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Efficient Thesis Management: A Study of Universitas Multimedia Nusantara's Application Development Using Extreme Programming Principles

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Abstract

The objective of this study is to develop and construct a thesis application utilizing the extreme programming approach, and to assess user contentment with the application using the End User Computing Satisfaction measurement technique. The Informatics study program at the Multimedia Nusantara University campus is encountering issues pertaining to the thesis procedure. The problems were identified through interviews with numerous lecturers, students, and the head of the Informatics department's study program at Universitas Multimedia Nusantara. The challenges include the decentralized distribution of information pertaining to theses, obstacles in obtaining thesis proposals, difficulties in obtaining details regarding the research specializations of lecturers, recapitulation of supervisors, and an array of additional issues. Based on these problems, a thesis application was designed and built using the extreme programming development method. The research findings indicate that the application has been effectively developed. The test results reveal that 87.267% of users strongly agreed that the application was highly beneficial in the thesis process.

Keywords: Extreme Programming, Information System, Thesis, Web Application

1. INTRODUCTION

In Indonesia, the term "thesis" refers to an undergraduate research paper that examines a specific problem or phenomenon within a particular field of study, adhering to established academic standards and methodologies [1]. Despite its significance in academic assessment, the thesis process in the informatics study program faces several challenges. Based on interviews with the head and secretary of the informatics study program, significant obstacles include the manual and time-consuming process of mapping lecturers to assess proposals, coordinating trial schedules that align with lecturers' availability, and ensuring that topics match lecturers' areas of interest.

Further interviews with informatics lecturers reveal additional issues in the thesis process. These include difficulties in reviewing thesis proposals, maintaining records of students requesting supervisors, providing necessary signatures due to illegible student messages, and other administrative hurdles. Students from the 2018 cohort, who have completed or are currently enrolled in thesis courses, also report challenges. These include difficulties in selecting supervisors, communicating with potential supervisors, navigating the thesis process, scheduling guidance sessions, and registering for trials.

This thesis addresses these challenges by designing and developing a web application using the Extreme Programming (XP) development methodology [2]. XP is a software development approach that enhances adaptability and flexibility by streamlining various stages of the development process [3], [4]. It covers all aspects of software development, not just coding, and its primary advantage lies in accelerating software production while reducing costs associated with modifications [5]–[7].

Previous research by Adnan Kasim, Lillyan Hadjaratie, and Roviana H. Dai titled "Rancang Bangun Sistem Informasi Skripsi dan Kerja Praktik Berbasis Web" aimed to develop an application to manage thesis and practical work data, thereby supporting the academic administration system in the informatics engineering department at Gorontalo State University. This research employed the prototyping method and utilized the Laravel framework [8].

Building on this background, the current research focuses on designing and developing a thesis management application using the Extreme Programming methodology and the CodeIgniter framework. The application will undergo functionality testing using the black box testing method and user testing through the End-User Computing Satisfaction (EUCS) model to ensure its effectiveness and user satisfaction.

2. METHODOLOGY

Extreme Programming is a software development approach or model that tries to simplify the various stages in the development process so that it becomes more adaptive and flexible. Extreme Programming is not only focused on coding but covers all areas of software development. Extreme Programming takes an 'extreme' approach to iterative development [9], [10]. There are four stages in the implementation of extreme programing. The four stages are as follows [5].

In the initial phase of software development, planning plays a crucial role, involving an in-depth understanding of the business concept and the collection of system requirements. Detailed descriptions of the desired output, features, and

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functionality are outlined, providing the foundation for the subsequent stages [3], [11]. Moving on to the design phase, data gathered during the planning stage, including analysis, system requirements, and desired features, is meticulously crafted using the Unified Modeling Language (UML). This step ensures adherence to standards and serves as a blueprint to guarantee timely completion, budgetary compliance, and alignment with the specifications established in the planning stage [12]. Subsequently, during the coding stage, a dedicated team incrementally translates the system flow, designed in the earlier phase, into software modules [9], [13]. Utilizing the principles of extreme programming, the code is refined through refactoring, enhancing readability and ease of modification. This iterative approach expedites software development. Finally, in the testing phase, the software undergoes rigorous evaluation through beta testing, inviting feedback from users who engage in functional software testing, marking the culmination of the extreme programming method. These four stages of extreme programming can be seen in Figure 1.

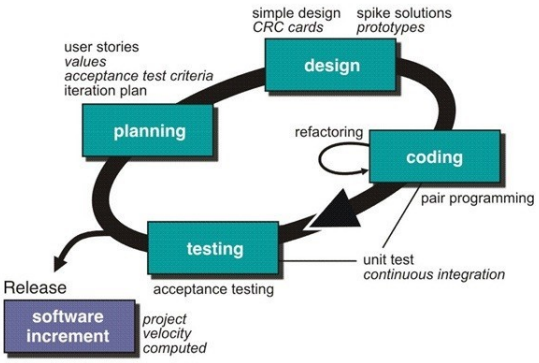

Figure 1. Extreme Programming Framework

The following is a research methodology that will be used in researching the design of the thesis application website with the extreme programming method.

1. Literature Study, Literature study is the examination and analysis of theories that are utilized to provide evidence and support for the given topic. Currently, the research is in the process of gathering information from academic journals and online sources. These sources will be utilized to provide a solid theoretical foundation for the completion of the research.
2. Data Gathering, Data will be gathered from multiple permanent lecturers, the head, and the secretary of the informatics study program at Multimedia Nusantara University, as well as from students who are enrolled in or have completed the thesis courses of the informatics study program class of 2018 at Multimedia Nusantara University. The objective of this data collecting is to identify issues inside an operational system. The data collected will serve as recommendations for application development.

3. Planning, this stage is the first step in extreme programming, at this stage the needs for building this website are planned, where in this system there will be four different users who will utilize this application, namely administrators, study program staff, lecturers and students.
4. Design, In the second stage of extreme programming, a design is carried out based on data obtained from the planning stage such as analysis, system requirements, system output, features and functionality which will be designed using the Unified Modeling Language (UML) which has benefits for modeling systems that already have standards. This stage is used to ensure that the software to be built is completed on time, within budget, and in accordance with the specifications set at the planning stage.
5. Coding, the third stage of Extreme programming will be coding the system; a small team will work in stages with a system flow guide that has been designed at the design stage on a module-by-module basis. By using refactoring, it can be easily read and modified which is a characteristic of the extreme programming method so that the expected results with software development are fast.
6. Testing, the testing stage is the final stage of the extreme programming method which will be carried out by testing using a black box and user satisfaction testing using End User Computing Satisfaction (EUCS) to measure the level of user acceptance.

2.1. End User Computing Satisfaction EUCS

End User Computing Satisfaction (EUCS) is a method for measuring application system user satisfaction by comparing expectations and reality of information systems. The EUCS definition of an information system is a comprehensive assessment based on the experience of information system users in using the system [14], [15]. The EUCS dimensions consist of content, accuracy, format, ease of use, and timeliness. The following is an explanation of each dimension [16]–[18].

1. The content dimension measures user satisfaction based on system content. System content usually consists of functions and modules that can be used by users of the system, as well as information obtained by the system.
2. The accuracy dimension measures user satisfaction in terms of data accuracy when the system receives input and processes it into information, the accuracy dimension measures user satisfaction based on data accuracy.
3. The display dimension (format) measures user satisfaction from the appearance and aesthetics of the system interface, the format of reports or information generated by the system.
4. The ease of use dimension measures user satisfaction according to the usability or user-friendliness when using the system, such as the process of inputting data, processing data, and searching for the required information.

5. The timeliness dimension measures user satisfaction according to the timeliness of the system in displaying or providing the data and information needed by users.

There are several models that have been proposed to measure end-user satisfaction with information systems. The Doll and Torkzadeh model presents 12 evaluation indicators, consisting of five factors (content, accuracy, format, ease of use, and timeliness) which are based on existing results [19].

2.2. Design Application

In the second stage of extreme programming, the application will be designed using a flowchart diagram.

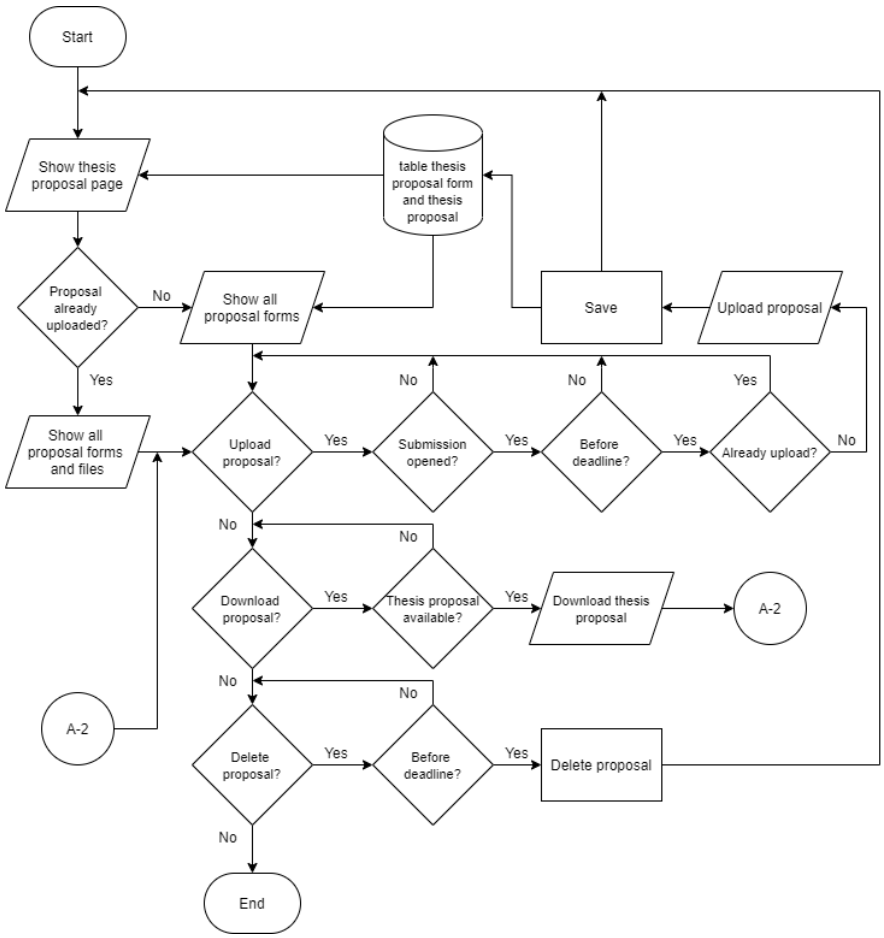

Figure 2. Proposal Submission Flowchart

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Figure 2 depicts the sequential steps involved in the preprocessing of the proposal collection. The application will extract data from the database and thereafter verify if the user has uploaded the file. If the file has been uploaded, it will be displayed in accordance with the form. Otherwise, the proposal collection form will be shown. Students are eligible to submit a thesis proposal if the collection is accessible, provided that they have not exceeded the deadline and have not previously posted a proposal. Uploaded proposals will be stored in the database. If students have not met the deadline, they are able to delete proposal files.

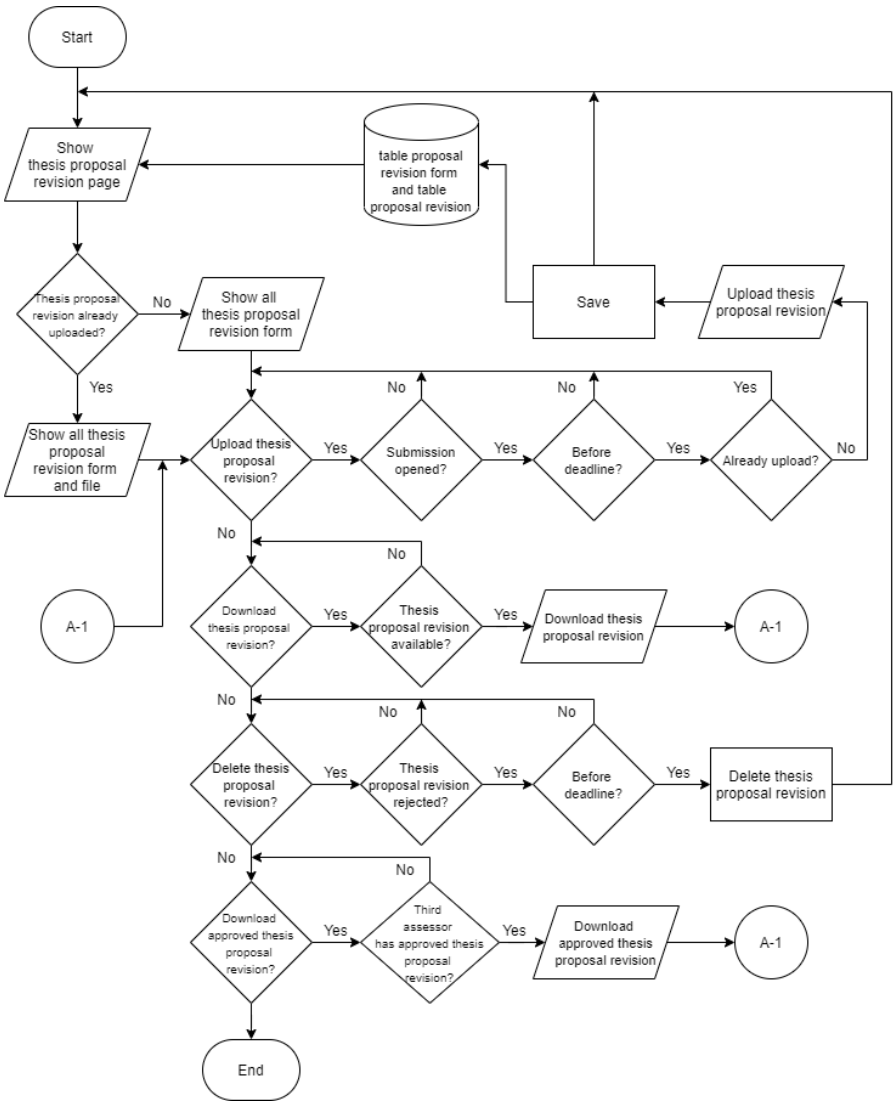

Figure 3. Proposal Revision Flowchart

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Figure 3 illustrates the sequence of steps involved in the preprocessing of the proposal revision. The application will extract data from the database and thereafter verify if the user has uploaded the file. If the file has been uploaded, it will be displayed in accordance with the form. If not, the form for collecting revised proposals will be shown. Students are eligible to gather thesis proposal revisions if the collection is accessible, provided that they have not over the deadline and have not previously submitted a proposal revision. The database will contain the uploaded revisions of the proposal. If the proposal revision file has not met the deadline, students are able to remove it.

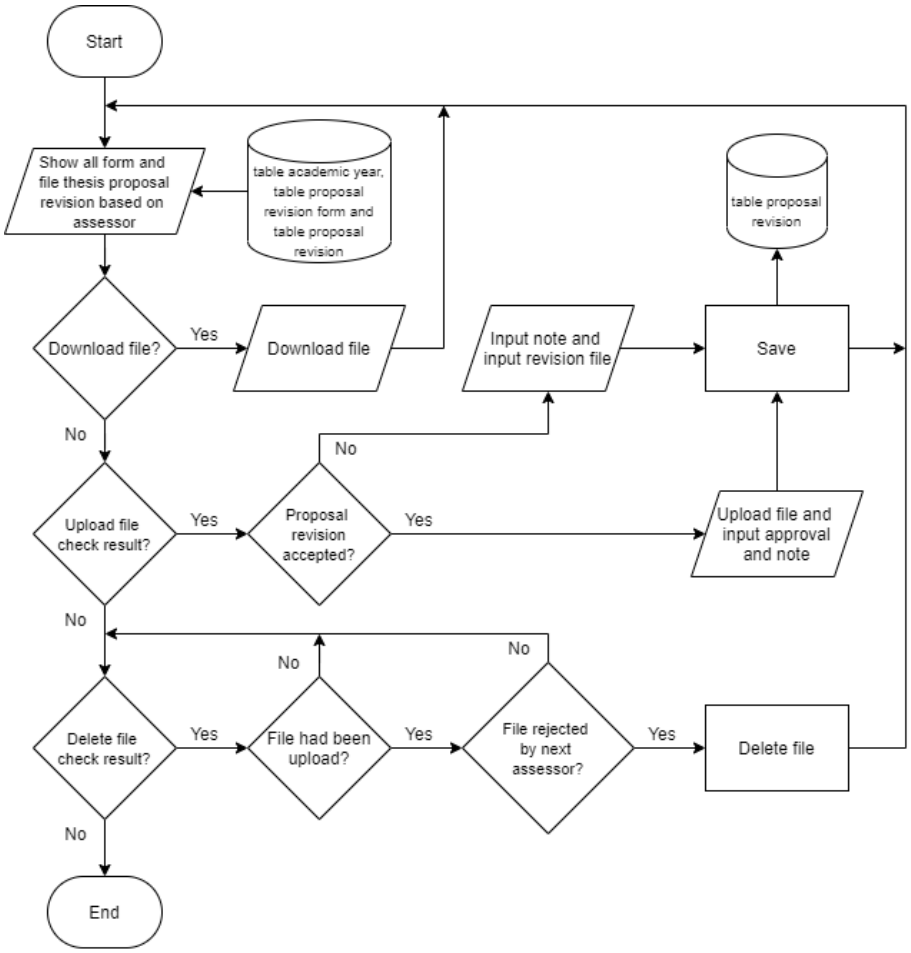

Figure 4. Check Proposal Revision Flowchart

Figure 4 depicts the sequence of steps in the preprocessing of the check proposal revision module. Users have the ability to view the revised thesis proposal for the

purpose of verification, as well as download the file containing the revised thesis proposal for verification. Additionally, users have the option to post the check results. If the assessment result is approved, the user is only required to upload the signed proposal revision file. However, if the assessment result is denied, the user must provide recommendations for improvement. If necessary, the user may also submit a revision file. Users have the ability to erase check results if the file has been uploaded and subsequently denied by the assessor

3. RESULT AND DISCUSSION

3.1. Implementation of the System

The implemented application includes a user-friendly interface for students to submit their thesis proposals, as illustrated in Figure 5. Within the student menu, there is a dedicated page for proposal submissions where students can upload their thesis proposal files. This functionality is available during the open submission period and before the specified deadline. The system allows students to replace their uploaded files by deleting the existing file and submitting a new one, as long as this is done before the deadline. Additionally, students can download their submitted files by clicking on the blue text links provided.

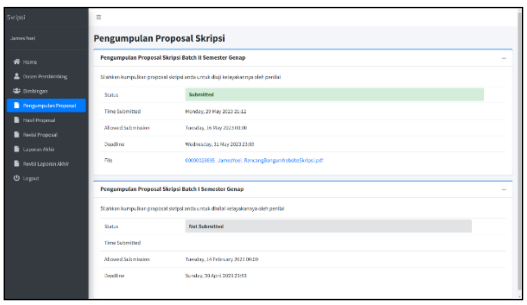

Figure. 5. Proposal Submission Page

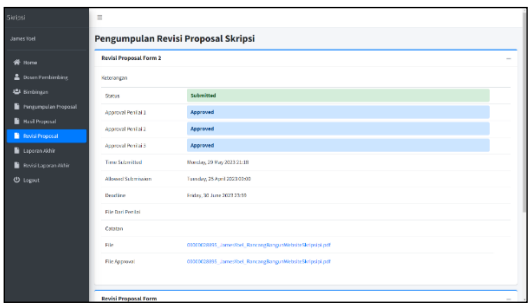

Figure. 6. Revision Proposal Page

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Figure 6 demonstrates the page where students can submit revised versions of their thesis proposals. This feature is accessible when the thesis proposal revision collection menu is active, and the submission deadline has not yet passed. Students can upload their revised thesis proposal files through the provided form. If a revision is rejected by any of the assessors, students can delete the file and upload a new one before the deadline. The system also enables students to track the approval status from assessor 1, assessor 2, and assessor 3. Once approved, students can download the final approved files by accessing the file area and selecting the respective links.

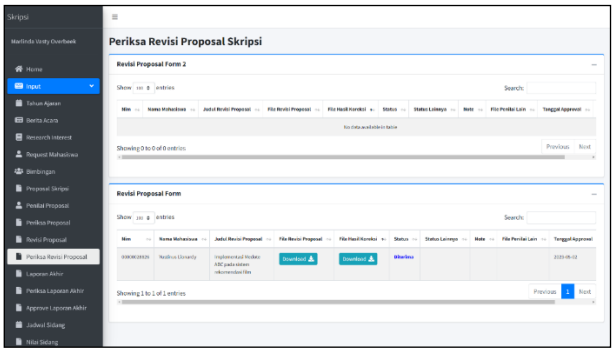

Figure. 7. Check Proposal Revision Page for Study Programs

Figure 7 shows the page designed for reviewing and revising research program proposals. The application presents a comprehensive list of thesis proposal modifications submitted by students or teachers. Users can upload files containing the results of their thesis proposal revisions and provide evaluations indicating whether the revisions are accepted. If a proposal is rejected, users can delete the uploaded file and request further revisions from the student or teacher responsible for the submission.

The application includes a robust evaluation and feedback mechanism. Assessors can provide detailed feedback on each thesis proposal, highlighting areas that need improvement. This feedback is integrated into the system, allowing students to view comments and make necessary adjustments. The iterative process ensures that proposals meet the required academic standards before final approval. The feedback system not only enhances the quality of the proposals but also provides a learning opportunity for students to refine their research skills.

One of the significant advantages of the implemented system is the automation of administrative tasks associated with thesis management. By digitizing the submission, review, and revision processes, the application reduces the administrative burden on both students and faculty. This automation leads to

increased efficiency and accuracy, minimizing the potential for errors and delays. The system's ability to handle large volumes of data and track progress in real-time ensures a smoother and more organized thesis management process.

Overall, the implementation of this application demonstrates significant improvements in the management of thesis proposals. The streamlined submission and revision processes, combined with a comprehensive evaluation and feedback system, enhance the overall efficiency and effectiveness of thesis management in the informatics study program.

3.2. Testing

Once the application has been developed using an extreme programming methodology and has undergone black box testing, a user satisfaction test is conducted to evaluate user satisfaction using the EUCS (End User Computing Satisfaction) method. Table 1 displays the outcomes of a survey conducted with 15 participants, who are lecturer and the head of the informatics study programmes.

Table 1. Questionnaire Results Table

Question	Category	SA	A	N	D	DS
Does the system provide the precise information you need?	Content	8	6	1	0	0
Does the information content meet your need?	Content	8	6	1	0	0
Does the system provide reports that seems to be just about exactly what you need?	Content	7	7	1	0	0
Dose the system provide sufficient information?	Content	5	8	2	0	0
Is the system accurate?	Accuracy	8	7	0	0	0
Are you satisfied with the accuracy of the system?	Accuracy	9	6	0	0	0
Do you think the output is presented in a useful format?	Format	6	5	4	0	0
Is the information clear?	Format	9	4	2	0	0
Is the system user friendly?	Ease of use	4	9	2	0	0
Is the system easy to use?	Ease of use	6	8	1	0	0
Do you get the information you need in time?	Timeliness	6	6	3	0	0
Does the system provide up-to-date information?	Timeliness	9	4	2	0	0

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Subsequently, the Likert scale formula will be employed to compute the percentage score for each category. Table 2 displays the outcome of the calculation of the percentage score.

Table 2. Percentage Score Calculation Results

Category	Score
Content	87,667%
Accuracy	91,333%
Format	86%
Ease of Use	84%
Timeliness	86,667%
Average score	**87.267%**

The overall system success percentage is determined by computing the average of the scores obtained for each category. The total percentage result for all dimensions is 87.267%. Based on the percentage results, it can be inferred that users have a strong consensus that the recommendation system is well-designed and that the programme is highly beneficial and useful in aiding the thesis writing process at Universitas Multimedia Nusantara.

4. CONCLUSION

Based on the completed research, it can be concluded that this thesis application website has been successfully designed and constructed using the extreme programming approach. After the creation of the application website, a user satisfaction test was conducted using the EUCS method. The test involved 15 respondents, including lecturers and the head of the Informatics Study Programme at Multimedia Nusantara University. The survey results indicated a high level of satisfaction, with a Likert scale score of 87.267%. This score suggests that users strongly agree that the thesis application website is highly beneficial and useful for writing theses at Universitas Multimedia Nusantara.

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REFERENCES

[1] N. Kumaladewi, "Pengembangan Sistem Informasi Penjadwalan Kuliah," *Expert J. Manaj. Sist. Inf. dan Teknol.*, vol. 1, no. 1, pp. 150–168, 2011, doi: 10.36448/jmsit.v1i1.419.

[2] W. Istiono and J. Sampurna, "Notification information system android-based for spreading school information," *Telkomnika (Telecommunication Comput. Electron. Control.*, vol. 19, no. 3, pp. 747–753, 2021, doi: 10.12928/TELKOMNIKA.v19i3.18326.

[3] A. Akhtar, B. Bakhtawar, and S. Akhtar, "Extreme Programming Vs Scrum: a Comparison of Agile Models," *Int. J. Technol. Innov. Manag.*, vol. 2, no. 2, pp. 80–96, 2022, doi: 10.54489/ijtim.v2i2.77.

[4] A. Andriani and J. Fernandes, "Designing a Web-Based Inventory Application at General Steel Supplier Using Extreme Programming Method Perancangan Aplikasi Inventory Berbasis Web pada General Steel Supplier Menggunakan Metode Extreme Programming," *Cogito Smart J.* |, vol. 9, no. 1, pp. 15–27, 2023.

[5] A. Shrivastava, I. Jaggi, N. Katoch, D. Gupta, and S. Gupta, "A Systematic Review on Extreme Programming," *J. Phys. Conf. Ser.*, vol. 1969, no. 1, 2021, doi: 10.1088/1742-6596/1969/1/012046.

[6] B. G. Sudarsono, "Using an Extreme Programming Method for Hotel Reservation System Development," *Int. J. Emerg. Trends Eng. Res.*, vol. 8, no. 6, pp. 2223--2228, 2020, doi: 10.30534/ijeter/2020/01862020.

[7] I. Freitas da Silva, "Describing the design thinking and extreme programming activities during a technology innovation academic workshop," *Innov. Manag. Rev.*, vol. 17, no. 3, pp. 267–284, 2020, doi: 10.1108/INMR-03-2019-0039.

[8] A. Kasim, L. Hadjaratie, and R. H. Dai, "Rancang Bangun Sistem Informasi Skripsi dan Kerja Praktik Berbasis Web," *Jambura J. Informatics*, vol. 2, no. 2, pp. 95–107, 2020, doi: 10.37905/jji.v2i2.5331.

[9] L. P. Wanti, O. Somantri, A. Romadloni, and E. Tripustikasari, "Optimization of Extreme Programming Methods in Plastics Waste Management Company Websites," *JISA(Jurnal Inform. dan Sains)*, vol. 4, no. 2, pp. 144–148, 2021, doi: 10.31326/jisa.v4i2.1018.

[10] N. Awaliah, Andryanto Aman, Nur Mustika, Erwin Gatot Amiruddin, and Made Nuryani, "Implementation of Extreme Programming in the Asoka Makassar Integrated Early Childhood Education E-Book Activities," *Ceddi J. Educ.*, vol. 1, no. 1, pp. 28–36, 2022, doi: 10.56134/cje.v1i1.14.

[11] M. Ibrahim *et al.*, "Presenting and Evaluating Scaled Extreme Programming Process Model," *Int. J. Adv. Comput. Sci. Appl.*, vol. 11, no. 11, pp. 163–171, 2020, doi: 10.14569/IJACSA.2020.0111121.

[12] W. ISTIONO, "Analyzing Time and Space Complexity: Kadane vs. Divide and Conquer Algorithms for Maximum Sub-array Problem," *J. Appl. Comput. Sci. Math.*, vol. 17, no. 2, pp. 27–32, 2023, doi: 10.4316/jacsm.202302004.

[13] O. Sohaib, H. Solanki, N. Dhaliwa, W. Hussain, and M. Asif, "Integrating design thinking into extreme programming," *J. Ambient Intell. Humaniz. Comput.*, vol. 10, no. 6, pp. 2485–2492, 2019, doi: 10.1007/s12652-018-0932-y.

[14] S. Anderjovi, M. L. Hamzah, I. Maita, and T. K. Ahsyar, "User Satisfaction Analysis of E-Learning Using End User Computing Satisfaction in Covid 19," in *Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka*, 2023, pp. 1–7. doi: 10.46254/af03.20220502.

[15] N. A. O. Saputri and A. Alvin, "Measurement of User Satisfaction Level in the Bina Darma Information Systems Study Program Portal Using End User Computing Satisfaction Method," *J. Inf. Syst. Informatics*, vol. 2, no. 1, pp. 154–162, 2020, doi: 10.33557/journalisi.v2i1.43.

[16] D. K. Pramudito, S. Arijanti, A. Yanto RUkmana, D. S. Oetomo, and K. Kraugusteeliana, "The Implementation of End User Computing Satisfaction and Delone & Mclean Model to Analyze User Satisfaction of M.TIX Application," *J. Inf. dan Teknol.*, vol. 5, no. 3, pp. 7–12, 2023, doi: 10.60083/jidt.v5i3.383.

[17] M. Azwar, I. Surandari, and H. I. Djohar, "Evaluating The Library Website Of The Indonesian Ministry Of Education And Culture Through The End-User Computing Satisfaction (EUCS) Model," *Libr. Philos. Pract.*, vol. 2020, pp. 1–19, 2020.

[18] T. A. Prasetya, C. T. Harjanto, and A. Setiyawan, "Analysis of student satisfaction of e-learning using the end-user computing satisfaction method during the Covid-19 pandemic," *J. Phys. Conf. Ser.*, vol. 1700, no. 1, 2020, doi: 10.1088/1742-6596/1700/1/012012.

[19] W. A. Putera and I. M. Candiasa, "Analysis of e-learning user satisfaction itb stikom bali using end user computing satisfaction (eucs) method," *J. Phys. Conf. Ser.*, vol. 1810, no. 1, 2021, doi: 10.1088/1742-6596/1810/1/012017.