JSiI | Jurnal Sistem Informasi
Vol.10 No.2 September 2023, Hal. 122-127

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

UTILIZING EXTREME PROGRAMMING METHODOLOGY FOR DEVELOPING AN ANDROID-BASED SALESMAN VISITATION APPLICATION IN THE WATER TANK INDUSTRY

Jansen Wiratama[1], Felix Yoto Theoderic[2,] Sobiyanto[3]

[1]*Information Systems, Faculty of Engineering and Informatics, Universitas Multimedia Nusantara*
Scientia Boulevard, Tangerang

[2,3] *Informatics, STMIK Dharma Putra,Otto Iskandar Dinata, Tangerang*

[1] jansen.wiratama@umn.ac.id

[2] felotheo7@gmail.com

[3] sobi_yanto@yahoo.co.id

Abstract

Integrating technology and industries has opened doors to new possibilities, leading to innovative solutions that reshape traditional practices. The water tank industry is an example that has witnessed significant technological influence as companies seek to optimize production processes, improve product quality, and enhance customer interactions. This article focuses on PT Sanggabuana Berjaya Indonesia (SBI), a company operating in the water tank industry in Indonesia. It discusses challenges related to conventional reporting methods for marketing visits and route determination for their marketing team. Previous studies in similar contexts have successfully addressed similar issues using technology, including GPS-based monitoring for location tracking and the development of mobile applications using the Extreme Programming (XP) model. Considering the relevant literature and interview results with SBI's sales manager, an Android-based monitoring application is proposed as a potential solution. The design process follows the System Development Life Cycle (SDLC) with the Extreme Programming (XP) model, covering planning, design, coding, and testing stages. Due to time and resource constraints, further stages of integration, delivery, retrospective, and continuous improvement are left for future work. This research proves that applying the extreme programming model in designing industry applications is quite relevant. The results of the black box testing tested show that all the features in the application can be used as needed.

Keywords*:* Android, Extreme Programming, Mobile-application, Salesman, Water-tank.

I. INTRODUCTION

In today's dynamic industrial landscape, unremitting technological advances have driven transformative changes [1]. Various industries worldwide are embracing technological innovation to revolutionize their operations, increase efficiency and ultimately achieve competitive advantage [2]. This intersection between technology and industry has opened the door to new possibilities, driving the development of solutions that transform traditional practices [3].

One industry that has experienced a significant impact from technology integration is the water tank industry. As the demand for efficient water storage solutions continues to grow, companies in this sector increasingly rely on technology to optimize production processes, improve product quality, and enhance customer interactions [4]. From automated manufacturing processes to intelligent monitoring systems, the use of technology not only simplifies operations but also enhances the overall capabilities of the industry [5].

In developing the water tank industry in Indonesia, there is a company called PT Sanggabuana Berjaya Indonesia (SBI).

 Received: July 24th, 2023 | Published: September 06th, 2023

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

This SBI company is engaged in producing and marketing water tanks under the SBI and Tedmond brands. The salesperson's daily visit reports are still carried out conventionally in the current business process. This reporting process is carried out using the WhatsApp application, which is reported by sending a picture of the marketing staff at the Building Shop during their visit. The weakness of this conventional method is that the Sales Manager cannot verify the location of marketing personnel when sending pictures via WhatsApp, which has the potential for fraud in reporting visits to shops that are distributors of SBI company products. The impact of fraud on the visit report process can result in a decrease in sales. Of course, this risks harming the SBI company's sales target.

In addition to problems related to the process of reporting visits by marketers, SBI Company also needed help determining the route of visits by marketers, so a lot of time was wasted deciding on visits.

Based on previous research, several approaches have been made to overcome problems using technology. A study at one of the private banks in Indonesia has succeeded in proving the use of technology to monitor marketing locations with GPS technology [6]. Furthermore, research conducted on a private campus in Indonesia has also succeeded in optimizing business processes using mobile-based applications developed with the Extreme Programming model [7]. Then the Extreme Programming Model has also been applied to other research objects, such as foreign language courses and training institutes [8]. In addition, the use of technology with the Extreme Programming model has also been proven to facilitate administrative processes, optimize data calculations at schools, and make it easier to authorize reports by school principals [9].

After conducting a literature review on several previous studies relevant to the problems at this SBI company, it was found that the visit monitoring application could solve these problems. Based on the results of an interview with the sales manager of SBI Company, the Android-based application platform is the primary choice because Android smartphones facilitate all marketers.

The Android-based application design process uses the System Development Life Cycle (SDLC) method with the Extreme Programming (XP) model. Of the eight stages in the XP model, this research was only carried out up to the 4th stage: Planning, Design, Coding, and Testing. Whereas stages 5 to 8, namely: Integration, Delivery, Retrospective, and Continous Improvement, cannot be carried out due to time constraints and system development costs [10].

II. METHODOLOGY

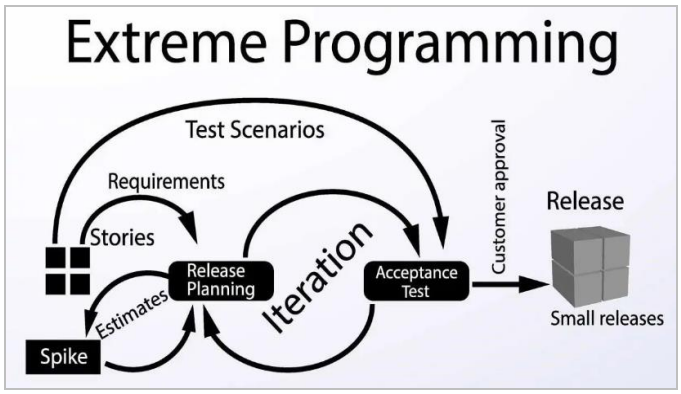

Figure 1. Extreme Programming Model

The application of the SDLC method with the Extreme Programming model is carried out in 4 stages, starting from:

1. **Requirements (Planning):** At this stage, interviews were conducted with marketing staff managers from the SBI Company regarding the feature requirements to be made in the mobile-based application. The results of the interviews were then observed and made into table form to make it easier to understand.

2. **Spike (Design):** The second stage is a design that uses case diagrams to describe the main functions of the designed application [11]. After the use case diagram has been successfully created, it will be followed by creating an activity diagram derivative of the use case diagram. The activity diagram in this application is made to show the activities of each role and the functions it has [12].

3. **Release Planning (Coding):** In the third stage, coding is carried out using the Dart programming language developed by Google and is the primary language used in developing applications with the Flutter framework [13]. The Flutter framework was developed to build consistently rich and attractive user interfaces (UI) across multiple platforms such as iOS, Android, web, and desktop from a single source code. Some of the advantages of the Flutter framework, which are the reasons why this framework was chosen in this study, are: Flutter offers several benefits that make it a popular choice for cross-platform app development: Single Codebase, Multiple Platforms: Develop once and deploy on multiple platforms like iOS, Android, web, and desktop, saving time and effort. Flutter, a cross-platform framework, stands out with its ability to develop multiple platforms from a single codebase, delivering customizable and smooth user interfaces. Its unique features, like Hot Reload for instant code changes, are complemented by an engaged

 Received: July 24th, 2023 | Published: September 06th, 2023

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

community and the Dart programming language's versatility for both the front and back ends. Flutter ensures a native-like experience through its expressive widgets, adhering to platform design standards. At the same time, its open-source nature and rapid development tools make it an accessible and efficient choice for creating high-quality applications [14].

4. **Acceptance test (Testing):** The final stage carried out in this research is testing the functionality of the application using the User Acceptance Test (UAT) method with the Black box testing model [15]. The expectations from the test results with the black box testing model are the main features of the system which become user requirements to get valid results and function as needed.

III. Results And Discussion

In the initial planning stage, the research focused on extracting three fundamental requirements from the subject of the study, namely the SBI companies. These essential needs emerged from insights gained through interviews, as illustrated in Table 1, which depicts the immediate necessities identified.

Table 1. User Requirements

No	User Requirements
1	The application can be accessed by two user roles: Managers and marketers.
2	The application can display the name of the distributor shop.
3	The application can determine the route of visit according to the shortest distance.

Transitioning to the subsequent design stage, the formulation of use case diagrams and activity diagrams took precedence. This phase delineated two distinct roles within the application: sales managers and salesmen. The two roles are imbued with disparate functions, elucidated in Figure 2 below:

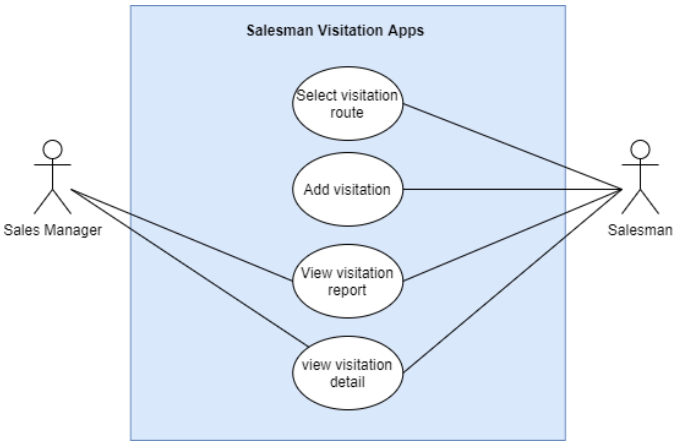

Figure 2. Proposed Use Case Diagram

The Sales Manager actor is endowed with a more confined role, primarily centered around monitoring sales performance activities. The Sales Manager Actor's repertoire encompasses perusing visitation reports and delving into visitation particulars. Conversely, the Salesman actor's responsibilities align closely with the Sales Manager's, augmented by two additional pivotal functions: the ability to select visitation routes and facilitate visitation input.

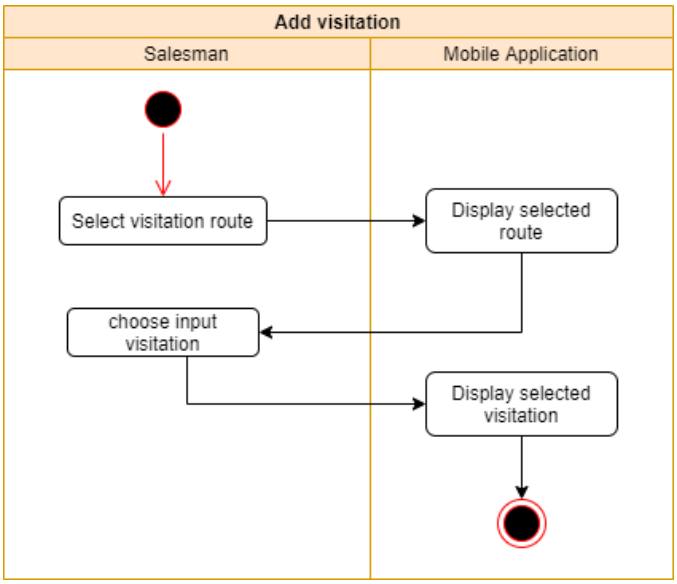

Figure 3. Activity diagram of Salesman

The orchestration of interactions and flow between the user (salesman) and the system is illustrated by the activity diagram in Figure 3. User-initiated input processes solicit responses from the system, subsequently manifesting in the form of the selected display. The user initiates the journey at the start node, culminating at the system's endpoint.

Received: July 24th, 2023 | Published: September 06th, 2023

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

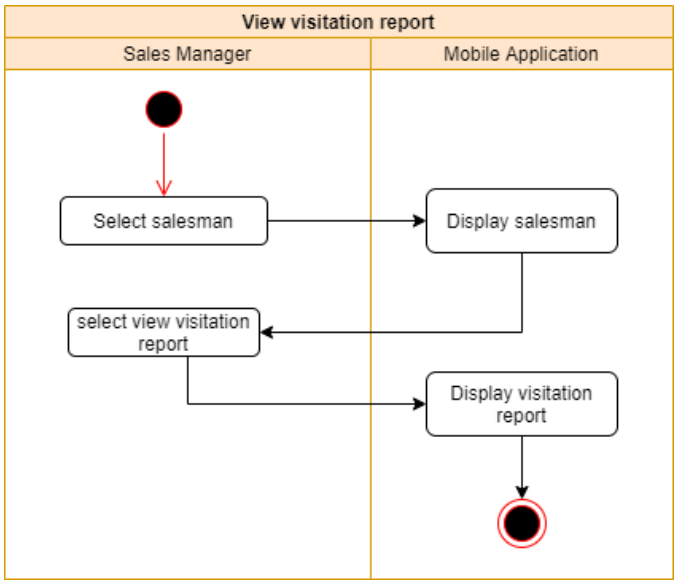

Figure 4. Activity diagram of Sales Manager

Figure 4 shows the view visitation report process that the sales manager can do for salesmen through the application. The sales manager can choose which salesmen want to see the results of their activities in visiting water tank distributors. The results of the visitation report can also be validated and printed in pdf format.

In the third phase of implementing the Extreme Programming (XP) model, the coding process uses the Dart programming language within the Flutter framework. This coding task is executed using Visual Studio Code (VSCode) version 1.63, with the necessary environment facilitated by the Dart plugin, the Flutter framework, and a dark-themed interface. Illustrated in Figure 5 is a snapshot of the coding interface:

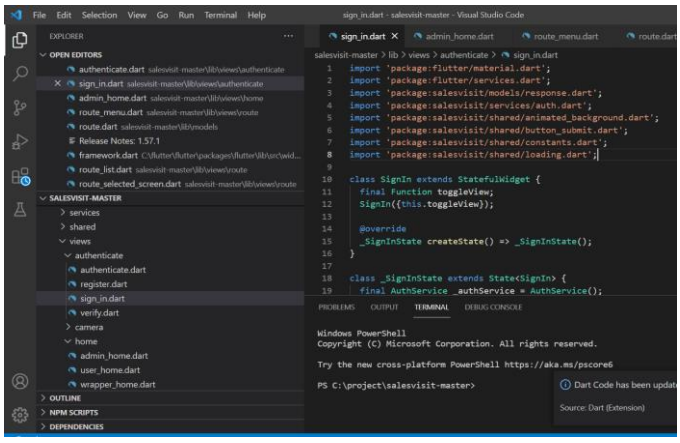

Figure 5. Programming Environment using VSCode.

The culmination of the design and coding stages yields the tangible manifestation of the Application User Interface (UI), which encapsulates information crucial to salesmen during their visits to distributor stores for water tanks. The UI incorporates diverse displays, exemplified in Figures 6 and 7 below:

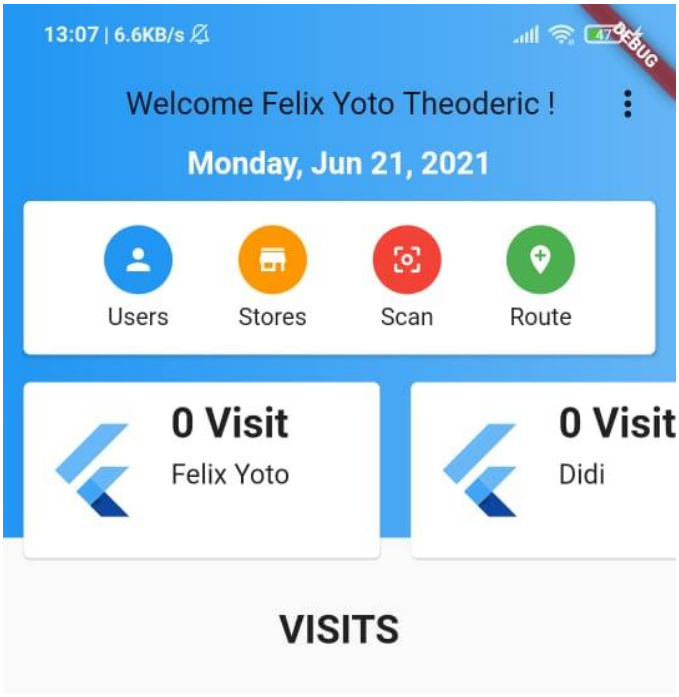

Figure 6. Mobile apps dashboard

The dashboard UI operates as a comprehensive hub of critical information for salesmen, presenting a spectrum of crucial insights that include detailed user profiles, distributor store particulars, the convenience of QR code scans facilitating visit entries, and exhaustive route details. This foundational feature ensemble receives an added enhancement layer through the real-time presentation of the most up-to-date visitation statistics attributed to each salesperson. This real-time data accessibility empowers Sales Managers with swift and immediate access to these performance metrics, facilitating prompt decision-making.

Furthermore, this application introduces an ingenious route selection feature, which runs parallel with the dashboard's adeptness in delivering all-encompassing insights into salesperson profiles. This capability bestows salesmen with the agency to meticulously optimize their daily visit routes, effectively streamlining their operations. Significantly, this functionality is complemented by the added convenience of Sales Managers being able to contribute their preferences to the route selection process, fostering a harmonious alignment between salesmen and managerial strategies.

The UI in Figures 6 and 7 is a tangible illustration of actual implementation on an Android smartphone, particularly the Redmi 8 Pro model, characterized by a screen resolution of 1080 x 2340 pixels. This visually immersive presentation affirms the UI design's adaptability and seamless

 Received: July 24th, 2023 | Published: September 06th, 2023

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

compatibility with the intricate specifications of a specific device configuration, underscoring the application's versatility across various mobile platforms.

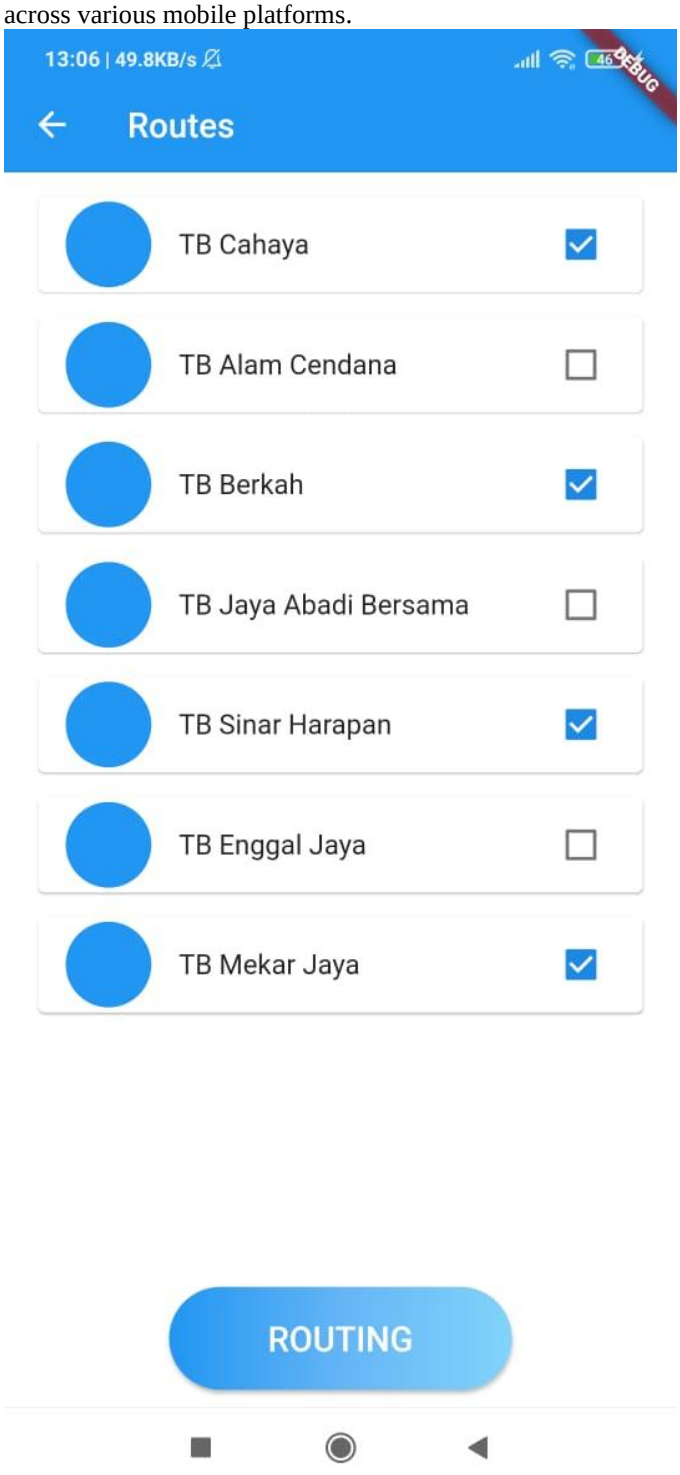

Figure 7. Visitation Routes

Culminating in the conclusive phase of the research, meticulous testing was undertaken to employ the black box model to assess the core features' functionality within the application. Conducive to rigorous evaluation, six users—comprising five salesmen and one Sales Manager—conducted ten tests. These tests yielded valid outcomes indicative of the application's robustness and reliability. The comprehensive results of the black box testing regimen are comprehensively outlined in Table 2.

Table 2. Black box testing results

No.	Scenario test	Expectation from results	Results
1	The Sales Manager inputs the username and password.	Login admin page (Sales Manager)	Valid
2	The Sales Manager adds a new user (marketer).	Displays new Salesmen on the list	Valid
3	The Sales Manager defines new customer coordinates.	Displays the coordinates of the distributor's location	Valid
4	The Sales Manager adds a new customer.	Shows new distributors on the subscriber list	Valid
5	Sales Manager View Salesmen visit report.	Shows a list of salesmen visit reports	Valid
6	Sales Manager View location Salesperson visit report does not match customer location.	The system offers a sign if it exceeds a 30-meter radius of the location	Valid
7	The Salesmen input the username and password.	Enter the user page (Salesmen)	Valid
8	Salesmen scan the QR code.	Displays distributors coordinate	Valid
9	Salesmen report visits to take pictures and fill out descriptions.	Displays a list of Salesmen Visits	Valid
10	Salesmen select distributors to visit.	Shows the order of distributors according to the shortest distance	Valid

IV. CONCLUSION

In conclusion, the application of the Extreme Programming (XP) methodology across all development stages has yielded several noteworthy findings. Firstly, the XP model has demonstrated its effectiveness in the swift design of Android-based applications, even within constrained time frames. Moreover, the study showcased that the XP model is adaptable to resource limitations, highlighting its practicality in resource-constrained environments. The successful transformation of user requirements into functional features within the application underscores the alignment between user

 Received: July 24th, 2023 | Published: September 06th, 2023

DOI 10.30656/jsii.v10i2.7111
p-ISSN: 2406-7768
e-ISSN: 2581-2181

needs and the application's capabilities. Lastly, the rigorous black box testing, comprising ten distinct scenarios, underscored the robustness of the system's functionality by consistently garnering valid marks across all tests.

V. ACKNOWLEDGEMENT

We thank PT Sanggabuana Berjaya Indonesia as the Research object for their significant assistance and Universitas Multimedia Nusantara for the support. They made a substantial contribution that was crucial to accomplishing this research. We want to express our sincere appreciation to our Information Systems Department colleagues, whose wise advice and knowledge were extremely helpful to us during the research process. They made significant contributions that influenced this study's direction and raised its level of excellence.

REFERENCES

[1] T. A. D. P. Subianto, J. Wiratama, and F. A. Halim, "The Development of web-based Cashier and Inventory Information Systems using Prototyping Model on Micro, Small, and Medium Enterprise (MSMEs) in Indonesia," *JOINS (Journal Inf. Syst.*, vol. 8, no. 1, pp. 80–89, 2023, doi: 10.33633/joins.v8i1.7983.

[2] T. Mahmood and M. S. Mubarik, "Balancing innovation and exploitation in the fourth industrial revolution: Role of intellectual capital and technology absorptive capacity," *Technol. Forecast. Soc. Change*, vol. 160, no. June, p. 120248, 2020, doi: 10.1016/j.techfore.2020.120248.

[3] M. H. Lee *et al.*, "How to respond to the Fourth Industrial Revolution, or the second information technology revolution? Dynamic new combinations between technology, market, and society through open innovation," *J. Open Innov. Technol. Mark. Complex.*, vol. 4, no. 3, p. 21, 2018, doi: 10.3390/joitmc4030021.

[4] A. Jacob, S. Steimer, N. Stricker, B. Häfner, and G. Lanza, "Integrating product function design, production technology optimization and process equipment planning on the example of hybrid additive manufacturing," *Procedia CIRP*, vol. 86, no. March, pp. 222–227, 2020, doi: 10.1016/j.procir.2020.01.013.

[5] Y. Lu, X. Xu, and L. Wang, "Smart manufacturing process and system automation – A critical review of the standards and envisioned scenarios," *J. Manuf. Syst.*, vol. 56, pp. 312–325, 2020, doi: https://doi.org/10.1016/j.jmsy.2020.06.010.

[6] A. Permana, D. Rahmadi, I. Fakultas, I. Komputer, and U. Kuningan, "MARKETING MENGGUNAKAN PERANGKAT GPS (Studi Kasus : PD . BPRS Gotong Royong Subang)," *J. Cloud Inf.*, vol. 1, no. 1, pp. 10–14, 2015.

[7] J. Wiratama, H. Santoso, and Clairence, "Developing a Class Scheduling Mobile Application for Private Campus in Tangerang with the Extreme Programming (XP) Model," *G-Tech J. Teknol. Terap.*, vol. 7, no. 2, pp. 484–493, 2023, doi: https://doi.org/10.33379/gtech.v7i2.2288.

[8] L. Ariyanti, M. N. D. Satria, and D. Alita, "Sistem Informasi Akademik Dan Administrasi Dengan Metode Extreme Programming Pada Lembaga Kursus Dan Pelatihan," *J. Teknol. dan Sist. Inf.*, vol. 1, no. 1, pp. 90–96, 2020, doi: 10.33365/jtsi.v1i1.214.

[9] R. Mersita, D. Darwis, and A. Surahman, "Sistem Informasi Pembayaran SPP pada Sekolah di Kecamatan Gedung Tataan dengan Metode Extreme Programming," *J. Ilm. Sist. Inf. Akunt.*, vol. 2, no. 2, pp. 45–53, 2022, doi: 10.33365/jimasia.v2i2.1872.

[10] K. Beck, *Extreme Programming Explained: Embrace Change*. Addison-Wesley, 2000. [Online]. Available: https://books.google.co.id/books?id=G8EL4H4vf7UC

[11] J. Wiratama and R. Ikana Desanti, "The Development of Web-based Sales Reporting Information Systems using Rapid Application Development Method," *Ultim. Infosys J. Ilmu Sist. Inf.*, vol. 13, no. 2, pp. 110–116, 2022.

[12] S. Chandra, R. Sutomo, and J. Wiratama, "Design And Development of Car Sparepart Sales Information System For Web-Based Using RAD Method On UMKM Sinar Seroja," *G-Tech J. Teknol. Terap.*, vol. 7, no. 2, pp. 494–503, Mar. 2023, doi: 10.33379/gtech.v7i2.2019.

[13] S. Alessandria and B. Kayfitz, *Flutter Cookbook: Over 100 proven techniques and solutions for app development with Flutter 2.2 and Dart*. Packt Publishing, 2021. [Online]. Available: http://ieeexplore.ieee.org/document/10163215

[14] D. Lohani, *Taking Flutter to the Web: Learn how to build cross-platform UIs for web and mobile platforms using Flutter for Web*. Packt Publishing, 2022. [Online]. Available: http://ieeexplore.ieee.org/document/10162794

[15] E. Sonalitha, B. Nurdewanto, A. Zubair, S. R. Asriningtias, K. Yudhistiro, and I. Mujahidin, "Blackbox Testing Model Boundary Value Of Mapping Taxonomy Applications and Data Analysis of Art and Artworks," in *2020 3rd International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)*, 2020, pp. 7–11. doi: 10.1109/ISRITI51436.2020.9315406.

 Received: July 24th, 2023 | Published: September 06th, 2023