used to determine the preference weight based on the weight given by the decision maker; 5) input of interest rating score data on each aspect by users, which was used to enter interest rating score data provided by the user on each evaluation aspect; 6) calculation of average value of the aspects, which was used to calculate the average value of each aspect of evaluation; 7) normalization process, used to determine the results of normalization; And 8) result of evaluation, used to display evaluation result. The appearance of these forms could be seen in Figure 3-10 below.
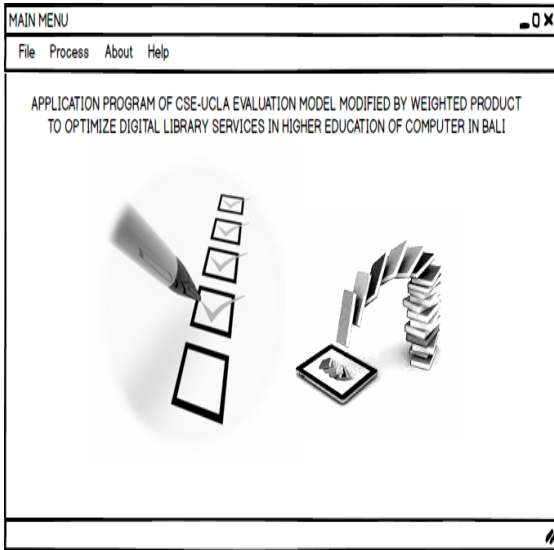
Figure 3: Design of Main Menu
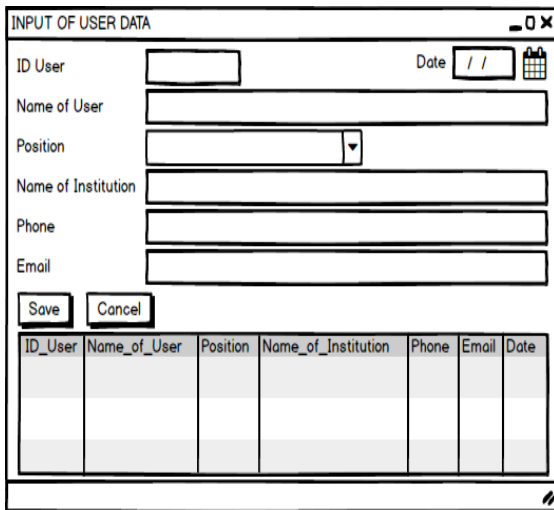
Figure 4: Design of User Data Input
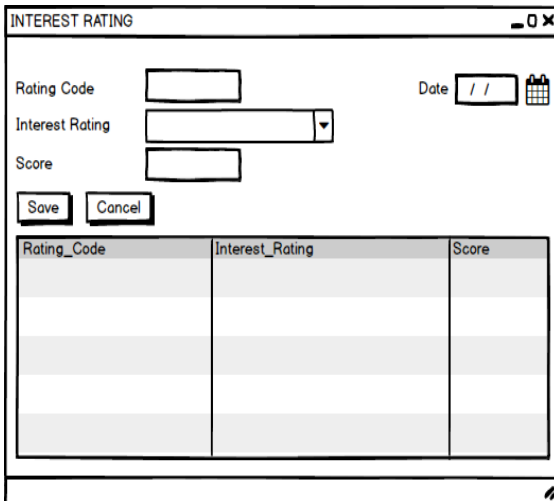
Figure 5: Design of Interest Rating
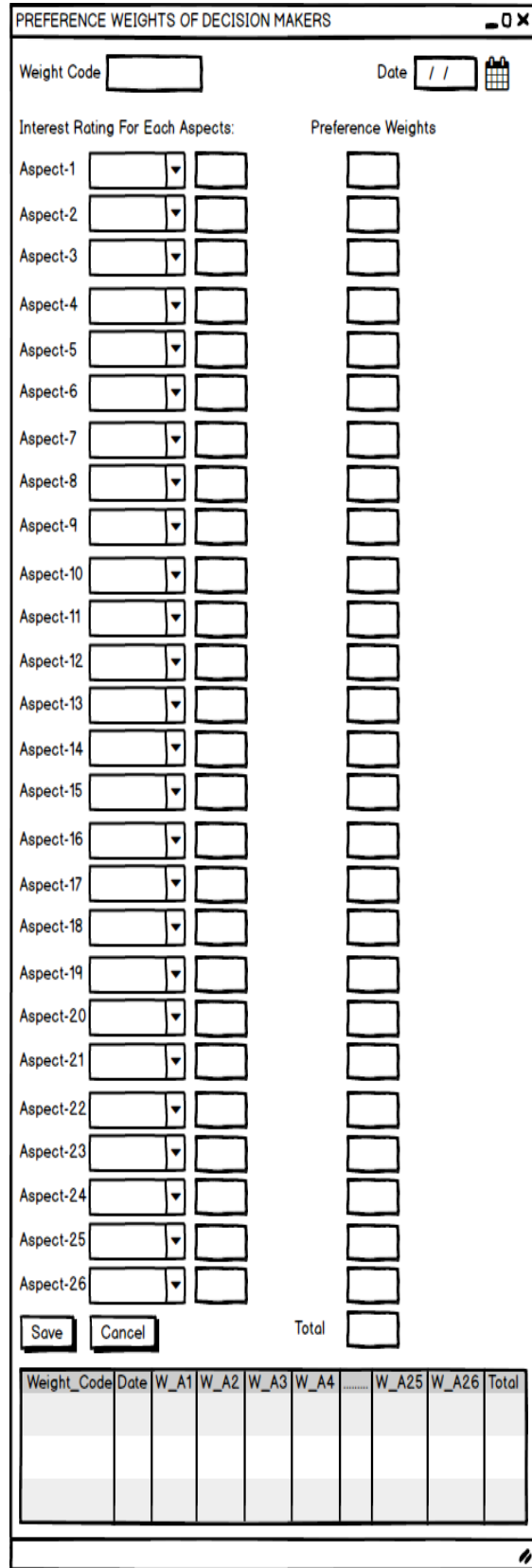
Figure 6: Design of Preference Weights of Decision Makers

Figure 7: Design of Input of Interest Rating Score Data on Each Aspect by Users
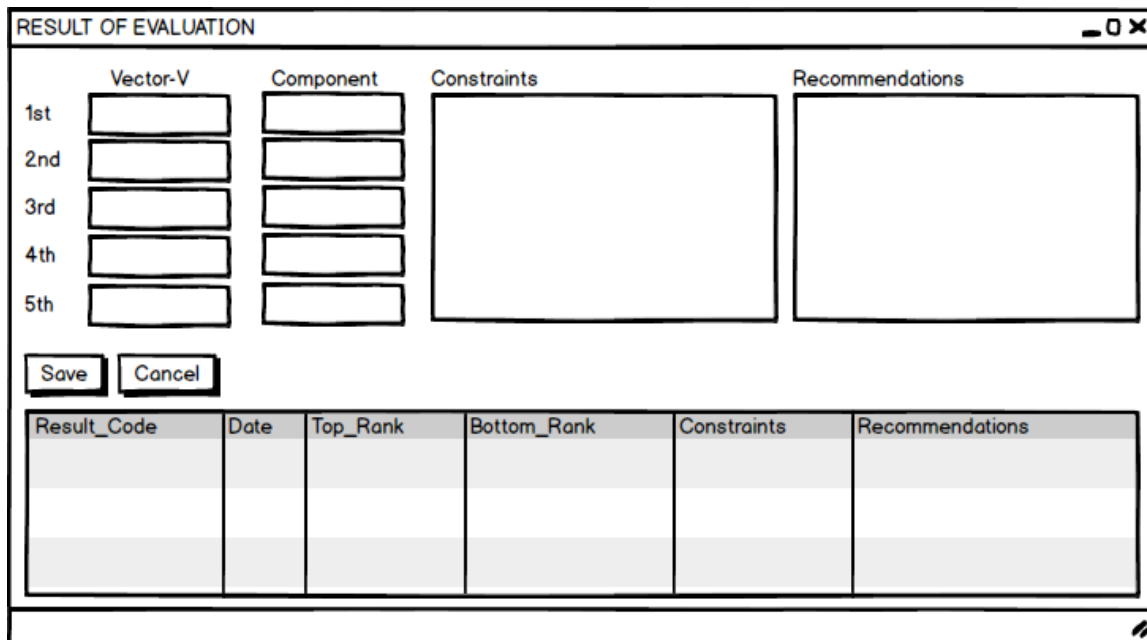
Figure 8: Design of Calculation of Average Value of The Aspects

Figure 9: Design of Normalization Process

Figure 10: Design of Evaluation Result

4.1.4   Preliminary Trial

In this stage was explained about the results of preliminary trials conducted by educational experts and informatics experts on the conceptual and physical design that had been designed.

The results of prelminary trial conducted by the expert on the conceptual framework design in the form of *CSE-UCLA* evaluation model modified with *weighted product* could be seen in table 3 below.

Table 3: The Results of Preliminary Trial on the Design of CSE-UCLA Evaluation Models Modified by Weighted Product

No	Respon-dent	Item-							Σ	%
		1	2	3	4	5	6	7		
1	Expert 1	5	5	5	5	5	4	5	34	97.14
2	Expert 2	5	4	4	5	4	5	4	31	88.57
3	Expert 3	4	5	4	5	4	5	5	32	91.43
4	Expert 4	5	5	5	4	5	4	5	33	94.29
								Average		92.86

Notes:

Item-1 : Suitability of the evaluation aspects on the *System Assessment* component

Item-2 : Suitability of the evaluation aspects on the *Program Planning* component

Item-3 : Suitability of the evaluation aspects on the *Program Implementation* component

Item-4 : Suitability of the evaluation aspects on the *Program Improvement* component

Item-5 : Suitability of the evaluation aspects on the *Program Certification* component

Item-6 : Suitability of the method used to obtain accurate results showing the highest category to the lowest of each evaluation component

Item-7 : Suitabilty of the evaluation stage description which was conducted from the beginning until getting recommendation

The results of preliminary trial conducted by experts on conceptual design in the form of database design about the application program of *CSE-UCLA* evaluation model modified with *weighted product* could be seen in table 4 below.

Table 4: The Resuts of Preliminary Trial on Database Design on the Application Program of CSE-UCLA Evaluation Model Modified by Weighted Product

No	Respondent	Item-				Σ	%
		1	2	3	4		
1	Expert 1	4	5	4	5	18	90.00
2	Expert 2	5	5	5	4	19	95.00
3	Expert 3	5	4	4	3	16	80.00
4	Expert 4	5	4	4	4	17	85.00
					Average		87.50

Notes:

Item-1: Field determination accuracy

Item-2: Data type selection accuracy

Item-3: Size determination accuracy

Item-4: Relation between tables accuracy

The results of preliminary trial conducted by the expert on the physical design, it was the interface design application program *CSE-UCLA* evaluation modified with *weighted product* could be seen in table 5 below.

Table 5: The Results of Preliminary Trial on Interface Design Application Program of CSE-UCLA Evaluation Model Modified by Weighted Product

No	Respon-dent	Item-								Σ	%
		1	2	3	4	5	6	7	8		
1	Expert 1	4	4	4	4	4	5	4	5	34	85.00
2	Expert 2	5	5	5	4	4	4	4	4	35	87.50
3	Expert 3	5	5	4	3	4	5	5	5	36	90.00
4	Expert 4	5	4	5	5	4	5	4	5	37	92.50
									Average		88.75

Notes:

Item-1 : The suitability and accuracy of the main menu design so it could handle navigation to all other forms.

Item-2 : The suitability and accuracy of user input data form design so it could handle user identity input

Item-3 : The suitability and accuracy of the interest rating form design so it could handle the importance rating and input score.

Item-4 : The suitability and accuracy of the weight preference design form provided by the decision makers so it could handle the weight of preference well.

Item-5 : The suitability and accuracy of the score input form design of interest rating on each evaluation aspect so that it could handle the input score data of interest rating given by each user on each evaluation aspect.

Item-6 : The suitability and accuracy of the average value calculation form design of each aspect so it was able to handle the average value process of each evaluation aspect well.

Item-7 : The suitability and accuracy of the normalization process design form, so it could handle the process of determining the normalization result well.

Item-8 : The suitability and accuracy of the result of evaluation form design, it could show the evaluation results well.

4.1.5 Main Product Revision

Although in general the preliminary trial show good results, but it should also be known some of the revisions suggested by experts to refine the conceptual design and physical design that has been made. The results of main product revision given by experts to the conceptual design and physical design of applications of *CSE-UCLA* evaluation model modified with *weighted product* can be seen in table 6 below.

Table 6: The Results of Main Product Revision on the Conceptual Design and Physical Design of CSE-UCLA Evaluation Model Modified by Weighted Product

No	Respondent	Design	Suggestion / Revision
1	Expert 1	Conceptual	-
		Physical	Please create a facility that used to add new evaluation aspects
2	Expert 2	Conceptual	-
		Physical	Please add the dynamically facility that can add new evaluation aspects
3	Expert 3	Conceptual	Please adjust the database design with physical design
		Physical	Please add facilities that can accommodate the knowledge base of recommendations
4	Expert 4	Conceptual	-
		Physical	Please create a form that used to add new evaluation aspects

4.2 Discussion

Based on the research results that had been described previously, there were several things that needed to be discussed so that the information described related to this research could be more complete. The main points to be discussed included: the analysis of suitability on evaluation aspects shown in the framework design of *CSE-UCLA* evaluation model that had been modified with *weighted product*, the analysis of conceptual design concepts in the form of database design, and analysis of suitability on the physical design of the program application.

4.2.1 The Analysis of Suitability on Evaluation Aspects

The suitability of the aspects used in evaluating digital library services had been piloted in a conceptual draft in the form of a framework design of *CSE-UCLA* evaluation model modified with *weighted product*. It was stated that the evaluation aspects were suitabile.This was reinforced by the preliminary trial results shown in Table 3. From table 3, it showed that the average percentage of the assessment on the preliminary trial given by the respondents was 92.86%, so it belonged to very good category.

4.2.2 The Analysis of Suitability on Database

The sutaibilty of the database design had referred to several important things that were required in the application program development of *CSE-UCLA* evaluation model modified with *weighted product*,

such as: field suitability, data types selection, size determination, and relations between tables. Based on preliminary trials on the database design presented in Table 4, it showed that the average percentage of assessment towards the preliminary trial given by the respondents was 87.50%, so it belonged to good category

4.2.3 The Analysis of Suitability on User Interface Design

The suitability of the user interface design had referred to the main functionality of the application program, thereby being able to use *CSE-UCLA* evaluation model modified with *weighted product* optimally. Based on preliminary trial results on user interface design presented in table 5, it showed that the average percentage of assessment towards preliminary trials given by the respondents was 88.75%, so it belonged to good category. All derived categories in the analysis results were obtained from the conversion of the achievement level scaled by five, which explained that the percentage of 90% -100% belonged to very good category, 80% -89% belonged to good category, 65% -79% belonged to adequate category, 55% - 64% belonged to less category, and 0% -54% belonged to poor category.

Based on the results of this study that compared with the results of related research, and then there were several things could make the advantage of this research. The advantage of this study if it was compared to the research that conducted by Fadli, Kusumandari, and Nurussaadah in 2014, was able to show the evaluation results optimally with the accurate calculation in sequence from the highest to the lowest category for each evaluation component and able to show clearly the obstacles found in the evaluation implementation based on valid and accurate calculations. While in the research conducted by Fadli, Kusumandari, and Nurussaadah, the evaluation was only limited to the introduction of digital libraries and obstacles found in the implementation descriptively based on observations and interviews.

If it was compared to the Syamsudin's research in 2013, this research had strengthen in the terms of determining the effectiveness or quality of digital library services. It could be done thoroughly using *CSE-UCLA* model with several evaluation components, namely: *system assessment*, *program planning*, *program implementation*, *program improvements*, and *program certifications*. Meanwhile, in Syamsudin's research, the determination of digital library services effectiveness used precision effectiveness

formulation model so that it was limited to the determination of the simple search and advanced search facilities effectiveness as a means of retrieval information in digital libraries. If it was compared to research conducted in 2015 by Srirahayu, Anna, and Irfana, the advantage of this research was in the determination of accurate calculation in sequence from the highest to the lowest category for each component evaluation, while research conducted by Srirahayu, Anna, And Irfana was limited to the determination of the highest dimension in digital library evaluation.

Besides several advantages in this research, there were also some obstacles found, such as: 1) it had not found yet the application program design that able to make evaluation aspects that dynamically able to be added and reduced as required, 2) it had not found yet the design that was able to accommodate the recommendation knowledge base, it made the recommendation was still manual.

5. CONCLUSIONS

Referring to the problems, the research results and discussion, it could be concluded several things, as follows: a) there were 26 aspects used in evaluating digital library services. They were appropriate with the needs and reviews from the *CSE-UCLA* model component point of view which was proven by the assessment percentage on a preliminary trial towards conceptual design in the form of *CSE-UCLA* evaluation model design modified with *weighted product*. It was 92.86%, so it belonged to very good category; b) conceptual design in the form of database design was appropriate with the standard needs of a database which was proven by the assessemnt percentage on the initial trial towards the database application program design *CSE-UCLA* model modified with *weighted product*. The percentage was 87.50%, so that it belonged to good category; c) Physical design in the form of user interface design was appropriate with the functionality needs of application programming. It was proven by the assessment percentage on the initial trial towards the application user interface design of *CSE-UCLA* model modified with *weighted product*. The percentage was 88.75%, so it belonged to the good category.

To overcome the obstacles found in this research, in the future it was expected that this research would be developed become more dynamic application program design so that it could handle the needs associated with the updated evaluation aspect process and able to handle the needs associated with the recommendations knowledge base.

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