OBJECT-ORIENTED ANALYSIS AND DESIGN OF RESEARCH SEMINAR ONLINE REGISTRATION IN HIGHER EDUCATION

Pungki Prayughi[1], Irman Hermadi[2], Heru Sukoco[3]
[1]Mahasiswa Program Magister Ilmu Komputer, Institut Pertanian
[2]Staf Pengajar Departemen Ilmu Komputer IPB
[3]Staf Pengajar Departemen Ilmu Komputer IPB

Abstract

Nowadays the quality aspects of information technology (IT) implementation plays an imperative role in the case of supporting services to its related stakeholders, mainly more on the issue of an effective and efficient process. To provide a more reliable, understandable, reusable, and maintainable academic information systems, Graduate School of IPB needs to improve the quality of its IT. Development of information systems (IS) through the proper stages of analysis and design expected to create a reliable and qualified IS. This research will evaluate the effectiveness of Academic Management IS. An evaluation conducted by observing the current system, using questionnaires, and measurement using a Likert scale. Questionnaire instrument tested for its validity (Product Moment) and reliability (Cronbach's Alpha) using SPSS version 19. This study adopts an integrated database schema that IPB has developed and designing research seminar online registration prototypes using object-oriented approach for a better IS future development.

Keywords: *Object-orientedapproach, prototypes, Reliability Alpha Cronbach's, Skala Likert, SPSS, Validity Product Momen*

Introduction

The Implementation of information and communication technology (ICT) in Higher Education can provide value-added benefits for teaching and learning process and management activities in Higher Education institutions (Indrajit 2014) and supporting services to its stackholders. Utilization of ICT in higher education institutions such as Graduate School (SPs), Bogor Agricultural University (IPB) is the implementation of Academic Manage-ment Information System (SIMAK). SIMAK according to (MWA 2003) is to help business processes in their role as providers of academic administration and quality assurance. SPs IPB academic administration is based on the (SOP 2006) to serve their stakeholders.

The currently running system still hold many shortcomings, one important issue is the amount of academic administrative services burden because almost all services performed face to face and process done manually. Online registration is beneficial for the university and their students, because it can save time, and they can do it anytime and anywhere (Farhan 2014).

This research conducted observation and questionnaire using Likert scale assessment to collect user needs. Questionnaires respondent are active regular master student, and faculty staff (Tendik) of SPs IPB. The validity of Product Moment and Cronbach's Alpha reliability testing on the instrument conducted using Stastical Product and Service Solutions (SPSS) version 19. Likert scale assessment uses to analyze data with interval 1-4.

This study aimed to evaluate the effectiveness of the use of SIMAK at SPs, its role to help meet the needs, analysis and design a research seminar online registration prototypes using object-oriented approaches to develop high-quality, more reliable, easier to repair and more reuseable product. The development of prototype uses an integrated database schema of IPB.

Methodology

Stages of research done in several stages, they are as in Figure 1:

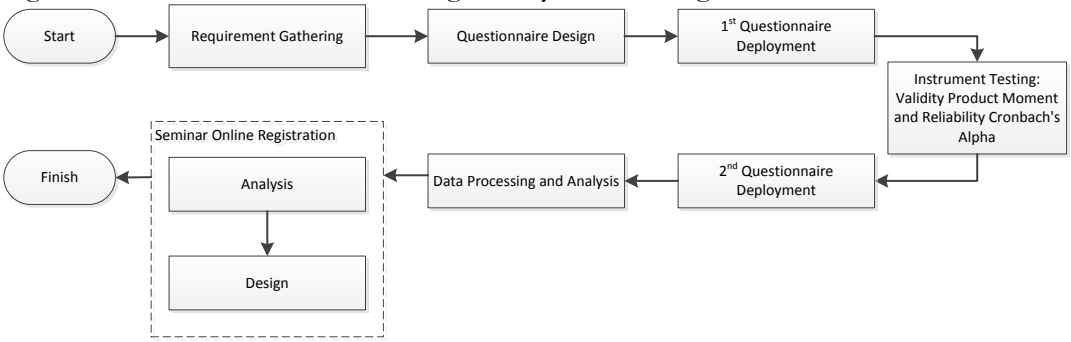

Figure 1 Research Methodology

Requirement Gathering

The running system evaluated, the evaluation is done by observation of academic administrative services directly to obtain clear information about the usefulness of the system running and can increase the value of application usability. (Nurhadryani *et al.* 2013). Evaluation performs on SIMAK contents and data academic services is analyzed to accumulate information related to user requirements.

Evaluation of SIMAK is critical to know its functionalities, as expressed by (Reddy et al. 2009) that IS can store and process data into information, and disseminate it to stakeholders to support their business processes. As a posh IS can provide an effective and efficient impact to an organization's operations, by optimizing Tendik functionality, and reducing operational costs (Suskamiyadi 2014).

Questionnaire Design

The questionnaire is one way to obtain the value of the usability of the application, as according to (Nurhadryani *et al.* 2013) usability testing can be done by interviewing, observation, and questionnaires. Preparation of the questionnaire was based on questionnaires User Evaluation Program Application System IPB-I-MHERE B.2.C Directorate of Communication and Information Systems (DKSI) IPB in 2012 (http://cris-evaluation.event.ipb.ac.id/jadwal) to be changed according to the needs of research (DKSI 2012).

The questionnaire uses purposive sampling technique, with Tendik and Student as respondents. Questionnaire divided into Part A: the identification of respondents, and Part B: questions related to the use of SIMAK. Questionnaire for students consists of three categories, and questionnaire for Tendik consists of five categories. The next stage is distributing questionnaires to the respondents, which carried out in two stages.

Questionnaire Deployment

Distributing questionnaires to the respondents done in two stages, in the first stages questionnaires needed to determine the validity of each of the instruments used in the questionnaire. In

this phase, questionnaires distributed to thirty Tendik and thirty students. Then its research instruments analyzed to gain questions that can utilize in the questionnaire distribution phase two.

The phase two of questionnaire distribution, deployment conducted in two ways: manually, and by using a Google Form facility, which is an online questionnaire to maximize the distribution of the questionnaire. Online are for those that are within the campus or those that are doing research outside.

Instrument Testing

At this stage, the results of the questionnaire analyzed by testing their instruments validity and reliability of Product Moment and Cronbach's Alpha using SPSS 19. Instrument considered valid if the correlation coefficient of the values of each question with a total amount of question (r calculate) is bigger than the value of the correlation coefficient in use 0.05 (r table). According to (Widoyoko 2012) validity testing conducted to determine whether the questions worthy to measure the concepts utilized in the study.

Reliability testing of research instruments (Alpha Cronbach's) is to determine whether it reliable or not. The instrument said to be reliable if (r calculate > r table), where the greater the value, the higher level of reliability of questionnaire in used.

Questionnaire Data Processing and Analysis

Data analysis performed using a Likert scale questionnaire with intervals of 1-4, the interval is determined with the following conditions: I = 100, then I / maximum number of Likert = 100/4 = 25.

Table 1 Distribution of Class Interval and Criteria

Class Interval	Criteria
0% - 24.9%	Strongly disagree (SD)
25% - 49.9%	Disagree (D)
50% - 74.9%	Agree (A)
75% - 100%	Strongly agree (SA)

Design and Analysis Seminar Online Registrastion

Analysis and design of systems in this study will use object-oriented approach; this approach can create a new system that more responsive and reliable. According to (Hermadi et al.2002) one of the basic concepts of object-oriented systems is to develop high-quality software, with products that are more reliable, easier to repair and more reuseable, especially on the development of the software industry.

Object-oriented analysis (OOA), Defines all types of objects that work in the system and shows what user interactions required, to complete tasks visualized with models. The model to illustrates activity needs are use case diagrams and activity diagrams (Satzinger 2007).

Object-oriented design (OOD) is a design model of software that intended for software developers. OOD aim to provide the necessary grounding in the coding process and also describes what the system is doing (Satzinger 2007). Model used is the design class diagrams, and Interaction diagrams that based on the integrated database schema developed Sub-Directorate of Data Integration (DIDSI) IPB.

Results And Discussion

Requirement Gathering

The results show nearly all of the administrative services yet to be accommodated by SIMAK, and almost all of the output can not be used. One type of service that is already functional and can be access by the student is FRS online (SOP 04) show in Table 2.

Table 2 Administrative Services and Modules on SIMAK based SOP

Administrative Services			Modules on SIMAK			Additional Information
Type	SOP Code	Quantity	Accomodated	for Tendik	for Student	
Course	04, 05, 16, 17a, 17b	5	1	1	1	
Research and seminar	06, 09, 11	3	2	2	0	Output unusable
Examination	07, 12,13	4	4	4	0	Output unusable
Garduation	15a, 15b	2	1	1	0	Output unusable
Report	10	1	0	0	0	
Total		15	8	8	1	

The second observation result of service transactions of Academic Administration Division during the period January 2014 - March 2015 using Descriptive Analysis Frequency SPSS shows in Table 3. The results of the analysis did not produce missing value N (N Missing), the analysis shows a high average transaction occurs on SOP 05 (171.5), and SOP 11 (102.8). Those numbers contribute to academic administrative service burdens.

This study proposes SOP 11 to be online because it depends on the availability of time and registration place

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Table 3 Frequency Statistics Service SIMAK SPs based on SOP IPB

	SOP SPs											
	05	06	07	09	10	**11**	12	13	14	15	17	17b
N Valid	15	15	15	15	15	15	15	15	15	15	15	15
Mean	171.5	22.5	18.0	13.5	10.1	**102.8**	83.2	16.7	17.1	100.4	12.3	5.3
Median	167	22	19	11	7	89	71	15	12	77	10	5
Mode	94[a]	20[a]	14[a]	8[a]	1[a]	72	40	4[a]	7[a]	223	5	0
Std. Deviation	59.6	6.2	5.8	6.8	13.4	33.4	53.8	14.7	16.0	55.7	9.0	4.9
Min	94	10	6	6	1	67	36	3	1	36	3	0
Max	319	31	24	29	56	183	193	61	54	223	34	14

Questionnaire and Instrument Testing

Quesitionnaire Design

The questionnaire was based on a User Evaluation IPB Application System questionnaire - I-MHERE B.2.C Program by Directorate of Communication and Information System (DKSI) IPB in 2012 (http://cris-evaluation.event.ipb.ac.id/jadwal), with change being made according to the needs of research.

The questionnaire divided into Part A, namely the identification of respondents, and Part B, namely questions related to the use of SIMAK SPs divided into several categories of questions, which is:

The questionnaire for students consists of three categories, namely: B1-Interaction of respondents with SIMAK currently running (13 questions), B2-Completeness of technical documents and technical support (7 questions),B3-Features and services online at SIMAK (12 questions).As for Tendik consists of five categories of questions, namely: B1-Interaction of respondents with SIMAK (8 questions), B2-Support and completeness of technical documents(9 questions), B3-Features-data-information and services online at

SIMAK (19 questions), B4-Reability-usability, and maintainability of SIMAK (12 questions), and B5-User Satisfaction and SIMAK role in improving the performance of users (7questions).

First questionnaire distribution

The result of phase one questionnaire distribution is that respondents consist of thirty Tendik and Students respectively. The distribution conducted manually to various Study Programs and at the Graduate School administration office.

Instrument Testing

Testing result for Tendik show in Table 4 with N = 30 and a significance value of 0.371 at 0.05 (r table). Value of 0.371 derived from N-2 at r table (Siregar 2013).

Table 4 Validity and Reliability Instruments Testing, and Likert Measurement for Tendik Respondents

Code	Number of Question	Pearson Correlation	Cronbach's Alpha	Indeks Likert	Measurement Criteria
B1	7	0.517	0.579	66.1	A
B2	9	0.813	0.928	66.5	A
B3	15	0.502	0.829	79.8	SA
B4	12	0.807	0.945	73	A
B5	7	0.772	0.858	65.7	A
	Average	0.681	0.828	70.2	A

The validity result claims that the value of questions B1.1, B3.1, B3.5, B3.6 and B3.19 are less than value at r table, so it considered invalid and excluded for the stage subsequent analysis. On the other hand results for Cronbach's Alpha reliability on the other hand showing all the inquiry declared reliable or consistent.

Testing result for Tendik show in Table 5, show a significance value of 0.186 at 0.05 (r table). The test results stated questions B1.8, B1.11, and B1.12 are invalid. Reliability test result that all are reliable.

Table 5 Validity And Reliability Instruments Testing, And Likert Measurement For Student Respondents

Code	Number of Question	Pearson Correlation	Cronbach's Alpha	Indeks Likert	Measurement Criteria
B1	10	0.578	0.817	72.2	A
B2	7	0.755	0.858	65.3	A
B3	12	0.578	0.781	77.1	SA
	Average	0.637	0.819	71.5	A

Questionnaire Distribution Second Phase

There are two groups of respondent, Student with 114 respondents, and Tendik with 30 respondent. Respondent demographics (%) for Tendik are female (43), and male (57), for Student 45 and 55. Tendik majority age between 30- 39 years old(47), while Student majority age between 20-29 years old(68).

A very high figure (93%) stated that respondents very rarely access SIMAK, which should be the source of all academic information. Testing the validity and reliability of questionnaire will be done prior to performing data analysis.

Data Processing and Analysis

The results aggregation Likert scale ratings at Table 4 and Table 5 showed relatively similar between Tendik and Students, stated agreed (A) to all the criteria. Results for B3 both respondents stated strongly agree (SA). Based on those observations and data analysis we purpose a design of online registration for SOP 11.

Analysis and Design

A. Object-Oriented Analysis

Defines all types of objects that involve in the online registration system and shows what user interactions required, show in Figure 4, and Figure 5 described an effective workflow involving students, lecturer, and tendik as an actor.

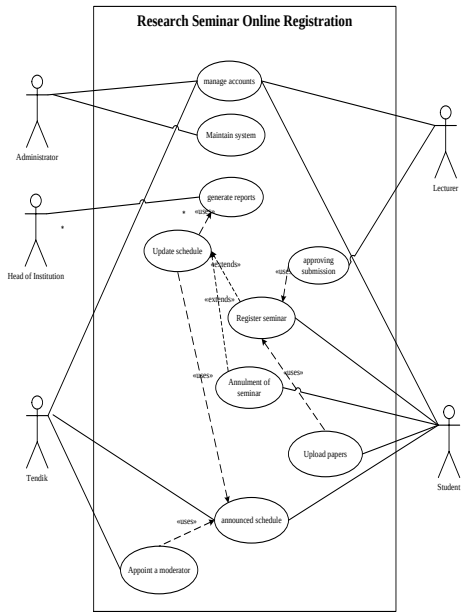

Figure 4 Use case diagrams

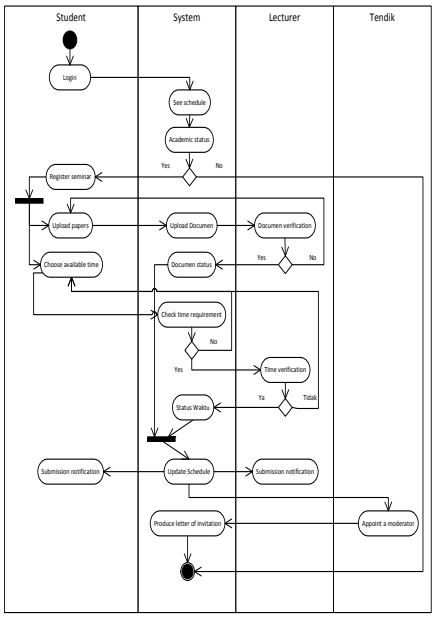

Figure 5 Activity diagram online registration

B. Object-Oriented Design

Figure 6 shows the interaction between students and the flow of system message that occurs.

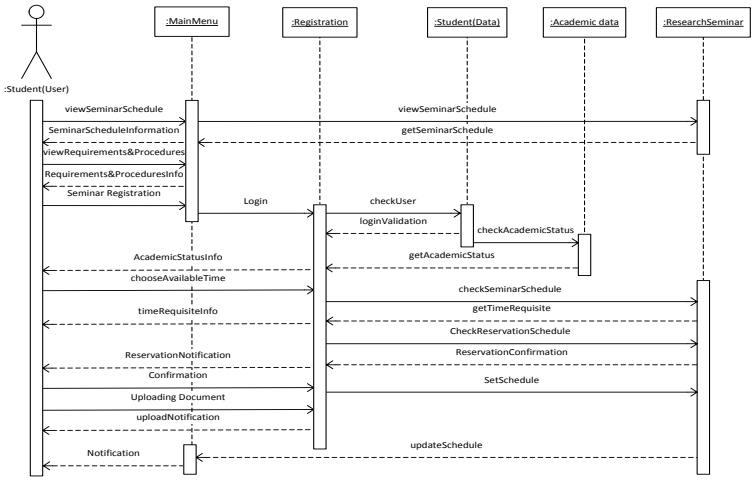

Figure 6 Interaction Diagram Seminar Online Registration

Design class diagram of online registration uses user roles approach, where object Person play different roles as Employees and Students, as shown in Figure 7.

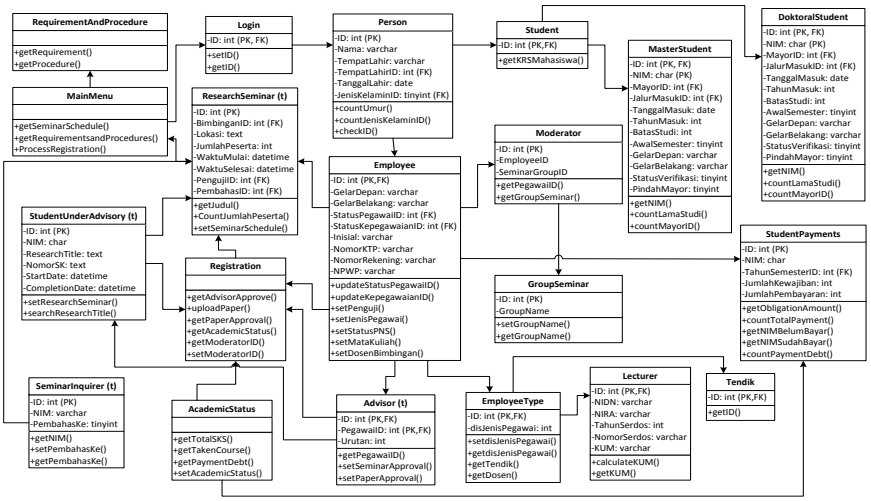

Figure 7 Design Class Diagram Seminar Online Registration

Seminar Online Registration

A. Objectives

Online registration seminar aims to provide convenience process for students as perpetrators of registration. The online registration process can be conducted anywhere and does not depend on office hours of academic administrative services, and facilitates coordination between students and supervisor in determining the date of the seminar. Coordination features could carry out simultaneously with the supervisor, and able to save time.

The key function includes an ease coordination of seminar registration process with our research supervisor, updated seminar schedule, and seminar papers upload facility. The impacts are to ease the burden of academic administrative services.

B. Prototyes

Seminar online registration prototype consists of these special feature:

B.1 Informative homepage

The prototype homepage provides announcements and updates, also the latest seminar schedule information for each seminar group and equipped with detailed research information of keynote speaker for those who need more than just a schedule. Display the homepage as shown in Figure 9.

Figure 9 Seminar Online Registration Homepage

B.2 Feature of schedule registration

This feature provides information about of seminar schedule that are still available, that still need confirmation (pending), and registered schedule.

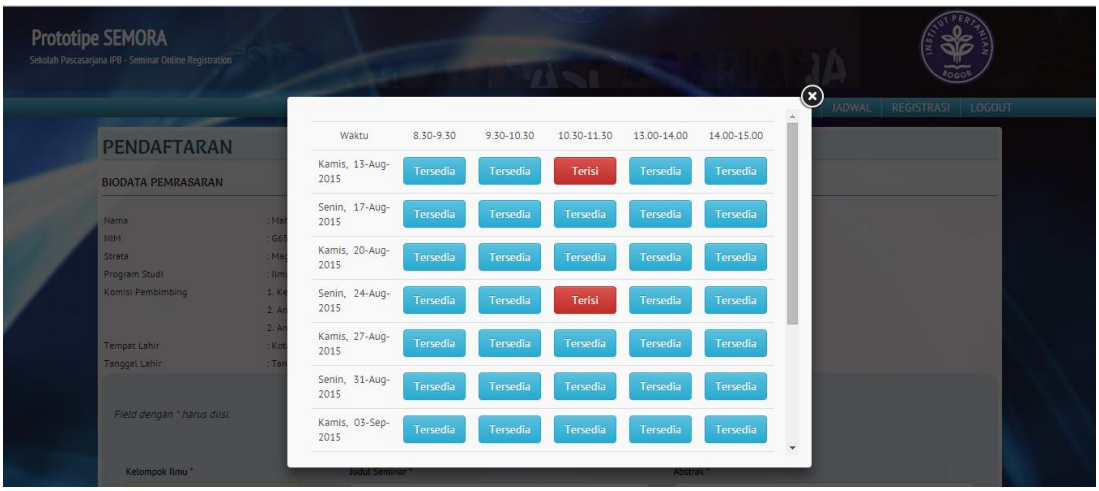

Figure 10 Schedule Availability Information

B.2 Registration approval

This feature designed for supervisor, which in this feature supervisor can give consent or repudiation, and can download the papers that have been uploaded by Student, as shown in Figure 11.

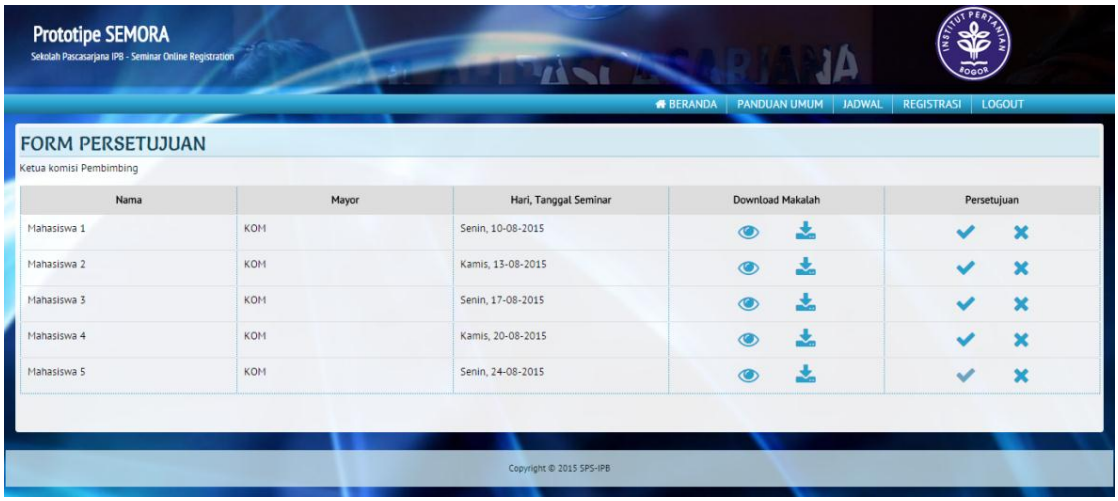

Figure 11 Registraton Consent

B.2 Appointment of moderator

This feature designed for Tendik, after registration and the consent of seminar registration completed, a moderator seminar will be appointed by Tendik, as shown in Figure 12

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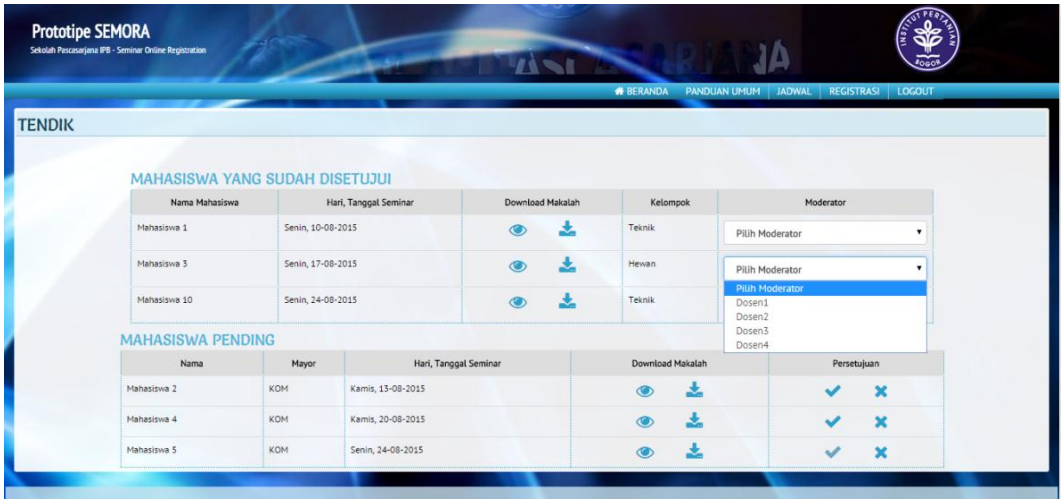

Figure 12 Appoinment Of Moderator

Recommended for future system development

Further research of seminar online registration system development still needed in order to run better and meet all the needs of users, and can accommodate a variety of conditions that might occur.

Registration submission form can be integrated with the cover page of seminar paper format, where approval lecturer and head of study program created in one format to further streamline the approval of the online registration process.

Seminar online registration system can be integrated with seminar attendancy, which would replace the function of the seminar attendance form.

Conclusionand Recomendation

Conclusion

The results of functional observation and data of academic administrative services performed in this study show SIMAK performance is not yet optimal. The main reason is that it does not accommodate most of the academic administrative services needs. The results of the identification of the respondents reflect almost all student respondents (93%) use SIMAK SPs with a low intensity.

Results of questionnaire analysis showed that users strongly agree on the future development of SIMAK with the addition of online features. The result above obtain an average value of 77.1 and 79.3 on the measurement using a Likert scale.

Based on the analysis of academic administration services data transaction stated research seminar registration contribute substantially to the burden of administration services, with an average of 102.8 transactions per month. Therefore, the study performs an analysis and design of a research seminar online registration system with the objective to contribute to the burden academic administrative services reduction.

Seminar online registration prototype that develops in this study still required some additional features, those features including integration with the ongoing registration system, which is presently still done manually. Another features to add is seminar attendance recording and generating a summary report. All of that will make the system more useful and can ease the registration process for the user.

Results of the analysis and design research seminar online registration purposed by this research is expected to reduce the burden on academic

administrative services. Tendik role rearrange to a minimum in the design process of online registration to leverage its functionality.

Recomendation

Implementation of Object-oriented metric on seminar online registration design in future studies is essential. OOM is an appropriate way make measure the product quality, to be more reliable, understandable, and maintainable (Kaur dan Kaur 2013).

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