THE EFFECTIVENESS OF THE KANBAN METHOD IN DEVELOPING ACCOUNTING INFORMATION SYSTEMS FOR MSMEs

[1]Andhika Anandya[*], **[2]Rini Lestari, [3]Rudy Hartanto, [4]Edi Sukarmanto, [5]Asri Suangga, [6]Lukmannul Hakim Firdaus**

[1,2,3,4,5] Universitas Islam Bandung, [6]Politeknik Negeri Bandung

Email: [1]anandyaandhika@gmail.com[*]

*)Corresponding Author

1.   INTRODUCTION

Data can become valuable when a company or organization implements an information system that facilitates its business needs. An information system is a system used to collect, process, store, and present information required within an organization. The development of accounting information systems is crucial for Micro, Small, and Medium Enterprises (MSMEs) to effectively manage their finances and operations. An accounting information system is essential for managing the business activities of an organization or company. If there are errors in the implementation of an information system that does not align with its business needs, it will undoubtedly impact the decision-making of business actors or owners.

In the Banjaran District, there are approximately 74 household industries of MSMEs (BPS, 2020) that hold significant business potential. PC Persis - Banjaran, an Islamic organization located at 115 Pajagalan Street, Banjaran, plays a crucial role in nurturing numerous MSMEs through its economic programs. The outcome of a Zoom meeting on November 28, 2022, with one of the representatives from the Social-Economic Development Division of Jam'iyyah Persis Banjaran (Agus, 2022) and three business actors from the youth group of Jam'iyyah (Persis Banjaran) revealed that there were around 100 MSMEs under the guidance of PC Persis. This meeting concluded that many of these business actors were still using manual information systems,

relying only on a small portion of technological advantages. Additionally, many business actors did not have systematic purchases, sales, and financial records. Consequently, not only is it challenging to calculate zakat, but even recording sales and purchases (cash inflow and outflow) can be difficult to carry out regularly. It is highly likely that MSME managers or owners are not yet proficient or capable of utilizing technology for business purposes (Putu et al., 2017).

Based on the Zoom meeting, it was explained that business actors, especially in the retail/sales sector, have a need for an accounting application to assist users in recording and managing financial data. This includes sales data, product data, supplier data, and more. The need for an accounting information system that supports business processes also encompasses zakat calculations, which are often overlooked and challenging for computers.

In the context of developing an accounting information system, the primary goal is to support the financial management and accounting processes of MSMEs under the guidance of PC Persis-Banjaran. This was followed up by several youth business groups by developing a systematic financial transaction recording and reporting system through the design of a simple accounting information system. However, they faced a significant initial challenge, which was the urgent need to complete the accounting information system in a very limited time frame. They had a target to achieve within just 3 months, precisely by June 2023.

Confronted with this pressing time constraint and the aspiration to ensure the accounting information system is completed and functions effectively in terms of features and quality, the development team had to consider employing a specialized and efficient system development method.

According to the General Accounting Office, the failure rate of software development projects is 53%. This means that more than half of software development projects do not achieve their intended goals or may not be used as planned (Swords, Simon. 2020). The reasons for the failure of software projects are complex and can include poor requirements, weak project support, political imperatives, excessive optimism, managerial issues, and technical difficulties.

Table 1. Measurement of a Software Development Project (CHAOS REPORT 2020)

Measure	2011	2012	2013	2014	2015
Successful	29%	27%	31%	28%	29%
Challenged	49%	56%	50%	55%	52%
Failed	22%	17%	19%	17%	19%

From the explanation in the table above, we can see that there is still a need for effort to achieve successful outcomes in software development projects. This table summarizes the results of projects between 2011 and 2015 using the definition of success factors: on time, on budget, and with satisfactory results (Dominguez, Jorge. 2021).

The choice of the information system development method is crucial, and it should be based on the project's needs and circumstances. The use of the Kanban method has become quite popular lately, with explanations that its application is acceptable and applicable in the company's information system development process. This is supported by the Annual 'State of Agile' reports, which show that the use of Kanban increased from 31% to 39% in 2015 and from 39% to 50% in 2016. The statement aligns with Ahmad, M. O., Markkula, J., & Oivo, M.'s (in September 2018) explanation that the main motivating factors for adopting Kanban are simplicity, a focus on workflow, and the absence of mandatory iterations.

Major studies indicate a trend of usage, transition, and acceptance from traditional software development methodologies to the Kanban method. Furthermore, Sérgio, P., Beltrão, A. C., & Souza, B. P. De, (2018) found that 'work visibility,' 'control of project activities and tasks,' 'flow of work,' and 'time-to-market' are the main reasons why the Kanban method can be relied upon (Sérgio, P., Beltrão, A. C., & Souza, B. P. De, 2018). Kanban has the potential to enhance efficiency and effectively address time constraints in the realm of software development. The adoption of Kanban methodologies in software development has resulted in better team collaboration, shorter development cycles, and increased overall productivity. Kanban offers a visual way to represent work processes, places restrictions on concurrent tasks (Work in Progress or WIP limits), and facilitates the monitoring and control of workflow (Riaz, 2019).

This research attempts to explain whether the Kanban method chosen by the development team successfully addresses the needs and suitability for the desired results within a limited time.

2.   LITERATURE REVIEW

System Development

System development is a process or a set of activities that provide a detailed description of how a system will operate. System development aims to produce a complete system or software that aligns with user needs (Satzinger J.W., Jackson R.B., and Burd S.D., 2012). Detailed design is expected to yield the final system or software that satisfies users as it addresses their needs (O'Brien & Marakas, 2009).

The stages involved in system development encompass the design of inputs, outputs, and processes. The output design stage aims to determine the outputs used by the system. Good output design aligns with what the user needs. The input stage, as the determinant of the data required by business activities, enables the system to process this data to generate the outputs or reports needed by the user

Kanban Development Method

In information system development, the development method is a critical factor that determines the success of a project. The Kanban method has become a popular choice in information system development due to its flexibility and adaptability. The Kanban method allows development to be done iteratively and incrementally, with a focus on team collaboration and rapid response to changing user needs.

The Kanban method was originally introduced by Toyota as a production control method (Ahmad, M. O., Markkula, J., & Oivo, M., 2018). It is used to manage workflow and visualize the status of work using a Kanban board. The Kanban board, in its simplest form, consists of three main columns: "To Do" (tasks to be done), "In Progress" (tasks currently being worked on), and "Work Done" (completed tasks). This format is highly flexible and can be applied to nearly any project or workflow.

The recommended steps for using a Kanban board are as follows:
1. Ideas: This stage is the beginning of everything. Here, ideas or thoughts emerge through the thinking process, which may or may not materialize into a question or task.
2. To Do or In Progress: After an idea emerges, the question becomes: who will do this work and when will the work start? This is the initial step in turning an idea into concrete action. So, if the idea is going to be executed, it goes into the "To Do" column. When the work has started, it can be moved to the "In Progress" column to indicate that the work is in progress.
3. In Progress/Doing: This is the stage where tasks or work are actually being carried out. The team or individuals responsible will focus on completing this work.
4. Done: After all tasks or work in the project are completed, they are moved to the "Done" column to signify that the work has been successfully completed.

Pull-System Principle on the Kanban board, some columns represent the stages of work, such as "To Do," "In Progress," and "Done." Each task is represented by a card that is moved from one column to the next as the work progresses. A simple format of a Kanban board can be explained as shown in the board below.
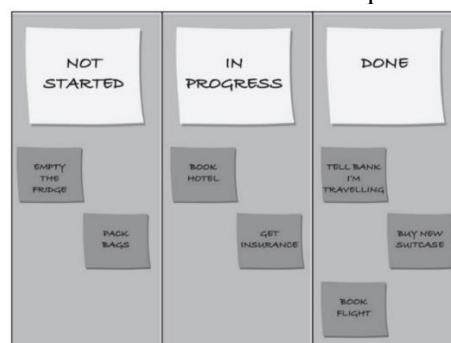

Figure 1. Simple Kanban Board Format
Source: Cole, 2015: 74

By using a Kanban board like this, the team can clearly track the status of each task or work item in their project, ensuring greater involvement and transparency in their workflow. It also makes it easier to identify issues or bottlenecks in the process and take the necessary steps to address them.

3. RESEARCH METHODS

This research employs a qualitative descriptive analysis approach through a case study of the development of a simple accounting information system for MSMEs under the auspices of PC Persis–Banjaran. A case study is an in-depth investigation of a specific social environment, including the people within it.

Data validity in this research is ensured through data triangulation. Data triangulation is a technique for checking the validity of data by using something else outside of the data for verification or as a comparison against the data. Moleong explains that triangulation with sources means comparing and cross-checking the degree of confidence in information obtained through different times and different instruments (Moleong, Lexy J., 2005). Triangulation as a data examination technique is divided into four types (Sutopo, H.B., 2006):

1. Source Triangulation: This involves gathering data from different sources, such as observations, interviews, and document analysis. By combining data from different sources, researchers can ensure that their findings are more accurate and reliable.
2. Method Triangulation: Data collection techniques in method triangulation use different methods to obtain data from the same source. This research uses passive participatory observation, in-depth interviews, and documentation simultaneously from the same data source.
3. Researcher Triangulation: This involves utilizing other researchers for the purpose of rechecking the degree.
4. Theory Triangulation: The final result of qualitative research is an information summary or thesis statement. This information is then compared with relevant theoretical perspectives to avoid individual researcher bias in the findings or conclusions generated.

This research was conducted among business operators within the Jam'iyyah Persis Banjaran community located at Jl. Pajagalan No.115, Banjaran, Bandung Regency, during the period from March to June 2023.

4. RESULT AND DISCUSSION

The application of Kanban in the development of accounting information systems and Zakat calculation allows the development team to visualize the workflow clearly and identify any obstacles or challenges that may arise in the development process. To develop this information system, the team first formulated a schedule for the development of the information system and divided the system requirements and feature development into monthly stages, adjusted to capacity and mutual agreement.

Table 2. System Development Schedule

No	Activities	Month						
		1	2	3	4	5	6	7
1	Application Requirements Analysis			█				
2	Application Design			█				
3	Application Development (Iteration 1)			█	█			
4	Alpha Testing				█			
5	Improvement and Deployment (Iteration 2)				█	█		
6	Beta Testing						█	█

Source : Processed Data, 2023.

Then, after the system development schedule has been agreed upon, the team creates a specific timeline for application development. Effectively, the development team allocates time from March to May.

Table 3. Development Timeline

No	Activities	Month						
		1	2	3	4	5	6	7
2	**Backend API Development** March 6 to March 31, 2023			▓				
3	**Implementation of User Interface in Mobile Programming** March 13 to March 31, 2023			▓				
4	**Integration of UI with API** March 20 to May 26, 2023			▓	▓	▓		

Source : Processed Data, 2023.

Table 4. Developer Team

No	Name	Roles	Jobs to be Done
1	Rifqi Azhar Nugraha	UI Designer	Creating a Wireframe User Interface for all features
2	Hendar	Mobile Programmer	Implementing UI for features: Login, Register, Master Items, Master Users, Master Suppliers, Inventory, Item Procurement, Sales, Invoice Generation, Payments, Notifications, and Settings. Integrating UI with API for features: Login, Register, Master Items, Master Users, Master Suppliers, Inventory, Item Procurement, Sales, Invoices, Notifications, and Settings.
3	Lukmannul Hakim Firdaus	Mobile Programmer	Implementing UI for features: Financial Flow, Debt and Receivable Summary, Zakat, Sales Report, Purchase Report, Inventory Report. Creating Customer Purchase History with features: Financial Flow, Debt and Receivable Summary, Zakat, Sales Report, Purchase Report, Inventory Report.
4	Ilham Muttaqien	Backend Web Programmer	Implementing Backend APIs for all features
5	Ruswendi	Tester	Planning Alpha and Beta Testing

Source : Processed Data, 2023.

The application to be developed in 3 months is a Point of Sales application named "Kaashir," developed by the branch leaders of Persatuan Islam (Persis). This application is designed for mobile devices with the Android operating system. It encompasses the following features:

1. Master Data Management, including customer, product, supplier, and Zakat recipient data

2. Product Procurement
3. Sales Transactions and Invoice Generation
4. Payment Handling, including both immediate and installment payments
5. Simple automated financial recording derived from product procurement and sales
6. Sales activity reporting, including sales reports, inventory reports, and procurement reports
7. Calculation and payment of zakat based on sales transactions

The application's requirement design is depicted through the Use Case Diagram as follows:
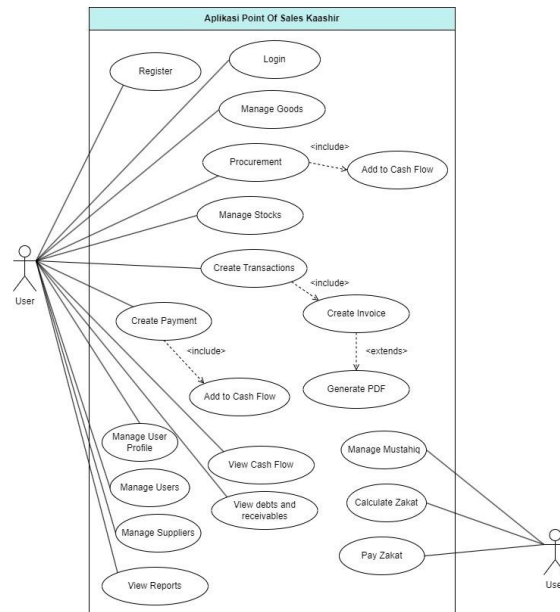

Figure 2. Use Case Diagram
Source : Processed Data, 2023

a. Actors

This application only interacts with one actor, which is the user. The user referred to is the store manager or business owner, who plays the role of the application administrator.

b. Use Cases

Table 5. Use Case Table

No	Use Case	Description
1	Register	The user registers with the system to obtain login credentials.
2	Login	The user logs in to access the system.
3	Manage Master Items	The user manages items, including adding, modifying, and deleting items.
4	Item Procurement	The user initiates item procurement to increase inventory.
5	Add to Financial Flow	The system automatically records incoming and outgoing funds from item procurement or paid sales.

6	Manage Stock Items	The user manages inventory by manually adding or reducing stock and can view the current stock status and history of item movements.
7	Create Transaction	The user records new sales transactions from customers.
8	Generate Invoice	The system automatically generates invoices and displays them to the user.
9	Generate PDF	The system can automatically generate invoices in PDF format.
10	Payments (Option)	The user adds payments for completed transactions, which can be made in cash or through a bank, either immediately or in installments.
11	Manage Customer Data	The user can add, modify, and delete customer data. Additionally, the user can view customer transaction history.
12	Manage Supplier Data	The user can add, modify, and delete supplier data.
13	Manage Zakat Recipient Data	The user can add, modify, and delete data of Zakat recipients.
14	Zakat Calculation	The user can select which transactions to calculate zakat for, and the system automatically performs zakat calculations.
15	Zakat Payments	The user can make zakat payments, either in cash or through a bank, and the system automatically records the expenses in the financial records.
16	View Financial Flows	Users can view financial flows, both in cash and through banks.
17	View Sales Activity Reports	Users can view sales activity reports, including sales reports, procurement reports, and inventory reports.
18	View Debts and Receivables	Users can view a list of debts and receivables. Debts are derived from outstanding procurements, while receivables are derived from unpaid sales.

Source : Processed Data, 2023.

The team can easily view the status of tasks and understand the overall workflow, which enhances transparency and team engagement. Additionally, the Kanban method provides flexibility in managing priorities and quickly adapting to changes in user needs. The team can easily move task cards to columns that correspond to changing priorities or new requirements that arise.
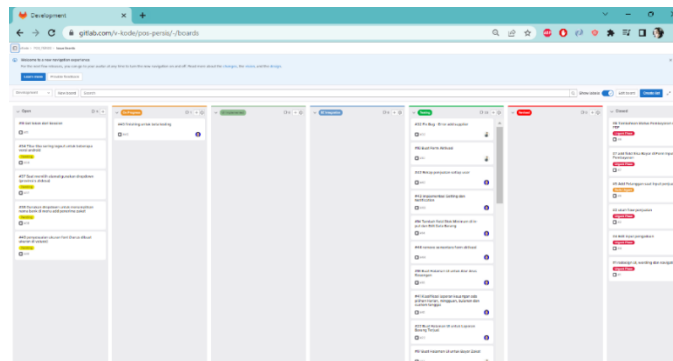

Figure 3a. Kanban Board (Developer Documentation)
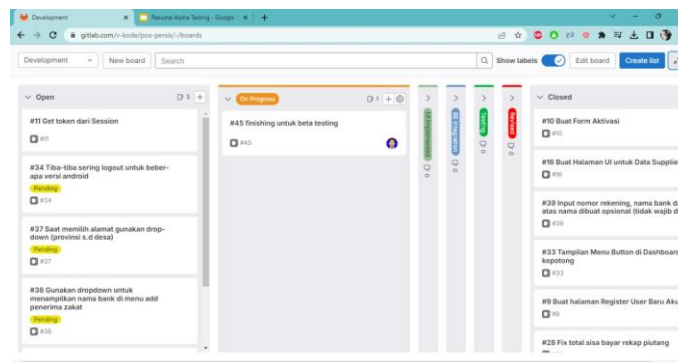Source : Processed Data, 2023

Figure 3b. Kanban Board (Developer Documentation)
Source : Processed Data, 2023

Each task is grouped into 2 milestones:

Figure 4. Milestone Board (Developer Documentation)
Source : Processed Data, 2023

The use of the Kanban method in the development of accounting information systems offers several advantages. First, this method allows the development team to visually see the workflow and the status of tasks clearly. This helps identify obstacles or constraints that may arise during the development process. Second, the Kanban method provides flexibility in managing priorities and quickly adapting to changes in user needs. The team can easily move task cards to columns that align with changing priorities. Finally, the Kanban method enables the development team to focus on ongoing work without being burdened by too many tasks that need to be completed simultaneously.
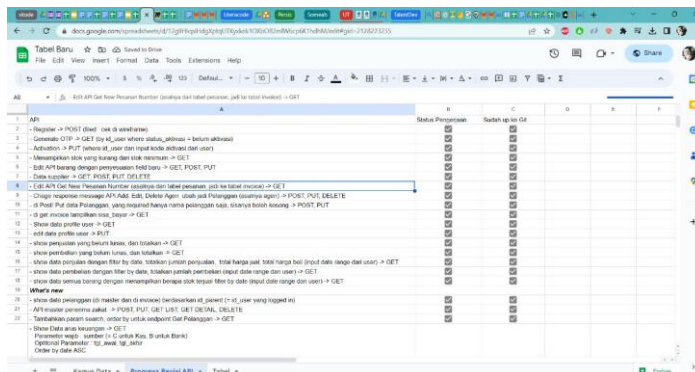
Figure 5. To-Do List (Developer Documentation)
Source : Processed Data, 2023

To test the successfully designed and developed accounting information system, which has been realized in the form of an application named Kaashir, two tests were conducted: alpha testing and beta testing. Alpha testing is a type of user acceptance testing carried out in a limited scope. This testing is performed internally by the development team. Alpha testing aims to discover basic bugs or defects in the product. It checks whether the core functions are functioning properly.

Alpha testing was conducted with 5 business participants from the youth group of Persis Banjaran and took place at the PC. Persis Banjaran office on Saturday, April 15, 2023, from 08:00 to 12:00 WST.

From these points, the research team, assisted by the IT development team from the youth group of PC. Persis obtained feedback for improving the Kaashir application's features, which will be used in the beta testing phase. The feedback for feature improvements is presented in the table below:

Table 5: Proposed Improvements Based on User Interview Findings (Developer Documentation)

No	Revisions	Beta Testing	Next Development
1	OTP saat register tidak tersedia	☑	☐
2	Tampilan navigasi kepotong	☑	☐
3	Tiba-tiba sering logout sendiri	☑	☐
4	Tambahkan kategori/ varian barang di Master Barang	☐	☑
5	Fitur Add Supplier tidak berfungsi	☑	☐
6	Typo penulisan "Nama Perussahaan" di Add Supplier	☑	☐
7	Debug Aplikasi di Tablet	☑	☐
8	Select All saat memilih transaksi di Bayar Zakat	☑	☐
9	Saat memilih alamat, gunakan dropdown Provinsi -> Kab -> kecamatan -> Desa Detail Alamat : RT, RW, No Rumah	☑	☐
10	Gunakan dropdown untuk menampilkan nama bank saat add penerima zakat	☑	☐
11	Input nomor rekening di penerima zakat menjadi opsional	☑	☐
12	Penyesuaian ukuran Font	☑	☐
13	Pencetakan Nota saat transaksi selesai konek ke perangkat printer	☐	☐
14	Klasifikasi Laporan keuangan ada pilihan harian, mingguan, bulanan, tahunan	☑	☐
15	Kurva laporan perjualan secara periodik	☐	☑
16	Rekap penjualan setiap user	☑	☐
17	Ada mode offline untuk aplikasi	☐	☑

Source : Processed Data, 2023.

Based on the results of alpha testing, the author conducted interviews with the 5 participants, which are further explained as follows:

1. Functional testing of the design and development of the Accounting Information System (AIS) resulted in the application named Kaashir.
8. Any 25 out of 26 tested features worked well on smartphones, although there were some notes from the participants.
9. The feature "Add Supplier" did not work.
10. Only 10 out of 26 features could be tested on tablets.
11. The reason was that some features in the data master did not work, so further testing of other features was not possible.
12. Based on user experience, the use of the Kaashir application yielded the following results:
13. Overall, in terms of colour, font size, and layout, all participants gave positive feedback.
14. Only the font size on the tablet was considered too small by users.
15. Features that were easy to use, according to participants, were "Data Barang" (Item Data) and "Stok Barang" (Stock of Goods).
16. The majority did not mention features that were difficult to use.

17. Most participants mentioned that the features "Zakat" and "Pengadaan Barang" (Procurement of Goods) were very helpful for their business activities.
18. The majority of participants mentioned that the advantages of the Kaashir application over others were the "Zakat" feature and the procurement feature. However, the drawback was that it was not supported on tablets, and some found the icons a bit confusing.

The research findings indicate that the implementation of the Kanban method in software development for micro, small, and medium-sized enterprises (MSMEs) under the auspices of PC Persis Banjaran has improved flexibility and development speed. However, developers still face challenges in implementing Kanban, such as the lack of measurable lead time, limited experience and skills in using the Kanban methodology, difficulty in determining specific user requirements, and an inability to effectively measure product quality. While the system's objectives have been achieved, there is still a need for deeper attention to system reliability in terms of errors and system faults, as well as the reliability and security of the accounting information system.

In the context of developing a simple accounting information system for MSMEs under the auspices of PC Persis Banjaran, the use of the Kanban method can provide an appropriate approach. The development team can effectively manage workflow, prioritize tasks, and quickly respond to user needs. Within a limited time frame, such as 2-3 months, the Kanban method helps ensure the effective and efficient achievement of accounting information system development goals.

This study found that the use of the Kanban method in the development of a simple accounting information system resulted in improvements in the effectiveness and efficiency of information system requirements related to data processing, financial transaction calculations, and zakat reporting that were in line with the needs of prospective information system users. This aligns with research by Ahmad, M. O., Markkula, J., & Oivo, M. (2018), and Riaz (2019), which explains that the benefits of using Kanban include customer satisfaction, improved software quality, better lead time delivery, earlier feedback, reduced defect reporting by customers, improved communication among stakeholders, and increased developer motivation (Ahmad, M. O., Markkula, J., & Oivo, M., 2018). Overall, Kanban offers organizations an effective means of managing their development processes and meeting time constraints in software development.

5. CONCLUSION

The research results demonstrate that the application of the Kanban method in the development of a simple accounting information system for micro, small, and medium-sized enterprises (MSMEs) under the auspices of PC Persis Banjaran is quite effective. Within a timeframe of 3 months, the developers successfully completed the requirements for the accounting information system and zakat calculations, in accordance with the initial agreement and on time.

The Kanban method enables information system developers to adapt more flexibly and responsively to changing system development needs. Kanban encourages effective teamwork and coordination among team members, ultimately resulting in increased efficiency and reduced time-to-market for software products. Kanban aids teams in maintaining concentration and efficiency by concentrating on the current workflow and avoiding unnecessary iterations.

This research provides a significant contribution to understanding the application of the Kanban method in the development of simple accounting information systems for MSMEs in the city of Bandung.

Suggestions

Based on the research conducted regarding the accounting information system development method, the following recommendations can be made:

1. Consider Kanban as a Development Method: The findings suggest that Kanban can be a viable option for the development of accounting information systems due to its flexibility in handling changes during the development phase and its ease of measuring the work of each team member.
2. Improvement of Kanban Implementation: To enhance the effectiveness of Kanban implementation, developers should address certain challenges, such as the need for better measurement of lead time, gaining experience and skills in using the Kanban methodology, determining specific user needs, and effectively measuring product quality. Attention to system reliability, error handling, and security in the accounting information system is also essential. These recommendations aim to improve the

adoption of the Kanban method for accounting information system development and address specific challenges encountered during its implementation.

6. BIBLIOGRAPHY

Badan Pusat Statistik Kabupaten Bandung. 2020. "Kecamatan Bojongsoang dalam Angka-Angka 2020.

Dominguez, Jorge. 2021. The Curious Case Of the Chaos Report 2009. IT Project Management, https://www.projectsmart.co.uk/it-project-management/the-curious-case-of-the-chaos-report-2009.php.

Liker, Jeffrey K. 2004. *The Toyota Way*. America: Mc.Grawhill.

Liker, Jeffrey K. dan Michael Hoseus. 2009. *Toyota Culture*. America: McGraw-Hill.

M. O. Ahmad, D. Dennehy, K. Conboy, and M. Oivo. 2018. "Kanban in software engineering: A systematic mapping study," J. Syst. Softw., vol. 137, pp. 96–113, 2018, doi: 10.1016/j.jss.2017.11.045.

M. Skarin. 2015. Real-World Kanban - Do Less, Accomplish More with Lean Thinking.

Moleong, Lexy J. 2005. *Metodologi Penelitian Kualitatif. Edisi Revisi.Cetakan Keduapuluhsatu*. Bandung: Remaja Rosdakarya. 330-331.

O'Brien & Marakas. 2009. Management Information Systems. Ninth Edition.

Portman, Henny. 2021. CHAOS 2020: Beyond Infinity Overview. Project Success Quick Reference Card, https://hennyportman.files.wordpress.com/2021/01/project-success-qrc-standish-group-chaos-report-2020.pdf.

R. Cole, Brilliant. 2015. Agile project management: a practical guide to using Agile, Scrum and Kanban.

Riaz, M. N. 2019. Implementation of Kanban Techniques in Software Development Process: An Empirical Study Based on Benefits and Challenges. *Sukkur IBA Journal of Computing and Mathematical Sciences*, *3*(2), 25–36. https://doi.org/10.30537/sjcms.v3i2.356.

Satzinger J.W, Jackson R.B., and Burd S.D. 2012. *System Analysis and Design in a Changing World Seventh Edition*. Cengage Learning.

Sérgio, P., Beltrão, A. C., & Souza, B. P. De. 2018. *On the benefits and challenges of using kanban in software engineering: a structured synthesis study*. 1–29.

Sutopo, H.B. 2006. *Metodologi Penelitian Kualitatif*. Surakarta: Penerbit Universitas Sebelas Maret.

Swords, Simon. 2020. Why Software Projects Fail & 6 Strategies To Make Them Succeed. Atlas Code. https://www.atlascode.com/blog/why-software-projects-fail.

Versionone. 2016. The 10th Annual State of Agile Survey. Annual State of Agile Survey URI http://stateofagile.versionone.com/.

Versionone. 2017. The 10th annual State of the agile survey. Annual state of agile survey URI https://explore.versionone.com/state-of-agile/versionone-11th-annual- state-of-agile-report-2.