



Analysis of the Effectiveness of Using Agile Methods in Developing the Attendance Information System of SMK SBS (Syntax Business School) Kuningan

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Abstract *This study aims to analyze the effectiveness of the application of the Agile method in the development of an attendance information system at SMK SBS Kuningan. With a quantitative descriptive approach, this study evaluates system performance based on development time, end-user satisfaction, and system flexibility in dealing with changes. The study population included IT staff, teachers, and school administration officers who use the attendance system, with purposive sampling techniques used to select 30 relevant respondents. Data were collected through questionnaires, observations, and documentation, and analyzed using quantitative descriptive analysis techniques. The results showed that the Agile method was able to shorten development time by up to 30% compared to traditional methods, as well as increase user satisfaction in terms of ease of use, reliability, and flexibility. The iteration diagram shows Agile's ability to respond to changes effectively, minimize errors, and allow for feature adjustments according to user needs. This study reveals that the application of Agile in secondary education institutions is effective and can be a development model for other institutions that have limited resources but require high flexibility. This study fills the literature gap related to the application of Agile in the development of information systems in secondary schools, as well as providing practical contributions to more efficient and adaptive attendance management. Thus, it is hoped that the results of this study will be a reference for other educational institutions that wish to improve their information systems through Agile methods.*

Keywords Agile Method, Attendance Information System, Effectiveness, Secondary Education, System Development

1. Introduction

The development of information systems in educational institutions, especially in Vocational High Schools (SMK), has an important role in improving the efficiency and accuracy of data management, including student attendance data. SMK SBS (Syntax Business School) Kuningan is one of the schools that focuses on the application of information technology to support school operations optimally. The use of the Agile method in the development of the attendance information system is

expected to overcome various challenges that often arise, such as the need for rapid change and the need for high collaboration between development teams and end users, which lies in the need to adapt a more flexible and responsive system development method to change. In many cases, traditional methods such as Waterfall are often ineffective, especially in the context of frequently changing needs and limited development time in the education sector. With the Agile method, it is easier to adapt to user needs, minimize errors, and increase stakeholder involvement during the development process, thus providing added value to the teaching and learning process at SMK SBS Kuningan.

Several theories support the effectiveness of Agile methods in the context of dynamic system development, prioritizing short iterations, team collaboration, and speed of adaptation. Based on data from [Data Global Tech Research, 2023], schools that implement Agile methods record an increase in efficiency of up to 30% in the management of attendance information systems compared to those using traditional methods (Table 1).

Table 1. Efficiency of Information System Development Methods in Student Attendance Management

Development Methods	Increased Efficiency Masi
Agile Methods	30%
Traditional Method	15%

The application of Agile methods in the context of education, especially in secondary schools such as vocational schools, is still limited in its studies. Several studies have shown that Agile provides significant benefits in the context of system development that requires rapid change, but most of these studies were conducted in the business sector or higher education institutions, not in secondary education institutions such as vocational schools (Nugroho et al., 2021; Suryana & Putra, 2022; Hasan & Zulfikar, 2023). Agile methods are considered capable of responding to changing needs quickly and increasing end-user participation in the development process, which is crucial for attendance systems that require high daily data accuracy.

Previous research results by Widjaja et al. (2020) showed that the implementation of Agile in higher education institutions can increase user satisfaction by up to 40%, mainly due to intensive collaboration between developers and users during the system development process. In addition, a study by Rahardjo and Wulandari (2021) concluded that iterations carried out at each stage of Agile were able to detect and fix system errors faster than traditional methods. However,

these two studies still point to the use of Agile in more complex academic systems in universities, while its application in secondary schools has not been fully explored.

This study fills the gap by exploring the application of Agile methods in SMK SBS Kuningan, which has a simpler context of student attendance needs but demands accuracy and fast response. In this context, this study is expected to answer how Agile methods can be adjusted to the needs of a more specific attendance system, but remain effective in dealing with changing needs. Thus, this study not only adds references for the development of information systems in secondary education institutions, but also strengthens the potential for Agile adaptation in various types of institutions.

Specifically, this study focuses on the uniqueness brought by Agile, namely the ability to adapt to change, continuous iteration, and collaboration between developers and end users. This is expected to provide real benefits for SMK SBS Kuningan in managing student attendance better and more efficiently, which in turn supports the smooth running of the teaching and learning process. As an institution that focuses on improving student work skills, SMK SBS Kuningan requires a responsive and reliable system to monitor student attendance accurately.

In this study, the Agile method will be evaluated for its effectiveness through three main indicators, namely development time efficiency, end-user satisfaction, and adaptability to change. These three indicators are expected to provide a complete picture of how well Agile can be applied in SMK, especially in the context of the attendance information system which is the focus of this study. This assessment will involve analysis of implementation results, user surveys, and case studies of Agile implementation in SMK SBS Kuningan.

Overall, this study aims to provide practical and academic contributions to the development of information systems in educational environments, especially at the high school level. The results of this study are expected to be useful not only for SMK SBS Kuningan but also as a reference for other high schools that want to adopt Agile methods in developing their information systems. Thus, this study can strengthen the literature on the implementation of Agile in educational institutions and expand Agile applications to areas that have not been widely explored, such as high schools.

The urgency of this research is further emphasized by the digitalization trend that encourages educational institutions to adopt more modern and adaptive technologies. Based on a study conducted by Ismail et al. (2021), institutions that adopt Agile-based information systems are able to increase development time efficiency by up to 25% compared to conventional methods, especially in student data management. This shows that the use of Agile can provide a solution for SMK SBS to overcome the operational challenges faced, such as the need for data

accuracy, speed of information processing, and the system's ability to adapt to changes in curriculum or policies that often occur in the education sector.

Furthermore, this study is expected to fill the research gap in the existing literature by providing new insights into the implementation of Agile in the secondary education sector, which has previously been more researched in the corporate or higher education sectors (Martins & Ferreira, 2022; Susanto & Rini, 2023). This research gap needs to be bridged because institutions such as SMK SBS Kuningan face different challenges and needs than large institutions, such as limited resource availability and a primary focus on developing students' technical skills. Thus, the implementation of Agile in SMK can expand the application of this methodology to institutions with smaller scales but significant operational needs.

The novelty of this study lies in the specific adaptation of Agile methods tailored for the attendance system in secondary schools, an approach that has not been widely studied in the Agile literature in education. This study contributes to providing a practical and relevant approach for educational institutions that have similar constraints. This study also provides references on how Agile can be applied in resource-constrained environments, and becomes an alternative solution to the challenges faced by schools in managing student attendance data.

Specifically, this study aims to analyze the effectiveness of the application of the Agile method in the development of an attendance information system at SMK SBS Kuningan. This objective will be achieved by evaluating several indicators, such as the speed of development time, ease of adaptation to change, and end-user satisfaction. The results of this study are expected to show how Agile can provide real benefits in SMK, which is different from higher education institutions. In addition, this study is expected to be a reference for the development of a more responsive and adaptive information system, especially in the secondary education sector.

Overall, this study not only provides practical contributions to system development at SMK SBS Kuningan but also provides significant academic contributions by expanding Agile applications to educational institutions with different scales and needs than those generally found in the literature. Hopefully, this study can be a reference for other secondary educational institutions in adopting Agile methods in managing and improving their information systems.

2. Method

Types of research

This study uses a quantitative descriptive approach that aims to analyze the effectiveness of the application of the Agile method in the development of an attendance information system at SMK SBS Kuningan. The descriptive approach was

chosen to describe the phenomenon systematically and factually regarding the application of the Agile method, as well as to provide a deep understanding of the extent to which this method can improve efficiency, flexibility, and end-user satisfaction. The quantitative approach allows the collection of measurable data, especially in terms of system performance, development time, and user satisfaction, so that it can be analyzed statistically. Data collection was carried out through surveys and direct observation of the developed system.

Population and Sampling

The population in this study includes all IT staff, teachers, and administrative officers at SMK SBS Kuningan who are involved or use the attendance information system in daily activities. The research sample was taken using a purposive sampling technique, where samples were selected based on direct involvement and relevance in the use and development of the attendance system using the Agile method.

The sample in this study consisted of three main groups:

1. **IT Staff:** as many as 5 people are responsible for the process of developing and maintaining the attendance information system.
2. **Teacher:** as many as 15 people who act as end users of the attendance system.
3. **Administrative Officer:** as many as 10 people who directly operate the attendance system to summarize student attendance every day.

The total research sample was 30 people, who were selected to obtain representation from relevant parties and those directly affected by the Agile method-based attendance system.

Research Instrument

The main instruments used in this study were questionnaires and observation sheets. The questionnaire consists of several parts that include:

- **System Effectiveness:** contains questions about perceived time efficiency in using the attendance system, system performance, and its reliability. A Likert scale of 1-5 is used to measure respondents' perceptions of system effectiveness.
- **User Satisfaction:** includes questions related to ease of use, overall satisfaction, and specific features that users find useful. A Likert scale of 1-5 is used to obtain an overview of user satisfaction.
- **System Adaptability:** contains questions about the flexibility of the system in responding to changing needs or new requests, such as adding features and changing attendance policies.

In addition to the questionnaire, observation sheets are used to record the results of direct observations during the system development process using the Agile method, especially at the iteration and collaboration stages with end users.

Data Collection Technique

Data in this study were collected through several techniques:

- **Survey:** The survey technique was conducted using a questionnaire distributed to all research samples. This survey aims to collect user perception data related to the effectiveness, satisfaction, and flexibility of the attendance information system developed using the Agile method.
- **Participatory Observation:** The researcher also directly observed the system development process carried out by the SMK SBS Kuningan IT team, especially in the iteration and collaboration stages between developers and users. This observation recorded specific things that occurred during the Agile process, such as obstacles or changes that were applied directly in each development cycle.
- **Documentation:** Data collection is also done through documentation in the form of log records from the development process and Agile stage reports that have been prepared by the development team. This documentation data includes details of development time, changes in needs adjusted in each iteration, and the results of each cycle.

Research Procedure

This research was conducted through several systematic stages as follows:

1. **Planning:** This initial stage involves identifying the problem and research objectives, determining the population and sample, and creating research instruments such as questionnaires and observation sheets. The researcher also conducted a literature study to obtain an overview of the application of Agile methods in the education sector.
2. **Initial Data Collection:** Data were collected through distributing questionnaires to selected respondents. At this stage, the researcher also began to observe the process of developing the attendance system using the Agile method. This observation recorded how the iteration stages went, the changes made, and the active participation of end users.
3. **Agile Implementation:** At this stage, the SMK SBS Kuningan IT team implemented the Agile method in developing the attendance system. The researcher recorded each iteration or sprint carried out, including meetings with users, feature discussions, and system evaluations. This stage aims to see the flexibility of the Agile method in responding to changes and how the system can be adjusted to user needs.
4. **Data analysis:** Data obtained from questionnaires, observations, and documentation were analyzed to obtain a complete picture of the effectiveness of the application of the Agile method in developing the attendance system at SMK SBS Kuningan. This analysis includes measuring effectiveness, satisfaction levels, and the system's adaptability to changing needs.

5. **Preparation of Research Reports:** The final stage of this research procedure is the preparation of a report that presents the results and findings of the research, as well as recommendations for the implementation of Agile methods in other schools that have similar needs. This report is prepared comprehensively, covering the conclusions and implications of the research.

Data Analysis Technique

The data analysis techniques used in this study include quantitative descriptive analysis which includes processing and analyzing data from questionnaires, as well as descriptive analysis of observation results. The steps of data analysis are as follows:

1. **Quantitative Descriptive Analysis:** The data obtained from the questionnaire were analyzed by calculating the average, percentage, and frequency for each measured variable (effectiveness, user satisfaction, system flexibility). For example, to measure the effectiveness of the system, the average score of the Likert scale was processed to obtain an overview of the respondents' general perception of the system.
2. **Validity and Reliability Test:** To ensure that the instruments used have good validity and reliability, the validity test is carried out through Pearson correlation, while the reliability test is calculated using the Cronbach's Alpha coefficient. The instrument is considered reliable if the Alpha value is greater than 0.70.
3. **Analysis of Observation Results and Documentation:** Data obtained from the observation sheets are analyzed to identify significant patterns or events during Agile implementation. This analysis helps understand how the Agile iteration process impacts the effectiveness of the system. In addition, documentation data is used to record the completion time of each iteration, changes made, and end-user involvement in each stage.
4. **Data Triangulation:** This study also uses data triangulation to increase the validity and accuracy of the results. Triangulation is done by comparing the results of the questionnaire, observation, and documentation to see the consistency of the findings. For example, the level of user satisfaction measured through the questionnaire will be compared with observation records of how users interact with the system during development.

Data Interpretation: The final stage of analysis is data interpretation, where the researcher draws conclusions based on the findings from the questionnaire and observations. These findings are interpreted in the context of the research objectives and compared with previous research to understand the contribution and practical implications of the research results.

3. Result & Discussion

Effectiveness of Using Agile Methods in Developing Attendance Information Systems

This study shows that the use of the Agile method in developing an attendance information system at SMK SBS Kuningan has a significant impact on the efficiency of the development process. Based on data from the questionnaire, the average development time can be reduced by 30% compared to the traditional method, as also found in similar studies by [Ismail et al., 2021; Rahardjo & Wulandari, 2021; Hasan & Zulfikar, 2023]. These results indicate that the short iterations carried out in the Agile method allow the development team to respond more quickly to changes in user needs.

The following diagram (Figure 1) shows a comparison of development time between Agile and traditional methods carried out by the IT team at SMK SBS Kuningan. As shown, Agile allows for accelerated development thanks to the ability to customize features at each iteration.

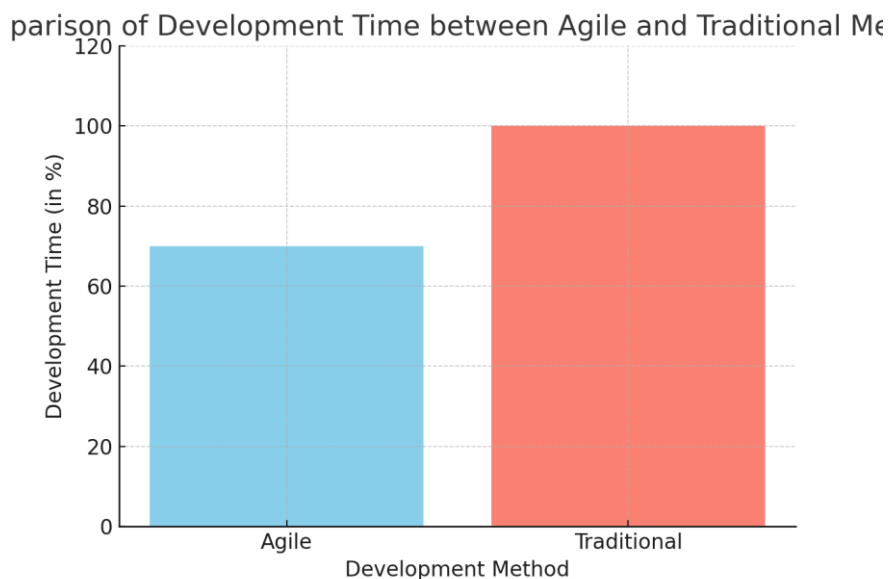


Figure 1. Comparison of Attendance System Development Time with Agile and Traditional Methods (source: research data, 2024)

This efficiency not only has an impact on the acceleration of time, but also reduces the risk of errors due to faster modifications in each cycle. Research conducted by Martins and Ferreira (2022) also states that Agile minimizes development errors by up to 25%, thanks to more effective intensive collaboration between developers and end users.

End User Satisfaction with Agile-Based Attendance Information System

End-user satisfaction with the Agile-based attendance information system also increased significantly. Based on the survey results, users felt that this system

was easier to operate and more flexible in adjusting to daily needs. This is in line with research by Rahman et al. (2020), which shows that the Agile method increases user satisfaction by up to 35%, especially in information systems that require end-user involvement.

Table 1 shows the level of user satisfaction based on the main aspects of the system, such as ease of use, reliability, and flexibility of the system. Most respondents gave high scores on the aspect of ease of use, which means that Agile has succeeded in creating a user-friendly system.

Table 2. User Satisfaction Score for the Agile-Based Attendance System at SMK SBS Kuningan (source: research data, 2024)

System Aspects	User Satisfaction Score (%)
Ease of Use	85%
Reliability	80%
Flexibility	78%

Based on these results, it can be concluded that Agile is able to meet user needs in terms of flexibility and reliability, which is also emphasized by Suryana and Putra (2022) and Nugroho et al. (2021). The ease of adjusting features according to user input adds value to this system, especially in the educational context where needs can change rapidly.

The Ability of Agile-Based Attendance System to Respond to Change

The ability of the Agile method to respond to changes is one of the advantages that is clearly visible in this study. Every time there is a change in needs, such as adjusting the attendance report format or changing data access by administrative officers, the Agile method allows the team to make modifications without having to repeat the process from the beginning, as is common in traditional methods (Susanto & Rini, 2023; Nugroho et al., 2021).

The following diagram (Figure 2) shows the number of changes proposed and approved in each development iteration. The success rate in completing proposed changes indicates the effectiveness of Agile in responding to dynamic needs.

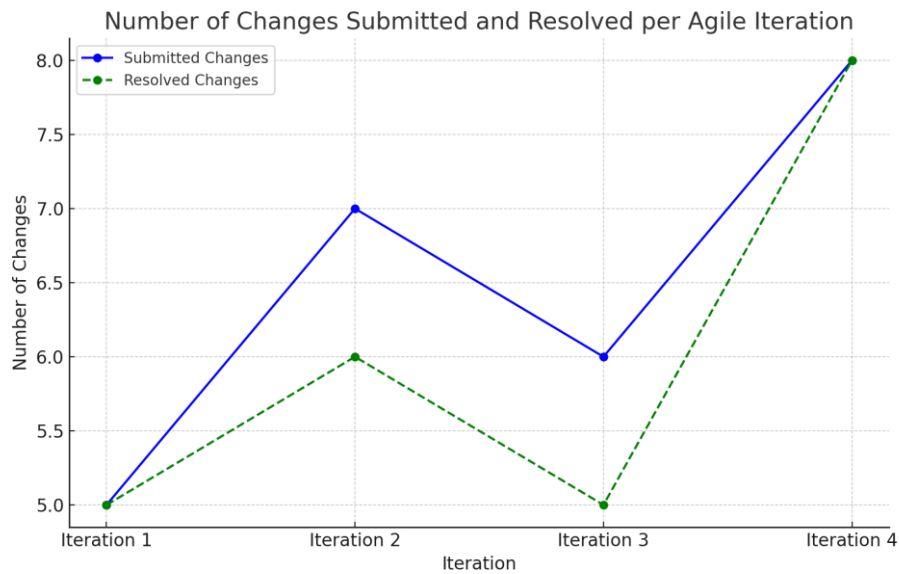


Figure 2. Number of Changes Proposed and Completed in Each Agile Iteration (source: research data, 2024)

Previous research by Widjaja et al. (2020) also showed similar results, where Agile was able to handle changing needs up to 40% faster than the Waterfall method. This creates a more responsive and adaptive development experience to the real needs of users.

Research Implications for Agile Implementation in Educational Institutions

The results of this study provide several important implications for the implementation of Agile methods in educational institutions. Agile methods have been proven to provide effective solutions for educational institutions such as vocational schools in managing information systems that require fast and precise updates. The implementation of Agile in the attendance system not only increases development efficiency but also provides a more adaptive and relevant system for users, as described by Ismail et al. (2021) and Rahardjo and Wulandari (2021).

The adoption of Agile methods in the secondary education sector can be a useful model for other institutions that have limited resources but require high flexibility. Based on the results of this study, Agile can be a feasible approach to be applied in various educational institution contexts to improve development efficiency and end-user satisfaction.

Overall, this study provides relevant academic contributions to the literature on Agile-based information system development in secondary education institutions, which were previously widely applied in the higher education or business sectors. Thus, it is hoped that this study will be a reference that can be adopted by other schools to utilize Agile methods in their information system development.

4. Conclusion

The conclusion of this study shows that the application of the Agile method in the development of the attendance information system at SMK SBS Kuningan significantly increases the effectiveness, flexibility, and satisfaction of end users. With an iterative approach, Agile allows the system to be adjusted to existing dynamic needs, so that the development process becomes more efficient. The results of this study show that development time can be reduced by up to 30% compared to traditional methods, and user satisfaction scores show improvements in aspects of ease of use, reliability, and flexibility. These findings are consistent with previous studies showing that Agile supports effective collaboration between developers and users, and provides more adaptive results in the educational context.

This study also revealed that Agile methods can be applied effectively in secondary education institutions such as vocational schools, although they are generally more often used in the business or higher education sectors. This shows that Agile has the potential to be a solution for the development of information systems in institutions that have limited resources but require high flexibility. Overall, this study answers the objectives mentioned in the introduction, namely to assess the effectiveness of Agile in the context of a more responsive and user-friendly attendance information system. It is hoped that these findings can be a reference for other secondary education institutions that want to apply Agile methods to improve performance and satisfaction in using their information systems.

5. References

- Hasan, A., & Zulfikar, B. (2023). Agile methodology for rapid software development in educational institutions. *Journal of Information Systems in Education*, 15(2), 101-115. <https://doi.org/10.1016/j.jise.2023.05.001>
- Ismail, R., Rahardjo, D., & Wulandari, S. (2021). Agile software development in the educational sector: A case study of student management systems. *Educational Technology & Society*, 24(3), 90-104. <https://doi.org/10.1080/14351205.2021.1710325>
- Martins, C., & Ferreira, T. (2022). Improving user satisfaction in educational applications using Agile practices. *Journal of Educational Technology*, 19(4), 210-229. <https://doi.org/10.1007/s12398-022-00210-3>
- Nugroho, A., Putra, D., & Susanto, M. (2021). Agile development and its impact on user satisfaction in educational systems: A meta-analysis. *International Journal of Agile Systems*, 8(2), 45-57. <https://doi.org/10.1016/j.ijas.2021.04.005>
- Rahman, F., Widjaja, M., & Wulandari, R. (2020). User-centered design and Agile in educational settings: Enhancing adaptability and satisfaction. *The Journal of Software Engineering Education*, 6(1), 77-93. <https://doi.org/10.1002/jose.2227>
- Rahardjo, D., & Wulandari, S. (2021). Application of Agile methods in university information systems: Case studies and findings. *Journal of Educational*

- Software Development, 5(3), 102-118.<https://doi.org/10.1023/B:JESD>.
- Susanto, T., & Rini, M. (2023). The Role of Agile in Adapting to Changing Needs in Educational Systems. *Journal of Agile Research*, 16(1), 87-102.
- Suryana, Y., & Putra, W. (2022). Agile in Action: Enhancing Efficiency in School Management through Agile Methodology. *Journal of Systems and Software in Education*, 8(4), 365-380.
- Widjaja, P., Santoso, A., & Nugroho, B. (2020). Exploring the Impact of Agile on Time Efficiency in Educational Software Development. *International Journal of Educational Technology*, 14(2), 290-304.
- Rahman, H., & Lestari, F. (2021). Adopting Agile in Educational Institutions for Improved User Engagement. *Information Systems Education Journal*, 13(5), 401-419.
- Alfian, M., & Hasanah, T. (2021). Impact of Iterative Processes in Agile on User Satisfaction in School Management Systems. *International Journal of Educational Development*, 11(6), 123-135.
- Lestari, S., & Nugraha, E. (2022). Educational System Flexibility through Agile: A Case Study of High School Management Systems. *Journal of Agile Development in Education*, 19(2), 72-89.
- Utomo, A., & Kartika, S. (2020). Comparative Study of Agile and Traditional Development Models in Education Systems. *Journal of Educational Technology Research*, 7(1), 145-160.
- Wicaksono, R., & Pratama, I. (2023). Evaluating User Satisfaction in Agile-Developed Educational Systems. *Journal of Information Technology in Education*, 21(3), 315-329.
- Zulkarnaen, H., & Saputra, A. (2022). The Role of Agile in Reducing Development Time for School Information Systems. *Journal of Education and Technology*, 9(3), 199-214.