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Design and Build Financial Information System and Administration of SMK Tunas Harapan West Jakarta using the Extreme Programming Method

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ABSTRACT

SMK Tunas Harapan West Jakarta currently manages a substantial student body of 1,050 active students across various vocational programs. However, its financial and administrative management is still conducted manually using conventional tools such as physical ledgers and standalone spreadsheets. This outdated approach frequently causes delays in data retrieval, difficulties in financial report recapitulation, and high risks of human error during payment processing. Furthermore, this condition is exacerbated by a lack of integration between departments, leading to inconsistent information and inefficient monitoring. To address these critical challenges, this study aims to design and develop an integrated, web-based financial and administrative information system utilizing the Extreme Programming (XP) method. The XP methodology was chosen for its adaptability, involving continuous stages of planning, simple design, pair programming coding, testing, and continuous integration. Data collection techniques included observations, structured interviews, and document studies , followed by an in-depth analysis using the PIECES framework. The developed system is built on the Laravel 12 framework, PHP, JavaScript, and MySQL. It offers comprehensive features such as online student registration, automated billing management, payment verification, and digital receipt generation. Based on Black Box Testing, all system modules functioned perfectly as intended. Additionally, User Acceptance Testing (UAT) conducted with 92 respondents yielded a high user satisfaction rate of 86.49%. In conclusion, this system effectively modernizes the school's administrative workflow, improves financial transparency, and is deemed highly suitable for implementation.

Keyword : *Financial Information System, School Administration, Extreme Programming, Vocational High School, PIECES Method*

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1. INTRODUCTION

The growth of information technology today has brought significant transformations in the education sector such that digitization is a key factor to enhance the efficacy of operations, ranging from academic to financial management (Fricticarani et al., 2023). The use of computerized information systems has been proved to enhance the efficiency, transparency, and correctness of data administration in educational institutions (Sasmita Susanto et al., 2020) But the implementation of this technology has not been uniform. One example is SMK Tunas Harapan West Jakarta, which currently has to manage 1,050 active students and continues to receive hundreds of new students every year. Despite managing a sizable scale of students, the administration and finances at this school are still run manually using separate notebooks, physical receipts, and spreadsheets. This conventional system poses serious problems in the form of delays in data search, complicated report recapitulation, and a high risk of human error in calculations. Manual systems are particularly vulnerable to data duplication and archive loss which triggers information inaccuracies in decision-making (Mikraj & Fauzi, 2024). The PIECES (Performance, Information, Economy, Control, Efficiency, Service) method was used as analytical framework to map the essential factors to be addressed to assess these deficiencies. Several previous studies have sought to digitize education administration, including using the Waterfall method (Cipta et al., 2021) and the SCRUM method (Yudhi Putra et al., 2025). In contrast to the research, this study established an integrated information system by employing the Extreme programming (XP) paradigm. XP is extremely ideal to be utilized because to its iterative nature which can adapt fast to the changes in dynamic system demands (Diah et al., 2020).This study is to design and create a web-based financial and administrative information system for SMK Tunas Harapan West Jakarta. The implementation of this system is expected to be able to automate recording, minimize errors, accelerate staff performance, and optimize the transparency of administrative services for students' parents.

2. LITERATURE REVIEW

2.1 School Administration

School administration encompasses a systematic series of managerial processes, including planning, organizing, implementing, supervising, and evaluating all activities within the school environment. According to (Fatoni et al., 2025), this process extends far beyond mere documentation; it is an integral effort to manage educational resources to achieve learning objectives effectively and efficiently. Its scope is exceptionally broad, with financial administration serving as a vital component for budget management and transparent reporting. Consequently, the implementation of information systems has become crucial to support and enhance the effectiveness of school administration in today's digital age.

2.2 School Financial Management

School financial management is a strategic process of financial management that includes the stages of planning, implementation, and reporting and accountability of education funds. According to (Manajemen et al., 2025), this management must be carried out in a transparent and accountable manner so that it can be monitored and audited properly. The main goal is to ensure that the allocation of funds runs efficiently, effectively, and on target to support educational programs. Given the complexity and large number of stakeholders involved, the implementation of information systems is essential. A good system not only makes it easier to record transactions, but also strengthens accountability and increases public trust in the governance of school funds.

2.3 Metode Extreme Programming (XP)

XP is one of the ways of agile development that targets short literacy, active participation of users and ongoing testing. This strategy is extremely ideal for educational information systems since it

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gives the flexibility to alter (Agustiani et al., 2023). In addition, (Halim et al., 2021) also mentioned that XP may build a system that is in accordance with the real demands of users via a fast and flexible development process.

XP is distinct from other agile approaches like Scrum which is also quite popular in education system development. In a research by (Sains et al., 2025), it was shown that the use of Scrum in the construction of School Infrastructure Information Systems increases the efficiency of the team and the quality of the system. Scrum uses phases like sprint planning, daily scrum and sprint retrospective to manage work in an organized and collaborative way.

2.4Management Information System (SIM))

Management Information Systems (SIMs) are computer-based systems designed to provide accurate information to support organizational decision-making. According to (Lough, 2023), SIM integrally integrates technology, data, procedures, and human resources to support various operational and strategic activities. In the school environment, the presence of a driver's license accelerates access and processing of data, such as student administration and financial reporting. This automation facilitates school management in data-driven decision-making, thereby creating more effective, efficient, and accountable governance.

3. METHODOLOGY

This research was carried out at SMK Tunas Harapan, West Jakarta with a focus on the management of financial and administrative information systems. The sampling technique used proportionate stratified random sampling based on the Slovin formula, which produced 92 respondents from a total population of 1,052 people consisting of administrators, treasurers, and parents of students. Qualitative data collection is carried out through the stages of observation, interviews, and document studies to understand ongoing administrative procedures. Problem analysis is carried out using the PIECES (Performance, Information, Economy, Control, Efficiency, Service) method to evaluate the weaknesses of the manual system and formulate new system needs. For software development, this study applies the Extreme Programming (XP) method which is iterative and highly adaptive to change. The XP stages carried out include planning, system design (simple design), coding (pair programming), testing (black box testing), to continuous integration (continuous integration). The system is built on the web using the PHP and JavaScript programming languages, the Laravel 12 framework, and MySQL as the database manager. The system modeling process is visualized in a structured manner using the Unified Modeling Language (UML) consisting of Use Case, Activity, and Class Diagram—as well as the Entity Relationship Diagram (ERD) for the database design.

3.1 Planning

In this early stage, the development team works closely with parents, treasurers, administrative staff, and principals to identify the needs of the system. This need is summarized in the form of user stories, which are then prioritized based on their urgency and value of benefits. Each iteration is focused on developing priority features.

Table 1. User Story

No	Aktor	*User Story*
1.	Admin	• As an admin, I want to manage student data, such as adding, changing and deleting student data. • As an admin, I want to manage my billing data by category, such as adding, changing, and deleting billing data. • As an admin, I want to be able to do the management of the system's users, so that there is no interference from others.
2.	Treasurer	• As a treasurer, I want to create financial reports automatically, so I can more easily see the list of transactions and recap payments without having to rewrite the folio book. • As a treasurer, I want to create a receipt in digital or printed format, so I don't have to write a receipt manually. • As a treasurer, I want to be able to see the transaction history of student payments, so I don't have to look for them again in the folio book.

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3.	Principal	• As the principal, I wanted to get monthly reports in a quick way without having to ask the treasurer.
4.	Parents/ Guardians of Students	• As a parent/guardian of a student, I want to make tuition payments without having to come to school. • As a parent/guardian of a student, I want to register new students without having to have school data.

3.2 Design (Perancangan)

The developers designed the system in a simple yet functional way, building only the features that were really needed at the time. This approach allows the system to remain efficient and easy to develop as the need increases. The design is kept to a minimum, but still meets quality and ease of maintenance standards.

The design stage is an initial overview stage that focuses on translating the planning stage into a design form to ensure that the software is in accordance with the specifications that have been set in the design stage, the design results are in the form of Unified Modelling Language (UML). The development of the school's financial and administrative information system is described in the design of a rough interface, ERD and 3 types of UML, namely, usecase diagram, activity diagram and class diagram.

3.3Development (Pair Programming and Coding)

The system development stage is carried out through the pair programming technique, where two developers work collaboratively in writing code. This method improves accuracy, speeds up the process of identifying and correcting errors, and allows for knowledge transfer between team members. The code is developed based on the user stories that have been planned for the iteration.

In creating a website-based financial and administrative information system for schools, researchers use programming languages such as HTML, PHP, CSS and JavaScript. As for the database used, it is MySQL.

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3.5 System Design Diagram

3.5.1 Use Case Diagram

Use Case Diagrams are used to visualize the main functions of the system as well as the interaction between users (actors) and the information system developed. There are four main actors with specific access rights, namely School Admin, Treasurer, Principal, and Parents/Guardians of Students. School Admins are in charge of managing student data and system user accounts. The treasurer has the authority to validate payments, print receipts, and recap monthly transactions. The xprincipal can monitor the payment summary and

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download the financial statements as evaluation materials. Meanwhile, Parents/Guardians of Students interact with the system to register registration, bill payment transactions, and view payment status.

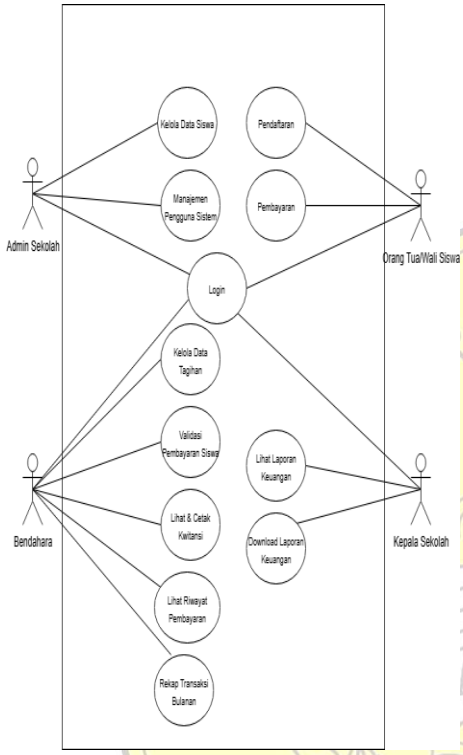

Figure 1. Use Case Diagram

3.5.2 Activity Diagram Login

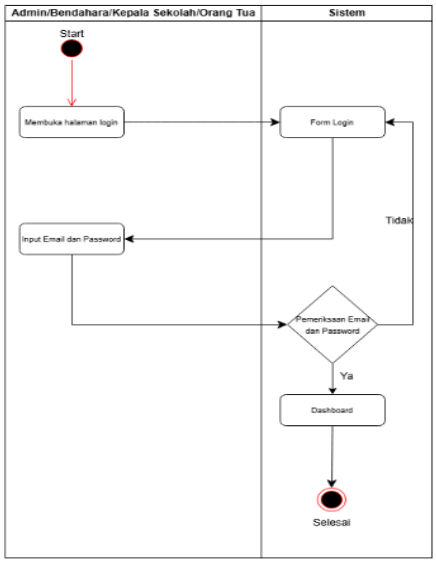

Figure 2. Activity Diagram Login

3.5.3 Activity Diagram Logout

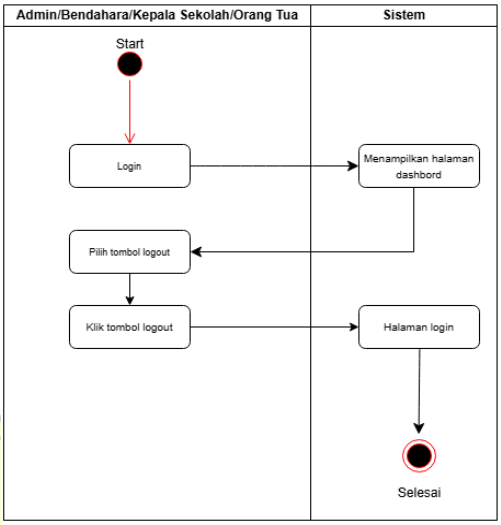

Figure 3. Activity Diagram Logout

3.5.4 Activity Diagram Registration

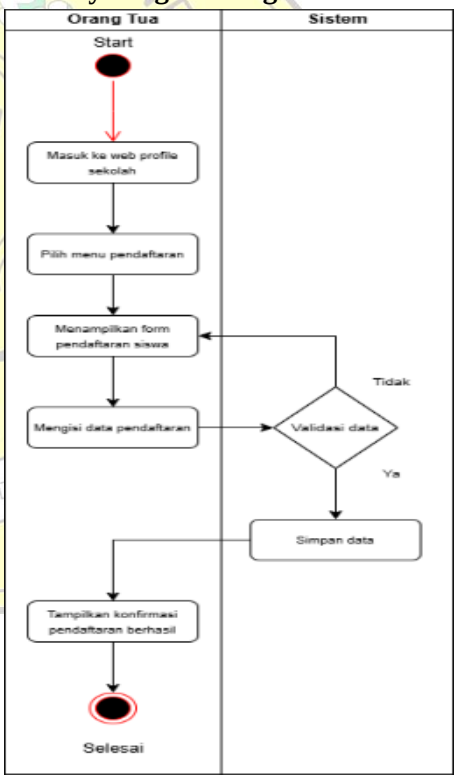

Figure 4. Activity Diagram Registrastion

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3.5.5 Activity Diagram Input Payment

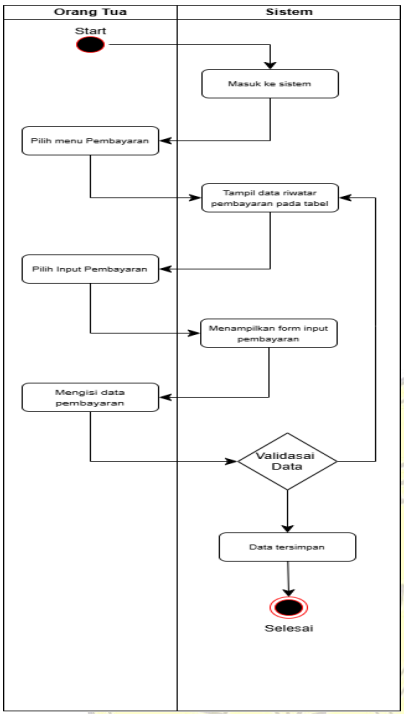

Figure 5. Activity Diagram Input Payment

3.5.6 Activity Diagram Data Studens

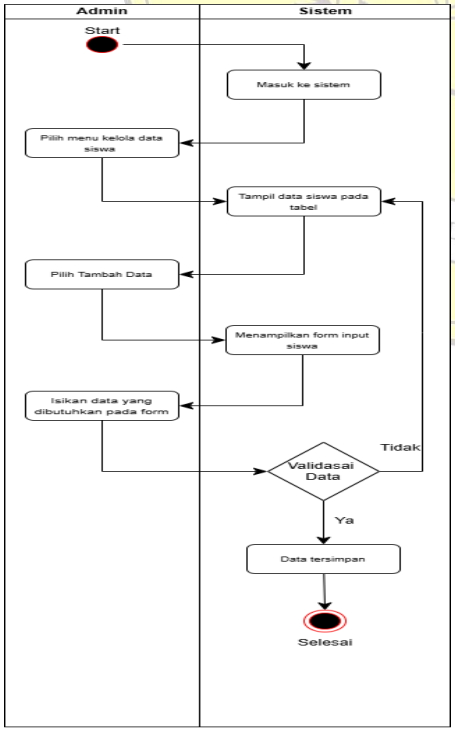

Figure 6. Activity Diagram Data Students

3.5.7 Activity Diagram User Management

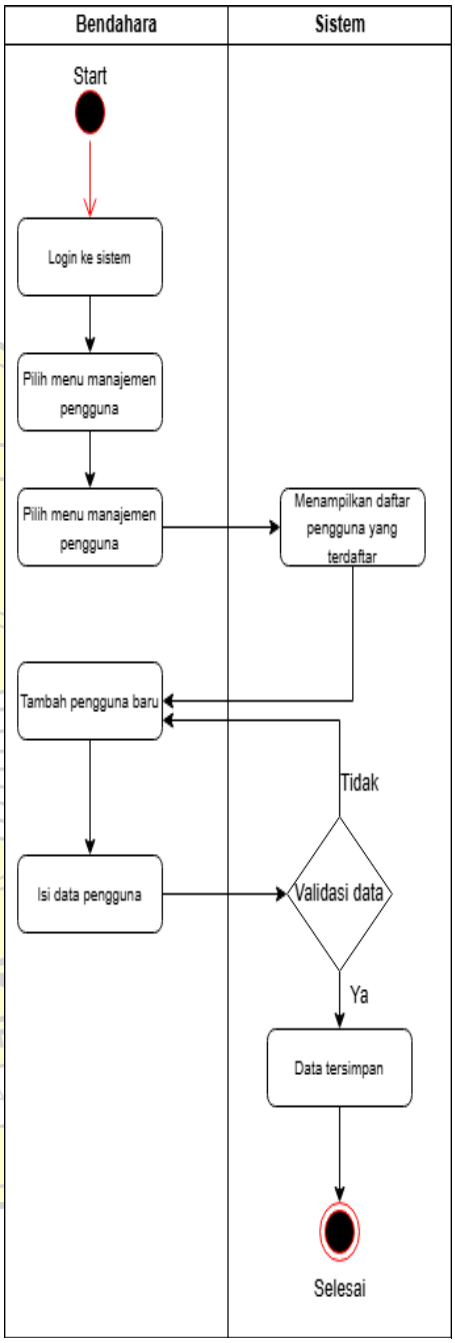

Figure 1. Activity Diagram User Management

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3.5.8 Activity Diagram Kwitansi

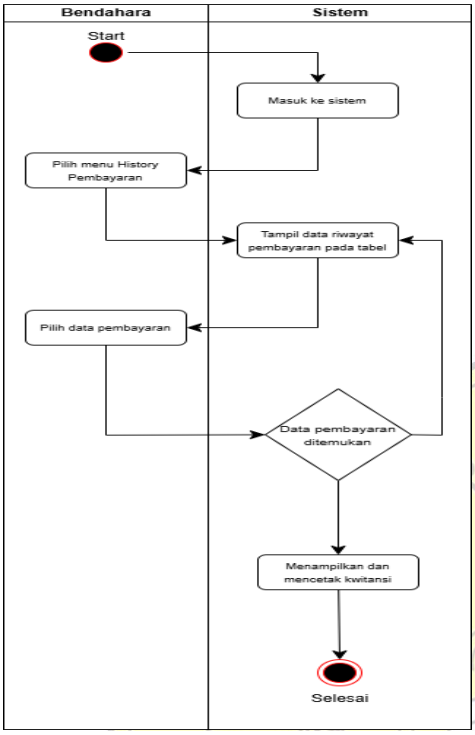

Figure 2. Activity Diagram Kwitansi

3.5.9 Activity Diagram History Payment

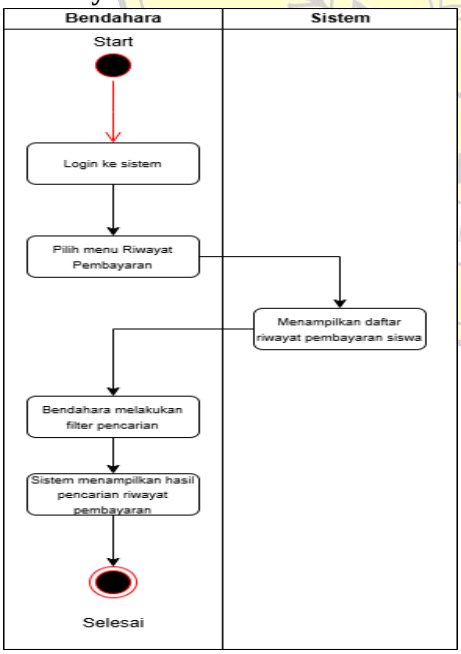

Figure 3. Activity Diagram History Payment

3.5.10 Activity Diagram Recap of Monthly Transactions

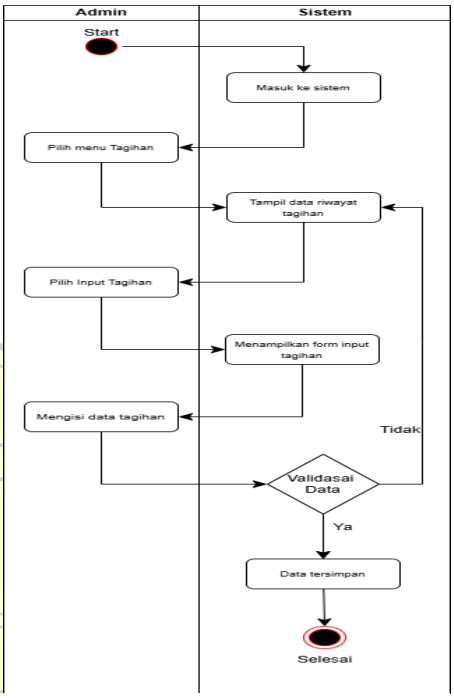

Figure 4. Activity Diagram Recap Of Monthy

3.5.11 Activity Diagram Billing Data Management

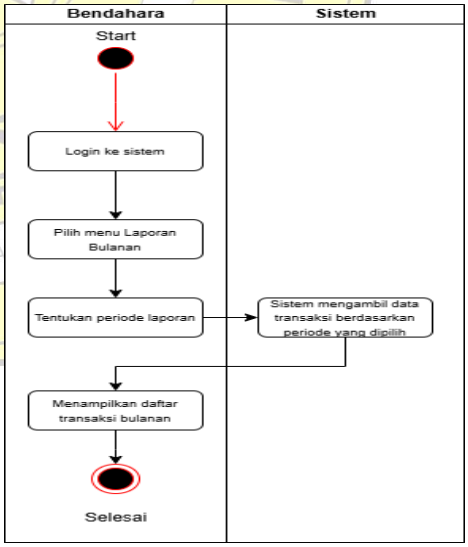

Figure 5. Activity Diagram Billing Data Management

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3.5.12 Activity Diagram Payment Validation

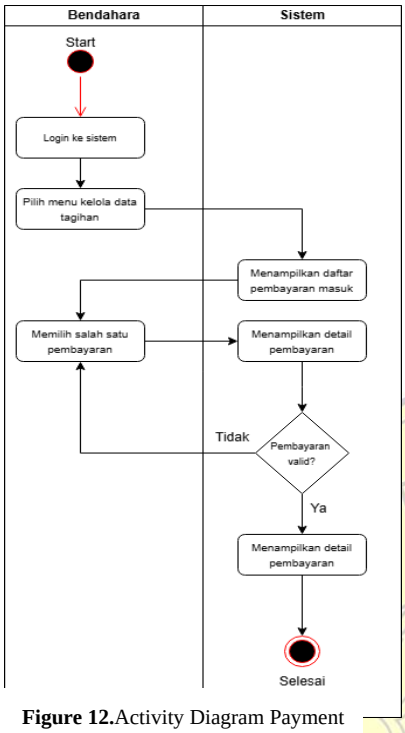

Figure 12. Activity Diagram Payment Validation

Activity Diagram

3.5.13 Report Management

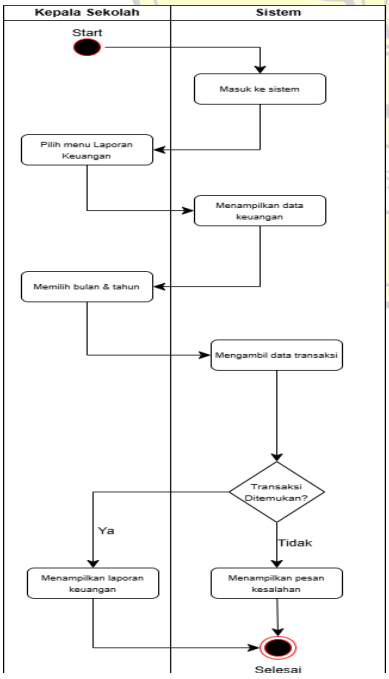

Figure 13. Activity Diagram Payment Validation

4. RESULTS AND DISCUSSION

4.1 System Needs Analysis

The functional needs of the system include recording student administrative data, processing payment transactions, bill management, automated report generation, and setting user access rights. Meanwhile, non-functional needs demand the use of Laravel 12, PHP 8.3, JavaScript, and MySQL 8.0.30. The minimum hardware requires 8 GB of RAM, an Intel i3/AMD Ryzen 3 processor, and a 256 GB SSD. The system also requires 24-hour availability with 95% uptime, role-based security, and intuitive interface design.

4.2 Coding Results

The following is the user interface of the implementation of the website in vocational high schools Tunas Harapan.

1. Home Page Display

Figure 14. Home Page Display

2. Parent Page View

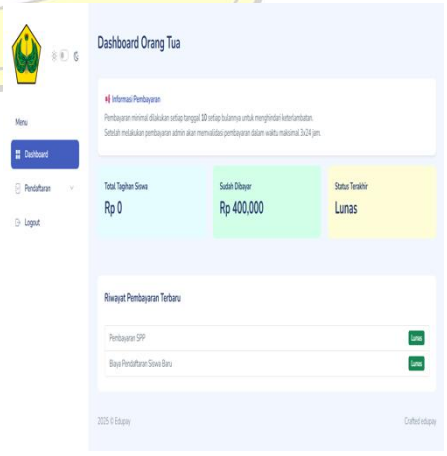

Figure 6. Parent Page View

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3. Treasurer Dashboard View Page

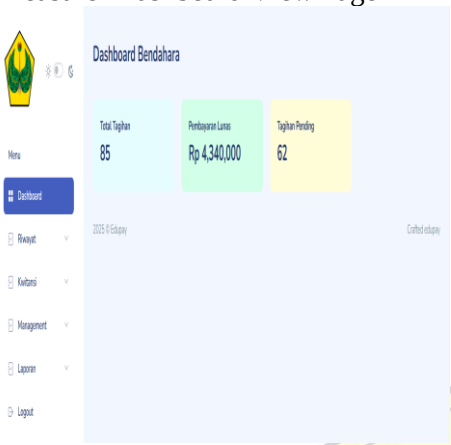

Figure 16. Treasurer Dashboard View Page

4. Entire Payment Billing Data Page

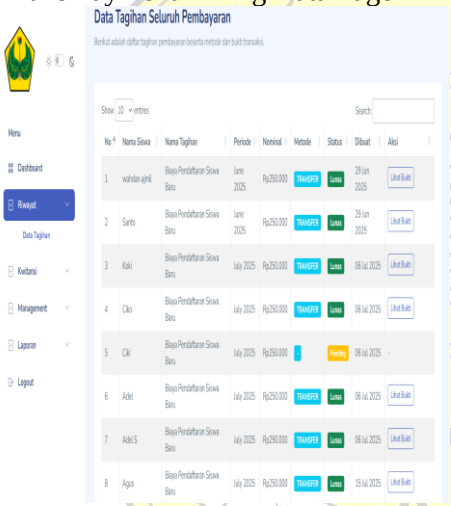

Figure 17. Entire Payment Billing Data Page

5. Payment Receipt List Page

Figure 18. Payment Receipt List Page

Figure 19. Payment Receipt Page

4.3 System Testing

User Acceptance Testing (UAT) is carried out as the final stage of evaluation before the system is fully implemented. UAT involves the school, such as the treasurer and administrative staff, to evaluate the functionality of the system including payment management, transaction recording, and financial reporting. This test was measured using a Likert-scale questionnaire distributed to 92 respondents, and included 7 assessment indicators that have been tested for validity and reliability (Ayuningtyas, 2022). The results of the questionnaire calculation showed that the system acceptance rate by users reached 86.49%. This figure concludes that the information system developed is very well received, meets the eligibility criteria, and is ready to be used to support operations at SMK Tunas Harapan West Jakarta.

Table 2. Weighted Value of Questions

No.	Questions	Rating Scale				
		STS	TS	N	S	SS
1.	The system is easy to use and accessible to users			9	33	50
2.	The interface on the system interface is attractive and easy to understand			10	40	42
3.	The system helps work more efficiently			11	42	39
4.	The system provides clear financial reports			7	46	39
5.	The system helps reduce payment recording errors			10	45	36
6.	Student financial information can be easily accessed through the system			9	46	37
7.	System functions properly without interferenceSystem functions properly without interference			2	4	36

$$\text{UAT Results} = \frac{(0\times1)+(1\times2)+(68\times3)+(296\times4)+(279\times5)}{92*7*5} x100\%$$

$$= \frac{2785}{3220} x100\%$$

$$= 86.49\%$$

5. CONCLUSION

Based on the research findings, the Financial and Administrative Information System at SMK Tunas Harapan Jakarta Barat, developed using the Extreme Programming (XP) method, provides an optimal solution for managing school administration data,

including tuition payments, student registration, and financial reporting. This system facilitates administrative staff in processing data digitally and structurally, thereby reducing the risk of manual recording errors and accelerating information delivery to relevant stakeholders. The use of the XP method has proven to yield an adaptive and focused development outcome through rapid iterations and continuous communication between the developers and the school. Furthermore, the User Acceptance Testing (UAT) results demonstrate a user satisfaction rate of 86.49%, indicating that the system is well-received and effectively fulfills the primary operational needs of the school's financial and administrative management.

BIBLIOGRAPHY

Agustiani, S., Pribadi, D., Dalis, S., Khotimatul Wildah, S., Mustopa, A., Bina Sarana Informatika Jl Kramat Raya No, U., & Jakarta Pusat, K. (2023). Pengembangan Sistem Informasi Akademik untuk Meningkatkan Efektivitas Pengelolaan Data pada SMK Mihadunal Ula. *Jurnal Rekayasa Perangkat Lunak*, *4*(1). http://jurnal.bsi.ac.id/index.php/reputasi

Fatoni, M. H., Fatimah, M., Santoso, B., & Syarifuddin, H. (2025). *Peran Administrasi Sekolah dalam Meningkatkan Efektivitas Operasional dan Kualitas Pendidikan Islam mengelola berbagai proses penting seperti penyusunan anggaran , penjadwalan kelas , dan*. *3*(1).

Fricticarani, A., Hayati, A., R, R., Hoirunisa, I., & Rosdalina, G. M. (2023). Strategi Pendidikan Untuk Sukses Di Era Teknologi 5.0. *Jurnal Inovasi Pendidikan Dan Teknologi Informasi (JIPTI)*, *4*(1), 56–68. https://doi.org/10.52060/pti.v4i1.1173

Halim, Z., Muhammadiyah HAMKA Jl Tanah Merdeka No, U., Rambutan, K., Rebo, P., & Timur, J. (2021). PENERAPAN SISTEM INFORMASI AKADEMIK DENGAN METODE EXTREME PROGRAMMING. *Sistem Informasi |*, *8*(1), 66–74.

Lough, B. J. (2023). Social development. *Encyclopedia of Macro Social Work*, *3–3*(2), 2214–2223. https://doi.org/10.7810/9780908912964_6

Manajemen, I., Sekolah, B., & Meningkatkan, D. (2025). *IMAMAH : 3*(1), 20–24.

Sains, J. I., Teknologi, D., Aulia, H., & Dedi Irawan, M. (2025). *IMPLEMENTASI METODE SCRUM DALAM PENGEMBANGAN SISTEM INFORMASI SARANA DAN PRASARANA SEKOLAH*. *9*(1).

Sasmita Susanto, E., Hamdani, F., & Tari, Y. (2020). Sistem Informasi Administrasi Keuangan Sekolah Berbasis Web (Studi Kasus: Smk Al-Kahfi). *Jurnal Informatika, Teknologi Dan Sains*, *2*(1), 7–14. https://doi.org/10.51401/jinteks.v2i1.553

Yudhi Putra, M., Ismiyana Putri, D., & Safei, A. (2025). *Sistem Informasi Pembayaran Biaya Pendidikan Berbasis Web Menggunakan Metode SCRUM Pada SMK Kota Bekasi*. *19*(1).